SYED AMMAL ENGINEERING COLLEGE, RAMANATHAPURAM-623 502.

APTITUDE BOOKLET

 ISO 9001:2015 Certified Institute

 Accreditated by NBA TO EEE,ECE,CSE & MECH

Department of Mathematics

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	SYED AMMAL ENGINEERING COLLEGE **RAMANATHAPURAM**
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I Year Engineering Classes

Aptitude for Placement and Training

Aim:

Students should be able to answer any question on numbers, HCF & LCM and algebraic formulae to clear the preliminary test and in major examination towards placement.

Objectives:

➢ To understand the complete number system and types.
➢ To simplify any type of large numbers in a simplified form from algebraic formulae.
➢ To calculate the HCF & LCM of numbers and the related results.
➢ To think in varied ways to solve a problem practically.
➢ To know about different types of graphs and decision making.

Syllabus:

Unit I: Number System

Numbers-types of numbers-primes-coprime-place values-Solved Problems- Exercise problems.

Unit II: Algebraic formulae.

Algebraic formulae-identities-solved problems – exercise problems.

Unit III: HCF & LCM

HCF-LCM-Relationship between HCF & LCM- Solved problems –Tricks- Exercise problems.

Unit IV: Graphs

Definition-Simple Graphs-Types of graphs-decision making(commenting on the graphs)

Unit V: Puzzles.

More of problems related to numbers as puzzles

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Expected Outcome:The candidates will be able to all types of number problems which frequently occur in day today life and in the competitive examinations.

Unit I: Number System

Numbers-types of numbers-primes-coprime-place values-Solved Problems- Exercise problems.

What is Number System?

A number system is a collection of various symbols which are called digits.
Different types of Number System

1. Binary Number System
A binary number system is a system which has a base of two. It means that it has only 2 different symbols that make up its number system.
The 2 symbols are

 The numbers that are made in Binary Number System are made up of 0 or 1.

2. Decimal Number System

The number system that we follow is called as Decimal Number System where the base is 10.The base 10 indicates that there are 10 different symbols that we use.
The ten symbols are:

These symbols are called as digits.

Any number that we form is a combination of the above digits,
1425 – Combination of 1, 2, 3, 4,
494737 – Combination of 4, 9, 4, 7, 3, 7
The number 1486 can be represented as

We represent the numbers in this manner because we are using different digits and each digit has a different place value depending on its position.

$$1 \times 1000 + 4 \times 100 + 8 \times 10 + 6 \times 1$$

The representation should be in the power of 10's.

Any two digit 'a' and 'b' can be represented as

$$10a + b$$

Three digits a, b and c should be represented as

$$100a + 10b + c$$

Classification of Number System

A decimal number system has 10 digits but it consists of infinite numbers.

Real Numbers:
Real numbers represent the actual physical quantities like length, height, weight, density, etc, in a meaningful figure. These are further classified as,

1.   Rational Number: These are the numbers which can be represented in the form of a/b, where a and b are integers and b is not equal to 0. Rational numbers are either terminating or recurring in nature.

> **Example:**
> ½, ¾, 7/12, 8, -6, 1/7, 2/9

2.   Irrational Number: These are the numbers which cannot be expressed as a/b and where b is not equal 0. Irrational numbers are neither non-terminating or non-recurring in nature.

> **Example:**
> $\sqrt{\Box}, \sqrt[3]{\Box}, \sqrt{a^2+b^2}$ etc

Terminating Numbers: Terminating numbers are those numbers which stop after the decimal point.

Example:
0.5, 0.75, 0.25 etc

Non- Terminating Numbers: Non- terminating numbers are the numbers which don't stop after the decimal numbers.

Example:
0.583333...., 0.333333 etc

Recurring Numbers: The part of the number which keeps on recurring again-again is termed as a recurring number. Generally, non-terminating numbers are classified as recurring numbers.

Non-recurring Numbers: Non-recurring numbers are those numbers which don't keep on recurring again and again.

Types of Numbers –

1. Natural Numbers: It is the set of positive numbers.

$N = \{1, 2, 3, 4, \ldots \ldots \}$

2. Whole numbers: It is the set of all natural numbers including 0.

$W = \{0, 1, 2, 3, 4, \ldots \ldots \}$

3. Integers: Integers is the set of all whole numbers along with negative numbers.

$I = \{ \ldots -3, -2, -1, 0, 1, 2, 3, 4, \ldots \}$

4. Even Numbers: Set of numbers exactly divisible by 2.

Even Numbers = {0, 2, 4, 6, 8……}

5. Odd Numbers: Set of numbers not exactly divisible by 2.

Odd Numbers = {1, 3, 5, 7, 9,……}

Factors and Multiples

If a number x divides y perfectly, then x is considered as a factor of y and y becomes the multiple of x.
For example, 4 is a factor of 16, 18 is a multiple of 6.

Prime Numbers: Prime numbers are the numbers which have no factor other than 1 and itself.

Prime Numbers			
2	3	5	7
1	1	1	1
2	3	5	7

Composite Numbers: Composite numbers are those numbers which have other factors besides 1 and itself i.e. it has more than 2 factors. Numbers which are not prime are called as composite numbers.

Composite Numbers			
4	6	8	9
1	1	1	1
2	2	2	3
4	3	4	9
	6		

Note: Except 1 any natural number can be classified as a prime or composite number.

Fractions:

 A fraction denotes a part or parts of a unit. It is majorly classified into following types-

1.   Proper Fractions: In a proper fraction the numerator is always less than the denominator. Proper Fractions are always less than 1.

Proper Fraction : $\frac{1}{2}$, $\frac{3}{5}$, $\frac{6}{10}$, $\frac{7}{15}$

2. Improper Fraction: In an improper fraction the numerator is more than the denominator. Improper Fractions are greater than 1.

Improper Fraction : $\frac{3}{2}$, $\frac{8}{5}$, $\frac{10}{9}$

3. Mixed Fraction: A mixed fraction consists of two parts i.e. The fractions which consist of two parts i.e. the integer part and a fractional part. All mixed fractions are improper fractions.

Mixed Fraction : $2\frac{1}{3}$, $4\frac{5}{6}$, $9\frac{4}{11}$,

Co-prime Numbers:-Two natural numbers a and b are said to be co-prime if their HCF is 1.

Example:- (21, 44), (4, 9), (2, 3), - - - - -

Twin prime numbers :-   A pair of prime numbers (as 3 and 5 or 11 and 13) differing by two are

called twin prime number.

Example:- The twin pair primes between 1 and 100 are
          (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), (59, 61), (71, 73).

Face value:- Face value is the actual value of the digit.
 Example:- In the number 7635, the "7" has a face value of 7, the face value of 3 is 3 and so on

Place value:-The value of where the digit is in the number, such as units, tens, hundreds, etc.

Example:- In 352, the place value of the 5 is "tens"
Place value of 2 * 1 = 2;
Place value of 5 * 10 = 50;
Place value of 3 * 100 = 300.

Divisibility Rules for 1 to 10

Before we discuss some important divisibility rules we will make precise what it means for an integer *n* to be divisible by another integer *m*.

Definition 1: Let *n* and *m* be integers. *n* is said to be **Divisible** by *m* if there exists an integer *k* such that *n=km*.

*Equivalently, we can say that n is divisible by m if m is a factor of n.*
We now discuss the rules to determine whether an arbitrary integer *n* is divisible by 1, 2, …, and 10.

Divisibility by 1

Rule 1: Every integer *n* is divisible by 1.

Divisibility by 2

Rule 2: An integer *n* is divisible by 2 if and only if *n* is even, i.e., the last digit of *n* is either 0, 2, 4, 6, or 8.

Divisibility by 3

Rule 3: An integer *n* is divisible by 3 if and only if the sum of the digits of *n* is divisible by 3.

Divisibility by 4

Rule 4: An integer *n* is divisible by 4 if and only if the number formed by the last two digits of *n* is divisible by 4.

Divisibility by 5

Rule 5: An integer *n* is divisible by 5 if and only if the last digit of *n* is either 0 or 5.

Divisibility by 6

Rule 6: An integer *n* is divisible by 6 if and only if it is divisible by both 2 and 3, i.e., *n* is even and the sum of the digits of *n* is divisible by 3.

Divisibility by 7

Rule 7: An integer *n* is divisible by 7 if and only if the number formed by removing the last digit of *n* subtract the number formed by two multiplied by the last digit of *n* is divisible by 7.

Divisibility by 8

Rule 8: An integer *n* is divisible by 8 if and only if *n* is even, *n*2 is even, and *n*4 is even.

Divisibility by 9

Rule 9: An integer *n* is divisible by 9 if and only if the sum of the digits of *n* is divisible by 9.

Divisibility by 10

Rule 10: An integer *n* is divisible by 10 if and only if the last digit of *n* is 0.

Practice Questions:

Moderate Number System Questions

Q1.	A number when divided by a divisor leaves a remainder of 24. When twice the original number is divided by the same divisor, the remainder is 11. What is the value of the divisor?

A. 13	**B.** 59	**C.** 35	**D.** 37

How do you find this question?

Solution:
Option(**D**) is correct

Let the original number be '*a*'
Let the divisor be '*d*'
Let the quotient of the division of *a* by *d* be '*x*'
Therefore, we can write the relation as $a/d=x$ and the remainder is 24.
i.e., $a=dx+24$
When twice the original number is divided by *d*,$2a$ is divided by *d*.
We know that $a=dx+24$. Therefore, $2a=2dx+48$
The problem states that $(2dx+48)/d$ leaves a remainder of 11.

$2dx$ is perfectly divisible by *d* and will, therefore, not leave a remainder.
The remainder of 11 was obtained by dividing 48 by *d*.

When 48 is divided by 37, the remainder that one will obtain is 11.

Hence, the divisor is **37**.

Q2. The product of 4 consecutive even numbers is always divisible by:

A.	600	**B.**	768	**C.**	864	**D.**	384

Solution:
Option(**D**) is correct

To solve this question, we need to know two facts.

Fact 1:
The product of 4 consecutive numbers is always divisible by 4!.

Fact 2:
Since, we have 4 even numbers, we have an additional 2 available with each number.

Now, using both the facts, we can say that the product of 4 consecutive even numbers is always divisible by,

$$=(2^4)\times 4!$$

$$=16\times 24 \ =\textbf{384}$$

Q3. What is the minimum number of square marbles required to tile a floor of length 5 metres 78 cm and width 3 metres 74 cm?

| **A.**	176	**B.**	187	**C.**	540	**D.**	748

Solution:
Option(**B**) is correct

The marbles used to tile the floor are square marbles.

Therefore, the length of the marble=width of the marble.

As we have to use whole number of marbles, the side of the square should a factor of both 5 m 78 cm and 3m 74. And it should be the highest factor of 5 m 78 cm and 3m 74.

---

5 m 78 cm = 578 cm and 3 m 74 cm = 374 cm.

The HCF of 578 and 374 = 34.

Hence, the side of the square is 34.

The number of such square marbles required,

=578×37434×34 =17×11= **187 marbles**

Q4. What number should be subtracted from $x3+4x2−7x+12$
if it is to be perfectly divisible by $x+3$?

✔	**A.**	42	**B.**	39	**C.**	13	**D.**	None of these

Solution:
Option(**A**) is correct

According to remainder theorem when *dfrac f(x)* is $x+a$, then the remainder is *f(−a)*.

In this case, as $x+3$ divides $x3+4x2−7x+12–k$ perfectly (*k* being the number to be subtracted), the remainder is 0 when the value of *x* is substituted by -3.

i.e., $(−3)3+4(−3)2−7(−3)+12−k=0$

or $−27+36+21+12= k$ or $k=$**42**

| *Q5.*	Find the remainder when 289 is divided by 89?

A. 1

B. 2

C. 87

D. 88

Solution:

Option(**B**) is correct

When we take successive powers of 2and find their remainders, we get the following cyclic patterns of cycle length 11

viz2,4,8,16,32,64,39,78,67,45,1

i.e211 leaves a remainder 1

Thus, 289=(211)8(2)leaves a remainder of **2**.

Alternate Method:

Remainder of $\frac{N^{p-1}}{P}$is 1 as long as $P$is a prime number.

Now, 289−1=288leaves a remainder of 1 when divided by 89 (note that 89 is a prime number)

So, 289will leave remainder **2** when divided by 89.

Q6. What is the remainder when 37 is divided by 8?
- **A.** 1
- **B.** 2
- ✔ **C.** 3
- **D.** 5

Solution:
Option(**C**) is correct

We know that 37=3×33×33=3×27×27=3(272).

The number immediately before 27 that is divisible by 8 is 24.

Hence, replace 27 with 24+3.

Then we have:

37=3(272)=3(24+3)2=3(242+2×24×3+32)

=3×242+3×2×24×3+3×9

Now,

$378 = 3 \times 24^2 + 3 \times 2 \times 24 \times 3 + 3 \times 98$

$= 3 \times 24^2 \cdot 8 + 3 \times 2 \times 24 \times 3 \cdot 8 + 3 \times 98$

$= \text{Integer} + \text{Integer} + 278$

$= \text{Integer} + \text{Integer} + 24 + 38$

$= \text{Integer} + \text{Integer} + 3 + 38.$ Hence, the remainder is **3**

Q7. A boy writes all the numbers from 100 to 999. The number of zeroes that he uses is 'a', the number of 5's that he uses is 'b' and the number of 8's he uses is 'c'.

What is the value of b+c−a?

A. 280

✔ **B.** 380

C. 180

D. 80

Solution:
Option(**B**) is correct

We can see by symmetry b=c and hence all we need to calculate b and a

b=280 and a=180

⇒ 2b−a= **380**

Q8. Find the unit's digit in $264^{102} + 264^{103}$

✔ **A.** 0

B. 2

C. 4

D. 6

Solution:
Option(**A**) is correct

Required unit's digit = unit's digit in 4102+4103.

Now, 42 gives unit digit 6.

⇒ 4102 gives unit digit 6.

⇒ 4103 gives unit digit of the product 6×4 i.e., 4.

Hence, unit's digit in 264102+264103

= unit's digit in (6+4)=0

	In a meet, persons from five different places have assembled in Bangalore High School. From the five places the persons come to represent are 42,60,210,90 and 84.What is the minimum number of rooms that would be required to accommodate so that each room has the same number of occupants and occupants are all from the same places?
Q9.	

   A. 44
   B. 62
✔ **C.** 81
   D. 96

Solution:

Option(**C**) is correct

All the students from each have to be accommodated in a certain number of rooms.

There should be no person left over (remainder) from any places who can be clubbed together with the persons left over from other places.

To have the minimum number of rooms, the capacity of each room is HCF of all the numbers.

HCF(42,60,210,90,84)=6

Thus Min number of rooms =(42+60+210+90+84)6=81

A set has exactly five consecutive positive integers starting with 1.

Q10.	What is the percentage decrease in the average of the numbers when the greatest one of the numbers is removed from the set?

A. 8.54

B. 12.56

C. 15.25

✔ **D.** 16.66

Solution:
Option(**D**) is correct

The average of the five consecutive positive integers 1,2,3,4 and 5 is:
(1+2+3+4+5)5=155=3

After dropping 5 (the greatest number), the new average becomes:
(1+2+3+4)4=104=2.5.

% drop in the average==(Old average – New average) / Old
average×100⇒(3−2.5)/3×100=100/6=16.66

Exercise problems:

Q1. When writing numbers from 1 to 10,000, how many times is the digit 9 written?

A. 3200

B. 3600

C. 4000

D. 4200

Q2.	Which digits should come in place of @ and # if the number 62684@# is divisible by both 8 and 5?

A. 4, 0

B. 0, 4

C. 4, 4

D. 1, 1

Q3.	How many keystrokes are needed to type numbers from 1 to 1000 on a standard keyboard?

A. 3001

B. 2893

C. 2704

D. 2890

Q4. How many natural numbers below 660 are divisible by 5 and 11 but not by 3?

A. 8

B. 9

C. 10

D. 11

Q5. What is the maximum value of m

such that $7m$

divides into 14! evenly?

A. 1

B. 2

C. 3

D. 4

Q6. Find the remainder when 3164 is divided by 162?

	A.	0	**B.**	9	**C.**	11	**D.**		81

Q7. The two positive integers 'p' and 'q' satisfy: $Dfrac(p+q)t=text\ HCF(p,q)$
.Which of the following two numbers sum up to 't'?

A. 13 and 52

B. 132 and 96

C. 18 and 126

D. 56 and 45

Q8. Which one of the following is the minimum value of the sum of two integers whose product is 36?

A. 37

B. 20

C. 15

D. 12

Q9.
What is the remainder when 91+92+93+....+98
is divided by 6?

  A.   3
  B.   2
  C.   0
  D.   5

Q10.
What is the unit's digit of the number 6256–4256

  A. 0
  B. 1
  C. 4
  D. 7

Q11. What is the place value of 7 in the numeral 2734?

    A.) 70   **B.)**7   **C.)** 700   **D.)**7.00

Q12. What is the place value of 3 in the numeral 3259

    A.) 300   **B.)**30   **C.)** 3   **D.)**3000

Q13. What is the difference between the place value of 2 in the numeral 7229?

   **A.)** 20   **B.)**200   **C.)** 180   **D.)**18

Q14. What is the place value of 0 in the numeral 2074?

    A.) 100   **B.)**70   **C.)** 7.0   **D.)**0

Q15. What is the difference between the place value and face value of 3 in the numeral 1375?

    A.) 300   **B.)**3   **C.)** 297   **D.)**303

16. A number when divided by a divisor leaves a remainder of 24.
When twice the original number is divided by the same divisor, the remainder is 11. What is the value of the divisor?

☐ **A.)** 73 ☐ **B.)**37 ☐ **C.)** 64 ☐ **D.)**53

Q17. The largest number amongst the following that will perfectly divide $101^{100} - 1$ is:

☐ **A.)** 100 ☐ **B.)**10000 ☐ **C.)** 100^100 ☐ **D.)**10

Q18. In an election, candidate A got 75% of the total valid votes. If 15% of the total votes were declared invalid and the total numbers of votes is 560000, find the number of valid vote polled in favors of candidate.

☐ **A.)** 357600 ☐ **B.)**356000 ☐ **C.)** 367000 ☐ **D.)**357000

Q19. Aravind had $ 2100 left after spending 30 % of the money he took for shopping. How much money did he take along with him?

☐ **A.)** $ 3600 ☐ **B.)**$ 3300 ☐ **C.)**$ 3000 ☐ **D.)**$ 3100

Q20. A shopkeeper bought 600 oranges and 400 bananas. He found 15% of oranges and 8% of bananas were rotten. Find the percentage of fruits in good condition.

☐ **A.)** 87.8% ☐ **B.)**86.8% ☐ **C.)**85.8% ☐ **D.)**84.8%

Answers:

1.C 2.A 3.B 4.A 5.B 6.D 7.D 8.D 9.C 10.A

 11.C 12.D 13.C 14.A 15.C

Fill in the answers for the below questions

16. 17. 18. 19. 20.

Unit II: Algebraic formulae.

Algebraic formulae-identities-solved problems – exercise problems.

list of Algebraic formulae –

- ❖ $a^2 - b^2 = (a - b)(a + b)$
- ❖ $(a+b)^2 = a^2 + 2ab + b^2$
- ❖ $a^2 + b^2 = (a - b)^2 + 2ab$
- ❖ $(a - b)^2 = a^2 - 2ab + b^2$
- ❖ $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$
- ❖ $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab - 2ac + 2bc$
- ❖ $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$; $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
- ❖ $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
- ❖ $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
- ❖ $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- ❖ $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- ❖ $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
- ❖ $(a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4)$
- ❖ $(a - b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4)$
- ❖ $a^4 - b^4 = (a - b)(a + b)(a^2 + b^2)$
- ❖ $a^5 - b^5 = (a - b)(a^4 + a^3b + a^2b^2 + ab^3 + b^4)$

If n is a natural number, $a^n - b^n = (a - b)(a^{n-1} + a^{n-2}b + \ldots + b^{n-2}a + b^{n-1})$

If n is even $(n = 2k)$, $a^n + b^n = (a + b)(a^{n-1} - a^{n-2}b + \ldots + b^{n-2}a - b^{n-1})$

If n is odd $(n = 2k + 1)$, $a^n + b^n = (a + b)(a^{n-1} - a^{n-2}b + \ldots - b^{n-2}a + b^{n-1})$

$(a + b + c + \ldots)^2 = a^2 + b^2 + c^2 + \ldots + 2(ab + ac + bc + \ldots.)$

Laws of Exponents
$(a^m)(a^n) = a^{m+n}$
$(ab)^m = a^m b^m$
$(a^m)^n = a^{mn}$

Fractional Exponents
$a^0 = 1$

Formula	Use
$A = \pi r^2$	Area of a circle. r is the radius
$C = 2\pi r$	Circumference of a circle. r is the radius
$A = LW$	Area of a rectangle. L is length, W is width
$P = 2L + 2W$	Perimeter of a rectangle. L is length, W is width
$A = \frac{1}{2}BH$	Area of a triangle. B is base length, H is height
$a^2 + b^2 = c^2$	Pythagoean theorem for a right triangle.a, b lengths of legs&c length of hypotenuse
$A = Prt$	Simple interest. A is interest earned, P is the principal, r is the interest rate (decimal), t is time
$A = P(1 + \frac{r}{n})^{nt}$	Compound interest. A is interest earned, P is principal, r is interest rate (decimal), n is number of times interest is paid per year, t is time in years
$A = Rt$	Rates. A is amount, R is rate, t is time
$d = vt$	Distance and speed. d is distance, v is speed, t is time
$C = \frac{5}{9}(F - 32)$	Temperature conversion. F is degrees Fahrenheit C is degrees Centigrade

Question 1: Find out the value of $5^2 - 3^2$
Solution:
Using the formula $a^2 - b^2 = (a - b)(a + b)$
where a = 5 and b = 3
$(a - b)(a + b)$
$= (5 - 3)(5 + 3)$
$= 2 \times 8$
$= 16$

Question 2: $4^3 \times 4^2 = ?$
Solution:
Using the exponential formula $(a^m)(a^n) = a^{m+n}$
where a = 4
$4^3 \times 4^2$
$= 4^{3+2}$
$= 4^5$
$= 1024$

1. Write 230,000,000,000 in scientific notation.

   Solution

   Write the given number in the form

   $a \times 10^n$, where a is a real number such that $1 \leq |a| < 10$ and n is an integer.

   $230,000,000,000 = 2.3 \times 100,000,000,000 = 2.3 \times 10^{11}$

2. Evaluate: $30 - 12 \div 3 \times 2 =$

   Solution

   According to order of operations, $12 \div 3 \times 2$ (division and multiplication) is done first

   from left to right

$12 \div 3 \times 2 = 4 \times 2 = 8$

Hence

$30 - 12 \div 3 \times 2 = 30 - 8 = 22$

3. Evaluate: $|4 - 8(3 - 12)| - |5 - 11| =$

   Solution

   According to order of operations, inner brackets first. Hence

   $|4 - 8(3 - 12)| - |5 - 11| = |4 - 8*(-9)| - |5 - 11|$

   According to order of operations, multiplication within absolute value signs (which may be considered as brackets when it comes to order of operations) next. Hence $= |4 + 72| - |5 - 11|$

   $= |76| - |-6|$

   $= 76 - 6 = 70$

4. Evaluate: $-18 + 4(6 \div 2)^2$
   Solution
   According to order of operations, inner brackets first. Hence
   $-18 + 4(6 \div 2)^2 = -18 + 4(3)^2$
   According to order of operations, power next. Hence
   $= -18 + 4*9$
   According to order of operations, multiplication next. Hence
   $= -18 + 36$
   $= 18$

5. Solve the equation

6. $5(- 3x - 2) - (x - 3) = -4(4x + 5) + 13$

7. Simplify the expression

2(a -3) + 4b - 2(a -b -3) + 5

8. If x <2, simplify |x - 2| - 4|-6|

9. Find the distance between the points (-4 , -5) and (-1 , -1).
10. Find the x intercept of the graph of the equation . 2x - 4y = 9

11. Evaluate f(2) - f(1) f(x) = 6x + 1

12. Find the slope of the line passing through the points (-1, -1)   and (2 , 2).

13. Find the slope of the line 5x - 5y = 7

14. Find the equation of the line that passes through the points (-1 , -1) and (-1 , 2).

15. Solve the equation |- 2 x + 2| - 3 = -3

Unit III: HCF & LCM

HCF- LCM-Relationship between HCF & LCM- Solved problems –Tricks- Exercise problems.

What do mean by Factors?

A factor of a number are all those numbers, which exactly divide the given number. **"Exactly divides"**

means that when a number is divided by its factor the reminder is always 0.

Example: 1,2,and 4 are the factors of 4.

Likewise the factors of 5, 6, 7, 8 are given below.

Factors			
5	6	7	8
1	2	1	1
5	3	7	2
	6		4
			8

What do you mean by Multiples?

Multiples of a number are those numbers which are exactly divisible by the given number.

Example: The multiples of 4 are 4,8,12,16,20 etc.

Like wise the multiples of the number 5, 6, 7, 8 are given below.

Multiples			
5	6	7	8
5	6	7	8
10	12	14	16
15	18	21	24
20	24	28	32

Prime and Composite Numbers

A **Prime Number** is a number which has only two factors.
The first factor is "1" and the second factor is the number itself.

Example: As you can look in the table given below, the numbers in the table have only two factors.

Prime Numbers			
2	3	5	7
1	1	1	1
2	3	5	7

A **Composite Number** is a number which has more than two factors.

Example: As you can look in the table given below, the numbers in the table have more than two factors.

Composite Numbers			
4	6	8	9
1	1	1	1
2	2	2	3
4	3	4	9
	6	8	

The difference between a prime number and a composite number is that- **a prime number has exactly 2 factors and a composite number has more than two factors.**

What is LCM and HCF?

LCM: Least Common Multiple

LCM of two given numbers is the least number which is exactly divisible by each one of the given number.

Example 1:

Question: Find the LCM of 3 and 4.

Solution:

Step 1:

Given below is the list of multiples that 3 and 4 have.

The least common multiple between the two numbers is 12.

Therefore, The LCM of 3 and 4 is 12.

Example 2:
Question: Find the LCM of 12.36,45,60.
Solution:
It is not possible to write down the multiples of all the numbers as it is a long procedure. So, we follow a method to solve such questions.
Step 1:

Eliminate the numbers which are the factors of other numbers.

Step 2:

Step 3:
2 x 2 x 3 x 5 = 180
Therefore, 180 is the smallest number which is divisible by all the numbers.

HCF: Highest Common Factor

HCF of two or more given numbers is the highest number which exactly divides all the numbers.

Example 1:
Question: What is the HCF of 12 and 16?

Solution: Write down all the factors of the given number and check which is the highest

common factor between the two given numbers-

Therefore, the HCF of 12 and 16 is 4.

It is a tedious job to write all the factors first and then finding the highest common factor. So we take the simple division method which will help us to find the HCF of the given number. In this method, the divisor which gives the remainder as zero becomes the HCF of the given number.

If the numbers given are prime numbers then there HCF is 1.

Therefore, the HCF of 12 and 16 is 4.

Example 2:
Question: What is the HCF 10,35 and 50?
Solution:
At a given point of time, we can find HCF for only numbers.
In this case, for example, lets take the 3 numbers as a, b, c.
We first find the HCF of a and b.
Suppose the HCF of a and b is 'd'.
Then we take the HCF of d and c and then their HCF becomes the HCF of a,b and c.

Step 1:

HCF of 10 and 35

Step 2:
The HCF of 10 and 35 is 5.
Now we take the HCF of 5 and 50.

Therefore the HCF of 10,35 and 50 is 5.

How to find LCM and HCF of a Fraction or Non-Integer Numbers?

LCM of a Fraction or Non – Integer Numbers

$$\text{LCM of Non-Integer No.s} = \frac{\text{LCM (numerators)}}{\text{HCF (denominators)}}$$

Take the LCM of all the numerators and the HCF of all the denominators to find the LCM of given pair of non-integer numbers

Example:
Question: Find the LCM of 2/3 and 4/6.
Solution:

 Step 1:

LCM of 2 and 4 is 4.
Step 2:
HCF of 3 and 6 is 3.
Therefore, LCM of 2/3 and 4/6 is 4/3.
HCF of a Fraction or Non-Integer Numbers

$$HCF \text{ of Non-Integer No.s} = \frac{HCF \text{ (numerators)}}{LCM \text{ (denominators)}}$$

Take the HCF of all the numerators and the LCM of all the denominators to find the HCF of given pair of non-integer numbers.

Example:
Question: Find the HCF of 10/20 and 5/2.
Solution:
Step 1:
HCF of 10 and 5 is 5
Step 2:
LCM of 20 and 2 is 20
Therefore, HCF of 10/20 and 5/2 is 5/20 i.e. 1/4

Model 1: Questions on LCM and HCF

Question 1: What will be the smallest number divisible by 6,8,18,24,and 36.
Solution:
Step 1:
6,8 and 18 are eliminated because they are the factors of 24 and 36.

Step 2:

```
2 | 24  ,  36
  ×
2 | 12  ,  18
  ×
2 | 06  ,  09
  ×
3 | 03  ,  09
  ×
3 | 01  ,  03
  |  01  ,  01
```

Step 3:

2 x 2 x 2 x 3 x 3 = 72.
Therefore, 72 is the number which is exactly divisible by 6,8,18,24,and 36.

Question 2: Which is the largest number that can exactly divide 52,65 and 143.
Solution:

Step: HCF of 52 and 65

```
52) 65 (1
    52
    ----
    13) 52 (4
        52
        ----
         0
```

Step 2: HCF of 13 and 143

```
13 ) 143 (11
     143
     ----
       0
```

Therefore, The largest number that can exactly divide 52, 65 and 143 is 13.

Model 2: What is the product of LCM and HCF

For any two positive numbers a and b

$$a \times b = L \times H$$

L = LCM of a and b

H = HCF of a and b

In the examination any three digits will be given and we need to find the one missing number.

Example: What is the product of LCM and HCF?

Question: The LCM and HCF of two positive numbers are 300 and 30 respectively. If one number is divided by 4, the quotient is 15, then what is the other number?

Solution:

Step 1:

LCM = 300

HCF = 30

As a is divided by 4 and the quotient is 15,

a/4 = 15

a = 15 x 4

a = 60; b =?

Step 2:

a x b = L x H

60 x b = 300 x 30

b = 300×30/60

b = 150Therefore, the other number is 150.

Solved Problems of HCF and LCM

1. The LCM of two numbers 2079 and their HCF is 27. If one of the numbers is 189, find the other.

A. 296B. 297C. 298D. 299

Answer: (B).

Explanation:

Product of two numbers (first number * second number) = H.C.F. * L.C.M.
Here, H.C.F. = 27, L.C.M. = 2079 and first number = 189
Let second number number be x.
Thus, x * 189 = 27 * 2079.or, x = 297.

2. H.C.F. of two 4-digit numbers is 103 and their L.C.M. is 19261. Find out the two numbers.

A. 1750 and 1130B. 1751 and 1133C. 1750 and 1131D. 1755 and 1140

Answer: (B).

Explanation:

L.C.M. = 19261 = 11 * 1751.

Thus, one of the number is 1751.
Product of two numbers (first number * second number) = H.C.F. * L.C.M.
x * 1751 = 103 * 19261   x = 1133   Thus, required numbers are 1751 and 1133.

3. Sum of two positive integers is 10 while their product is 24. What is the L.C.M. of these numbers?

A. 12B. 24C. 6D. 4

Answer: (A).

Explanation:

Let the two number be x and y.

x + y = 10----------------(i)

xy = 24

or, y = 24x

from (i), we have

$x+24x=10$ or, $x2+24=10x$

or, $x2−10x+24=0$

or, $x2−6x−4x+24=0$

or, $x(x−6)−4(x−6)=0$

or, $(x−6)(x−4)=0$

or, $x=6,4$ Thus, L.C.M. of 6 and 4 = 12.

4. The ratio of two numbers is 3 : 4 and their H.C.F. if 5. Their L.C.M. is:

A. 10B. 60C. 15D. 12

Answer: (B).

Explanation:

Let the two numbers be 3x and 4x.

H.C.F. = 5Thus, x = 5∴ the two numbers are 15 and 20.

15 = 3 x 5

20 = 2 x 2 x 5

∴ L.C.M. of 15 and 20 = 60

5. The least number which when divided by 21, 24 and 28 leaves the remainder 2 in each case is:

A. 166B. 170C. 168D. 164

Answer: (B).

Explanation:

L.C.M. of 21, 24 and 28 = 168

∴Required number = 168 + 2 = 170.

6. A milkman has 75 litres milk in one cane and 45 litres in another. The maximum capacity of container which can measure milk of either container exact number of times is:

A. 10litresB. 15litresC. 20litresD. 25litres

Answer: (B).

Explanation:

Required maximum capacity of container = H.C.F. of 75 and 45.

75 = 5 x 5 x 3

45 = 3 X 3 X 5

∴ H.C.F. = 15 litres.

7. The least square number which is divisible by 8, 15 and 24 is:

A. 1200B. 2400C. 3200D. 3600

Answer: (D).

Explanation:

L.C.M. of 8, 15 and 24 = 120

120 = 2 x 2 x 2 x 3 x 5

Multiply by 2, 3 and 5 so that all become pairs.

∴Required number = 2 x 3 x 5 x 120= 3600.

8. H.C.F. of $x^2 - y^2$ and $x^3 - y^3$ is:

A. $(x - y)$

B. $(x^3 - y^3)$

C. $(x^2 - y^2)$

D. $(x + y), (x^2 + xy + y^2)$

Answer: (A).

Explanation:

$x^2 - y^2 = (x - y)(x + y)$

$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

∴ H.C.F. = x - y

9. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they all change simultaneously at 08 : 20 : 00 hours, then they will change again simultaneously at:

A. 08 : 27 : 12 hours   B. 08 : 27 : 24 hours   C. 08 : 27 : 36 hours   D. 08 : 27 : 48 hours

Answer: (A).

Explanation:

Interval of change = L.C.M. of 48, 72 and 108

48 = 2 * 2 * 2 * 2 * 3

72 = 2 * 2 * 2 * 3 * 3

108 = 2 * 2 * 3 * 3 * 3

∴ L.C.M. = 2 * 2 * 2 * 2 * 3 * 3 * 3 = 432

Thus, the lights will change after every 432 seconds simultaneously.

432 seconds = 7 minutes 12 seconds

∴ the traffic lights will change again simultaneously at 08 : 27 : 12 hours.

Unit IV: Graphs

Definition-Simple Graphs-Types of graphs-decision making (commenting on the graphs)

What is Graph example?

A **graph** is a collection of points, called vertices, and line segments connecting those points, called edges.

Degree of the vertex

The number of edges that belong to a vertex is called the degree of the vertex. ...

What are the different types of graph?

Bar Graphs. Also known as a Pareto Diagram, a bar graph can be horizontal or vertical. .

> ➢ What is a horizontal bar graph?
> ➢ Definition of a **Bar graph**. A **bar graph** is a chart that uses **bars** to show comparisons between categories of data. The **bars** can be either **horizontal** or vertical. **Bar graphs** with vertical **bars** are sometimes called vertical **bar graphs**.
> ➢ What is a horizontal bar graph?
> ➢ Definition of a **Bar graph**. A **bar graph** is a chart that uses **bars** to show comparisons between categories of data. The **bars** can be either **horizontal** or vertical. **Bar graphs** with vertical **bars** are sometimes called vertical **bar graphs**.

Types of Customer Complaints
Second Quarter 2005

Pareto Chart

> ➢ A Pareto chart is a bar graph. The lengths of the bars represent frequency or cost (time or money), and are arranged with longest bars on the left and the shortest to the right. In this way the chart visually depicts which situations are more significant.

When to Use a Pareto Chart

- When analyzing data about the frequency of problems or causes in a process.
- When there are many problems or causes and you want to focus on the most significant.
- When analyzing broad causes by looking at their specific components.
- When communicating with others about your data.
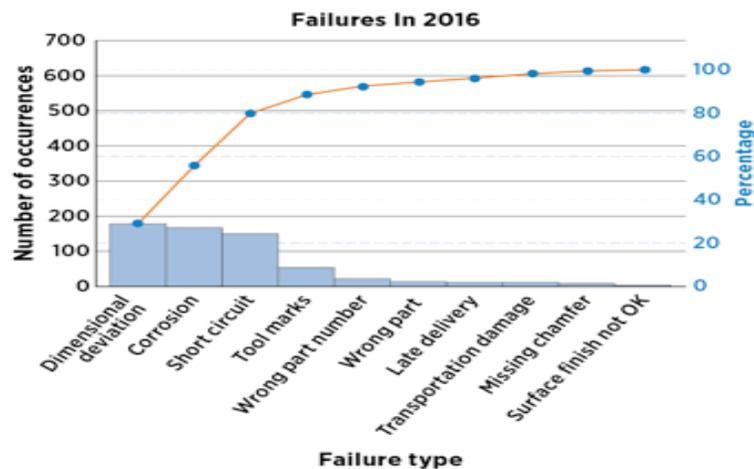
Pareto Chart Procedure

1. Decide what categories you will use to group items.
2. Decide what measurement is appropriate. Common measurements are frequency, quantity, cost and time.
3. Decide what period of time the Pareto chart will cover: One work cycle? One full day? A week?
4. Collect the data, recording the category each time. (Or assemble data that already exist.)
5. Subtotal the measurements for each category.

Histogram

A histogram is a type of bar chart showing a distribution of variables. A histogram represents each attribute or characteristic as a column and the frequency of each attribute or characteristic occurring as the height of the column.
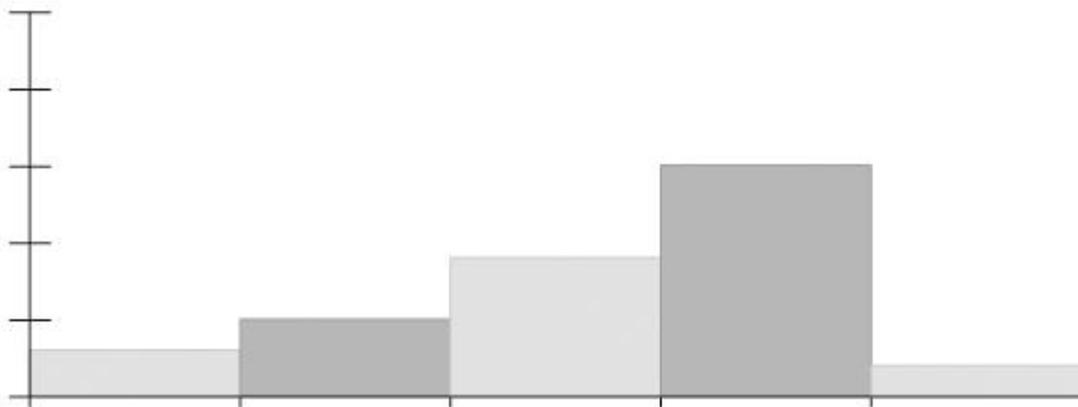
Flow Charts.

A flow chart is a graphical or symbolic representation of a process. Each step in the process is represented by a different symbol and contains a short description of the process step. The flow chart symbols are linked together with arrows showing the process flow direction.

A simple flow chart showing the symbols described above can be seen below:
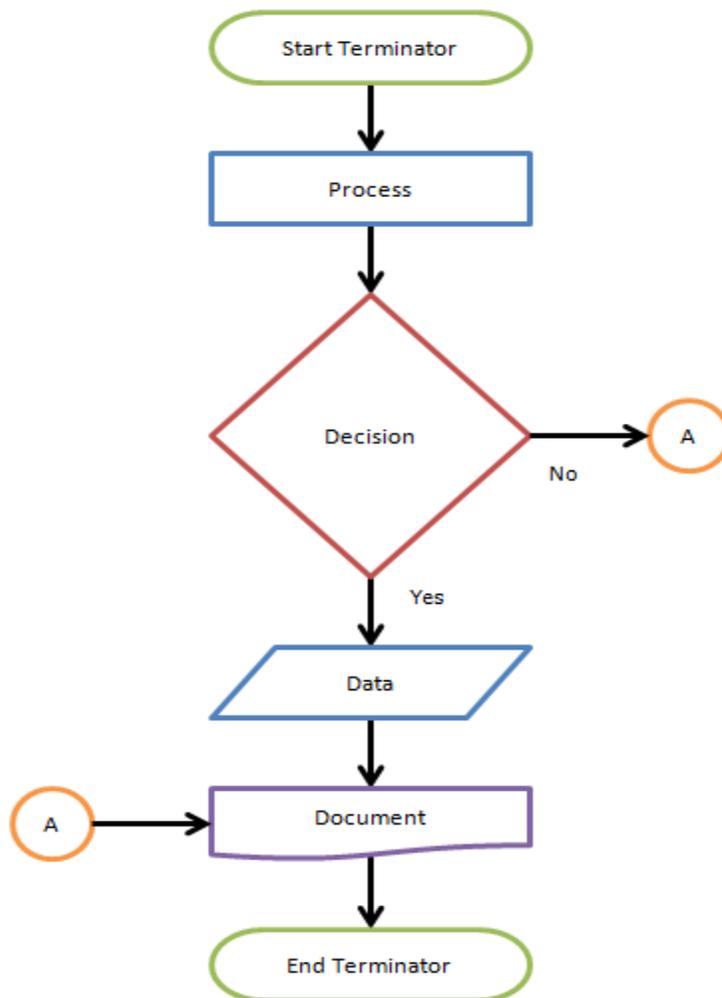
Three Alternative Definitions of Flow Chart
1. "Flow Chart" is *a Snap Shot of your Business Processes*.

2.*A Zoom Lens for your Business Processes*.

3.*Process Test Bed*

Pie Charts.

A pie chart (or a circle chart) is a circular statistical graphic, which is divided into slices to illustrate numerical proportion. In a pie chart, the arc length of each slice (and consequently its central angle and area), is proportional to the quantity it represents.

How do you calculate pie charts?

To draw a **pie chart**, we need to represent each part of the data as a proportion of 360, because there are 360 degrees in a circle. For example, if 55 out of 270 vehicles are vans, we will represent this on the circle as a segment with an angle of: $(^{55}/_{270})$ x 360 = 73 degrees.

How do you find the percentage for a pie chart?

We can find what **percentage** of the total expenditure each item equals. **Percentage** of weekly expenditure on: To draw a **pie chart**, divide the circle into 100 **percentage** parts. Then allocate the number of **percentage** parts required for each item.

When should you use pie charts?

Pie charts are best **to use** when **you** are trying **to** compare parts of a whole. They **do** not show changes over time. Bar graphs are used **to** compare things between different groups or **to** track changes over time. However, when trying **to** measure change over time, bar graphs are best when the changes are larger.

Contexts in which the word "bar" is used
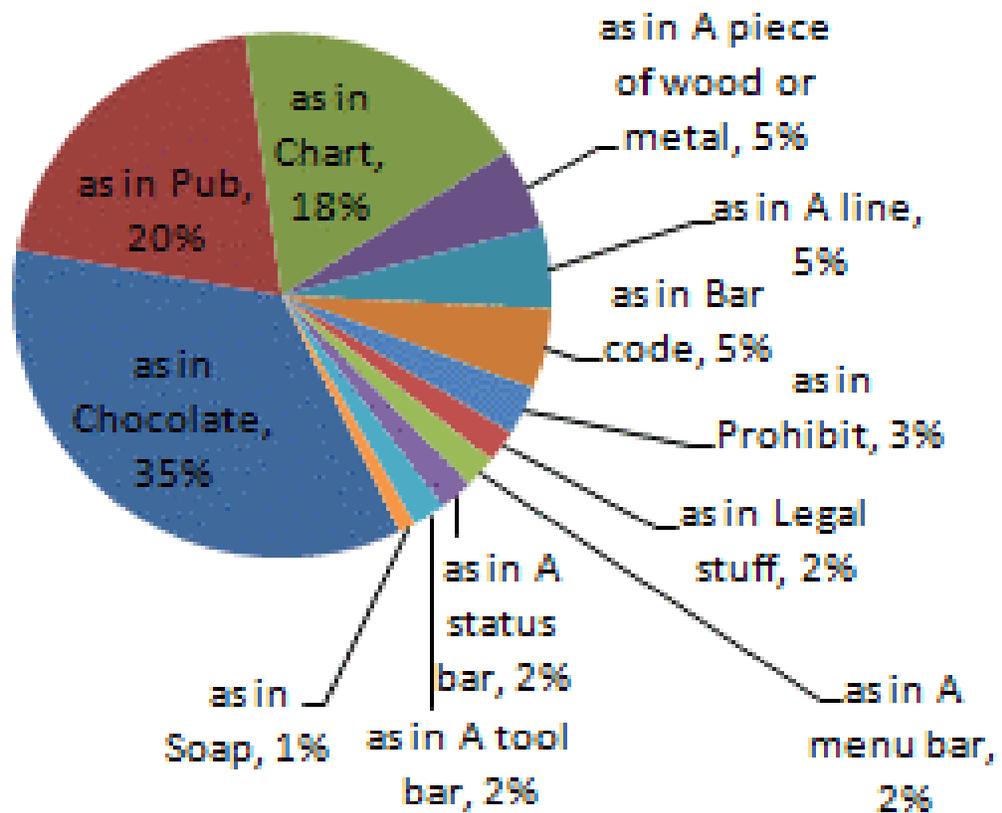
Line Graphs.

A line graph, also known as a line chart, is a type of chart used to visualize the value of something over time. For example, a finance department may plot the change in the amount of cash the company has on hand over time. The line graph consists of a horizontal x-axis and a vertical y-axis.
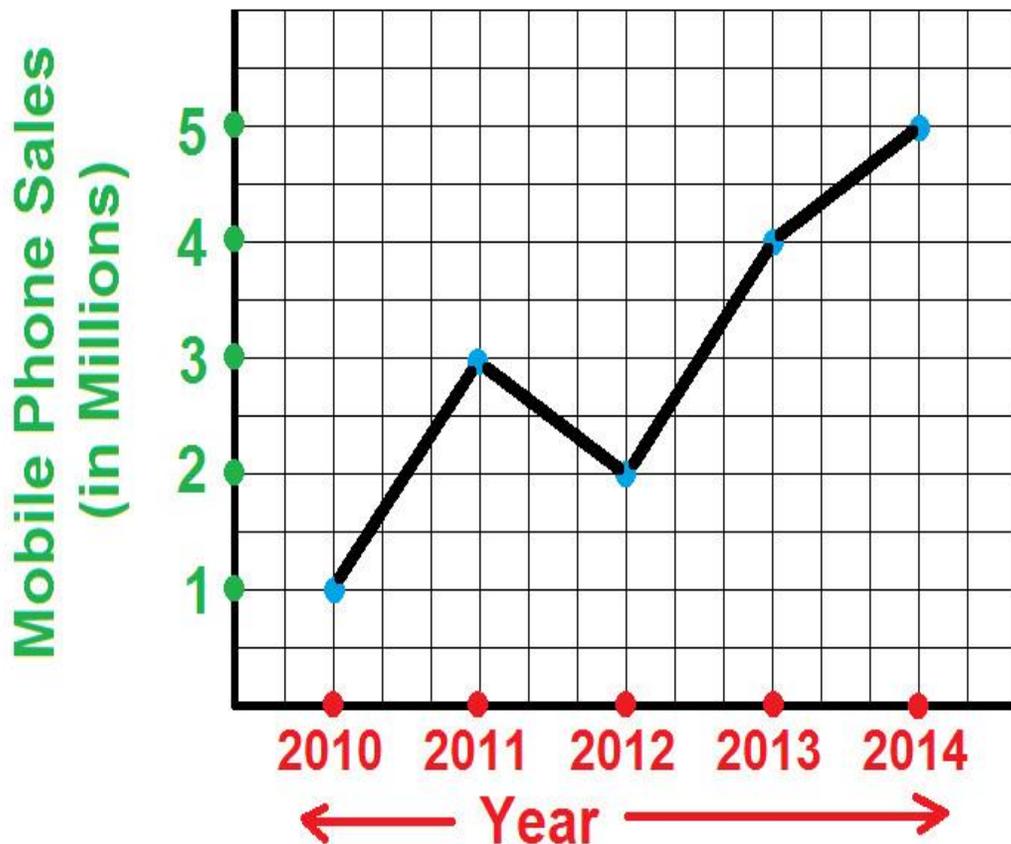
Pictograph

A pictograph is a graph that shows numerical information by using picture symbols or icons to represent data sets. The advantage of using a pictograph is that it is easy to read.

- a pictorial sign or symbol.
- a record consisting of pictorial symbols, as a prehistoric cave drawing or a graph or chart with symbolic figures representing a certain number of people, cars, factories, etc.

Tree

Tree is **special** form of **graph** i.e. minimally connected **graph** and **having** only one path between any two vertices. **Tree is a special case of graph having no loops**, **no circuits and no self-loops**. **Graph** can **have loops**, **circuits** as well as can **have self-loops**.
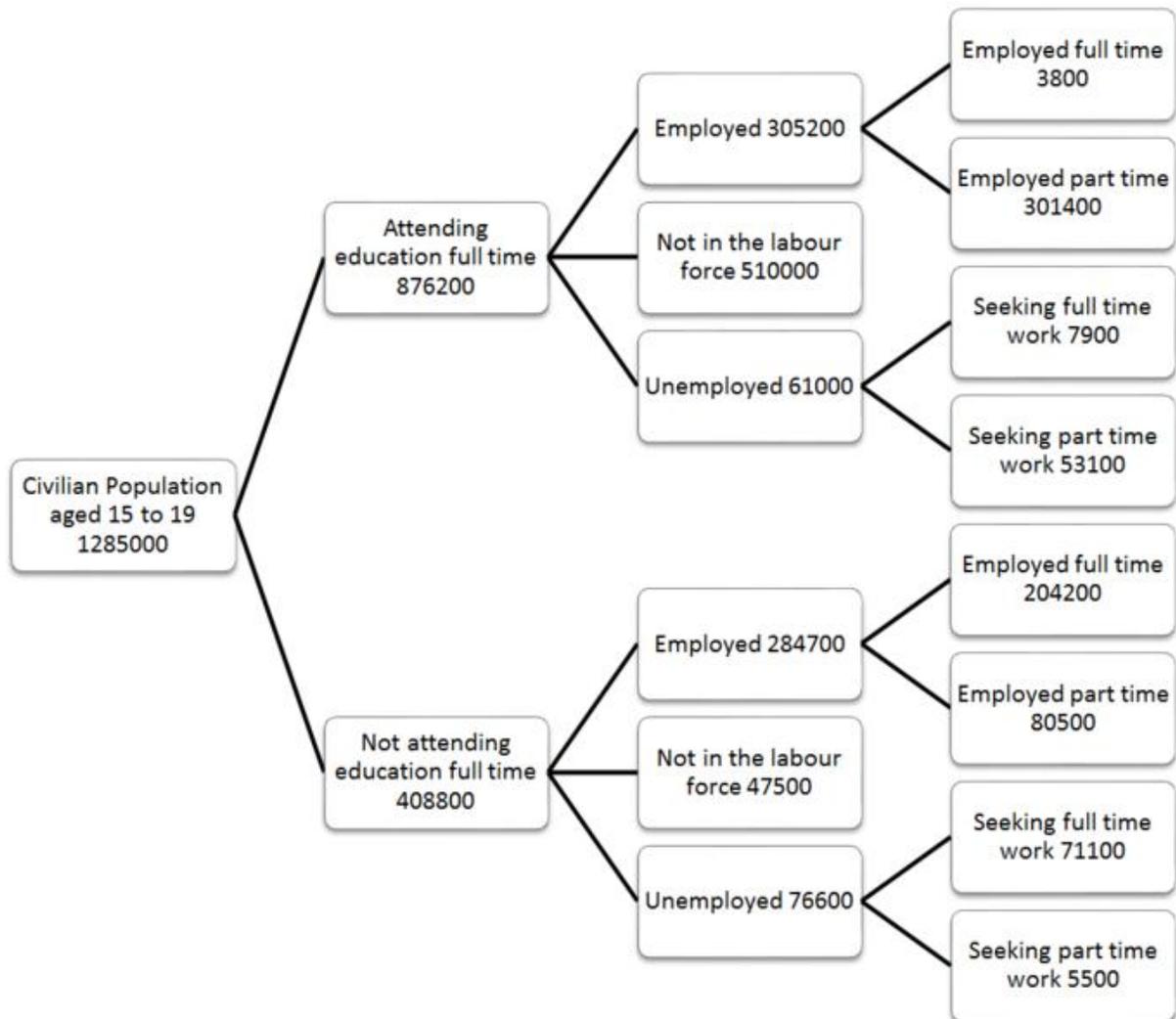
The bar graph given below shows the sales of books (in thousand number) from six branches of a publishing company during two consecutive years 2000 and 2001.

Sales of Books (in thousand numbers) from Six Branches - B1, B2, B3, B4, B5 and B6 of a publishing Company in 2000 and 2001.
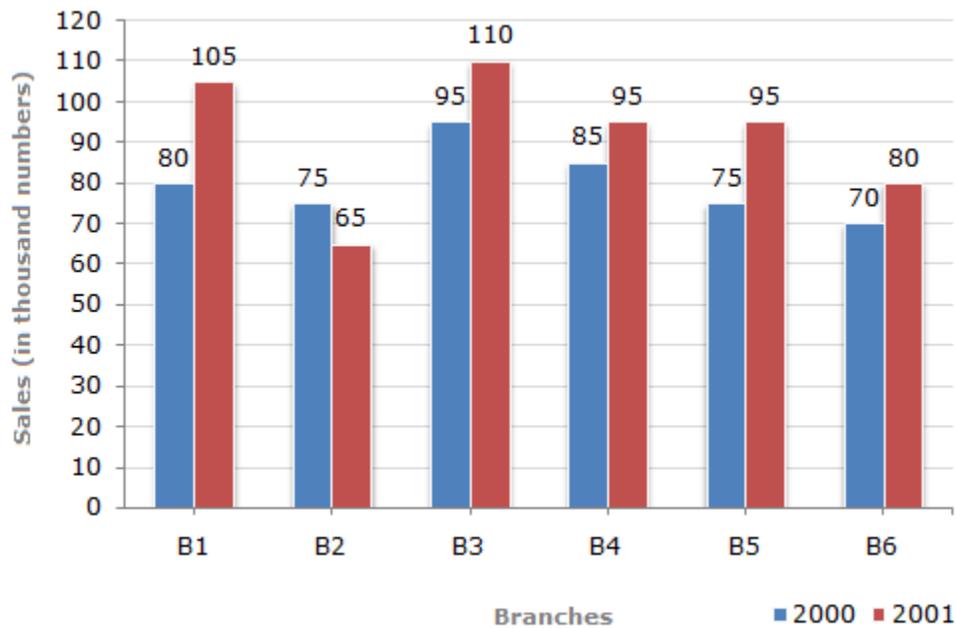
1. What is the ratio of the total sales of branch B2 for both years to the total sales of branch B4 for both years?

    A. 2:3

    B. 3:5

    C. 4:5

    D. 7:9

    Answer: Option **D**
    Explanation:
    Required ratio $= \dfrac{(75 + 65)}{(85 + 95)} = \dfrac{140}{180} = \dfrac{7}{9}$.

2. Total sales of branch B6 for both the years is what percent of the total sales of branches B3 for both the years?

    A. 68.54%

    B. 71.11%

    C. 73.17%

    D. 75.55%

    Answer: Option **C**
    Explanation:

    Required percentage $= \left[\dfrac{(70 + 80)}{(95 + 110)} \text{ x } 100 \right]\%$

    $\qquad\qquad\qquad\quad = \left[\dfrac{150}{205} \text{ x } 100 \right]\%$

    $\qquad\qquad\qquad\quad = 73.17\%.$

---

3. What percent of the average sales of branches B1, B2 and B3 in 2001 is the average sales of branches B1, B3 and B6 in 2000?

    A. 75%

    B. 77.5%

    C. 82.5%

    D. 87.5%

---

4. What is the average sales of all the branches (in thousand numbers) for the year 2000?

    A. 73

    B. 80

    C. 83

D. 88

Answer: Option **B**
Explanation:

Average sales of all the six branches (in thousand numbers) for the year 2000

$$= \frac{1}{6} \text{ x } [80 + 75 + 95 + 85 + 75 + 70]$$

$$= 80.$$

5. Total sales of branches B1, B3 and B5 together for both the years (in thousand numbers) is?

   A. 250

   B. 310

   C. 435

   D. 560

Answer: Option **D**
Explanation:

Total sales of branches B1, B3 and B5 for both the years (in thousand numbers)

$$= (80 + 105) + (95 + 110) + (75 + 95)$$

$$= 560.$$

The following pie-chart shows the percentage distribution of the expenditure incurred in publishing a book. Study the pie-chart and the answer the questions based on it.

Various Expenditures (in percentage) Incurred in Publishing a Book
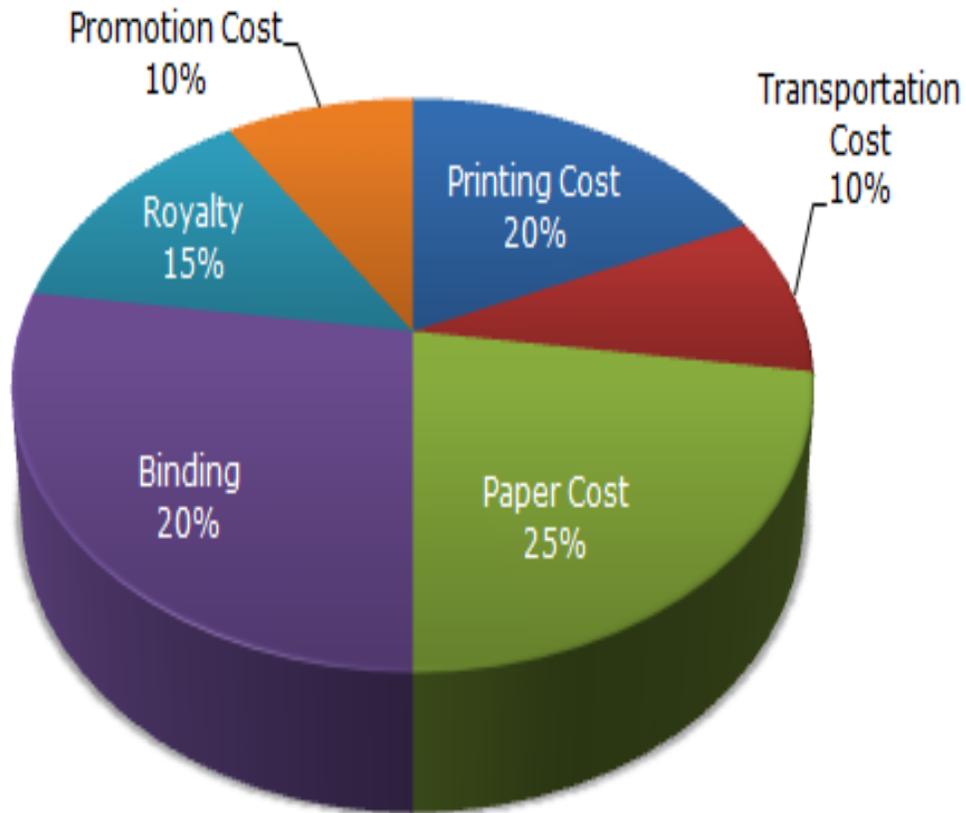
1. If for a certain quantity of books, the publisher has to pay Rs. 30,600 as printing cost, then what will be amount of royalty to be paid for these books?

    A. Rs. 19,450

    B. Rs. 21,200

    C. Rs. 22,950

    D. Rs. 26,150

Answer: Option **C**

Explanation:

Let the amount of Royalty to be paid for these books beRs. r.

Then, $20 : 15 = 30600 : r$ $\Rightarrow$ $r = $ Rs. $\left(\dfrac{30600 \times 15}{20} \right) = $ Rs. 22,950.

2. What is the central angle of the sector corresponding to the expenditure incurred on Royalty?

   A. 15º

   B. 24º

   C. 54º

   D. 48º

3. The price of the book is marked 20% above the C.P. If the marked price of the book is Rs. 180, then what is the cost of the paper used in a single copy of the book?

   A. Rs. 36

   B. Rs. 37.50

   C. Rs. 42

   D. Rs. 44.25

Answer: Option **B**

Explanation:

Clearly, marked price of the book = 120% of C.P.

Also, cost of paper = 25% of C.P

Let the cost of paper for a single book beRs. n.

Then, $120 : 25 = 180 : n \implies n = $ Rs. $\left(\dfrac{25 \times 180}{120} \right) = $ Rs. 37.50 .

4. If 5500 copies are published and the transportation cost on them amounts to Rs. 82500, then what should be the selling price of the book so that the publisher can earn a profit of 25%?

   A. Rs. 187.50

   B. Rs. 191.50

   C. Rs. 175

   D. Rs. 180

Answer: Option **A**

Explanation:

For the publisher to earn a profit of 25%, S.P. = 125% of C.P.

Also Transportation Cost = 10% of C.P.

Let the S.P. of 5500 books be Rs. x.

Then, $10 : 125 = 82500 : x \implies x = $ Rs. $\left(\dfrac{125 \text{ x } 82500}{10}\right) = $ Rs. 1031250.

$\therefore$ S.P. of one book = Rs. $\left(\dfrac{1031250}{5500}\right) = $ Rs. 187.50 .

5. Royalty on the book is less than the printing cost by:

   A. 5%

   B. $33\dfrac{1}{5}\%$

   C. 20%

   D. 25%

Answer: Option **D**
Explanation:

Printing Cost of book = 20% of C.P.

Royalty on book = 15% of C.P.

Difference = (20% of C.P.) - (15% of C.P) = 5% of C.P.

$\therefore$ Percentage difference $= \left(\dfrac{\text{Difference}}{\text{Printing Cost}} \text{ x } 100\right)\%$

$= \left(\dfrac{5\% \text{ of C.P.}}{\text{Printing Cost}} \text{ x } 100\right)\% = 25\%.$

Study the following line graph and answer the questions.

Exports from Three Companies Over the Years (in Rs. crore)
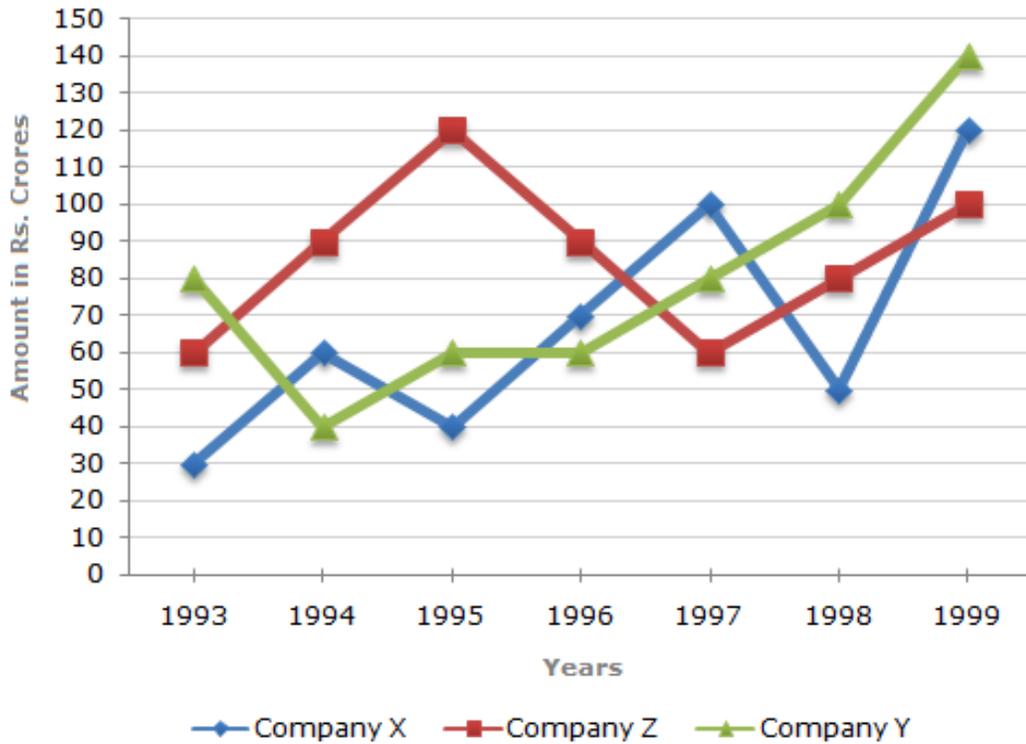
1. For which of the following pairs of years the total exports from the three Companies together are equal?

   A. 1995 and 1998

   B. 1996 and 1998

   C. 1997 and 1998

   D. 1995 and 1996

   Answer: Option **D**
   Explanation:

   Total exports of the three Companies X, Y and Z together, during various years are:

   In 1993 = Rs. (30 + 80 + 60) crores = Rs. 170 crores.

   In 1994 = Rs. (60 + 40 + 90) crores = Rs. 190 crores.

In 1995 = Rs. (40 + 60 + 120) crores = Rs. 220 crores.

In 1996 = Rs. (70 + 60 + 90) crores = Rs. 220 crores.

In 1997 = Rs. (100 + 80 + 60) crores = Rs. 240 crores.

In 1998 = Rs. (50 + 100 + 80) crores = Rs. 230 crores.

In 1999 = Rs. (120 + 140 + 100) crores = Rs. 360 crores.

Clearly, the total exports of the three Companies X, Y and Z together are same during the years 1995 and 1996.

2. Average annual exports during the given period for Company Y is approximately what percent of the average annual exports for Company Z?

   A. 87.12%

   B. 89.64%

   C. 91.21%

   D. 93.33%

Answer: Option **D**
Explanation:
<u>**Analysis of the graph: From the graph it is clear that**</u>

The amount of exports of Company X (in croreRs.) in the years 1993, 1994, 1995, 1996, 1997, 1998 and 1999 are 30, 60, 40, 70, 100, 50 and 120 respectively.

The amount of exports of Company Y (in croreRs.) in the years 1993, 1994, 1995, 1996, 1997, 1998 and 1999 are 80, 40, 60, 60, 80, 100 and 140 respectively.

The amount of exports of Company Z (in croreRs.) in the years 1993, 1994, 1995, 1996, 1997, 1998 and 1999 are 60, 90,, 120, 90, 60, 80 and 100 respectively.

Average annual exports (in Rs. crore) of Company Y during the given period

$$= \frac{1}{7} \text{ x } (80 + 40 + 60 + 60 + 80 + 100 + 140) = \frac{560}{7} = 80.$$

Average annual exports (in Rs. crore) of Company Z during the given period

$$= \frac{1}{7} \text{ x } (60 + 90 + 120 + 90 + 60 + 80 + 100) = \left(\frac{600}{7}\right).$$

∴ Required percentage = $\left[\dfrac{80}{\left(\dfrac{600}{7} \right)} \times 100 \right] \% \approx 93.33\%$.

3. In which year was the difference between the exports from Companies X and Y the minimum?

    A. 1994

    B. 1995

    C. 1996

    D. 1997

Answer: Option **C**
Explanation:

The difference between the exports from the Companies X and Y during the various years are:

In 1993 = Rs. (80 - 30) crores = Rs. 50 crores.

In 1994 = Rs. (60 - 40) crores = Rs. 20 crores.

In 1995 = Rs. (60 - 40) crores = Rs. 20 crores.

In 1996 = Rs. (70 - 60) crores = Rs. 10 crores.

In 1997 = Rs. (100 - 80) crores = Rs. 20 crores.

In 1998 = Rs. (100 - 50) crores = Rs. 50 crores.

In 1999 = Rs. (140 - 120) crores = Rs. 20 crores.

Clearly, the difference is minimum in the year 1996.

4. What was the difference between the average exports of the three Companies in 1993 and the average exports in 1998?

    A. Rs. 15.33 crores

    B. Rs. 18.67 crores

    C. Rs. 20 crores

    D. Rs. 22.17 crores

Answer: Option **C**

Explanation:

Average exports of the three Companies X, Y and Z in 1993

$$= \text{Rs.} \left[\frac{1}{3} \times (30 + 80 + 60) \right] \text{crores} = \text{Rs.} \left(\frac{170}{3} \right) \text{crores.}$$

Average exports of the three Companies X, Y and Z in 1998

$$= \text{Rs.} \left[\frac{1}{3} \times (50 + 100 + 80) \right] \text{crores} = \text{Rs.} \left(\frac{230}{3} \right) \text{crores.}$$

Difference $= \text{Rs.} \left[\left(\frac{230}{3} \right) - \left(\frac{170}{3} \right) \right] \text{crores}$

$$= \text{Rs.} \left(\frac{60}{3} \right) \text{crores}$$

$$= \text{Rs. } 20 \text{ crores.}$$

5. In how many of the given years, were the exports from Company Z more than the average annual exports over the given years?

A.	2
B.	3
C.	4
D.	5

Answer: Option **C**
Explanation: Average annual exports of Company Z during the given period

$$= \frac{1}{7} \times (60 + 90 + 120 + 90 + 60 + 80 + 100)$$

$$= \text{Rs.} \left(\frac{600}{7} \right) \text{crores}$$

$$= \text{Rs. } 85.71 \text{ crores.}$$

From the analysis of graph the exports of Company Z are more than the average annual

exports of Company Z (i.e., Rs. 85.71 crores) during the years 1994, 1995, 1996 and 1999, i.e., during 4 of the given years.

Unit V: Puzzles.

More of problems related to numbers as puzzles

Exercise :: Number puzzles

-

What number comes inside the circle?
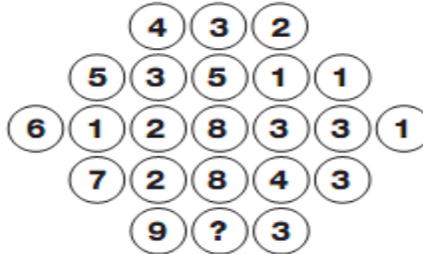
Answer : **6**

Explanation : Looking at the diagram in rows, the central circle equals half the sum of the numbers in the other circles to the left and right of the centre.

Which number replaces the question mark?
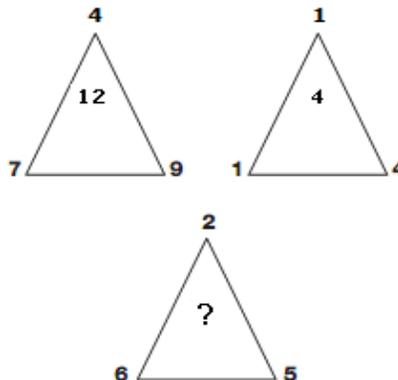
Answer : **9**

Explanation : The number at the centre of each triangle equals the sum of the lower two numbers minus the top number.

Which number completes the puzzle?
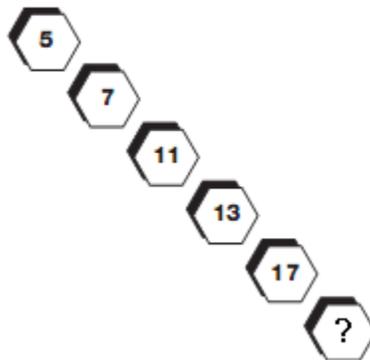
Answer   : 19

Explanation : As you move diagonally down, numbers follow the sequence of Prime Numbers.

Which number replaces the question mark?
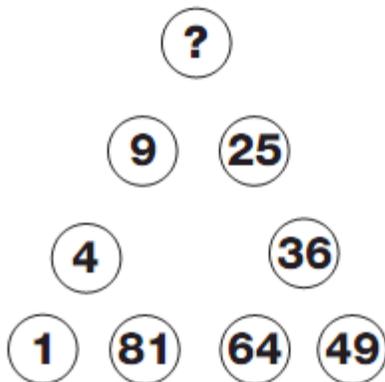
Answer   : 16

Explanation : Starting bottom left and moving clockwise around the

---

triangle, numbers follow the sequence of Square
Numbers.

Which number replaces the question mark?

Answer : **39**

Explanation : Working from top to bottom, double each number and
subtract 1, then 2, then 3 etc.

Which number replaces the question mark?
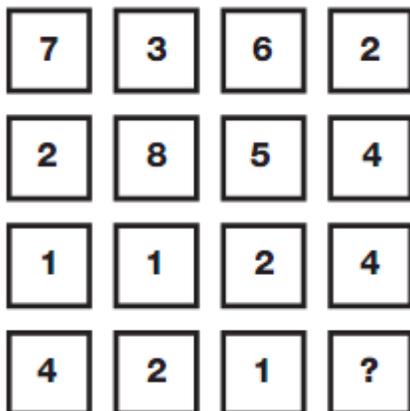
Answer : **4**

Explanation : Working in columns, the sum of the numbers in each
column is always 14

Which letter replaces the question mark?
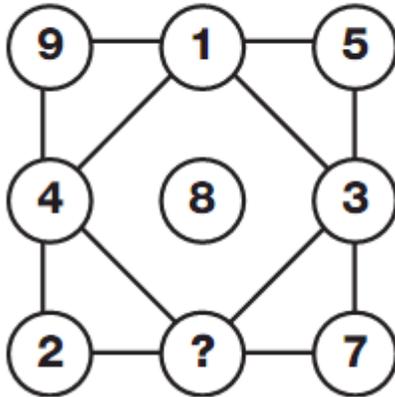
Answer   : **6**

Explanation : The numbers in each row and column add up to 15.

What is missing from the hexagon?

Answer   : **40**

Explanation : Moving from left to right, numbers increase by 2,3,4 and 5.

Which number replaces the question mark?
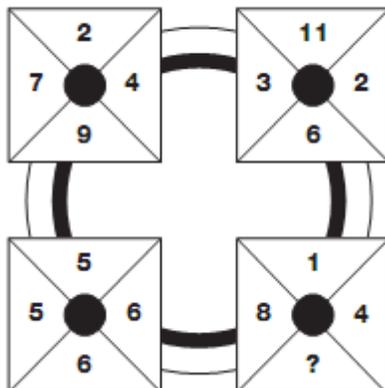
Answer   : **9**

Explanation : In each square of the diagram, the sum of the numbers is

---

always 22.

In a school, six bells are installed. All of them commence tolling together at the intervals of 2, 4, 5, 8, 10 and 12 seconds respectively. Can you find out how many times do they toll together in thirty minutes?

Answer & Explanation

Solution:

Calculate the LCM of 2, 4, 6, 8, 10 and 12 seconds.
The outcome will be 120 seconds.

Thus at 2 minutes, it rings once.

Which means that the bells will ring 15 times in the 30 minutes.

But wait that will be an incorrect answer as the bells will also ring together in the 0th second.

Which means the bells toll together $15 + 1 = 16$ times.

What is the smallest possible value of a when both 117 and 88 are the factors of no. a*47*64*1313?

Answer & Explanation

Solution:

a*47*64*1313 is the number

It can also be written as
a * 47 * 8 * 8 * 13 * 101

Now 88 and 117 are two factors
Or 8*11 and 13*9 are two factors

As you can clearly see that 11 and 9 are the missing in the number given to us
Thus a will be $11*9 = 99$

There is a 4 digit number that may comprise of 6, 2, 7 and 5 digits. Please take note that none of the numbers are repeated. Can you find out the possible number of combinations that are divisible by 36?

Answer & Explanation

Solution:

Ironically, there is no possible combination that is divisible by 36 that can be framed using the digits 6, 2, 7 and 5.

For a number to be divisible by 36, it must be divisible by 2, 3, 4, 6 and 9.
Now the sum of the given digits = 6 + 2 + 7 + 5 = 20 which is not divisible by 3. Thus there can be no combination that is divisible by 3.

In such case, there can be no combination that is divisible by 36.

In a school, four bells ring at an interval of 4, 8, 6 and 10 minutes. They all toll together when the clock strikes 2:00 am.

What must be the time on the clock when they toll together again?

Answer & Explanation

Solution:

This problem might sound confusing but for the solution, all you have to do is take the LCM of 4, 8, 6 and 10 which is 120 min or 2 hours.

Thus the bells will toll again when the clock strikes 2 am + 2 = 4 am.

How many prime numbers that lies between one and hundred are factors of 7150 ?

Answer & Explanation

Solution:

7150 = 2*5*5*11*13
Thus only four distinct numbers are present that are below 100.

Determine the largest number which is a factor of 1080 and 729.

Answer & Explanation

Solution:

In this question, we have to find out the highest common factor

While dividing 1080 with 729, the remainder is 351

While dividing 729 by 351, the remainder is 27

While dividing 351 with 27, the remainder is 0.

Thus the required number is 27.

Can you tell the lowest integer that is divisible by each integers ranging from 1 to 7 (inclusive)   **Answer & Explanation**

Solution:

420

Explanation:

L.C.M of (1,2,3,4,5,6,7)=2*2*3*5*7=420

If,
29 - 1 = 30
9 - 1 = 10
14 - 1 = 15

Based on above logic, can you prove that
11 - 1 = 10 ?

Answer & Explanation

Solution:

XI - I = X

Explanation:

Remove I (Roman equivalent of number 1) from the left side, you will the get the number on

the right.

29 - 1 = 30

XXIX - I = XXX (Roman equivalent of number 30)

14 - 1 = 15

XIV - I = XV (Roman equivalent of number 15)

9 - 1 =10

IX - I = X (Roman equivalent of number 10)

Similarly,

11 - 1 = 10

XI - I = X (Roman equivalent of number 10)

Let us say there are two natural numbers 'A' and 'B'. We performed eight operations on two numbers as

Step-1: $A = B$
Step-2: $A \times A = B \times A$
Step-3: $A^2 - B^2 = AB - B^2$
Step-4: $(A + B)(A - B) = B(A - B)$

Step-5: $A + B = B$
Step-6: $B + B = B$
Step-7: $2B = B$
Step- 8: $2 = 1$

What's the trick?

Answer & Explanation

Solution:

Step5 is Wrong.

Explanation:

We divided the two sides by (A-B).Since A = B which indicates that (A - B) = 0 and we cannot divide by zero.

In this famous ball puzzle, can you complete the series by finding the value of "?"

Answer & Explanation

Solution:

3

Explanation:

Digits are represented in binary form where a ball is 1 and a ring is 0.

001 = 1

010 = 2

100 = 4

011 = 3

0 0 0 = 6
1 1 1 = 6
2 2 2 = 6
3 3 3 = 6
4 4 4 = 6

5 5 5 = 6
6 6 6 = 6
7 7 7 = 6
8 8 8 = 6
9 9 9 = 6

You can use any mathematical symbols in the space provided to make all above algebraic expressions true.

Answer & Explanation

Solution:

Solution is done below.

$(0! + 0! + 0!)! = 6$

$(1! + 1! + 1!)! = 6$

$2 + 2 + 2 = 6$

$3 * 3 - 3 = 6$

$4 + 4 - sqrt(4) = 6$

$5 + 5 / 5 = 6$

$6 + 6 - 6 = 6$

$7 - 7 / 7 = 6$

$8 - sqrt(sqrt(8+8) = 6$

$(9 + 9) / sqrt(9) = 6$

Can you solve the number series problem by replacing boxes with number 1, 3 , 5 , 7 ,9 , 11 , 13 , 15?

Note: You can also repeat the number.

This interesting problem was asked in India's one of toughest competitive exam UPSC(IAS/IPS).

Solve this..

$$\square + \square + \square = 30$$

Fill the boxes using

(1, 3, 5, 7, 9, 11, 13, 15)

U can also repeat the numbers.

Answer & Explanation

Solution:

11.3135 + 9.3115+ 9.375

DIRECTIONS : **Choose the word Opposite in meaning to the given word.**

1. **A large volume of water is gushing through a pipe which narrows at the outlet. At which point, A, B, C or D will the water flow fastest?**
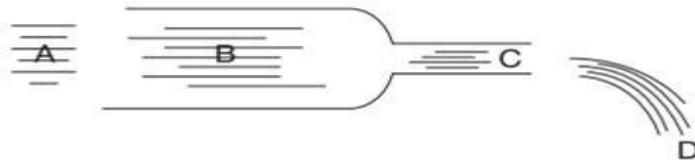
Answer

Ans: C.

Sol.
The water flows fastest at the narrowest point.

2. **SUNDAY**
   MONDAY
   TUESDAY
   WEDNESDAY
   THURSDAY
   FRIDAY
   SATURDAY
   What day comes three days after the day which comes two days after the day which comes immediately after the day which comes two days after Monday?

- **Answer**

Ans: Tuesday.

Sol. Tuesday.

3. **A man has 53 socks in his drawer: 21 identical blue, 15 identical black and 17 identical red. The lights are fused and he is completely in the dark. How many socks must he take out to make 100 per cent certain he has a pair of black socks?**

- **Answer**

Ans: 40 socks.

Sol. If he takes out 38 socks, although it is very unlikely, it is possible they could all be blue and red. To make 100 percent certain that he also has a pair of black socks he must take out a further two socks

4	Gordon is twice as old as Tony was when Gordon was as old as Tony is now. The combined age of Gordon and Tony is 112 years. How old are Gordon and Tony now?

- **Answer**

> **Ans**: Gordon 64 and Tony 48 .
>
> **Sol.** When Gordon was 48, Tony was 32(ie half the age Gordon is now).

5. **A bag of potatoes weighs 50 lbs divided by half of its weight. How much does the bag of potatoes weigh?**

- **Answer**

> **Ans**: 10 lb; .
>
> **Sol.**$50 \div 5 = 10$.

6. **How many lines appear below?**
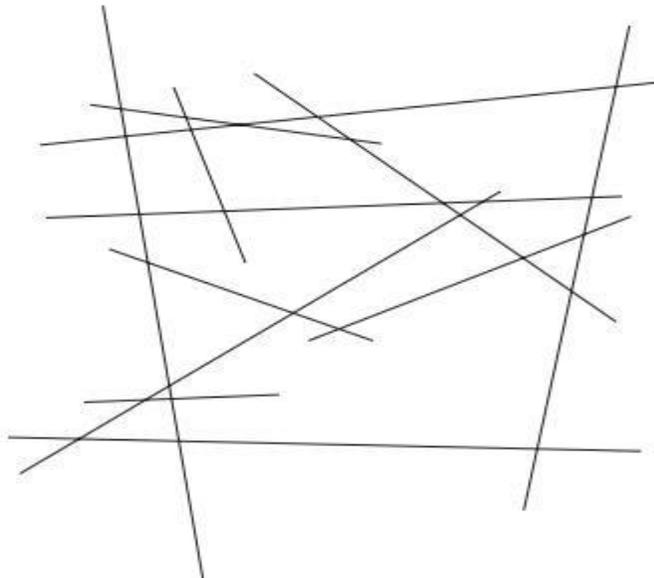
- **Answer**

> **Ans**: 12 .
>
> **Sol.** 12.

7. **How many cases do you need if you have to pack 112 pairs of shoes into cases that each hold 28 shoes?**

- **Answer**

> **Ans**: 8 .
>
> **Sol.** 112 pairs of shoes = 224 shoes. = 224 ÷ 28 = 8.

8. **In a party of 35 people there are twice as many women as children and twice as many children as men. How many of each are there?**

- **Answer**

> **Ans**: 5 men, 10 children and 20 women.
>
> **Sol.** IF x = the number of men, then x + 2x + 4x = 35.
> Therefore 7x = 35. So X = 5.

9. **On taking delivery of a consignment of eggs the market stall owner was furious to find that several were cracked. In fact, on counting them up in order to assess the damage he found that 72 were cracked, which was 12 per cent of the total consignment. How many eggs in total were in the consignment?**

- **Answer**

> **Ans**: 600 .
>
> **Sol.** $= 72 \div 12 \times 100 = 600$.

10. **At college, 70% of the students studied Maths, 75% studied English, 85% studied French and 80% studied German. What percentage at least must have studied all 4?**

- **Answer**

> **Ans**: 10 .
>
> **Sol.** 10.

11. **A card player holds 13 cards of four suits, of which seven are black and six are red. There are twice as many hearts as clubs and twice as many diamonds as hearts. How many spades does he hold?**

- **Answer**

> **Ans**: 6.
>
> **Sol.** The player holds 1 club, 2 hearts and 4 diamonds.
> As he holds 13 cards (or seven black cards), it follows that there must be 6 spades.

12. At each stage the black dot moves three corners clockwise and the white dot moves four corners anticlockwise. After how many stages will both dots be together in the same corner?
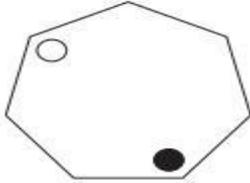
- **Answer**

Ans:

Sol. They will never appear together in the same corner as in a heptagon three corners clockwise is the same as four corners anticlockwise.

13. A B C D E F G H
What letter comes two to the right of the letter which is immediately to the left of the letter that comes three to the right of the letter that comes midway between the letter two to the left of the letter C and the letter immediately to the right of the letter F?

- **Answer**

Ans: H .

Sol. H.

14. **Which three of the four pieces below can be fitted together to form a perfect square?**
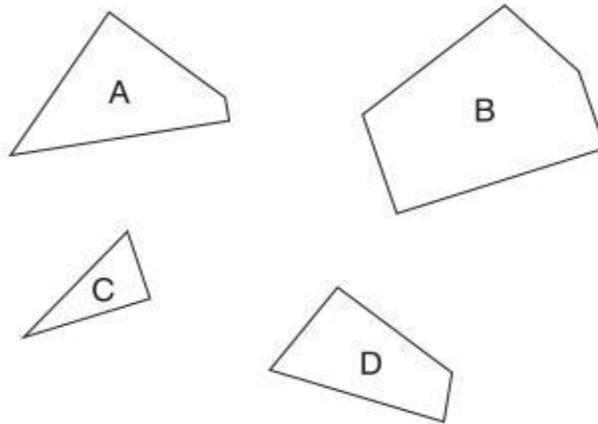
- **Answer**

Ans: C B D.
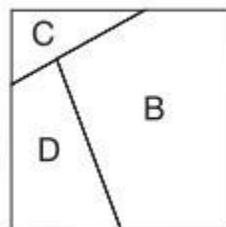
Sol.

15. **A train moving at 49 mph meets and is passed by a train moving at 63 mph. A passenger in the first train noted that the second train took AS seconds to pass him. How long is the second train?**

- **Answer**

Ans: 740.46ft.

Sol.
$$\frac{5289 \times (49 + 63) \times 4.5}{60 \times 60}$$
$$= 740.46 \text{ ft}$$

Outcomes:

✓ The students will be able to attempt all questions related to number system, algebraic formulae, HCF & LCM and about graphs in decision making logically.

II

years

II Year Engineering Classes

Aptitude for Placement and Training

Aim:

Students should be able to apply any problems in real life based on Time and work , Time and Distance & Area problems to clear the preliminary test and in major examination towards placement.

Objectives:

- ➢ To understand the Word problems.
- ➢ To analyze the time , work and distance of the situations.
- ➢ To solve the train problems.
- ➢ To calculate the area of the particular region.
- ➢ To know about different types of problems and decision making.

Syllabus:

Unit I : Time and Work

Unit II : Time and Distance

Unit III: Train Problems

Unit IV: Area

Unit V : Abbreviations

Expected Outcome:

The candidates will be able to all types of number problems which frequently occur in day today life and in the competitive examinations.

UNIT I

TIME AND WORK

IMPORTANT FORMULAE:

- If A can do a piece of work in n days, work done by A in 1 day = 1/n
- If A does 1/n work in a day, A can finish the work in n days
- If M1 men can do W1 work in D1 days working H1 hours per day and M2 men can do W2 work in D2 days working H2 hours per day (where all men work at the same rate), then $M1\ D1\ H1\ /\ W1\ =\ M2\ D2\ H2\ /\ W2$
- If A can do a piece of work in p days and B can do the same in q days, A and B together can finish it in $pq\ /\ (p+q)$ days
- If A is thrice as good as B in work, then => Ratio of work done by A and B = 3 : 1 & Ratio of time taken to finish a work by A and B = 1 : 3

Examples:

1. P is able to do a piece of work in 15 days and Q can do the same work in 20 days. If they can work together for 4 days, what is the fraction of work left?

   Answer:

   Amount of work P can do in 1 day = 1/15 ; Amount of work Q can do in 1 day = 1/20

   Amount of work P and Q can do in 1 day = 1/15 + 1/20 = 7/60

   Amount of work P and Q can together do in 4 days = 4 × (7/60) = 7/15

   Fraction of work left = 1 − 7/15= 8/15

2. P can lay railway track between two stations in 16 days. Q can do the same job in 12 days. With the help of R, they completes the job in 4 days. How much days does it take for R alone to complete the work?

   Answer:

   Amount of work P can do in 1 day = 1/16 ; Amount of work Q can do in 1 day = 1/12

   Amount of work P, Q and R can together do in 1 day = 1/4

   Amount of work R can do in 1 day = 1/4 - (1/16 + 1/12) = 3/16 − 1/12 = 5/48

   => Hence R can do the job on 48/5 days = 9 (3/5) days

3. P, Q and R can do a work in 20, 30 and 60 days respectively. How many days does it need to complete the work if P does the work and he is assisted by Q and R on every third day?

   Answer:

   Amount of work P can do in 1 day = 1/20 ;   Amount of work Q can do in 1 day = 1/30

   Amount of work R can do in 1 day = 1/60

   P is working alone and every third day Q and R is helping him,

   Work completed in every three days = 2 × (1/20) + (1/20 + 1/30 + 1/60) = 1/5

   So work completed in 15 days = 5 × 1/5 = 1 ;ie, the work will be done in 15 days

4. A can do a particular work in 6 days . B can do the same work in 8 days. A and B signed to do it for

   Rs. 3200. They completed the work in 3 days with the help of C. How much is to be paid to C?

   Answer:

   Amount of work A can do in 1 day = 1/6 ;   Amount of work B can do in 1 day = 1/8

   Amount of work A + B can do in 1 day = 1/6 + 1/8 = 7/24

   Amount of work A + B + C can do = 1/3 ;   Amount of work C can do in 1 day = 1/3 - 7/24 = 1/24

   work A can do in 1 day: work B can do in 1 day: work C can do in 1 day = 1/6 : 1/8 : 1/24 = 4 : 3 : 1

   Amount to be paid to C = 3200 × (1/8) = 400

5. 6 men and 8 women can complete a work in 10 days. 26 men and 48 women can finish the same work in

   2 days. 15 men and 20 women can do the same work in - days.

   Answer:

   Let work done by 1 man in 1 day = m   and   work done by 1 woman in 1 day = b

   Work done by 6 men and 8 women in 1 day = 1/10

   => 6m + 8b = 1/10 ;   => 60m + 80b = 1 --- (1)

   Work done by 26 men and 48 women in 1 day = 1/2

=> 26m + 48b = ½   ;   => 52m + 96b = 1 --- (2)

Solving equation (1) and equation (2), We get   **m = 1/100** and **b = 1/200**

Work done by 15 men and 20 women in 1 day = 15/100 + 20/200 = 1/4

  => Time taken by 15 men and 20 women in doing the work = 4 days

6. A can do a piece of work in 4 hours . A and C together can do it in just 2 hours, while B and C together need 3 hours to finish the same work. B alone can complete the work in --- hours.

   Answer:

   Work done by A in 1 hour = ¼ ;   Work done by B and C in 1 hour = 1/3

   Work done by A and C in 1 hour = 1/2

   Work done by A,B and C in 1 hour = 1/4+1/3 = 7/12

   Work done by B in 1 hour = 7/12 – 1/2 = 1/12   => B alone can complete the work in 12 hours

7. A completes 80% of a work in 20 days. Then B also joins and A and B together finish the remaining work in 3 days. How long does it need for B if he alone completes the work?

   Answer:

   Work done by A in 20 days = 80/100 = 8/10 = 4/5 ;

   Work done by A in 1 day = (4/5) / 20 = 4/100 = 1/25   --- (1)

   Work done by A and B in 3 days = 20/100 = 1/5 (Because remaining 20% is done in 3 days by A and B)

   Work done by A and B in 1 day = 1/15   ---(2)

   Work done by B in 1 day = 1/15 – 1/25 = 2/75

   => B can complete the work in 75/2 days = 37 ½ days

8. A is thrice as good as B in work. A is able to finish a job in 60 days less than B. They can finish the work in - days if they work together.

   Answer:

   If A completes a work in 1 day, B completes the same work in 3 days

   Hence, if the difference is 2 days, B can complete the work in 3 days

   => if the difference is 60 days, B can complete the work in 90 days

   => Amount of work B can do in 1 day= 1/90 ;

Amount of work A can do in 1 day = 3 × (1/90) = 1/30

Amount of work A and B can together do in 1 day = 1/90 + 1/30 = 4/90 = 2/45

=> A and B together can do the work in 45/2 days = 22 ½ days

9. P can do a work in the same time in which Q and R together can do it. If P and Q work together, the work can be completed in 10 days. R alone needs 50 days to complete the same work. then Q alone can do it in

Answer:

Work done by P and Q in 1 day = 1/10   ;   Work done by R in 1 day = 1/50

Work done by P, Q and R in 1 day = 1/10 + 1/50 = 6/50

But Work done by P in 1 day = Work done by Q and R in 1 day . Hence the above equation can be written as

Work done by P in 1 day × 2 = 6/50   ;   => Work done by P in 1 day = 3/50

=> Work done by Q and R in 1 day = 3/50   ;

Hence work done by Q in 1 day = 3/50 – 1/50 = 2/50 = 1/25

So Q alone can do the work in 25 days

10. Machine P can print one lakh books in 8 hours. Machine Q can print the same number of books in 10 hours while machine R can print the same in 12 hours. All the machines started printing at 9 A.M. Machine P is stopped at 11 A.M. and the remaining two machines complete work. Approximately at what time will the printing of one lakh books be completed?

Answer:

Work done by P in 1 hour = 1/8 ; Work done by Q in 1 hour = 1/10   ; Work done by R in 1 hour = 1/12

Work done by P,Q and R in 1 hour = 1/8 + 1/10 + 1/12 = 37/120

Work done by Q and R in 1 hour = 1/10 + 1/12 = 22/120 = 11/60

From 9 am to 11 am, all the machines were operating.

ie, they all operated for 2 hours and work completed = 2 × (37/120) = 37/60

Pending work = 1- 37/60 = 23/60

Hours taken by Q an R to complete the pending work = (23/60) / (11/60) = 23/11

which is approximately equal to 2

Hence the work will be completed approximately 2 hours after 11 am ;   ie around 1 pm

Exercise:

1. P can finish a work in 18 days. Q can finish the same work in 15 days. Q worked for 10 days and left the job. how
   many days does P alone need to finish the remaining work?
   - A. 8
   - B. 5
   - C. 4
   - D. 6

2. 3 men and 7 women can complete a work in 10 days . But 4 men and 6 women need 8 days to complete the same work.
   In how many days will 10 women complete the same work?
   - A. 50
   - B. 40
   - C. 30
   - D. 20

3. A and B can finish a work 30 days if they work together. They worked together for 20 days and then B left. A finished the remaining work in another 20 days. In how many days A alone can finish the work?
   - A. 60
   - B. 50
   - C. 40
   - D. 30

4. A can complete a work in 12 days with a working of 8 hours per day. B can complete the same work in 8 days when
   working 10 hours a day. If A and B work together, working 8 hours a day, the work can be completed in --- days.
   - A. $5\frac{5}{11}$
   - B. $4\frac{5}{11}$
   - C. $6\frac{4}{11}$
   - D. $6\frac{5}{11}$

5. P is 30% more efficient than Q. P can complete a work in 23 days. If P and Q work together, how much time will it
   take to complete the same work?
   - A. 9
   - B. 11
   - C. 13
   - D. 15

6. P, Q and R can complete a work in 24, 6 and 12 days respectively. The work will be completed in --- days if all of
   them are working together.
   - A. 2
   - B. $3\frac{3}{7}$
   - C. 4 ¼
   - D. 5

7. 10 men can complete a work in 7 days. But 10 women need 14 days to complete the same work. How many days will 5
   men and 10 women need to complete the work?
   - A. 5
   - B. 6
   - C. 7
   - D. 8

8. Kamal will complete work in 20 days. If Suresh is 25% more efficient than Kamal, he can complete the work in ---
   days.
   - A. 14
   - B. 16
   - C.18
   - D. 20

9. Anil and Suresh are working on a special assignment. Anil needs 6 hours to type 32 pages on a computer and Suresh
    needs 5 hours to type 40 pages. If both of them work together on two different computers, how much time is needed to
    type an assignment of 110 pages?
    A. 7 hour 15 minutes   B. 7 hour 30 minutes

    C. 8 hour 15 minutes   D. 8 hour 30 minutes

10. P and Q can complete a work in 20 days and 12 days respectively. P alone started the work and Q joined him after 4
    days till the completion of the work. How long did the work last?
    A. 5   B. 10   C.14   D. 22

11. P takes twice as much time as Q or thrice as much time as R to finish a piece of work. They can finish the work in 2
    days if work together. How much time will Q take to do the work alone?
    A. 4   B. 5   C.6   D. 7

12. P and Q can complete a work in 15 days and 10 days respectively. They started the work together and then Q left
    after 2 days. P alone completed the remaining work. The work was finished in --- days.
    A. 12   B. 16   C.20   D. 24

13. P and Q can do a work in 30 days. Q and R can do the same work in 24 days and R and P in 20 days. They started the
    work together, but Q and R left after 10 days. How many days more will P take to finish the work?
    A. 10   B. 15   C.18   D. 22

14. P works twice as fast as Q. If Q alone can complete a work in 12 days, P and Q can finish the work in --- days
    A. 1   B. 2   C.3   D. 4

15. A work can be finished in 16 days by twenty women. The same work can be finished in fifteen days by sixteen men.
    The ratio between the capacity of a man and a woman is
    A. 1:3   B. 4:3   C.2:3   D. 2:1

16. P and Q need 8 days to complete a work. Q and R need 12 days to complete the same work. But P, Q and R together

can finish it in 6 days. How many days will be needed if P and R together do it?

   A. 3   B. 8   C.12   D. 4

17. P can do a work in 24 days. Q can do the same work in 9 days and R can do the same in 12 days. Q and R start the

work and leave after 3 days. P finishes the remaining work in --- days.

   A. 7   B. 8   C.9   D. 10

18. If daily wages of a man is double to that of a woman, how many men should work for 25 days to earn Rs.14400?

   Given that wages for 40 women for 30 days are Rs.21600.

   A.12   B. 14   C.16   D. 18

19. P,Q and R together earn Rs.1620 in 9 days. P and R can earn Rs.600 in 5 days. Q and R in 7 days can earn Rs.910.

   How much amount does R can earn per day?

   A. Rs.40   B. Rs.70   C. Rs.90   D. Rs.100

20. Assume that 20 cows and 40 goats can be kept for 10 days for Rs.460. If the cost of keeping 5 goats is the same as the

cost of keeping 1 cow, what will be the cost for keeping 50 cows and 30 goats for 12 days?

   A. Rs.1104   B. Rs.1000   C. Rs.934   D. Rs.1210

21. There is a group of persons each of whom can complete a piece of work in 16 days, when they are working

individually. On the first day one person works, on the second day another person joins him, on the third day one more

person joins them and this process continues till the work is completed. How many days are needed to complete the

work?

   A. $3\frac{1}{4}$days   B. $4\frac{1}{3}$ days   C. $5\frac{1}{6}$ days   D. $6\frac{1}{5}$ days

Answers :

1) D	7) C	13) C	19) B
2) B	8) B	14) D	20) A
3) A	9) C	15) B	21) C
4) A	10) B	16) B	
5) C	11) C	17) D	
6) B	12) A	18) C	

UNIT II

TIME AND DISTANCE

IMPORTANT FORMULAS:

- Basics

$$Speed = \frac{Distance}{Time} \quad ; \quad Distance = Speed \times Time \; ; \; Time = \frac{Distance}{Speed}$$

- Convert kilometers per hour(km/hr) to meters per second(m/s) $= x \times \frac{5}{18}m/s$

- Convert meters per second(m/s) to kilometers per hour(km/hr) $= x \times \frac{18}{5} \; km/hr$

- Average Speed

  If an object covers a certain distance at x kmph and an equal distance at y kmph, the average speed of the whole

  Journey $= \frac{2xy}{x+y} \; kmph$

- Relation Between Distance, Speed and Time

- Speed and time are inversely proportional (when distance is constant)

  $\Rightarrow speed \propto 1 \; time$ (when distance is constant)

- If the ratio of the speeds of A and B is $a:b$, then, the ratio of the time taken by them to cover the same distance is

$$\frac{1}{a} : \frac{1}{b} = a:b$$

- Assume two objects A and B start at the same time in opposite directions from P and Q respectively. After passing each other, A reaches Q in a seconds and B reaches P in b seconds. Then,

$$\text{Speed of A} : \text{ Speed of B} = \sqrt{b} : \sqrt{a}$$

- Relative Speed

  If two objects are moving in the same direction at v1 m/s and v2 m/s respectively where $v_1 > v_2$, then their relative speed$= (v_1 - v_2)m/s$

  - Consider two objects A and B separated by a distance of $d$meter. Suppose A and B start moving in the same direction at the same time such that A moves towards B at a speed of $a$meter/second and B moves away from A at a speed of b meter/second where $a > b$. Then,relative speed $= (a - b)m/s$

    time needed for A to meet B $= \frac{d}{a-b}m/s$

- If two objects are moving in opposite directions at v_1 m/s and v_2 m/s respectively, then their relative speed $= (v_1 + v_2) m/s$
- Consider two objects A and B separated by a distance of d meter. Suppose A and B start moving towards each other at the same time at a meter/second and b meter/second respectively. Then,

$$\text{relative speed} = (a + b) m/s$$

$$\text{time needed for A to meet B} = \frac{d}{a+b} m/s$$

Examples:

1. A man takes 5 hours 45 min in walking to a certain place and riding back. He would have gained 2 hours by riding both ways. The time he would take to walk both ways is

Answer:

Given that time taken for riding both ways will be 2 hours lesser than the time needed for waking one way and

riding back.

Therefore, time needed for riding one way = time needed for waking one way - 2 hours

Given that time taken in walking one way and riding back = $5\ hours\ 45\ min$

Hence, the time he would take to walk both ways = $5\ hours\ 45\ min\ +$

$2\ hours\ = 7\ hours\ 45\ min$

2. A person crosses a 600 meter long street in 5 minutes. What is his speed in km per hour?

Answer:

Distance = 600 meter = 0.6 km

Time $= 5$ minutes $= \frac{1}{12}$ hour ; $Speed = \frac{Distance}{Time} = \frac{0.6}{\left(\frac{1}{12}\right)} = 7.2$ km/hr

3. Excluding stoppages, the speed of a bus is 54kmph and including stoppages, it is 45kmph. For how many minutes does the bus stop per hour?

Answer:

Speed of the bus excluding stoppages $= 54\ kmph$

Speed of the bus including stoppages $= 45\ kmph$

Loss in speed when including stoppages $= 54 - 45 = 9\ kmph$

$\Rightarrow$ In 1 hour, bus covers 9 km less due to stoppages.

Hence, time in which the bus stops per hour = Time taken to cover $9\ km$

$$= \frac{Distance}{Speed} = \frac{9}{54}hr = \frac{1}{6}hr$$

$= 10min$

4. A man complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.

   Answer:

   Average Speed $= \frac{2 \times 21 \times 24}{21+24} = 22.4$ km/hrTotal distance $= 22.4 \times 10 = 224$ km

5. A car traveling with 5/7 of its actual speed covers
   $42\ km\ in\ 1\ hr\ 40\ min\ 48\ sec$.What is the actual speed of the car?
   Answer:
   time$=1\ hr\ 40\ min\ 48$ sec $= 1\ hr + \frac{40}{60}hr + \frac{48}{3600}hr = \frac{126}{75}hr$;   distance $=$
   $42\ km$

$$Speed = \frac{Distance}{Time} = \frac{45}{\left(\frac{126}{75}\right)} = \frac{42 \times 75}{126} = 25 \text{ km/hr}$$

$\Rightarrow \frac{5}{7}$ of the actual speed $= 25$; $\Rightarrow$ Actual speed $= 25 \times \frac{7}{5} = 35\ km/hr$

6. A man covered a certain distance at some speed. If he had moved 3kmph faster, he would have taken 40 minutes less. If he had moved 2kmph slower, he would have taken 40 minutes more. What is the distance in km

   Answer:

   Speed $= \frac{2v_1v_2}{v_1-v_2} = \frac{2 \times 3 \times 2}{3-2} = 12$ km/hr

   distance $= vt_1\left(1 + \frac{v}{v_1}\right) = 12 \times \frac{40}{60}\left(1 + \frac{12}{3}\right) = 40$ km

7. A and B walk around a circular track. A and B walk at a speed of 2 rounds per hour and 3 rounds per hour respectively. If they start at 8 a.m. from the same point in opposite directions, how many times shall they cross each other before 9.30 a.m.?

Answer:

Relative speed =   Speed of A + Speed of B (∵ they walk in opposite directions)

=2+3 = 5 rounds per hour

Therefore, they cross each other 5 times in 1 hour and 2 times in 12 hour

Time duration from 8 a.m. to 9.30 a.m. =1.5 hour

Hence they cross each other 7 times before 9.30 a.m.

8. Two boys starts from the same place walking at the rate of 5kmph and 5.5kmph respectively in the same direction. What time will they take to be 8.5 km apart?

Answer:

relative speed = 5.5 − 5 = 0.5kmph (because they walk in the same direction)

distance = 8.5 km

$$Time = \frac{Distance}{Speed}\ = \frac{8.5}{0.5} = 17 \text{ hr}$$

9. In covering a distance of 30 km, Arun takes 2 hours more than Anil. If Arun doubles his speed, then he would take 1 hour less than Anil. What is Arun's speed?

Answer:

If Arun doubles his speed, he needs 3 hour less. Double speed means half time. Hence, half of the time

required by Arun to cover 30 km =3 hour

i.e., Time required by Arun to cover 30 km =6 hour

Arun's speed $= \frac{30}{6} = 5$ kmph

10. A car travels first 160 km at 64 km/hr and the next 160 km at 80 km/hr. What is the average speed for the first 320 km of the tour?

Answer:

Average Speed $= \frac{2 \times 64 \times 80}{64 + 80} = \frac{2 \times 64 \times 80}{144} = 71.11$ kmph

Exercise:

1. A man travelled a distance of 61 km in 9 hours. He travelled partly on foot at 4 km/hr and partly on bicycle at 9 km/hr. What is the distance travelled on foot?
   A. 12 km   B. 14 km   C. 16 km
        D. 16 km

2. Walking 6/7th of his usual speed, a man is 12 minutes too late. What is the usual time taken by him to cover that distance?
   A. 1hr42 min   B. 1hr   C. 2hr
   D. 1hr12 min

3. A man goes to his office from his house at a speed of 3 km/hr and returns at a speed of 2 km/hr. If he takes 5 hours in going and coming, what is the distance between his house and office?
   A. 3 km   B. 4 km   C. 5 km
        D. 6 km

4. A man rides his bicycle 10 km at an average speed of 12 km/hr and again travels 12 km at an average speed of 10 km/hr. What is his average speed for the entire trip approximately?
   A. 11.2kmph   B. 10 kmph   C. 10.2kmph
   D. 10.8kmph

5. An aero plane covers a certain distance at a speed of 240kmph in 5 hours. To cover the same distance in 123 hours, it must travel at a speed of:
   A. 660 km/hr   B. 680 km/hr   C. 700 km/hr
   D. 720 km/hr

6. A train can travel 50% faster than a car. Both start from point A at the same time and reach point B, 75kms away from A, at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. What is the speed of the car?
   A. 80kmph   B. 102 kmph   C. 120kmph
   D. 140kmph

7. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. What is the duration of the flight ?
   A. 2 hour   B. $1\frac{1}{2}$ hour   C. $\frac{1}{2}$ hour
        D. 1 hour

8. If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. What is the actual distance travelled by him?

A. 80 km   B. 70 km   C. 60 km
D. 50 km

9. The ratio between the speeds of two trains is 7:8. If the second train runs 400 km in 4 hours, What is the speed of the first train?
   A. 85 km/hr   B. 87.5 km/hr   C. 90 km/hr
   D. 92.5 km/hr

10. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. What is the ratio of the speed of the train to that of the car?
    A. 3:4   B. 2:3   C. 1:2
    D. 1:3

11. Arun is travelling on his cycle and has calculated to reach point A at 2 pm if he travels at 10kmph. He will reach there at 12 noon if he travels at 15kmph. At what speed must he travel to reach A at 1 pm?
    A. 8kmph   B. 10kmph   C. 12kmph
    D. 14 kmph

12. A car travels at an average of 50 miles per hour for $2\frac{1}{2}$ hours and then travels at a speed of 70 miles per hour for $1\frac{1}{2}$ hours. How far did the car travel in the entire 4 hours?
    A. 210 miles   B. 230 miles   C. 250 miles
    D. 260 miles

13. The speed of a bus increases by 2kmph after every one hour. If the distance travelled in the first one hour was 35 km, what was the total distance travelled in 12 hours?
    A. 422 km   B. 552 km   C. 502 km
    D. 92 km

14. Sound is said to travel in air at about 1100 feet per second. A man hears the axe striking the tree, $\frac{11}{5}$ seconds after he sees it strike the tree. How far is the man from the wood chopper?
    A. 1800ft   B. 2810ft   C. 3020ft
    D. 2420ft

15. An athlete runs 200 meters race in 24 seconds. What is his speed?
    A. 20 km/hr   B. 25 km/hr   C. 27.5 km/hr   D. 30 km/hr

16. A train is moving at the speed of 80 km/hr. What is its speed in meters per second?

A. $22\frac{2}{9}$ m/s   B. 22 m/s   C. $21\frac{1}{9}$ m/s   D. 21 m/s

17. The distance between two cities A and B is 330 km. A train starts from A at 8 a.m. and travels towards B at 60 km/hr. Another train starts from B at 9 a.m. and travels towards A at 75 km/hr. At what time will they meet?

A. 10.30 a.m.   B. 10 a.m.   C. 12 noon   D. 11 a.m.

18. A man walking at the rate of 5 km/hr crosses a bridge in 15 minutes. What is the length of the bridge (in meters)?

A. 1250   B. 1280   C. 1320   D. 1340

19. A train travelled at an average speed of 100 km/hr, stopping for 3 minutes after every 75 km. How long did it take to reach its destination 600 km from the starting point?

A. 6hrs21 min   B. 7hrs14 min   C. 7hrs22 min
D. 6hrs

20. A person travels from A to B at a speed of 40 km/hr and returns by increasing his speed by 50%. What is his average speed for both the trips?

A. 60 km/hr   B. 56 km/hr   C. 52 km/hr   D. 48 km/hr

21. A man in a train notices that he can count 21 telephone posts in one minute. If they are known to be 50 meters apart, at what speed is the train travelling?

A. 61 km/hr   B. 56 km/hr   C. 63 km/hr   D. 60 km/hr

22. A truck covers a distance of 550 meters in 1 minute whereas a train covers a distance of 33kms in 45 minutes. What is the ratio of their speed?

A. 2:1   B. 1:2   C. 4:3   D. 3:4

23. A person has to cover a distance of 6 km in 45 minutes. If he covers one-half of the distance in two-thirds of the total time, to cover the remaining distance in the remaining time, what should be his speed in km/hr?

A. 14 km/hr   B. 12 km/hr   C. 10 km/hr   D. 8 km/hr

Answers :

1) C 2) D3) D4) D5) D6) C7) D8) D9) B10) A11) C

12) B   13) B14) D15) D16) A17) D18) A19) A   20) D21) D22)D23)B

TRAIN PROBLEMS

IMPORTANT FORMULAS:

- Important Formulas – Time and Distance.
- Time taken by a train x meters long to pass a pole or standing man or a post $=$ Time taken by the train to travel x meters.
- Time taken by a train x meters long to pass an object of length y meters $=$ Time taken by the train to travel $(x + y)$ metres.
- If two trains are moving in opposite directions at v_1 m/s and v_2 m/s, then their relative speed $= (v_1 + v_2)$ m/s.
- Assume two trains of length x meters and y meters are moving in opposite directions at v_1 m/s and v_2 m/s, then the time taken by the trains to cross each other $=$ $\frac{x+y}{v_1+v_2}$ seconds.
- Assume two trains of length x metres and y metres are moving in the same direction at v_1 m/s and v_2 m/s where $v_1 > v_2$, Then the time taken by the faster train to cross the slower train $= \frac{x+y}{v_1-v_2}$ seconds.

Examples:

1) A train is running at a speed of 40 km/hr and it crosses a post in 18 seconds. What is the length of the train?

Answer:

Speed $= 40 km/hr = 40 \times \frac{5}{18} = \frac{100}{9}$ m/s ; Time =18 seconds ; Distance

Covered $= \frac{100}{9} \times 18 = 200$ m

Therefore, length of the train =200 m

2) A train, 130 meters long travels at a speed of 45 km/hr crosses a bridge in 30 seconds. The length of the bridge is

Answer:

Speed $= 45 \ km/hr = 45 \times \frac{5}{18} = 12.5$ m/s ; Time $= 30$ s

Distance travelled $= 12.5 \times 30 = 375 \ m$

Length of the bridge $= 375 - 130 = 245 \ m$

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3) A train has a length of 150 meters. It is passing a man who is moving at 2 km/hr in the same direction of the train, in 3 seconds. Find out the speed of the train.

Answer:

Length of the train =150m ; Speed of the man =2 km/hr

Relative speed $= \frac{150}{3} = 50\text{m/s} = 50 \times \frac{18}{5} = 180$ km/hr

Relative speed = Speed of train - Speed of the man (as both are moving in the same direction).

Therefore,

Speed of the train = Relative speed + Speed of the man $= 180 + 2 = 182\ km/hr$

4) A train having a length of 240 meter passes a post in 24 seconds. How long will it take to pass a platform having a length of 650 meter?

Answer:

Speed of the train $= \frac{240}{24} = 10$ m/s

Required time $= \frac{240+650}{10} = 89$ seconds

5) A train 360 meter long runs with a speed of 45 km/hr. What time will it take to pass a platform of 140 meter long?

Answer:

Speed $= 45\ km/hr = 45 \times \frac{5}{18} = \frac{25}{2} m/s$

Distance travelled = Length of the train + Length of the platform $= 360 + 140 = 500\ metre$

Time taken to cross the platform $= \frac{500}{\left(\frac{25}{2}\right)} = 40$ seconds.

6) Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively. If they cross each other in 23 seconds, what is the ratio of their speeds?

Answer:

Let speed of the trains be x m/s and y m/s respectively.

Length of first train $= 27x$; Length of second train $= 17y$

Relative speed $= x + y$

Time taken to cross each other $= 23\ s$

$$\Rightarrow \frac{27x+17y}{x+y} = 23\ ; \Rightarrow 27x + 17y = 23(x+y)\ ;\ \Rightarrow 4x = 6y\ ;$$

$$\frac{x}{y} = \frac{6}{4} = \frac{3}{2}$$

7) A jogger is running at 9kmph alongside a railway track in 240 meters ahead of the engine of a 120 meters long train. The train is running at 45kmph in the same direction. How much time does it take for the train to pass the jogger?

Answer:

Distance to be covered $= (240 + 120) = 360\ m$

$$\text{Relative speed} = (45 - 9) = \frac{36\ km}{hr} = 36 \times \frac{5}{18} = 10\ \text{m/s}$$

$$\text{Required time} = \frac{360}{10} = 36\ \text{seconds}$$

8) Two trains of equal length are running on parallel lines in the same direction at 46 km/hr and 36 km/hr. If the faster train passes the slower train in 36seconds,what is the length of each train?

Answer:

Let length of each train $= x$ metre

Total distance covered while passing the slower train $= (x + x) = 2x$ metre

$$\text{Relative speed} = (46 - 36) = 10\ \text{km/hr} = 10 \times \frac{5}{18} = \frac{50}{18}\ \text{m/s}$$

Time = 36 seconds

$$\frac{2x}{36} = \frac{50}{18}\quad => \ x = 50$$

9) Two trains having length of 140metre and 160metre long run at the speed of 60 km/hr and 40 km/hr respectively in opposite directions (on parallel tracks). The time which they take to cross each other, is

Answer:

$$\text{Distance} = (140 + 160) = 300\ m = 0.3\ km$$

$$\text{Relative speed} = (60 + 40) = 100\ km/hr$$

$$\text{Required time} = \frac{0.3}{100}\text{hr} = \frac{0.3}{100} \times 3600\ \text{sec} = 10.8\ sec.$$

10) Two trains are moving in opposite directions with speed of 60 km/hr and 90 km/hr respectively. Their lengths are

1.10 km and 0.9 km respectively. The time taken by the slower train to cross the faster train is

Answer:

Relative speed $= 60 + 90 = 150$ km/hr   (since both trains are moving in opposite directions)

Total distance $= 1.1 + 0.9 = 2 \, km$

Time $= \dfrac{2}{150} hr \; = \dfrac{2}{150} \times 3600 \sec = 48 \, sec.$

Exercise:

1) A train passes a platform in 36 seconds. The same train passes a man standing on the platform in 20 seconds. If the speed of the train is 54 km/hr, The length of the platform is

   A. None of these   B. 280 meter   C. 240 meter   D. 200 meter

2) A train moves past a post and a platform 264 metre long in 8 seconds and 20 seconds respectively. What is the speed of the train?

   A. 79.2 km/hr   B. 69 km/hr   C. 74 km/hr   D. 61 km/hr

3) Two trains having equal lengths, take 10 seconds and 15 seconds respectively to cross a post. If the length of each train is 120 metres, in what time (in seconds) will they cross each other when travelling in opposite direction?

   A. 10   B. 25   C. 12   D. 20

4) Two trains, one from P to Q and the other from Q to P, start simultaneously. After they meet, the trains reach their destinations after 9 hours and 16 hours respectively. The ratio of their speeds is

   A. 2:3   B. 2:1   C. 4:3   D. 3:2

5) A train having a length of $\frac{1}{4}$mile, is travelling at a speed of 75 mph. It enters a tunnel $3\frac{1}{2}$ miles long. How long does it take the train to pass through the tunnel from the moment the front enters to the moment the rear emerges?

   A. 3 minutes   B. 4.2 minutes   C. 3.4 minutes   D. 5.5 minutes

6) A train runs at the speed of 72kmph and crosses a 250 meter long platform in 26 seconds. What is the length of the train?

   A. 270 meter   B. 210 meter   C. 340 meter   D. 130 meter

7) A train overtakes two persons who are walking in the same direction to that of the train at 2kmph and 4kmph and passes them completely in 9 and 10 seconds respectively. What is the length of the train?

    A. 62 meter   B. 54 meter   C. 50 meter   D. 55 meter

8) A train is travelling at 48kmph. It crosses another train having half of its length, travelling in opposite direction at 42kmph, in 12 seconds. It also passes a railway platform in 45 seconds. What is the length of the platform?

    A. 500 meter   B. 360 meter   C. 480 meter   D. 400 meter

9) A train having a length of 270 metre is running at the speed of 120kmph. It crosses another train running in opposite direction at the speed of 80kmph in 9 seconds. What is the length of the other train?

    A. 320 meter   B. 190 meter   C. 210 meter   D. 230 meter

10) Two trains, each 100 metre long are moving in opposite directions. They cross each other in 8 seconds. If one is

moving twice as fast the other, the speed of the faster train is

    A. 75 km/hr   B. 60 km/hr   C. 35 km/hr D. 70 km/hr

11) Two stations P and Q are 110 km apart on a straight track. One train starts from P at 7a.m. and travels towards Q at 20kmph. Another train starts from Q at 8 a.m. and travels towards P at a speed of 25kmph. At what time will they meet?

    A. 10.30a.m   B. 10a.m   C. 9.10a.m   D. 11a.m

12) A train overtakes two persons walking along a railway track. The first person walks at 4.5 km/hr and the other walks at 5.4 km/hr. The train needs 8.4 and 8.5 seconds respectively to overtake them. What is the speed of the train if both the persons are walking in the same direction as the train?

    A. 81 km/hr   B. 88 km/hr   C. 62 km/hr   D. 46 km/hr

13) A train, having a length of 110 meter is running at a speed of 60kmph. In what time, it will pass a man who is running at 6kmph in the direction opposite to that of the train

    A. 10 seconds   B. 8 seconds   C. 6 seconds   D. 4 seconds

14) A 300 metre long train crosses a platform in 39 seconds while it crosses a post in 18 seconds. What is the length of the platform?

    A. 150 meter   B. 350 meter   C. 420 meter   D. 600 meter

15) A train crosses a post in 15 seconds and a platform 100 meter long in 25 seconds. Its length is

    A. 150 meter   B. 300 meter   C. 400 meter   D. 180 meter

16) A train, 800 meter long is running with a speed of 78 km/hr. It crosses a tunnel in 1 minute. What is the length of the tunnel (in meters)?

   A. 440 meter   B. 500 meter   C. 260 meter   D. 430 meter

17) Two train each 500 meter long, are running in opposite directions on parallel tracks. If their speeds are 45 km/hr and30 km/hr respectively, the time taken by the slower train to pass the driver of the faster one is

   A. 50 seconds   B. 58 seconds   C. 24 seconds   D. 22 seconds

18) Two trains are running at 40 km/hr and 20 km/hr respectively in the same direction. If the faster train completely passes a man sitting in the slower train in 5 seconds, the length of the faster train is:

   A. 19 meter   B. $27\frac{7}{9}$ meter   C. $13\frac{2}{9}$ meter   D. 33 meter

19) Two trains are running in opposite directions in the same speed. The length of each train is 120 meter. If they cross each other in 12 seconds, the speed of each train (in km/hr) is

   A. 42   B. 36   C. 28   D. 20

20) A train 108 meter long is moving at a speed of 50 km/hr. It crosses a train 112 meter long coming from opposite direction in 6 seconds. What is the speed of the second train?

   A. 82kmph   B. 76kmph   C. 44kmph   D. 58kmph

21) How many seconds will a 500 meter long train moving with a speed of 63 km/hr, take to cross a man walking with a speed of 3 km/hr in the direction of the train ?

   A. 42   B. 50   C. 30   D. 28

Answers :

1) C	5) A	9) D	13) C	17) C	21) C
2) A	6) A	10) B	14) B	18) B	
3) C	7) C	11) B	15) A	19) B	
4) C	8) D	12) A	16) B	20) A	

AREA

IMPORTANT FORMULAS:

Geometric Shape	Description	Formulas
Rectangle 	$l =$ Length $b =$ Breadth $d =$ Length of diagonal	Area $= lb$ Perimeter $= 2(l + b)$ $d = \sqrt{l^2 + b^2}$
Square 	$a =$ Length of a side $d =$ Length of diagonal	Area $= a^2 = \frac{1}{2}d^2$ Perimeter $= 4a$ $d = \sqrt{2}a$
Parallelogram 	b and c are sides $b =$ base $h =$ height	Area $= bh$ Perimeter $= 2(b + c)$
Rhombus length of each side = a	$a =$ length of each side $b =$ base $h =$ height d_1, d_2 are the diagonals	Area $= bh$ (Formula 1 for area) Area $= \frac{1}{2}d_1 d_2$ (Formula 2 for area) Perimeter $= 4a$
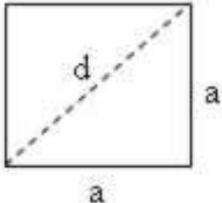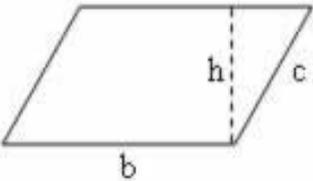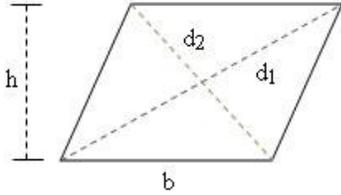
Triangle	a, b and c are sides	Area $= \frac{1}{2}bh$
	b = base h = height	(Formula 1 for area) Area$= \sqrt{s(s-a)(s-b)(s-c)}$ where s is the semi perimeter $= \frac{a+b+c}{2}$ (Formula 2 for area - Heron's formula) Perimeter $= a + b + c$ Radius of incircle of a triangle of area A $= \frac{A}{8}$ where s is the semi perimeter $= \frac{a+b+c}{2}$
Equilateral Triangle	a= side	Area$= \frac{\sqrt{3}}{4}a^2$ Perimeter $= 3a$
		Radius of incircle of an equilateral triangle of side $a = \frac{a}{2\sqrt{3}}$ Radius of circumcircle of an equilateral triangle of side $a = \frac{a}{\sqrt{3}}$
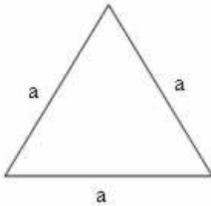
Trapezium (Trapezoid)	Base a is parallel to base b h =height	Area $= \frac{1}{2}(a + b)h$
Circle	r =radius d =diameter	$d = 2r$ Area $\pi r^2 = \frac{1}{4}\pi d^2$ Circumference $= 2\pi r = \pi d$ $\dfrac{\text{Circumference}}{d} = \pi$
Sector of Circle	r = radius θ = central angle	Area, A $=$ $\begin{cases} \frac{\theta}{360}\pi r^2 \text{(if angle is in degrees)} \\ \frac{1}{2}r^2\theta \quad \text{(if angle is in radians)} \end{cases}$ Arc Length, s $=$ $\begin{cases} \frac{\theta}{180}\pi r \text{ (if angle is in degrees)} \\ r\theta \quad \text{(if angle is in radians)} \end{cases}$ In the radian system for angular measurement, 2π radians $= 360°$ $\Rightarrow$ 1 radian $= \dfrac{180°}{\pi}$ $\Rightarrow 1° = \frac{\pi}{180}$radians Hence, Angle in Degrees = Angle in
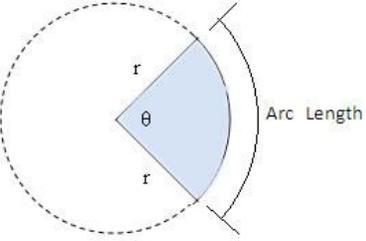
		Radians $\times \frac{180°}{\pi}$ Angle in Radians = Angle in Degrees $\times \frac{\pi}{180°}$
Ellipse	Major axis length $= 2a$ Minor axis length $= 2b$	Area $= \pi ab$ Perimeter $\approx 2\pi\sqrt{\frac{a^2+b^2}{2}}$
Rectangular Solid	l =length w =width h =height	Total Surface Area $\qquad = 2lw + 2wh + 2hl$ $= 2(lw + wh + hl)$ Volume $= lwh$
Cube	s = edge	Total Surface Area $= 6s^2$ Volume $= s^3$
Right Circular Cylinder	h = height r = radius of base	Lateral Surface Area $= (2\pi r)h$ Total Surface Area $= (2\pi r)h + 2(\pi r^2)$ Volume $= (\pi r^2)h$
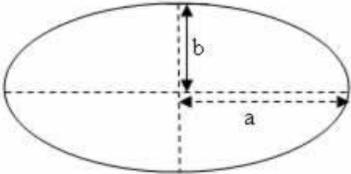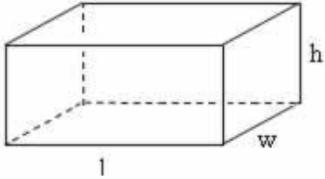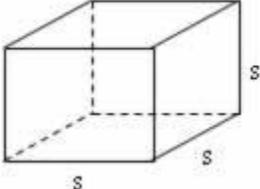
Pyramid 	h = height B = area of the base	Total Surface Area = B + Sum of the areas of the triangular sides Volume = $\frac{1}{3}Bh$
Right Circular Cone 	h = height r = radius of base	Lateral Surface Area = $\pi r\sqrt{h^2 + r^2} = \pi rs$ where s is the slant height $= \sqrt{h^2 + r^2}$ Total Surface Area = $\pi r\sqrt{h^2 + r^2} + \pi r^2$ $= \pi rs + \pi r^2$
Sphere 	r = radius d = diameter	$d = 2r$ Surface Area = $4\pi r^2 = \pi d^2$ Volume = $\frac{4}{3}\pi r^3 = \frac{1}{6}\pi d^3$
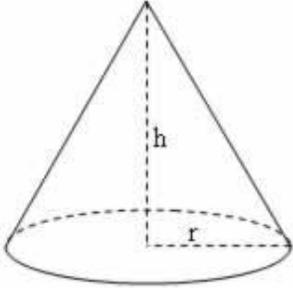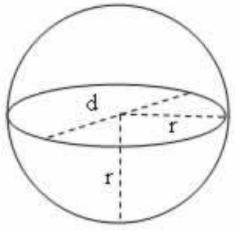
Examples:

1. An error 2% in excess is made while measuring the side of a square. What is the percentage of error in the calculated area
of the square?

Answer:

$$\text{Percentage error in calculated area} = \left(2 + 2 + \frac{2\times2}{100}\right)\% = 4.04\%$$

2. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the
park has been used as a lawn. The area of the lawn is 2109 sq. m. what is the width of the road?

Answer:
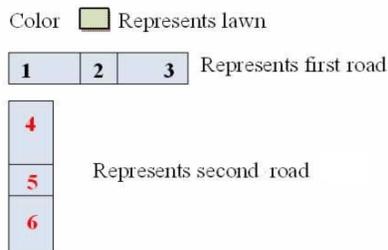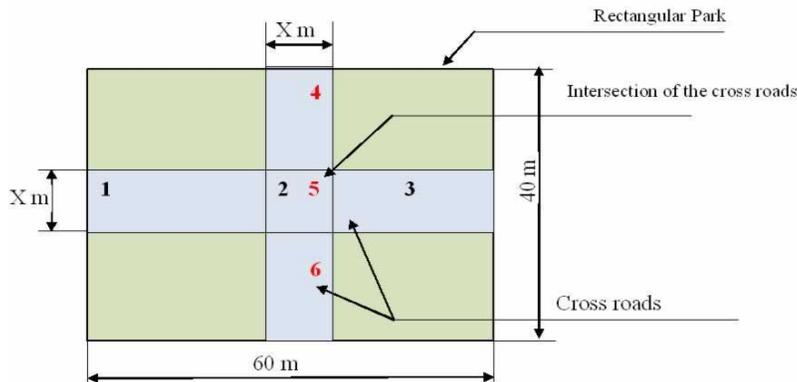
Please refer the diagram given above.

$$\text{Area of the park} = 60 \times 40 = 2400m^2 ; \quad \text{Given that area of the lawn} = 2109m^2$$

$$\therefore \text{Total area of the cross roads} = 2400 - 2109 = 291m^2$$

Assume that the width of the cross roads $= x$

Then, total area of the cross roads

$= Area\ of\ road\ 1\ +\ Area\ of\ road\ 2\ -\ (Common\ area\ of\ the\ cross\ roads)$

$= 60x + 40x - x^2$

Now, we have

Total area of cross roads $= 60x + 40x - x^2$; But total area of the cross roads $= 291m^2$

Hence,

$60x + 40x - x^2 = 291$; $\Rightarrow 100x - x^2 = 291$: $\Rightarrow x^2 - 100x + 291 = 0$;

$\Rightarrow (x - 97)(x - 3) = 0$

$\Rightarrow x = 3$ (x cannot be 97 as the park is only 60 m long and 40 m wide)

3. A towel, when bleached, lost 20% of its length and 10% of its breadth. What is the percentage decrease in area?

Answer:

percentage change in area $= \left(-20 - 10 + \frac{20 \times 10}{100}\right)\% = -28\%$

i.e., area is decreased by 28%

4. A rectangular field has to be fenced on three sides leaving a side of 20 feet uncovered. If the area of the field is 680

sq. feet, how many feet of fencing will be required?

Answer:

Area of the field = 680 sq. feet.

Length of the adjacent sides are 20 feet and $\frac{680}{20} = 34$ feet.

Required length of the fencing $= 20 + 34 + 34 = 88\ feet$

5. The area of a rectangular plot is 460 square metres. If the length is 15% more than the breadth, what is the breadth

Of the plot?

Answer:

$lb = 460\ m^2 \cdots (1)$; Let breadth $= b$

Then length, $l = b \times \frac{(100+15)}{100} = \frac{115b}{100} \cdots (2)$

From (1) and (2),

$$\frac{115b}{100} \times b = 460 \quad ; \quad b^2 = \frac{46000}{115} = 400 ; \quad \Rightarrow b = \sqrt{400} = 20m.$$

6. The length of a room is 5.5 m and width is 3.75 m. What is the cost of paying the floor by slabs at the rate of Rs.800
per sq. metre.

Answer:

Area $= 5.5 \times 3.75$ sq. metre.

$\qquad$ Cost for 1 sq. metre. $\quad = Rs. 800$

Hence, Total cost $= 5.5 \times 3.75 \times 800 = 5.5 \times 3000 = Rs. 16500$

7. A room 5 m44 cm long and 3 m74 cm broad needs to be paved with square tiles. What will be the least number of
square tiles required to cover the floor?

Answer:

length$= 5\ m\ 44\ cm\ = 544\ cm \quad ; \quad$ breadth $= 3\ m\ 74\ cm\ = 374\ cm$

$\qquad$ Area $= 544 \times 374\ cm^2$

$\qquad$ Now we need to find out HCF(Highest Common Factor) of 544 and 374.

$\qquad$ Let's find out the HCF using long division method for quicker results.

```
374) 544 (1
     374
     ———
     170) 374 (2
          340
          ———
          34) 170 (5
              170
              ———
                0
```

$\qquad$ Hence, HCF of 544 and 374= 34 ; Therefore, side length of largest square tile = 34 cm

$\qquad$ Area of each square tile $= 34 \times 34\ cm^2$

Number of tiles required $= \frac{544 \times 374}{34 \times 34} = 16 \times 11 = 176$.

8. A circle is inscribed in an equilateral triangle of side 24 cm, touching its sides. What is the area of the remaining portion of the triangle?

Answer:
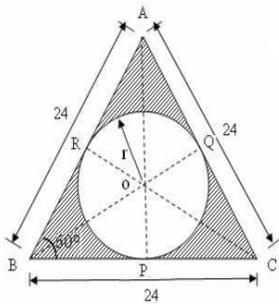
Area of an equilateral triangle $= \frac{\sqrt{3}}{4} a^2$; where a is length of one side of the equilateral triangle

Area of the equilateral Δ ABC $= \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} 24^2 = 144\sqrt{3} cm^2 \quad \cdots (1)$

Area of a triangle $= \frac{1}{2} bh$; where b is the base and h is the height of the triangle

Let r = radius of the inscribed circle.

Then, Area of $\Delta\, ABC = Area\, of\, \Delta\, OBC + Area\, of\, \Delta\, OCA + area\, of\, \Delta\, OAB$

$$= \left(\frac{1}{2} \times r \times BC \right) + \left(\frac{1}{2} \times r \times CA \right) + \left(\frac{1}{2} \times r \times AB \right)$$

$$= \frac{1}{2} \times r \times (BC + CA + AB) = \frac{1}{2} \times r \times (24 + 24 + 24)$$

$$= \frac{1}{2} \times r \times 72 = 36r\, cm^2 \qquad \cdots (2)$$

From (1) and (2), $144\sqrt{3} = 36r \Rightarrow \frac{144\sqrt{3}}{36} = 4\sqrt{3} \dots (3)$

From (3), area of the inscribed circle $= \pi r^2 = \pi \left(4\sqrt{3}\right)^2 = 48\pi \dots (4)$

Hence, area of the remaining portion of the triangle = Area of Δ ABC − Area of inscribed circle

$$= 144\sqrt{3} - 48\pi cm^2$$

9. What will be the length of the longest rod which can be placed in a box of 80 cm length, 40 cm breadth and 60cm height?

Answer:

Length of the longest rod that can be placed in a box of length l, breadth b and height h

$$= \sqrt{l^2 + b^2 + h^2}$$

Therefore, length of the longest rod $= \sqrt{80^2 + 40^2 + 60^2} = \sqrt{11600}$ cm

10. The length of a rectangular plot is 20 meters more than its breadth. If the cost of fencing the plot @Rs.26.50 per meter is Rs.5300, what is the length of the plot in meters?

Answer:

Length of the fence $= \frac{5300}{26.50} = 200m$

$\Rightarrow 2$(length + breadth) $= 200$ m

$\Rightarrow 2$(breadth + 20 + breadth) $= 200$ m ($\because$ length = breadth+20)

$\Rightarrow$ breadth + 20 + breadth $= 100$ m

$\Rightarrow$ breadth $= 40$ m

length $= 40 + 20 = 60\ m$

Exercise:

1. If the length of a rectangle is halved and its breadth is tripled, what is the percentage change in its area?

A. 25% increase   B. 25% decrease   C. 50% decrease

D. 50% increase

2. A person walked diagonally across a square plot. Approximately, what was the percent saved by not walking along the edges?

A. 35%   B. 30%   C. 20%

D. 25%

3. A rectangular parking space is marked out by painting three of its sides. If the length of the unpainted side is 9 feet, and

the sum of the lengths of the painted sides is 37 feet, find out the area of the parking space in square feet?

A. 126 sq. ft.   B. 64 sq. ft.   C. 100 sq. ft.   D. 102 sq. ft.

4. A large field of 700 hectares is divided into two parts. The difference of the areas of the two parts is one-fifth of the
average of the two areas. What is the area of the smaller part in hectares?

A. 400   B. 365   C. 385   D. 315

5. The length of a rectangle is twice its breadth. If its length is decreased by 5 cm and breadth is increased by 5 cm, the
area of the rectangle is increased by 75 sq.cm. What is the length of the rectangle?

A. 18 cm   B. 16 cm   C. 40 cm   D. 20 cm

6. If a square and a rhombus stand on the same base, then what is the ratio of the areas of the square and the rhombus?

   A. equal to $\frac{1}{2}$ B. equal to $\frac{3}{4}$ C. greater than 1   D. equal to 1

7. The breadth of a rectangular field is 60% of its length. If the perimeter of the field is 800 m, find out the area of the
field.

A. 37500 m^2 B. 30500 m^2 C. 32500 m^2 D. 40000 m^2

8. The ratio between the length and the breadth of a rectangular park is 3:2. If a man cycling along the boundary of the
park at the speed of 12 km/hr completes one round in 8 minutes, then what is the area of the park (in sq. m)?

A. 142000   B. 112800   C. 142500   D. 153600

9. What is the percentage increase in the area of a rectangle, if each of its sides is increased by 20%?

A. 45%   B. 44%   C. 40%
D. 42%

10. If the difference between the length and breadth of a rectangle is 23 m and its perimeter is 206 m, what is its area?

A. 2800 m^2 B. 2740 m^2 C. 2520 m^2 D. 2200 m^2

11. The ratio between the perimeter and the breadth of a rectangle is 5:1. If the area of the rectangle is 216 sq. cm, what
is the length of the rectangle?
A. 16 cm   B. 18 cm   C. 14 cm   D. 20 cm

12. What is the least number of square tiles required to pave the floor of a room 15 m 17 cm long and 9 m 2 cm
broad?
A. 814   B. 802   C. 836   D. 900

13. The diagonal of the floor of a rectangular room is $7\frac{1}{2}$ feet. The shorter side of the room is $4\frac{1}{2}$ feet. What is the area
of the room?
A. 27 sq. ft. B. 22 sq. ft.   C. 24 sq. ft.   D. 20 sq. ft.

14. The diagonal of a rectangle is $\sqrt{41}$ cm and its area is 20 sq. cm. What is the perimeter of the rectangle?

A. 16 cm   B. 10 cm   C. 12 cm   D. 18 cm

15. A tank is 25 m long, 12 m wide and 6 m deep. What is the cost of plastering its walls and bottom at the rate of 75
paise per sq.m?
A. Rs.558   B. Rs.502   C. Rs.516   D. Rs.612

16. It is decided to construct a 2 meter broad pathway around a rectangular plot on the inside. If the area of the plot is 96sq.m. and the rate of construction is Rs.50 per square meter, what will be the total cost of construction?
A. Rs.3500   B. Rs.4200   C. Insufficient Da
D. Rs.4400

17. The area of a parallelogram is 72 cm^2 and its altitude is twice the corresponding base. What is the length of the base?
A. 6 cm   B. 7 cm   C. 8 cm   D. 12 cm

18. Two diagonals of a rhombus are 72 cm and 30 cm respectively. What is its perimeter?

A. 136 cm   B. 156 cm   C. 144 cm   D. 121 cm

19. The base of a parallelogram is $(p + 4)$, altitude to the base is $(p - 3)$ and the area is $(p^2 - 4)$,find out its actual area.

A. 40 sq. units   B. 54 sq. units   C. 36 sq. units   D. 60 sq. units

20. A rectangular plot measuring 90 meters by 50 meters needs to be enclosed by wire fencing such that poles of the
fence will be kept 5 meters apart. How many poles will be needed?
A. 30   B. 44   C. 56   D. 60

Answers :

1) D	5) C	9) B	13) A	17) A
2) B	6) C	10) C	14) D	18) B
3) A	7) A	11) B	15) A	19) D
4) D	8) D	12) A	16) C	20) C

ABBREVIATIONS

S.No	Shortform	Expansion
	AACI	Airport Association Council International
	AAFI	Amateur Athletics Federation of India
	AAGSP	All Assam GanaSangramParishad
	AAPSO	Afro-Asian Peoples Solidarity Organisation
	AASU	All Assam Students Union
	ABM	Anti Ballistic Missile
	ABCDE	Annual Bank Conference on Development Economics
	ABSU	All Bodo Students Union
	ABT	Availability Based Tariff
	AC	Alternate Current or Ashok Chakra or Air Conditioner or Antarctic Club
	AD	Ano Domini (After the birth of Jesus)
	ADA	Air Defence Artillery
	ADB	Asian Development Bank
	AERE	Atomic Energy Research Establishment
	AEO	American Eagle Outfitters
	AFLP	Accelerated Female Literacy
	AFPPD	Asian Forum of Parliamentarians on Population & Development
	AGF	Asian Games Federation
	AGOC	Asian Games Organization Committee
	AICC	All India Congress Committee
	AICTE	All India Council of Technical Education
	AICCTU	All India Central Council of Trade Unions
	AICI	Agricultural Insurance Corporation of India
	AIDS	Acquired Immune Deficiency Syndrome
	AIFF	All India Football Federation
	AIIMS	All India Institute of Medical Sciences
	AIL	Aeronautics India Limited
	AIMPLB	All India Muslim Personal Law Board
	AINEC	All India Newspapers Editors Conference
	AIR	All India Radio
	AITUC	All India Trade Union Congress
	ALH	Advanced Light Helicopter
	AM	Anti Meridian (Before Noon)

	AMIE	Associate Member of the Institute of Engineers
	ANC	African National Congress
	APNN	Asian Pacific News Network
	APEC	Asian Pacific Economic Cooperation
	APPLE	Asian Passenger Payload Experiment
	APPU	Asian Pacific Postal Union
	ARF	Asian Regional Forum
	ARDS	Acute Respiratory Distress Syndrome
	ASEAN	Association of South East Asian Nations
	ASLV	Augmented Satellite Launch Vehicle
	ASI	Archaeological Survey of India
	ASSOCHAM	Associated Chamber of Commerce and Industry (India)
	AWACS	Airborne Warning and Control System
	ATCI	Air Time Committee of India
	ATF	Aviation Turbine Fuel
	ATPLO	All Tripura Peoples Liberation Organisation
	ATS	Anti Tetanus Serum
	ATTF	All Tripura Tribal Force
	AVARD	Association of Voluntary Agencies for Rural Development

III

year

	SYED AMMAL ENGINEERING COLLEGE
	SYED AMMAL ENGINEERING COLLEGE **RAMANATHAPURAM**
	Accreditated by NBA:EEE,ECE,CSE & MECH
	ISO 9001:2015 Certified Institution

III Year Engineering Classes

Aptitude for Placement and Training

Aim:

Students should be able to apply any problems in real life based on Simple interest, Compound interest , Probability , Volume , Calendar ,Logo problems to clear the preliminary test and in major examination towards placement.

Objectives:

> ➢ To understand the Word problems.
> ➢ To analyze the Simple, Compound interest of the situations.
> ➢ To solve the Probability &Calendar.
> ➢ To calculate the Volume of the particular region.
> ➢ To know about different types of problems and decision making.

Syllabus:

       Unit I : Simple interest, Compound interest

       Unit II : Probability

       Unit III: Volume

       Unit IV: Calendar

       Unit V : Logo

Expected Outcome:

The candidates will be able to all types of number problems which frequently occur in day today life and in the competitive examinations.

UNIT- I
SIMPLE INTEREST

The formula for calculating simple interest is:
Simple Interest = Principal x Interest Rate x Term of the loan
$$= P \times I \times N$$

Examples:

1. How much time will it take for an amount of Rs. 900 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

a)3 years   b) 1years   c) 2 years   d) 4 years

Explanation :

P = Rs.900

SI = Rs.81

T = ?

R = 4.5%

T$= (\frac{100 \times SI}{PR})$ $=\frac{100 \times 81}{900 \times 4.5}$ =2 years

2. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:

a) Rs. 650   b) Rs. 690   c) Rs. 698   d) Rs. 700

Explanation

S.I. for 1 year = Rs. (854 - 815) = Rs. 39.

S.I. for 3 years = Rs.(39 x 3) = Rs. 117.

Principal = Rs. (815 - 117) = Rs. 698.

3.Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?

a) Rs. 6400   b) Rs. 6500   c) Rs. 7200   d) Rs. 7500

Explanation:

Let the sum invested in Scheme A be Rs. x and that in Scheme B be Rs. (13900 - x).

Then $\left(\frac{x \times 14 \times 2}{100}\right) + \left(\frac{[13900-x] \times 11 \times 2}{100}\right)$

$\Rightarrow$28x - 22x = 350800 - (13900 x 22)

$\Rightarrow$6x = 45000

$\Rightarrow x = 7500.$

So, sum invested in Scheme B = Rs. (13900 - 7500) = Rs. 6400.

4. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

a)3.5 years   b) 4 years   c) 4.5 years   d) 5 years

Explanation:

Time = $\frac{100 \times 81}{450 \times 4.5}$ years = 4 years

5.Reena took a loan of Rs. 1200 with simple interest for as many years as the rate of interest. If she paid Rs. 432 as interest at the end of the loan period, what was the rate of interest?

a)3.6   b) 6   c) 18   d) cannot be determined   e)None of these

Explanation:

Let rate = R% and time = R years.

Then , $\frac{1200 \times R \times R}{100}$ =432

$\Rightarrow 12R^2 = 432$

$\Rightarrow R^2 = 36$

$\Rightarrow R = 6.$

6. A sum of Rs. 12,500 amounts to Rs. 15,500 in 4 years at the rate of simple interest. What is the rate of interest?

a)3%   b) 4%   c) 5%   d) 6%   e)None of these

Explanation:

S.I. = Rs. (15500 - 12500) = Rs. 3000.

Rate = $\left(\frac{100 \times 3000}{12500 \times 4}\right)\%$ =6%

7. An automobile financier claims to be lending money at simple interest, but he includes the interest every six months for calculating the principal. If he is charging an interest of 10%, the effective rate of interest becomes:

a)10%   b) 10.25%   c) 10.5%   d)None of these

Explanation:

Let the sum be Rs. 100. Then,

S.I. for first 6 months = Rs.$\left(\frac{100 \text{ x } 10 \text{ x } 1}{100 \text{ x } 2}\right)$= Rs. 5

S.I. for last 6 months = Rs.$\left(\frac{105 \text{ x } 10 \text{ x } 1}{100 \text{ x } 2}\right)$= Rs. 5.25

So, amount at the end of 1 year = Rs. (100 + 5 + 5.25) = Rs. 110.25

∴ Effective rate = (110.25 - 100) = 10.25%

8. A lent Rs. 5000 to B for 2 years and Rs. 3000 to C for 4 years on simple interest at the same rate of interest and received Rs. 2200 in all from both of them as interest. The rate of interest per annum is:

a)5%   b) 7%   c) $7\dfrac{1}{8}$ %   d)10%

Explanation:

Let the rate be R% p.a.

Then, $\left(\dfrac{5000 \times R \times 2}{100}\right) + \left(\dfrac{3000 \times R \times 4}{100}\right) = 2200.$

$\Rightarrow 100R + 120R = 2200$

$\Rightarrow R = \left(\dfrac{2200}{220}\right) = 10.$

∴ Rate = 10%.

9. A sum of Rs. 725 is lent in the beginning of a year at a certain rate of interest. After 8 months, a sum of Rs. 362.50 more is lent but at the rate twice the former. At the end of the year, Rs. 33.50 is earned as interest from both the loans. What was the original rate of interest?

a)3.6%   b) 4.5%   c) 5%   d) 6%   e)None of these

Explanation:

Let the original rate be R%. Then, new rate = (2R)%.

Here, original rate is for 1 year(s); the new rate is for only 4 months i.e. $\dfrac{1}{3}$ year(s).

∴ $\left(\dfrac{725 \times R \times 1}{100}\right) + \left(\dfrac{362.50 \times 2R \times 1}{100 \times 3}\right) = 33.50$

$\Rightarrow (2175 + 725)\,R = 33.50 \times 100 \times 3$

$\Rightarrow (2175 + 725)\,R = 10050$

$\Rightarrow (2900)R = 10050$

$\Rightarrow R = \dfrac{10050}{2900} = 3.46$

∴ Original rate = 3.46% Ans: E None of these

10. A man took loan from a bank at the rate of 12% p.a. simple interest. After 3 years he had to pay Rs. 5400 interest only for the period. The principal amount borrowed by him was:

a)2,000   b)10,000   c)15,000   d)20,000

Explanation:

$$\text{Principal} = \text{Rs.}\left[\frac{100 \times 5400}{12 \times 3}\right] = \text{Rs.}15000.$$

EXERCISE
1. A   sum of money amounts to Rs. 9800 after 5 years and Rs. 12005 after 8 years at the same rate of simple interest. The rate of interest per annum is:
a)5%   b) 8%   c) 12%   d) 15%

2. What will be the ratio of simple interest earned by certain amount at the same rate of interest for 6 years and that for 9 years?
a)1:3   b) 1:4   c) 2:3   d)Data inadequate   e)None of these

3. A certain amount earns simple interest of Rs. 1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned?
a)Rs.35   b) Rs.245   c) Rs.350   d)cannot be determined   e)None of these

4. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at $6\frac{1}{4}$ p.a for 2 years. Find his gain in the transaction per year.
a)Rs.112.50   b) Rs.125   c) Rs.150   d)Rs.167.50

5. How much time will it take for an amount of Rs. 900 to yield Rs. 81 as interest at 4.5% per annum of simple interest?
a)2 years   b) 3 years   c) 1 years   d) 4 years

6.Arun took a loan of Rs. 1400 with simple interest for as many years as the rate of interest. If he paid Rs.686 as interest at the end of the loan period, what was the rate of interest?
a)8%   b) 6%   c) 4%   d) 7%

7. What will be the ratio of simple interest earned by certain amount at the same rate of interest for 5 years and that for 15 years?

a)3:2   b) 1:3   c) 2:3   d)3:1

8. A man took loan from a bank at the rate of 8% p.a. simple interest. After 4 years he had to pay Rs. 6200 interest only for the period. The principal amount borrowed by him was:
a)17732   b) 20245   c)18230   d)19375

9. What annual payment will discharge a debt of Rs. 6450 due in 4 years at 5% per annum?
a)Rs 1500   b)Rs 1400   c) Rs 1800   d) Rs 1600

10. A lends Rs. 1500 to B and a certain sum to C at the same time at 8% per annum simple interest. If after 4 years, A altogether receives Rs. 1400 as interest from B and C, then the sum lent to C is
a)Rs 2875   b) Rs 1885   c) Rs 2245   d) Rs 2615

11. Simple interest on a certain sum is 16/25 of the sum. Find the rate percent and time, If both are numerically equal.
a) Rate = 7% and Time = 7 years.   b) Rate = 8% and Time = 8 years.
c) Rate = 6% and Time = 6 years.   d) Rate = 5% and Time = 5 years.

12. A certain sum of money amounts to Rs 1008 in 2 years and to Rs 1164 in 3 ½ years. Find the sum and the rate of interest.
a) 800, 14%   b) 800, 13%   c) 800, 12%   d) 800, 19%

13. A sum of Rs.1550 was lent partly at 8% p.a. simple interest. The total interest received after 3 years was Rs.300. The ratio of the money lent at 5% to that lent at 8% is :
a) 5:8   b) 6:7   c) 16:15   d) 17:18

14. A sum was put at simple interest at a certain rate for 3 years. Had it been put at 2% higher rate, it would have fetched Rs 360 more. Find the sum.
a) Rs.4000   b) Rs.9000   c) Rs.5000   d) Rs.6000

15. The difference between the simple interest received from two different sources on Rs.1500 for 3 years is Rs.13.50. The difference between their rates of interest is
a) 0.1%   b) 0.2%   c) 0.3%   d)0.4%

16. A sum of money amounts to Rs. 9800 after 5 years and Rs. 12005 after 8 years at the same rate of simple interest. The rate of interest per annum is:
a) 5%   b) 8%   c) 12%   d)15%

17. At what rate of compound interest per annum will a sum of rs.1200 becomes rs.1348.32 in 2 years

a) 6%   b) 6.5%   c) 7%   d)7.5%

18. A person takes a loan of Rs. 200 at 5% simple interest. He returns Rs.100 at the end of one year. In order clear his dues at the end of 2 years, he would pay :

a) Rs.100   b) Rs.105   c) Rs.115   d) Rs.110

19**.** How long will it take for a sum of money to grow from Rs.1250 to Rs.10,000, if it is invested at 12.5% p.a simple interest?

a) 65years   b) 56years   c) 45years   d) 57years

20. A Certain sum of money an amounts to Rs 2500 in a span Of 5 years and further to Rs.3000 in a span of 7 years at simple interest The sum is ?

a) Rs. 1800   b) Rs. 2000   c) Rs. 1400   d) Rs. 1250

21. A sum of money triples itself in 8 years simple interest. Find the rate of percent per annum?

a) 30%   b) 25%   c) 22%   d) 18%

22. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

a) 3.5 years   b) 4 years   c) 4.5 years   d) 5 years

23. The simple interest on Rs. 25 for 4 months at the rate of 3 paise per rupee per month is :

a) 240 paise   b) Rs. 1.40   c) Rs. 2.20   d) Rs. 3

ANSWERS

1) c   2) c   3) d   4) a   5) a   6) d   7) b

8) d   9) a   10) a   11) b   12) b   13) c   14) d

15) c   16) c   17) b   18) b   19) d   20) b   21) b

22) b   23) d

COMPOUND INTEREST

Let P be the principal, R be the interest rate percent per annum and N be the time period.

1.Compound Interest $= p(1 + \frac{R}{100})^N - p$

2.Amount = Principal + Interest

Examples

1.Find compound interest on Rs. 8000 at 15% per annum for 2 years 4 months, compounded annually

a) 2109   b) 3109   c) 4109   d) 6109

Explanation:
Time = 2 years 4 months = 2(4/12) years = 2(1/3) years.
Amount = Rs'. [8000 X (1+(15/100))^2 X (1+((1/3)*15)/100)]
=Rs. [8000 * (23/20) * (23/20) * (21/20)]
= Rs. 11109. .
:. C.I. = Rs. (11109 - 8000) = Rs. 3109.

2. A sum of money lent at compound interest for 2 years at 20% per annum would fetch Rs.482 more, if the interest was payable half yearly than if it was payable annually . The sum is

a) 10000   b) 20000 c) 40000   d) 50000

Explanation:
Let sum=Rs.x
C.I. when compounded half yearly = [$x(1+10/100)^4 - x$]=4641/10000
C.I. when compounded annually =[$x(20/100)^2 - x$]=1125
 (4641/10000)x−(11/25)$x = 482$
=> x=20000
3. A sum of money amounts to Rs.6690 after 3 years and to Rs.10,035 after 6 years on compound interest. find the sum.
a) 4360   b) 4460   c) 4560   d)4660

Explanation:
Let the sum be Rs.P.then
P(1+R/100)^3=6690…(i) and P(1+R/100)^6=10035…(ii)

On dividing ,we get $(1+R/100)^3=10025/6690=3/2$.
Substituting this value in (i),we get:
P*(3/2)=6690 or P=(6690*2/3)=4460
Hence ,the sum is rs.4460.

4. The difference between compound interest and simple interest on a sum for two years at 8% per annum, where the interest is compounded annually is Rs.16. if the interest were compounded half yearly , the difference in two interests would be nearly
a) Rs.24.64   b) Rs.21.85   c) Rs.16   d) Rs.16.80

Explanation:
For 1st year S.I =C.I.
Thus, Rs.16 is the S.I. on S.I. for 1 year, which at 8% is thus Rs.200
 i.e S.I on the principal for 1 year is Rs.200
Principle = $Rs.(100*200)/(8*1)$
= Rs.2500
Amount for 2 years, compounded half-yearly
 $Rs.[2500*(1+4/100)^4]=Rs.2924.4$
C.I = Rs.424.64
Also, $S.I=Rs.((2500*8*2)/100)=Rs.400$
Hence, [(C.I) - (S.I)] = Rs. (424.64 - 400) = Rs.24.64

5.The compound interest on rs.30000 at 7% per annum is Rs.4347. The period is
a)2 years   b) 2.5 years   c) 3 years   d) 4 years
Explanation:
Amount = Rs.(30000+4347) = Rs.34347
let the time be n years
Then,$30000(1+7/100)^n = 34347$
$(107/100)^n = 34347/30000 = 11449/10000 = (107/100)^2$
∴n = 2years

6. Find the compound interest on Rs. 10,000 in 2 years at 4% per annum, the interest being compounded half-yearly.
a)524.32   b)624.32   c)724.32   d)824.32

Explanation:
Principal = Rs. 10000; Rate = 2% per half-year; Time = 2 years = 4 half-years.
Amount == Rs. 10824.32.
 $Rs.[10000*(1+2/100)^4]=Rs.[10000*51/50*51/50*51/50*51/50]$
∴ C.I. = Rs. (10824.32 - 10000) = Rs. 824.32.

7.Reena took a loan of Rs. 1200 with simple interest for as many years as the rate of interest. If she paid Rs. 432 as interest at the end of the loan period, what was the rate of interest?
a)3.6   b)6   c)18   d)cannot be determined

Explanation:
Let rate = R% and time = R years.
Then, ((1200*R*R)/100)=432
$12R^2$=432
=>R^2=36⟺R=6

8. What annual payment will discharge a debt of Rs.7620 due in 3years at$16\frac{2}{3}$ % per annum interest?
a)5430   b)4430   c)3430   d)2430

Explanation:
Let each installment be Rs.x. Then,
(P.W. of Rs.x due 1 year hence) + (P.W of Rs.x due 2 years hence) +
 (P.W of Rs. X due 3 years hence) = 7620.
$[x/(1+(50/3x100))]+[x/(1 +(50/3x100)^2)]+[x/(1 +(50/3x100)^3)] = 7620$
(6x/7)+(36x/49)+(216x/343)=7620
 294x + 252x + 216x = 7620 * 343
 => x = 3430
 Amount of each installment = Rs.3430

9. If the simple interest on a sum of money at 5% per annum for 3 years is Rs. 1200, find the compound interest on the same sum for the same period at the same rate.
a)1261   b)1271   c)1281   d)1291

Explanation:
Clearly, Rate = 5% p.a., Time = 3 years, S.I.=Rs. 1200. . .
So principal=RS [100*1200]/3*5=RS 8000
Amount = Rs. 8000 x [1 +5/100]^3 - = Rs. 9261.
C.I. = Rs. (9261 - 8000) = Rs. 1261.

10. The compound interest on a sum of money for 2 years is rs.832 and the simple interest on the same sum for the same period is rs.800 .the difference between the compound interest and simple interest for 3 years

a) Rs.48   b) Rs.66.56   c) Rs.98.56   d)None of these

Explanation:

difference in C.I and S.I in 2years =Rs.32

S.I for 1year =Rs.400

S.I for Rs.400 for one year =Rs.32

rate=(100×32)/(400×1)%=8%

difference between in C.I and S.I for 3rd year

=S.I on Rs.832= Rs.(832×8×1)/100=Rs.66.56

EXERCISE

1. Find the compound interest on Rs. 16,000 at 20% per annum for 9 months, compounded quarterly

a) 2422   b) 2522   c) 2622   d) 2722

2. On a sum of money, the simple interest for 2 years is Rs. 660,while the compound interest is Rs.696.30,the rate of interest being the same in both the cases. The rate of interest is

a)10%   b)11%   c)12%   d)13%

3. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate

a) Rs.4972   b) Rs.3972   c) Rs.5972   d) Rs.2972

4. The population of a town was 3600 three years back. It is 4800 right now. What will be the population three years down the line, if the rate of growth of population has been constant over the years and has been compounding annually?

a) Rs.6000   b) Rs.6400   c) Rs.6500   d) Rs.6600

5. A man invests Rs.5000 for 3 years at 5% p.a. compound interest reckoned yearly. Income tax at the rate of 20% on the interest earned is deducted at the end of each year. Find the amount at the end of the third year

a) Rs.5624.32   b) Rs.5423   c) Rs.5634   d) Rs.5976

6. In what time will Rs. 1000 become Rs. 1331 at 10% per annum compounded annually?

a) 1years   b) 2years   c) 3years   d) 4years

7. The difference between the compound interest and the simple interest on a certain sum at 12% p.a. for two years is Rs.90. What will be the value of the amount at the end of 3 years?

a)8560   b)8673   c)8746   d) 8780.80

8. Divide Rs. 1301 between A and B, so that the amount of A after 7 years is equal to the amount of B after 9 years, the interest being compounded at 4% per annum.

a) Rs.625   b) Rs.626   c) Rs.286   d) Rs.627

9. The difference between simple interest and compound interest on Rs. 1200 for one year at 10% per annum reckoned half yearly is
a) Rs.2.50   b) Rs.3   c) Rs.4   d) Rs.4.50

10. Find compound interest on Rs. 7500 at 4% per annum for 2 years, compounded annually.
a) 612   b) 712   c) 812   d) 912

11. The principal that amounts to Rs.4913 in 3 years at $4\frac{1}{3}$% per annum compound interest compounded annually is
a) Rs.3096   b) Rs.4076   c) Rs.4085   d) Rs.4096

12. The present worth of Rs.169 due in 2 years at 4% per annum compound interest is
a) Rs.156.25   b) Rs.150   c) Rs.140   d) Rs.125.25

13. What will Rs.1500 amount to in three years if it is invested in 20% p.a. compound interest, interest being compounded annually?
a) Rs.2592   b) Rs.2492   c) Rs.2392   d) Rs.2292

14. What is the difference between the compound interests on Rs. 5000 for 1 1/2 years at 4% per annum compounded yearly and half-yearly?
a) 2.04   b) 3.04   c)4.04   d)5.04

15. Rs.100 doubled in 5 years when compounded annually. How many more years will it take to get another Rs.200 compound interest
a) 3 years   b) 5 years   c) 6 years   d) 7 years

16. A sum of money invested at compound interest amounts to Rs. 800 in 3 years and to Rs. 840 in 4 years. The rate of interest per annum is
a)6%   b)4%   c)5%   d)7%

17. Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:
a) Rs.1550   b) Rs.1650   c) Rs.1750   d) Rs.1850

18. The effective annual rate of interest corresponding to a nominal rate of 6% per annum payable half-yearly is
a)6.06%   b)6.07%   c)6.08%   d)6.09%

19. If you deposit $4000 into an account paying 6% annual interest compounded quarterly, how much money will be in the account after 5 years ?

a) 3387.42   b) 4387.42   c) 5387.42   d) 6387.42

20. If the compound interest on a certain sum at $16\frac{2}{3}$% to 3 years is Rs.1270, find the simple interest on the same sum at the same rate and f or the same period.

a)1080   b)1090   c)1180   d)1190

21. The least number of complete years in which a sum of money put out at 20% compound interest will be more than doubled is:

a)3   b)4   c)5   d)6

22. A sum is being lent at 20 % per annum compound interest.what is the ratio of increase in amount of 4th year to 5th year?

a) 4:5   b) 5:4   c) 5:6   d)cannot be determined

23.Rs 1000 is being charged at 50% per annum. what is the interest for 3rd year at compound interest?

a)1122   b)1025   c)1125   d)625

ANSWERS

1) b   2) b   3) b   4) b   5) a   6) c   7) d

8) a   9) b   10) a   11) d   12) a   13) a   14) a

15) b   16) c   17) c   18) d   19) c   20) a   21) b

22) c   23) c

UNIT- II

PROBABILITY

- *Experiment:*

An operation which can produce some well-defined outcomes is called an experiment.

- *Random Experiment:*

An experiment in which all possible outcomes are known and the exact output cannot be predicted in advance, is called a random experiment.

Examples:

  i.   Rolling an unbiased dice.
  ii. Tossing a fair coin.

Details:

  i.   When we throw a coin, then either a Head (H) or a Tail (T) appears.
  ii.   A dice is a solid cube, having 6 faces, marked 1, 2, 3, 4, 5, 6 respectively. When we throw a die, the outcome is the number that appears on its upper face.
  iii. A pack of cards has 52 cards.

  It has 13 cards of each suit; name *Spades, Clubs, Hearts and Diamonds*.

  Cards of spades and clubs are *black cards*.

  Cards of hearts and diamonds are *red cards*.

  There are 4 honours of each unit.

  There are *Kings, Queens and Jacks*. These are all called *face cards*

- *Sample Space:*

When we perform an experiment, then the set S of all possible outcomes is called the *sample space*.

Examples:

1. In tossing a coin, S = {H, T}
2. If two coins are tossed, the S = {HH, HT, TH, TT}.
3. In rolling a dice, we have, S = {1, 2, 3, 4, 5, 6}

- *Event:*

Any subset of a sample space is called as an *event*.

- *Probability of Occurrence of an Event:*

Let S be the sample and let E be an event.

Then, E $\subseteq$ S.

❖ P(E)=$\frac{n(E)}{n(S)}$

- *Results on Probability:*

  o P(S) = 1
  o 0 $\leq$ P (E) $\leq$ 1
  o P($\emptyset$) = 0
  o For any events A and B we have : P(A $\cup$ B) = P(A) + P(B) - P(A $\cap$ B)
  o If *A* denotes (not-A), then P(*A*) = 1 - P(A).

Examples

1. A bag contains 6 white and 4 black balls .2 balls are drawn at random. Find the probability that they are of same colour.

a) 1/2   b)7/15   c)8/15   d)1/9

Explanation:
Let S be the sample space
Then n(S) = no of ways of drawing 2 balls out of (6+4) =10C2
=(10*9)/(2*1) = 45
Let E = event of getting both balls of same colour
Then, n(E) = no of ways (2 balls out of six) or (2 balls out of 4)
        =6C_2+4C_2

=(6*5)/(2*1)+(4*3)/(2*1)
= 15+6 = 21
Therefore, P(E) = n(E)/n(S) = 21/45 = 7/15

2. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?
a) 1/2   b)3/15   c)9/20   d)8/15

Explanation:
Here, S = {1, 2, 3, 4, ..., 19, 20}.
Let E = event of getting a multiple of 3 or 5 = {3, 6 , 9, 12, 15, 18, 5, 10, 20}.
P(E) = n(E)/n(S) = 9/20.

3. Two dice are tossed. The probability that the total score is a prime number is:
a) 4/12   b)5/12   c) 6/12   d) 7/12

Explanation:
Clearly, n(S) = (6 x 6) = 36.
Let E = Event that the sum is a prime number.
Then E= { (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4,3),(5, 2), (5, 6), (6, 1), (6, 5) }
n(E) = 15.
P(E) = n(E)/n(S) = 15/36 = 5/12.

4. A man and his wife appear in an interview for two vacancies in the same post. The probability of husband's selection is (1/7) and the probability of wife's selection is (1/5). What is the probability that only one of them is selected ?
a) 2/7   b)1/7   c)3/4   d)4/5

Explanation:

Let   A = Event that the husband is selected
and   B = Event that the wife is selected.

Then, $P(A) = \frac{1}{7}$ and $P(B) = \frac{1}{5}$.

∴ $P(\overline{A}) = \left(1 - \frac{1}{7}\right) = \frac{6}{7}$ and $P(\overline{B}) = \left(1 - \frac{1}{5}\right) = \frac{4}{5}$.

∴   Required probability = P [(A and not B) or (B and not A)]

  = P [(A and $\overline{B}$) or (B and $\overline{A}$)]

  = P (A and $\overline{B}$) + P (B and $\overline{A}$)

  = $P(A) \cdot P(\overline{B}) + P(B) \cdot P(\overline{A}) = \left(\frac{1}{7} \times \frac{4}{5}\right) + \left(\frac{1}{5} \times \frac{6}{7}\right) = \frac{10}{35} = \frac{2}{7}$.

5. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red, is:

a) 2/91   b)1/22   c)3/22   d)2/77

Explanation:
Let S be the sample space.
Then, n(S) = number of ways of drawing 3 balls out of 15 = $15C3$
 =(15×14×13)/(3×2×1)
= 455.
Let E = event of getting all the 3 red balls.
 n(E) = $5C3$
 = (5×4×3)/(3×2×1) = 10.
 =>P(E) = n(E)/n(S) = 10/455 = 2/91.

6. In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize?
a) 2/7   b)5/7   c)1/5   d)1/2

Explanation:
Total number of outcomes possible, n(S) = 10 + 25 = 35
Total number of prizes, n(E) = 10
 $P(E)=n(E)/n(S)=10/35=2/7$

7. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected, is:
a) 21/46   b)1/5   c)3/25   d)1/50

Explanation:
Let , S - sample space   E - event of selecting 1 girl and 2 boys.
Then, n(S) = Number ways of selecting 3 students out of 25
            = $25C_3$
            = 2300.
n(E) = $10C1×15C2$ = 1050.
∴P(E) = n(E)/n(s) = 1050/2300 = 21/46

8. Two dice are thrown together .What is the probability that the sum of the number on the two faces is divided by 4 or 6.
a) 7/18   b)14/35   c)8/18   d)7/35

Explanation:

Clearly, n(S) = 6 x 6 = 36

Let E be the event that the sum of the numbers on the two faces is divided by 4 or 6. Then,

E = {(1,3),(1,5),(2,2),(2,4),(2,6),(3,1),(3,3),(3,5),(4,2),(4,4),(5,1),(5,3),(6,2),(6,6)}

n(E) = 14.

Hence, P(E) = n(E)/n(S) = 14/36 = 7/18

9.What is the probability of getting 53 Mondays in a leap year?

a) 1/7　　　　　　　　b)3/7　　　　　　　　c)2/7　　　　　　　　d)1

Explanation:

1 year = 365 days . A leap year has 366 days

A year has 52 weeks. Hence there will be 52 Sundays for sure.

52 weeks = 52 x 7 = 364days

366 – 364 = 2 days

In a leap year there will be 52 Sundays and 2 days will be left.

These 2 days can be:

1. Sunday, Monday
2. Monday, Tuesday
3. Tuesday, Wednesday
4. Wednesday, Thursday
5. Thursday, Friday
6. Friday, Saturday
7. Saturday, Sunday

Of these total 7 outcomes, the favorable outcomes are 2.

Hence the probability of getting 53 days = 2/7

10. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

a) 3/13　　　　　　　　b)1/13　　　　　　　　c)3/52　　　　　　　　d)9/52

Explanation:

Clearly, there are 52 cards, out of which there are 12 face cards.

P (getting a face card) = 12/52=3/13.

EXERCISE

1.Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

a) 3/2 b)29/34 c)47/100 d)13/102

2.A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

a) 3/7 b)4/7 c)1/8 d)3/4

3. In a class, 30% of the students offered English, 20% offered Hindi and 10% offered both. If a student is selected at random, what is the probability that he. has offered English or Hindi ?

a) 1/2 b)3/4 c)4/5 d)2/5

4.If two letters are taken at random from the word HOME, what is the probability that none of the letters would be vowels?

a) 1/6 b)1/2 c)1/3 d)1/4

5. Four dice are thrown simultaneously. Find the probability that all of them show the same face.

a) 1/216 b)1/36 c)2/216 d)4/216

6. Three unbiased coins are tossed. What is the probability of getting at most two heads?

a) 3/4 b)7/8 c)1/2 d)1/4

7. Three unbiased coins are tossed.What is the probability of getting at least 2 heads?

a) 1/4 b)1/2 c)3/4 d)1/3

8. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

a) 1/3 b)3/5 c)8/21 d)7/21

9. A word consists of 9 letters; 5 consonants and 4 vowels. Three letters are chosen at random. What is the probability that more than one vowel will be selected ?

a) 13/42 b)17/42 c)5/42 d)3/14

10. Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?

a) 3/4 b)3/8 c)5/16 d)2/7

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11. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?
a) 10/21   b)11/21   c)1/2   d)2/7

12. What is the probability of getting a sum 9 from two throws of a dice?
a) 1/2   b)3/4   c)1/9   d)2/9

13. Three houses are available in a locality. Three persons apply for the houses. Each applies for one house without consulting others. The probability that all the three apply for the same house is :
a) 2/9   b)1/9   c)8/9   d)7/9

14. A box contains 10 bulbs,of which just three are defective. If a random sample of five bulbs is drawn, find the probability that the sample contains exactly one defective bulb.
a) 5/12   b)7/12   c)3/14   d)1/12

15. Two brother X and Y appeared for an exam. The probability of selection of X is 1/7 and that of B is 2/9. Find the probability that both of them are selected.
a) 1/63   b)1/14   c)2/63   d)1/9

16. In a single throw of two dice , find the probability that neither a doublet nor a total of 8 will appear.
a) 7/15   b)5/18   c)13/18   d)3/16

17. An unbiased die is tossed. Find the probability of getting a multiple of 3.
a) 1/3   b)1/2   c)3/4   d)3/2

18. From a pack of 52 cards, 3 cards are drawn. What is the probability that one is ace, one is queen and one is jack?
a) 19/5525   b) 16/5525   c) 17/5525   d) 7/5525

19. In a race, the odd favour of cars P,Q,R,S are 1:3, 1:4, 1:5 and 1:6 respectively. Find the probability that one of them wins the race.
a) 319/420   b)27/111   c)114/121   d)231/420

20. What is the probability of getting at least one six in a single throw of three unbiased dice?
a) 1/36   b)91/256   c)13/256   d)43/256

21. I forgot the last digit of a 7-digit telephone number. If 1 randomly dial the final 3 digits after correctly dialing the first four, then what is the chance of dialing the correct number?
a) 1/999   b)1/1001   c)1/1000   d)4/1000

22. In a simultaneous throw of two dice, what is the probability of getting a doublet
a) 1/6   b)1/3   c)4/7   d)4/5

23. If a box contains 10 bulbs, of which just three are defective. If a random sample of five bulbs is drawn, find the probability that the sample contains no defective bulbs.
a) 5/12   b)7/12   c)3/14   d)1/12

ANSWERS

2) d	2) b	3) d	4) a	5) a	6) b	7) b
8) a	9) b	10) a	11) a	12) c	13) b	14) a
15) c	16) b	17) b	18) c	19) b	20) d	21) c
22) a	23) d					

UNIT- III
VOLUME
(Base =Area X Height)

1. CUBOID
Let length = l, breadth = b and height = h units. Then,
Volume = (1 x b x h) cubic units.
Diagonal= $\sqrt{l^2 + b^2 + h^2}$ units

2. CUBE
Let each edge of a cube be of length a. Then,
1. Volume= a^3 cubic units.
2. Diagonal= $\sqrt{3}$ a units.

3. CYLINDER
Let radius of base = r and Height (or length) = h. Then,
Volume= $\pi r^2 h$ cubic units.

4. CONE
Let radius of base = r and Height = h. Then,
Volume= (1/3) $\pi r^2 h$ cubic units.

5. SPHERE
Let the radius of the sphere be r. Then,
Volume = (4/3) πr^3 cubic units.

Remember: 1litre = 1000 cm^3

Examples

1. In a shower, 5 cm of rain falls. The volume of water that falls on 1.5 hectares of ground is:

a) 75 cu. m   b) 750 cu. m   c) 7500 cu. m   d) 75000 cu. M

Explanation:
1 hectare = 10,000 m^2
So, Area = (1.5 x 10000) m^2 = 15000 m^2.
Depth = $\frac{5}{100}$m = $\frac{1}{20}$m
Volume=(Area x Depth)=(15000 × $\frac{1}{20}$)m^3 = 750 m^3

2. A hall is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the sum of the areas of four walls, the volume of the hall is:

a) 720   b)900   c)1200   d)1800

Explanation:

2(15 + 12) x h = 2(15 x 12)

h = $\frac{180}{27}$ m = $\frac{20}{3}$ m

volume = $\left(15 \times 12 \times \frac{20}{3}\right) m^3$ = 12000 m^3 .

3. 66 cubic centimeters of silver is drawn into a wire 1 mm in diameter. The length of the wire in meters will be:

a)84   b)90   c)168   d)336

Explanation:

Let the length of the wire be h

Radius= $\frac{1}{2}$ mm = $\frac{1}{20}$ cm .then

$\Rightarrow \frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times h$ =6

h = $\left(\frac{66 \times 20 \times 20 \times 7}{22}\right)$ = 8400cm = 84 m

4. A hollow iron pipe is 21 cm long and its external diameter is 8 cm. If the thickness of the pipe is 1 cm and iron weighs 8 g/cm^3, then the weight of the pipe is:

a) 3.6 kg   b) 3.696 kg   c) 36 kg   d) 36.9 kg

Explanation:

External radius = 4 cm,

Internal radius = 3 cm.

Volume of iron = $\left(\frac{22}{7} \times [(4)^2 - (3)^2] \times 21\right) cm^3$

$= \left(\frac{22}{7} \times 1 \times 21\right) cm^3 = 462 \ cm^3$

5. A boat having a length 3 m and breadth 2 m is floating on a lake. The boat sinks by 1 cm when a man gets on it. The mass of the man is:

a) 12 kg   b) 60 kg   c) 72 kg   d) 96 kg

Explanation:

Volume of Water displaced = (3x2x0.01)m^3= 0.06 m^3

Mass of man = Volume of Water displaced × Density of Water

= (0.06 x 1000)kg = 60 kg

6. 50 men took a dip in a water tank 40 m long and 20 m broad on a religious day. If the average displacement of water by a man is 4 m^3, then the rise in the water level in the tank will be:

a)20cm   b) 25cm   c) 35cm   d) 50cm

Explanation:
Total volume of water displaced = (4 x 50) m^3 = 200 m^3.

Rise in Water level = $\left(\frac{200}{40\times20}\right) m = 0.25\ m = 25\ cm$

7. The slant height of a right circular cone is 10 m and its height is 8 m. Find the area of its curved surface.

 a) $30\pi\ m^2$ b) $40\pi\ m^2$ c) $60\pi\ m^2$ d) $80\pi\ m^2$

Explanation:
$l = 10$ m, $h = 8$ m.
So, $r = \sqrt{l^2 - h^2} = \sqrt{(10)^2 - 8^2} = 6$ m.
Curved surface area = $\pi r l = (\pi \times 6 \times 10)$ m^2 = 60π m^2.

8. A cistern 6m long and 4 m wide contains water up to a depth of 1 m 25 cm. The total area of the wet surface is:
a) 49 m^2 b) 50 m^{2}c) 53.5 m^2 d) 55 m^2

Explanation:

Area of the wet surface =$[2(lb + bh + lh) - lb]$

$$= [2(bh + lh) + lb]$$

$$= [2\ (4 \times 1.25 + 6 \times 1.25) + 6 \times 4]\ \text{m}^2 = 49\ \text{m}^2$$

9. A metallic sheet is of rectangular shape with dimensions 48 m x 36 m. From each of its corners, a square is cut off so as to make an open box. If the length of the square is 8 m, the volume of the box (in m^3) is:

a)4830   b)5120   c)6420   d)8960

Explanation:
Clearly, $l = (48 - 16)$m = 32 m,

$b = (36 - 16)m = 20$ m,
$h = 8$ m.
Volume of the box = $(32 \times 20 \times 8)$ m^3 = 5120 m^3.

10. A large cube is formed from the material obtained by melting three smaller cubes of 3, 4 and 5 cm side. What is the ratio of the total surface areas of the smaller cubes and the large cube?

a) 2 : 1   b)3:2   c)25:18   d)27:20

Explanation:
Volume of the large cube = $(3^3 + 4^3 + 5^3) = 216$ cm^3.
Let the edge of the large cube be a.
So, $a^3 = 216 \implies a = 6$ cm.
Required ratio=$\left(\frac{6\times(3^2+4^2+5^2)}{6\times6^2}\right) = \frac{50}{36} = 25 : 18$

EXERCISE

1. A cistern of capacity 8000 litres measures externally 3.3 m by 2.6 m by 1.1 m and its walls are 5 cm thick. The thickness of the bottom is:

a) 90 cm   b) 1 dm   c) 1 m   d)1.1cm

2. What is the total surface area of a right circular cone of height 14 cm and base radius 7 cm?

a) 344.35 cm^2 b) 462 cm^2 c) 498.35 cm^2 d)None of these

3. How many bricks, each measuring 25 cm x 11.25 cm x 6 cm, will be needed to build a wall of 8 m x 6 m x 22.5 cm?
a) 5600   b) 6000   c) 6400   d) 7200

4.A magician has a box of dimensions 10cm X 12cm X 8 cm. What can be the maximum length of the magic wand that he can keep in this box?

a) $2\sqrt{77}$ cm   b) 10 cm   c) 12 cm   d) $14\sqrt{11}$cm

5.I have a big box of volume 8160 cu.cm. How many small pizza boxes of dimension 4cm $\times$ 3cm $\times$ 2 cm can I store in this big box?
a)310   b) 320   c) 340   d) 375

6.A spherical ball has a surface area of $\frac{792}{7}$sq. m. Find its volume**.**

a)7 sq cm   b) $\frac{792}{7}$ cu cm   c) $\frac{792\pi}{7}$ cu.cm d) 792 cu.cm

7. A hall is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the sum of the areas of four walls, the volume of the hall is:
a)720   b) 900   c) 1200   d) 1800

8. How many cubes of 3cm edge can be cut out of a cube of 18cm edge
a)36   b) 232   c) 216   d) 484

9. A rectangular block 6 cm by 12 cm by 15 cm is cut up into an exact number of equal cubes. Find the least possible number of cubes.
a)30   b) 40   c) 10   d) 20

10. 50 men took a dip in a water tank 40 m long and 20 m broad on a religious day. If the average displacement of water by a man is 4 cu.m , then the rise in the water level in the tank will be:
a)20 cm   b)25 cm   c) 35 cm   d) 50 cm

11. How many bricks each measuring 25cm x 11.25cm x 6cm, will be needed to build a wall 8m x 6m x 22.5m
a) 5600   b)6000   c) 6400   d) 7200

12. The surface area of a cube is 1734 sq. cm. Find its volume
a) 2334 cu.cm   b) 3356cu.cm   c) 4913 cu.cm   d) 3478 cu.cm

13. Find the number of bricks, each measuring 24 cm x 12 cm x 8 cm, required to construct a wall 24 m long, 8m high and 60 cm thick, if 10% of the wall is filled with mortar?
a) 35000   b) 45000   c) 55000   d) 65000

14. The dimensions of an open box are 50 cm, 40 cm and 23 cm. Its thickness is 2 cm. If 1 cubic cm of metal used in the box weighs 0.5 gms, find the weight of the box.
a) 8.04 kg   b) 8.14 kg   c) 8.24 kg   d) 9.04 kg

15. How many cubes of 10cm edge can be put in a cubical box of 1m edge
a) 10   b) 100   c) 1000   d) 10000

16. A hollow iron pipe is 21 cm long and its external diameter is 8 cm. If the thickness of the pipe is 1 cm and iron weighs 8g/cu.cm, then the weight of the pipe is
a) 3.6 kg   b) 3.696 kg   c) 36 kg   d) 36.9 kg

17. In a shower, 5 cm of rain falls. The volume of water that falls on 1.5 hectares of ground is:

a) 75 cu.m   b) 750 cu.m   c) 7500 cu.m   d) 75000cu.m

18. The capacity of a tank of dimensions (8m x 6m x 2.5m)is

a) 120 litres   b) 1200 litres   c) 12000 litres   d) 120000litres

19. The size of the wooden block is 5 x 10 x 20 cm .How many such blocks will be required to construct a solid wooden cube of minimum size?

a) 6   b) 8   c) 12   d) 16

20. A cuboidal block 6cm x 9cm x 12cm is cut up into an exact number of equal cubes.The least possible number of equal cubes will be

a) 6   b) 9   c) 24   d) 30

21. The height of the wall is 6 times its width and lenght of the wall is 7 times its height .if the volume of the wall be 16128 cu.m.itswidth is

a) 4 m   b) 5m   c) 6 m   d) 7 m

22. A cylindrical rod of iron, whose height is equal to its radius, is melted and cast into spherical balls whose radius is half the radius of the rod. Find the number of balls.

a) 3   b) 4   c) 5   d) 6

23. The curved surface area of a cylindrical pillar is 264 m^2 and its volume is 924 m^3. Find the ratio of its diameter to its height.

a) 3 : 7   b)7:3   c)6:7   d)7:6

ANSWERS

1) b   2) c   3) c   4) c   5) a   6) c   7) b

8) c   9) c   10) b   11) b   12) c   13) c   14) b

15) a   16) c   17) b   18) b   19) d   20) b   21) b

22) b   23) d

UNIT- IV

CALENDAR

1.Odd Days:

We are supposed to find the day of the week on a given date.

For this, we use the concept of 'odd days'.

In a given period, the number of days more than the complete weeks are called *odd days*.

2.Leap Year:

(i). Every year divisible by 4 is a leap year, if it is not a century.

(ii). Every 4th century is a leap year and no other century is a leap year.

Note: *A leap year has 366 days*

3.Ordinary Year:

The year which is not a leap year is called an *ordinary years*. An ordinary year has 365 days.

4. *Counting of Odd Days:*

1. 1 ordinary year = 365 days = (52 weeks + 1 day.)

   ∵ 1 ordinary year has 1 odd day.

2. 1 leap year = 366 days = (52 weeks + 2 days)

   ∵ 1 leap year has 2 odd days.

3. 100 years = 76 ordinary years + 24 leap years

   = (76 x 1 + 24 x 2) odd days = 124 odd days.

   = (17 weeks + days) ≡ 5 odd days.

∵ Number of odd days in 100 years = 5.

Number of odd days in 200 years = (5 x 2) ≡ 3 odd days.

Number of odd days in 300 years = (5 x 3) ≡ 1 odd day.

Number of odd days in 400 years = (5 x 4 + 1) ≡ 0 odd day.

Similarly, each one of 800 years, 1200 years, 1600 years, 2000 years etc. has 0 odd days.

Examples

1.What was the day on 15th august 1947 ?

   a)Friday   b) Saturday   c) Sunday   d) Thursday

Explanation:

15 Aug, 1947 = (1946 years + Period from 1.1.1947 to 15.8.1947)
Odd days in 1600 years = 0
Odd days in 300 years = 1
46 years = (35 ordinary years + 11 leap years) = (35 x 1 + 11 x 2)= 57 (8 weeks + 1 day)
= **1 odd day**
Jan. Feb. Mar. Apr. May. Jun. Jul. Aug
(**31 + 28 + 31 + 30 + 31 + 30 + 31 + 15**) = 227 days = (32 weeks + 3 days) = **3 odd days.**
Total number of odd days = (0 + 1 + 1 + 3) = 5 odd days.
Hence, as the number of **odd days = 5 , given day is Friday.**

2. Today is Monday. After 61 days, it will be :
   a) Tuesday   b) Monday   c) Sunday   d) Saturday

Explanation:
Each day of the weekis repeated after 7 days. So, after 63 days, it will be Monday.
After 61 days, it will be Saturday.

3. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

a) Monday   b) Friday   c) Sunday   d) Tuesday

Explanation:
On 31st December, 2005 it was Saturday.
Number of odd days from 2006 to 2009 = (1 + 1 + 2 + 1) = 5 days.
On 31st December 2009, it was Thursday.
Thus, on 1st Jan, 2010 it is Friday

4. What was the day of the week on 28th May, 2006?
a) Sunday   b) Friday   c) Wednesday   d) Tuesday

Explanation:

28 May, 2006 = (2005 years + Period from 1.1.2006 to 28.5.2006)
Odd days in 1600 years = 0
Odd days in 400 years = 0
5 years = (4 ordinary years + 1 leap year) = (4 x 1 + 1 x 2) 6 odd days
(31[Jan] + 28 [Feb]+ 31[Mar] + 30[April] + 28[May]) = 148 days
148 days = (21 weeks + 1 day) 1 odd day.
Total number of odd days = (0 + 0 + 6 + 1) = 7 0 odd day.
Given day is Sunday

6. How many days are there in x weeks x days?
a) 7x*x   b) 8x   c) 14x   d) 7

Explanation:
x weeks x days = (7x + x) days = 8x days.

7. On 8th Dec, 2007 Saturday falls. What day of the week was it on 8th Dec, 2006?
a) Saturday   b) Friday   c) Monday   d) Tuesday
Explanation:
The year 2006 is an ordinary year. So, it has 1 odd day.
So, the day on 8th Dec, 2007 will be 1 day beyond the day on 8th Dec, 2006.
But, 8th Dec, 2007 is Saturday
S0, 8th Dec, 2006 is Friday
8. What was the day of the week on 17th June, 1998 ?
a) Monday   b) Tuesday   c) Wednesday   d) Friday

Explanation:
17th June, 1998 = (1997 years + Period from 1.1.1998 to 17.6.1998)
Odd days in 1600 years = 0
Odd days in 300 years = 1

97 years has 24 leap years + 73 ordinary years.
Number of odd days in 97 years (24 x 2 + 73) = 121 = 2 odd days.
Jan. Feb. March. April. May. June.
(31 + 28 + 31 + 30 + 31 + 17) = 168 days
168 days = 24 weeks = 0 odd day.
Total number of odd days = (0 + 1 + 2 + 0) = 3.
Given day is Wednesday.

9.On what dates of April, 2001 did Wednesday fall?

a) 2nd,9th,16th,23rd   b) 4th,11th,18th,25th
c) 12th,18th,27th,6th   d) 1st,8th,15th,22nd

Explanation:

We shall find the day on 1st April, 2001.
1st April, 2001 = (2000 years + Period from 1.1.2001 to 1.4.2001)
Odd days in 1600 years = 0
Odd days in 400 years = 0
Jan. Feb. March April
(31 + 28 + 31 + 1) = 91 days 0 odd days.
Total number of odd days = (0 + 0 + 0) = 0
On 1st April, 2001 it was Sunday
In April, 2001 Wednesday falls on 4th, 11th, 18th and 25th.

10. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?
a) Monday   b) Tuesday   c) Wednesday   d) Sunday

Explanation:

The year 2007 is an ordinary year. So, it has 1 odd day.
1st day of the year 2007 was Monday
1st day of the year 2008 will be 1 day beyond Monday
Hence, It will be Tuesday.

Exercise
1. The maximum gap between two successive leap year is?
a) 4   b)8   c)2   d)1

2. How many leap years does 100 years have?
a)25   b)24   c)4   d)26

3. The calendar for the year 2007 will be the same for the year
a)2014   b)2016   c) 2017   d) 2018

4. If Feb 12th,1986 falls on Wednesday then Jan 1st,1987 falls on which day?
a) Wednesday   b) Tuesday   c) Thursday   d) Friday

5. Prove that any date in March of a year is the same day of the week corresponding date in November that year.
a) Same day   b) Not same day   c) Next day   d) Previous day

6. The calendar for the year 1993 will be same for the year:
a)2004   b)1992   c) 1998   d) 2003

7. The calendar of the year 2024 can be used again in the year?
a)2032   b)2052   c) 2048   d) 2036

8. The year next to 2005 will have the same calendaras that of the year 2005?
a)2016   b)2022   c) 2011   d) None

9. If today is Saturday, what will be the day 350 days from now?
a) Wednesday   b) Monday   c) Saturday   d) Sunday

10. The calendar for the year 1988 is same as which upcoming year ?
a)2012   b)2014   c) 2016   d) 2010

11. Which two months in a year have the same calendar?
a) October, December b) April, November   c) June, October   d) April, July

12.Given that on 9th August 2016 is Saturday. What was the day on 9th August 1616 ?
a) Saturday   b) Sunday   c) Friday   d) Monday

13. Second & fourth Saturdays and every Sunday is a holiday. How many working days will be there in a month of 31 days beginning on a Friday ?
a)24   b)23   c)22   d)25

14. On 17th March, 1997 Monday falls. What day of the week was it on 17th March, 1996?
a) Monday   b) Tuesday   c) Saturday   d) Wednesday

15. Which year has 366 days?
a)1900   b)1200   c)2500   d)1700

16. The calendar of the year 1897 can be used again in the year?
a)1908   b)1901   c)1903   d)1926

17. The second day of a month is Sunday, What will be the last day of the next month which has 31 days ?
a) Friday   b) Saturday   c) Sunday   d) Can't be determined

18. If every seconds Saturday and all Sundays are holidays in a 30 days month beginning on Saturday, then how many working days are there in that month ? (Month starts from Saturday)
a)25   b)22   c)24   d)23

19. What is 90 days from today? **Hints :** Today is 20th January 2017, Sunday
a) 18th April, Friday   b) 20th April, Saturday
c) 21th April, Sunday   d) 19th April, Saturday

20. The year next to 2003 will have the same calendar as that of the year 2003?
a) 2024   b) 2014   c) 2009   d) 2020

21. How many days in 4 years?
a) 1460   b) 1461   c) 1462   d) 1459

22. The calendar of year 1989 was same as which year?
a) 1978   b) 1970   c) 1980   d) 1985

23. Suppose today is Friday, what day of the week will it be 65 days from now?
a) Saturday   b) Sunday   c) Friday   d) Thursday

ANSWERS

3) b   2) b   3) d   4) c   5) a   6) a   7)b

8) c   9) a   10) c   11) d   12) a   13) a   14) c

15) b   16) c   17) d   18) d   19) b   20) b   21) b

22) a   23) b

UNIT- V
LOGO

Examples

1. Which company is represented by the below logo?

   a) Bank of Madurai   b) Corporation Bank   c) Central Bank of India   d) None of the above

   Answer: c

2. **Which company is represented by the below logo?**

   a) Indian Navy   b) Indian Airforce   c) Indian Army   d) None of the above

   Answer: a

3**. Which company is represented by the below logo?**

a)Girishb) Havellsc) Syska   d) Philips

Answer: d

4**. Which company is represented by the below logo?**

a) Volkswagen   b) Chevrolet   c)BMW   d)Mercedes Benz

Answer: c

5. **Which company is represented by the below logo?**

a)Parker   b) Arrow   c)Luxor   d)Raymond

Answer: a

6. **Which company is represented by the below logo?**

a)Hazard   b) Honda   c)Hyundai   d)None of the above

Answer: c

7. **Which company is represented by the below logo?**

a)Citi Bank   b) Yes Bank   c)Deutsche Bank   d)None of the above

Answer: b

8. **Which company is represented by the below logo?**

a)Fadero OS   b) Ubuntu OS c)Rad Hat OS   d)Suse OS

Answer: d

9. What are the names of logo windows respectively?
 a) Graphics and the Listener Window   b) Upper and Lower Window
c) Bothd) None of the above

Answer: c

10. A procedure is a section of code that can be used

a)Only once   b) Over and over again   c) To perform a calculation   d) To make a decision

Answer: b

EXERCISE

1. How many buttons are in the button window in the logo?

a)2   b) 4   c) 6   d) 8

2. _____ is defined as any physical quantity that varies with time, space or any other independent variable

a)Signalb) system   c) signals & system   d) None of the above

3. **Which company is represented by the below logo?**

a)Essarb) Virgin   c) Tata Docomo   d) Hutch

4. **Which company is represented by the below logo?**

a) Dena Bankb) Pibeon India   c) Procter and gamble   d) Jammu and Kashmir Bank

5.Which company is represented by the below logo?

 a) Indian Medical Associationb) Indian Army   c) Indian Navy   d) Income Tax

6.**Which company is represented by the below logo?**

        a) BHEL   b) Nalco   c) Coal India   d) Sail

7.**Which company is represented by the below logo?**

        a) Hindusthan Petroleum   b) Bharat Petroleum   c) BPCL   d) None of the
        above

8. **Which company is represented by the below logo?**

   a) Allen Solly   b) United colors of Benetton   c) Spyker   d) Park Avenue

9.**Which company is represented by the below logo?**

   a) Kotak Mahindra Bank b) Standard Chartered Bank c) HSBC   d) ISRO

10. **Which company is represented by the below logo?**
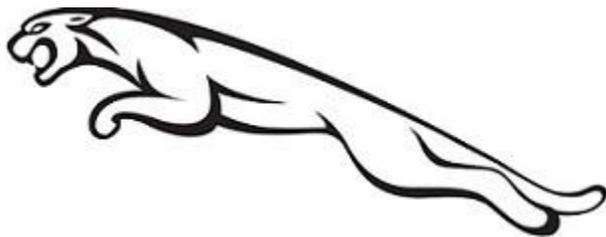
a) Toyota b) Yamaha c) Jaguar d) Mitsubishi

11.**Which company is represented by the below logo?**

a) Chevrolet b) Golden Point   c) Volkswagen d) None of the above

12.**Which company is represented by the below logo?**

a) RTO b) Income Tax   c) Delhi Police   d) EPFO

13. **Which company is represented by the below logo?**

a) Hot Beverage b) Cafe Coffee Day   c) Coffee Day   d) Java

14.**Which company is represented by the below logo?**
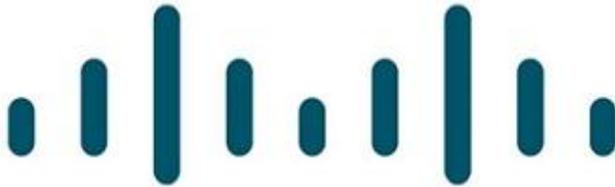
a) CCNA   b) BPTP   c) CISCO   d) Delloite

15. **Which company is represented by the below logo?**

a) Chevrolet   b) Mazda   c) Renault   d) Hyundai

16.**Which company is represented by the below logo?**

a) Reebok   b) Addidas   c) FILA   d) NIKE

17.**Which company is represented by the below logo?**

a) Red Chief   b) Woodland   c) Bata   d) Action

18.**Which company is represented by the below logo?**

a) DRDO   b) SAIL   c) Coal India   d) NALCO

19.**Which company is represented by the below logo?**

a) Levis   b) Kutons   c) Peter England   d) Lee Cooper

20.**Which company is represented by the below logo?**

a) Auston   b) Ashoka Leyland   c) Bajaj   d) Mahindra

21.**Which company is represented by the below logo?**

a) Indian Army   b) DRDO   c) Indian Navy   d) Indian Airforce

22.**Which company is represented by the below logo?**

a) Cisco   b) Coal India   c) ONGC   d) SAIL

23.**Which company is represented by the below logo?**

a) Manza   b) Mazda   c) Mood   d) Silver Eagle

ANSWERS

4) d	2) a	3) b	4) d	5) a	6) c	7) b
8) b	9) b	10) c	11) a	12) b	13) d	14) c
15) c	16) d	17) a	18) b	19) a	20) d	21) b
22) c	23) b					

IV year

IV Year Engineering Classes

Aptitude for Placement and Training

Aim:

Students should be able to answer any question on numbers, TCS, HCL &WIPRO etc. to clear the preliminary test and in major examination towards placement.

Objectives:

- ➢ To think in varied ways to solve a problem practically.
- ➢ To know about different types of problems.

Outcome:

The candidates will be able to answer all types of problems which frequently occur in day to day life and in the competitive examinations.

1. On a 26 question test, five points were deducted for each wrong answer and eight points were added for each correct answer. If all the questions were answered, how many were correct, if the score was zero ?

A). 10   B). 12   C). 11   D). 13

Ans: A

Explanation:

Take options and check. If 10 are correct, his score is 10 x 8 = 80.   But 16 are wrong. So total negative marking is 16 x 5 = 80.   So final score is zero.

2. In how many ways a team of 11 must be selected from 5 men and 11 women such that the team must comprise of not more than 3 men?

A). 1565   B). 1243   C). 2256   D). 2456

Ans: C

Explanation;

The team may consist of 0 men + 11 women, 1 men + 10 women, 2 men + 9 women, or 3 men + 8 women.

So Number of ways are = 11C11+5C1×11C10+5C2×11C9+5C3×11C8 = 2256

3. Eesha bought 18 sharpeners for Rs.100. She paid 1 rupee more for each white sharpener than for each brown sharpener. What is the price of a white sharpener and how many white sharpener did she buy ?

A). Rs.5, 10   B).Rs.6, 10   C).Rs.5, 8   D). Rs.6, 8

Ans: B

 Explanation:

Just check the options. If she bought 10 white sharpeners at Rs.6 per piece, She has spent Rs.60 already. And with the remaining Rs.40, she bought 8 brown sharpeners at 40/8 = Rs.5 which is Rs.1 less than White sharpener.

4.The fourteen digits of a credit card are to be written in the boxes shown above. If the sum of every three consecutive digits is 18, then the value of x is :

A) 3   B).cannot be determined from the given information   C). 2   D). 1

Ans : A

Explanation:

Let us assume right most two squares are a , b

Then Sum of all the squares = 18 x 4 + a + b .... (1)

Also Sum of the squares before 7 = 18

Sum of the squares between 7, x = 18

and sum of the squares between x , 8 = 18

So Sum of the 14 squares = 18 + 7 + 18 + x + 18 + 8 + a + b...... (2)

Equating 1 and 2 we get x = 3

5. Four people each roll a four die once. Find the probability that at least two people will roll the same number ?

A). 5/18   B).13/18   C).None of the given choices   D). 1295/1296

Ans: B

Explanation:

The number of ways of rolling a dice where no two numbers probability that no one rolls the same number = 6 x 5 x 4 x 3

Now total possibilities of rolling a dice = 64

The probability that a no one gets the same number = 6×5×4×364=518

So the probability that at least two people gets same number = 1?518=1318

6. Jake can dig a well in 16 days. Paul can dig the same well in 24 days. Jake, Paul and Hari together dig the well in 8 days. Hari alone can dig the well in

    A). 96 days   B).48 days   C).32 days   D). 24 days

Ans:B

Explanation:

Simple one. Let the total work to be done is 48 meters. Now Jake can dig 3 mts, Paul can dig 2 mts a day. Now all of them combined dug in 8 days so per day they dug 48/8 = 6 mts. So Of these 8 mts, Hari capacity is 1 mt.

So he takes 48 /1 = 48 days to complete the digging job.

7. The sum of the digits of a three digit number is 17, and the sum of the squares of its digits is 109. If we subtract 495 from the number, we shall get a number consisting of the same digits written in the reverse order. Find the number.

A). 773   B). 683   C). 944   D). 863

Ans: D

Explanation:

Check options. Sum of the squares should be equal to 109. Only Options B and D satisfying. When we subtract 495, only 863 becomes 368.

8. Mark told John "If you give me half your money I will have Rs.75. John said, "if you give me one third of your money, I will have Rs.75/- How much money did John have ?
A). 45   B). 60   C). 48   D). 37.5
Ans: B

Explanation:

Let the money with Mark and John are M and J respectively.
Now
$M + J/2 = 75$
$M/3 + J = 75$
Solving we get M = 45, and J = 60.

9. Eesha has a wheat business. She purchases wheat from a local wholesaler of a particular cost per pound. The price of the wheat of her stores is $3 per kg. Her faulty spring balance reads 0.9 kg for a KG. Also in the festival season, she gives a 10% discount on the wheat. She found that she made neither a profit nor a loss in the festival season. At what price did Eesha purchase the wheat from the wholesaler?
A). 3   B). 2.5   C). 2.43   D). 2.7
Ans: C

Explanation:

Faulty spring balance reads 0.9 kg for a kg" means that she sells 1 kg for the price of 0.9 kgs, so she looses 10% of the price because of the faulty spring balance.   She looses another 10% because of the discount.So, she actually sells 1 kg for $3×0.9×0.9=$2.43 and since at that price she made neither a profit nor a loss, then Eesha purchase the wheat from the wholesaler for $2.43.

10. Raj goes to market to buy oranges. If he can bargain and reduce the price per orange by Rs.2, he can buy 30 oranges instead of 20 oranges with the money he has. How much money does he have ?
A). Rs.100   B). Rs.50   C). Rs.150   D).Rs.120
Ans: D

Explanation:

Let the money with Raj is M.

So M20?M30=2. Check options. Option D satisfies.

11. A city in the US has a basketball league with three basketball teams, the Aziecs, the Braves and the Celtics. A sports writer notices that the tallest player of the Aziecs is shorter than the shortest player of the Braves. The shortest of the Celtics is shorter than the shortest of the Aziecs, while the tallest of the Braves is shorter than the tallest of the Celtics. The tallest of the Braves is taller than the tallest of the Aziecs. Which of the following can be judged with certainty ?

X) Paul, a Brave is taller than David, an Aziec

Y) David, a Celtic, is shorter than Edward, an Aziec

    A). Both X and Y   B). X only   C). Y only   D). Neither X nor Y

Ans: B

<div align="center">Explanation</div>

We solve this problem by taking numbers.

Let the shortest of Braves is 4 feet.   Then tallest of Aziecs is less than 4. So let it be 3 feet.

A -> 2 - 3

B -> 4 - 6

C -> 1 - 7

From the above we can safely conclude X is correct.but Y cannot be determined.

12. There are 3 classes having 20, 24 and 30 students respectively having average marks in an examination as 20,25 and 30 respectively. The three classes are represented by A, B and C and you have the following information about the three classes.

a. In class A highest score is 22 and lowest score is 18

b. In class B highest score is 31 and lowest score is 23

c. In class C highest score is 33 and lowest score is 26.

If five students are transferred from A to B, what can be said about the average score of A; and what will happen to the average score of C in a transfer of 5 students from B to C ?

A). definite decrease in both cases   B). can't be determined in both cases

C). definite increase in both cases   D). will remain constant in both cases

Ans: B

Explanation:

Class A average is 20. And their range is 18 to 22

Class B average is 25. And their range is 23 to 31

Class A average is 30. And their range is 26 to 33

If 5 students transferred from A to B, A's average cannot be determined but B's average comes down as the highest score of A is less than lowest score of B.

If 5 students transferred from B to C, C's average cannot be determined the B's range fo marks and C's range of marks are overlapping.

13. The value of a scooter depreciates in such a way that its value of the end of each year is 3/4 of its value of the beginning of the same year. If the initial value of the scooter is Rs.40,000, what is the value at the end of 3 years ?

A). Rs.13435   B). Rs.23125   C). Rs.19000   D). Rs.16875

Ans: D

Explanation:

$40,000(34)3=16875$

14. Rajiv can do a piece of work in 10 days ,Venky in 12 days and Ravi in 15 days. They all start the work together, but Rajiv leaves after 2 days and Venky leaves 3 days before the work is completed. In how many days is the work completed ?

A). 5   B). 6   C). 9   D). 7

Ans: D

Explanation:

Let the work be 60 units.   If venky worked for 3 days, and the remaining days of work be x days, total days to complete the work be x + 3 days.

Now Capacities of Rajiv is 60/10 = 6, Venky is 5, Ravi is 4.

(6 + 5 + 4) 2 + (5 + 4) (x - 3) + 5 x 3 = 60.

Solving we get x = 4.

So total days to complete the work is 7 days.

15. A man has a job, which requires him to work 8 straight days and rest on the ninth day. If he started work on Monday, find the day of the week on which he gets his 12th rest day.

A). Thursday B). Wednesday   C). Tuesday   D). Friday

Ans: B

Explanation:

He works for 8 days and takes rest on the 9th day. So On the 12th rest day,

there are 9 x 12 = 108 days passed.

Number of odd days = (108 - 1) / 7 = 107 / 7 = 2.

So the 12th rest day is wednesday.

16. 15 tennis players take part in a tournament. Every player plays twice with each of his opponents. How many games are to be played?

A). 190   B). 200   C). 210   D). 220

Ans: C

Explanation:

Formula: 15C2 x 2. So 15 x (15 - 1) = 15 x 14 = 210

17.A family X went for a vacation. Unfortunately it rained for 13 days when they were there. But whenever it rained in the mornings, they had clear afternoons and vice versa. In all they enjoyed 11 mornings and 12 afternoons. How many days did they stay there totally?

A). 19   B). 20   C). 18   D). 22

Ans: C

Explanation:

Clearly 11 mornings and 12 afternoons = 23 half days

since 13 days raining means 13 half days.

so 23 - 13 =10 half days (not affected by rain)

so 10 half days = 5 full days

Total no. of days = 13 + 5 = 18 days.

18. How many ways can one arrange the word EDUCATION such that relative positions of vowels and consonants remains same?

A). 2880   B). 2000   C). 1780   D). 2250

Ans: A

Explanation

The word EDUCATION is a 9 letter word with none of letters repeating

The vowels occupy 3,5,7th & 8th position in the word & remaining five positions are occupied by consonants.

As the relative position of the vowels & consonants in any arrangement should remain the same as in the word EDUCATION

The four vowels can be arranged in 3rd,5th,7th& 8th position in 4! ways.
similarly the five consonants can be arranged in 1st ,2nd ,4th, 6th & 9th position in 5! ways
Hence the total number of ways = 5!×4!=120×24=2880

19. There are three trucks A, B, C. A loads 10 kg/min. B loads 13 1/3 kg/min. C unloads 5 kg/min. If three simultaneously works then what is the time taken to load 2.4 tones?

A).2hrs 10min   B).1hrs 10min C).3hrs 10min   D). 4hrs 10min

Ans: A

Explanation
Work done in 1 min =10 + 403 – 5= 553 kg/min
For 1 kg = 3/55 min
For 2.4 tonnes = 3/55 x 2.4 x 1000 = 130 mins = 2hrs 10min

20. Rahul took a part in cycling game where 1/5 ahead of him and 5/6 behind him then total number of participants ?

   A).31   B).25   C).45   D).12

Ans: A

Explanation
Let x be the total number of participants including Rahul.
Excluding rahul = (x - 1)
1/5(x-1)+5/6(x-1) = x
31x - 31 = 30x
Total number of participants x = 31

21. A box of 150 packets consists of 1kg packets and 2kg packets. Total weight of box is 264kg. How many 2kg packets are there ?

A).114   B).256   C).145   D). 125

Ans: A

Explanation:

 Let x= 2 kg Packs
y= 1 kg packs
x + y = 150   .... Eqn 1

2x + y = 264   .... Eqn 2
Solve the Simultaneous equation; x = 114so, y = 36

22. If A can copy 50 pages in 10 hours and A and B together can copy 70 pages in 10 hours, how much time does B takes to copy 26 pages?

     A).3hrs.   B). 2hrs.   C). 6hrs.   D). 10hrs.

Ans: A

Explanation:

A can copy 50 pages in 10 hrs.
A can copy 5 pages in 1hr.(50/10)
now A & B can copy 70 pages in 10hrs.
thus, B can copy 90 pages in 10 hrs.[eqn. is (50+x)/2=70, where x--> no. of pages B can copy in 10 hrs.]
so, B can copy 9 pages in 1hr.
therefore, to copy 26 pages B will need almost 3hrs.
since in 3hrs B can copy 27 pages.

23. A bus started from bustand at 8.00a m and after 30 min staying at destination, it returned back to the bustand. the destination is 27 miles from the bustand. the speed of the bus 50 percent fast speed. at what time it returns to the bustand

A).11 a.m   B).9a.m   C).12 p.m.   D). 10a.m

Ans: A

Explanation

a bus cover 27 mile with 18 mph in =27/18= 1 hour 30 min. and it wait at stand =30 min.
after this speed of return increase by 50% so 50%of 18 mph=9mph
Total speed of returnig=18+9=27
Then in return it take 27/27=1 hour
then total time in joureny=1+1:30+00:30 =3 hour
so it will come at 8+3 hour=11 a.m.
So Ans==11 a.m

24. The total expense of a boarding house are partly fixed and partly variable with the number of boarders. The charge is Rs.70 per head when there are 25 boarders and Rs.60 when there are 50 boarders. Find the charge per head when there are 100 boarders.

A) 65   B) 55   C) 50   D) 45

Ans: B

Explanation

Let a = fixed cost and k = variable cost and n = number of boarders

total cost when 25 boarders c = 25*70 = 1750 i.e. 1750 = a + 25k

total cost when 50 boarders c = 50*60 = 3000 i.e. 3000 = a + 50k

solving above 2 eqns, 3000-1750 = 25k i.e. 1250 = 25k i.e. k = 50

therefore, substituting this value of k in either of above 2 eqns we get

a = 500 (a = 3000-50*50 = 500 or a = 1750 - 25*50 = 500)

so total cost when 100 boarders = c = a + 100k = 500 + 100*50 = 5500

so cost per head = 5500/100 = 55

25. Amal bought 5 pens, 7 pencils and 4 erasers. Rajan bought 6 pens, 8 erasers and 14 pencils for an amount which was half more than what Amal had paid. What % of the total amount paid by Amal was paid for pens?

     A) 37.5%   B) 62.5%   C) 50%   D) None of these

Ans: B

Explanation

Let, 5 pens + 7 pencils + 4 erasers = x rupees

so 10 pens + 14 pencils + 8 erasers = 2*x rupees

also mentioned, 6 pens + 14 pencils + 8 erarsers = 1.5*x rupees

so (10-6) = 4 pens = (2-1.5)x rupees

so 4 pens = 0.5x rupees => 8 pens = x rupees

so 5 pens = 5x/8 rupees = 5/8 of total (note x rupees is total amt paid byamal)

i.e 5/8 = 500/8% = 62.5% is the answer

26. I lost Rs.68 in two races. My second race loss is Rs.6 more than the first race. My friend lost Rs.4 more than me in the second race. What is the amount lost by my friend in the second race?

     A) 48Rs   B)41Rs   C) 51 Rs   D) 31 Rs

Ans: B

Explanation

x + x+6 = 68

2x + 6 = 68

2x = 68-6

2x = 62

x=31

x is the amt lost in I race

x+ 6 = 31+6=37 is lost in second race

then my friend lost 37 + 4 = 41 Rs

27. A face of the clock is divided into three parts. First part hours total is equal to the sum of the second and third part. What is the total of hours in the bigger part?

A) 10 hrs	B)6hrs	C)16hrs	D) 12hrs

Ans: B

<div align="center">Explanation</div>

the clock normally has 12 hours.

three parts x,y,z

x+y+z=12

x=y+z

2x=12

x=6

so the largest part is 6 hrs

28. With 4/5 full tank vehicle travels 12 miles, with 1/3 full tank how much distance travels

A)15 miles	B) 5 miles	C)10 miles	D) 7 miles

Ans: B

<div align="center">Explanation</div>

4/5 full tank= 12 mile

1 full tank= 12/(4/5)

1/3 full tank= 12/(4/5)*(1/3)= 5 miles

29. 2 oranges, 3 bananas and 4 apples cost Rs.15. 3 oranges, 2 bananas, and 1 apple costs Rs 10. What is the cost of 3 oranges, 3 bananas and 3 apples?

A) 5Rs.	B)15Rs.	C) 25Rs.	D) 35Rs.

Ans: B

<div align="center">Explanation</div>

2x+3y+4z=15

3x+2y+z=10 adding

5x+5y+5z=25

x+y+z=5 that is for 1 orange, 1 banana and 1 apple requires 5Rs.
so for 3 orange, 3 bannana and 3 apple requires 15Rs.
i.e. 3x+3y+3z=15

30. One fast typist type some matter in 2hr and another slow typist type the same matter in 3hr. If both do combinely in how much time they will finish.

A)1 hour 12 min. B) 2 hour 12 min. C) 4 hour 12 min.   D) 8 hour 12 min.
Ans: A

Explanation
Faster one can do 1/2 of work in one hourslower one can do 1/3 of work in one hourboth they do (1/2+1/3=5/6) th work in one hour.so work will b finished in 6/5=1.2 hour i e 1 hour 12 min.

31. What is the number of zeros at the end of the product of the numbers from 1 to 100?

    A) 24   B)36   C)45   D) 20
Ans: A

Explanation
 For every 5 in unit palce one zero is added
so between 1 to 100 there are 10 nos like 5,15,25,..,95 which has 5 in unit place.
Similarly for every no divisible by 10 one zero is added in the answer so between 1 to 100
 11 zeros are added
for 25,50,75 3 extra zeros are added
so total no of zeros are 10+11+3=24

32. Gavaskar average in first 50 innings was 50. After the 51st innings his average was 51 how many runs he made in the 51st innings

    A) 101   B)200   C)88   D) 158
Ans: A

 ### Explanation
first 50 ings.- run= 50*50=2500
51st ings.- avg 51. so total run =51*51=2601.
so run scored in that ings=2601-2500=101 runs.

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33. Anand finishes a work in 7 days,Bittu finishes the same job in 8 days and Chandu in 6 days. They take turns to finish the work. Anand on the first day, Bittu on the second and Chandu on the third day and then Anand again and so on. On which day will the work get over?

A) 7th day   B) 11thday   C) 6thday   D) 9thday

Ans: A

Explanation

In d 1st day Anand does 1/7th of total work
similarly, Bithu does 1/8th work in d 2nd day
hence at d end of 3 days, work done = 1/7+1/8+1/6=73/168
remaining work = (168-73)/168 = 95/168
again after 6 days of work, remaining work is = (95-73)/168 = 22/168
and hence Anand completes the work on 7th day.

34. There are three different boxes A, B and C. Difference between weights of A and B is 3 kgs. And between B and C is 5 kgs. Then what is the maximum sum of the differences of all possible combinations when two boxes are taken each time?

A)16kgs   B) 26 kgs   C) 24kgs   D) 36 kgs
Ans: A

Explanation

A-B = 3
B-c = 5
a-c = 8
so sum of diff = 8+3+5 = 16 kgs

35. There are two numbers in the ratio 8:9. if the smaller of the two numbers is increased by 12 and the larger number is reduced by 19 thee the ratio of the two numbers is 5:9. Find the larger number?

A)36   B) 26   C) 32   D) 46
Ans: A

Explanation

8x:9x initialy
8x+ 12 : 9x - 19 = 5x:9x
8x+12 = 5x
 x = 4
9x = 36 .

36. Excluding stoppages, the speed of a bus is 54 km/hr and including stoppages, it is 45 km/hr. For how many minutes does the bus stop per hour?

A)9   B) 10   C) 12   D)20
Ans:B

Explanation

Due to stoppages, it covers 9 km less.
Time taken to cover 9 km = 9/54 * 60 = 10 min.

37. A jogger running at 9 km/hralong side a railway track is 240 m ahead of the engine of a 120 m long train running at 45 km/hr in the same direction. In how much time will the train pass the jogger?

        A) 3.6 sec   B) 18 sec   C)36secD) 72sec

Ans:A

Explanation

Speed of train relative to jogger = 45 – 9 = 36 km/hr.
                                    = 36 * 5/18 = 10 m/sec.
Distance to be covered = 240 + 120 = 360 m.
Time taken = 360/10 = 36 sec.

38. Kim can do a work in 3 days while David can do the same work in 2 days. Both of them finish the work together and get Rs. 150. What is the share of Kim?

        A)Rs. 30   B)Rs. 60   C) Rs. 70   D)Rs. 75

    Ans:B

Explanation

Kim's wages : David's wages = Kim's 1 day work : David's 1 day work = 1/3 : 1/2 =2:3
Kim's share = 2/5 * 150 = Rs. 60

39. A and B start a business, with A investing the total capital of Rs.50000, on the condition that B pays A interest @ 10% per annum on his half of the capital. A is a working partner and receives Rs.1500 per month from the total profit and any profit remaining is equally shared by both of them. At the end of the year, it was found that the income of A is twice that of B. Find the total profit for the year?

A) 53000   B) 58000   C) 50000   D) 59000

Ans:D

Explanation

Interest received by A from B = 10% of half of Rs.50000 = 10% * 25000 = 2500.
An amount received by A per annum for being a working partner = 1500 * 12 = Rs.18000.
Let 'P' be the part of the remaining profit that A receives as his share. Total income of A = (2500 + 18000 + P)
Total income of B = only his share from the remaining profit = 'P', as A and B share the remaining profit equally.
Income of A = Twice the income of B
(2500 + 18000 + P) = 2(P)
P = 20500
Total profit = 2P + 18000
= 2*20500 + 18000 = 59000

40. Salaries of Ravi and Sumit are in the ratio 2:3. If the salary of each is increased by Rs. 4000, the new ratio becomes 40:57. What is Sumit's present salary?

A)Rs. 17,000   B)Rs. 20,000   C)Rs. 25,500   D) None of these

Ans:D
Explanation

Let the original salaries of Ravi and Sumit be Rs. 2x and Rs. 3x respectively.
Then, (2x + 4000)/(3x + 4000) = 40/57
6x = 68000 => 3x = 34000
Sumit's present salary = (3x + 4000) = 34000 + 4000 = Rs. 38,000.

41. A man can row 6 kmph in still water. When the river is running at 1.2 kmph, it takes him 1 hour to row to a place and black. What is the total distance traveled by the man?

A) 6.24 km   B) 6 km   C) 5.76 km   D) 5.66 km

Ans:C

Explanation

M = 6
S = 1.2
DS = 7.2
US = 4.8
x/7.2 + x/4.8 = 1
x = 2.88
D = 2.88 * 2 = 5.76

42. If the area of a circle is 616 sq cm then its circumference?

A)   78 m   B) 88 m   C) 75 m   D) 70 m

Ans:B

Explanation

22/7 r2 = 616 => r = 14
2 * 22/7 * 14 = 88

43 . The mean of 50 observations was 36. It was found later that an observation 48 was wrongly taken as 23. The corrected new mean is?

A) 35.2   B) 36.1   C) 36.5   D) 39.1

Ans:C

Explanation

Correct sum = (36 * 50 + 48 – 23) = 1825.
Correct mean = 1825/50 = 36.5

44. The H.C.F and L.C.M of two numbers are 84 and 21 respectively. If the ratio of the two numbers is 1:4, then the larger of the two numbers is?

A) 12   B) 48   C) 84   D) 108

Ans:C

Explanation

Let the numbers be x and 4x.
Then, x * 4x = 84 * 21 x2 = (84 * 21)/4 = x = 21.
Hence, larger number = 4x = 84.

45. If the sum and difference of two numbers are 20 and 8 respectively, then the difference of their square is?

A) 12   B) 28   C) 160   D) 180

Ans:C

Explanation

Let the numbers be x and y.
Then, x + y = 20 and x − y = 8
x2 − y2 = (x + y)(x − y) = 20 * 8 = 160.

46. Pipes A and B can fill a tank in 5 and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in?

A) 1 13/17 hours   B) 2 8/11 hours   C) 3 9/17 hours   D)4 1/2 hours

Ans:C

Explanation
Net part filled in 1 hour = 1/5 + 1/6 − 1/12 = 17/60
The tank will be full in 60/17 hrs, i.e., 3 9/17 hrs.

47. The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period(in years) is?

A) 2   B) 5   C) 3   D) 4

Ans:C

Explanation

Amount = (30000 + 4347) = Rs. 34347

Let the time be n years. Then,
$30000(1 + 7/100)n = 34347$
$= (107/100)n = 34347/30000 = (107/100)2$
$n = 2$ years.

48. A fair price shopkeeper takes 10% profit on his goods. He lost 20% goods during theft. His loss percent is?

A) 12   B) 28   C) 16   D) 18

Ans:A

Explanation

Suppose he has 100 items. Let C.P. of each item be Re. 1.

Total cost = Rs. 100.

Number of items left after theft=80.
S.P. of each item = Rs. 1.10
Total sale = 1.10 * 80 = Rs. 88
Hence, loss % = 12/100 * 100 = 12%

49. Eighteen years ago, a father was three times as old as his son. Now the father is only twice as old his son. Then the sum of the present ages of the son and the father is?

A) 12   B) 28   C) 105   D) 108

Ans:D

Explanation

Let the present ages of the father and son be 2x and x years respectively.

Then, $(2x − 18) = 3(x − 18)$

=>x=36
Required sum = (2x + x) = 108 years.

50. In an office, totally there are 6400 employees and 65% of the total employees are males. 25% of the males in the office are at-least 50 years old. Find the number of males aged below 50 years?

    A) 1040   B) 2080   C) 3120   D) 41600

Ans:C

Explanation

Number of male employees = 6400 * 65/100 = 4160

Required number of male employees who are less than 50 years old
= 4160 * (100 – 25)%
= 4160 * 75/100 = 3120.

51. The sum of four consecutive even numbers is 292. What would be the smallest number?

    A) 74   B) 76   C) 70   D) 80

Ans:C

Explanation

Let the four consecutive even numbers be 2(x – 2), 2(x – 1), 2x, 2(x + 1)

Their sum = 8x – 4 = 292

=>x=37
Smallest number is: 2(x – 2) = 70.

52. Among a group of 2500 people, 35 percent invest in municipal bonds, 18 percent invest in oil stocks, and 7 percent invest in both municipal bonds and oil stocks. If 1 person is to be randomly selected from 2500 people, what is the probability that the person selected will be one who invests in municipal bonds but not in oil stocks?

Municipal Bonds = 35%   Oil stocks = 18%
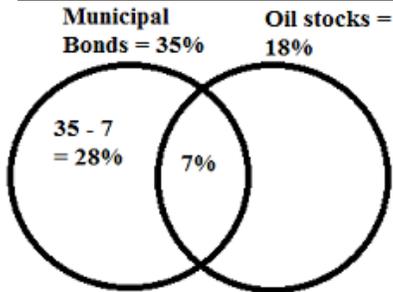
A) 8/25   B) 7/25   C) 9/25   D) 4/25

Ans:B

Explanation

2500 is redundant

From the diagram we know that only ones who invested in municipal bonds are 28%, the probability is 28 / 100 = 7/25

53. The dimensions of a room are 25 feet * 15 feet * 12 feet. What is the cost of white washing the four walls of the room at Rs. 5 per square feet if there is one door of dimensions 6 feet * 3 feet and three windows of dimensions 4 feet * 3 feet each?

A)Rs. 4800   B)Rs. 3600   C)Rs. 3500   D)Rs. 4500

Ans:D

Explanation

Area of the four walls = 2h(l + b)   Since there are doors and windows, area of the walls   = 2 * 12 (15 + 25) − (6 * 3) − 3(4 * 3) = 906 sq.ft.
Total cost = 906 * 5 = Rs. 4530.

54. Four of the following five are alike in a certain way and so form a group. Which is the one that does not belong to that group?

A) 226   B) 290   C) 360   D) 170

Ans:C

Explanation

After a close look you will get the exact 360 each number is one more than square of a natural number, i.e.,226 = 152+ 1 ; 290 = 172+ 1 ; 170 = 132+ 1 ; 122 = 112+ 1.

55. After 4 p.m. on a sunny day when Ramesh was returning from his school, he saw his uncle coming in the opposite direction. His uncle talked to him for some time. Ramesh saw that the shadow of his uncle was to his right side. Which direction was his uncle facing during their talk?

A) North   B) South   C) East   D) Data inadequate

Ans:B

Explanation

After 4 p.m. the shadow will be towards East. Now, East is to the right of Ramesh. So Ramesh faces North. And his uncle, who is opposite him, faces South.

56. One afternoon, Manisha and Madhuri were talking to each other face to face in Bhopal on M.G. Road. If Manisha's shadow was exactly to the exactly to the left of Madhuri, which direction was Manisha facing?

A) North   B) South   C) East   D)   Data inadequate

Ans:A

Explanation
In the afternoon the sun is in the west. Hence, the shadow is in the East. Now, East is to the left of Madhuri. So, Madhuri is facing South. Therfore, Manisha, who is face to face with Madhuri, is facing North.

57. If it is possible to make a meaningful word with the second, the fourth, the seventh and the eight letters of the word CONTROVERSIAL which of the following will be the 57. first letter of the word? If more than one such word can be made, given 'M' as the answer. If no such word can be made, give 'X' as the answer.

A) X   B) V   C) M   D) T

Ans:C

Explanation

The respective letters are O, T, V and E.
The words that can be formed are VOTE AND VETO.

58. Several liters of acid were drawn off from a 54 L vessel full of acid and an equal amount of water is added. Again the same volume of the mixture was drawn off and replaced by water. As a result, the vessel contained 24L of pure acid. How much acid was drawn off initially?

A) 12L   B)16L   C)8L   D)24L

Answer: C

Explanation:

$24 = 54(1 - x/54)^2$ =>
$24/54 = (1 - x/54)^2$ =>
$2/3 = 1 - x/54$ =>
$x = 18L$

59. Fresh fruits contain 72% water and dry fruit contains 20% water. How much can dry fruit from 100kg of fresh fruit be obtained?

A) 35kg   B)32kg   C)27kg   D)22kg

Answer: A

Explanation:

Let x kg of dry fruit be obtained from 100kg of fresh fruit.
Now pulp in fresh fruit = pulp in dry fruit
=> 28/100 *100 = 80/100 * x
=> x = 35 kg

60. An application was received by an inward clerk in the afternoon of a weekday. Next day he forwarded it to the table of the senior clerk, who was on leave that day. The senior clerk put up the application to the desk officer next day in the evening. The desk officer studied the application and disposed of the matter on the same day i.e Friday. Which day was the application received by the inward clerk?

A) Wednesday   B) Monday   C) Tuesday   D) Previous week's Saturday

Answer: A

Explanation:
The senior clerk got the application on Friday. The inward clerk got the application on Wednesday.

61. If Dennis is 1/3 rd the age of his father Keith now, and was 1/4 th the age of his father 5year ago, then how old will his father Keith be 5 year from now?

A) 45 year   B) 40 year   C) 55 year
D) 50 year

Answer: D

Explanation:
Let the present age of Dennis and his father be x and y respectively.
Then, $x = y/3$……………(i) and
$(x-5) = (y-5)/4$……(ii)
On solving both equation
we get y= 45 year.
Hence, required age = $(y+5) = 50$ year

62. A person wishes to make a 100 sq m rectangular garden. Since he has only 30m barbed wire for fencing, he fences only three sides letting the house wall act as the fourth side. The width of the garden is?

A)4m   B)5m   C)8m   D)10m

Answer: B

Explanation:

Let, the length be 'l' and breadth be 'b'.

Thus, l*b =100

=> l= 100/b 100/b +b+b = 30

By solving this we get b= 10 and 5. b is not equal to 10 because it will become square. so, b=5m is the answer.

63. There are three prizes to be distributed among five students. If no students gets more than one prize, then this can be done in?

A)10 ways   B)30 ways   C)60 ways   D)80 ways

Answer: A

Explanation:

3 prize among 5 students can be distributed in 5C3 ways = 10 ways.

64. In a hockey championship, there are 153 matches played. Every two team played one match with each other. The number of teams participating in the championship is?

A)18   B)19   C)17   D)16

Answer: A

Explanation:

Let there were x teams participating in the games, then total number of matches

=> nC2 = 153

On solving we get n= -17 and n=18.

It cannot be negative so n=18 is the answer.

65. A bag contains 21 toys numbered 1 to 21. A toy is drawn and then another toy is drawn without replacement. Find the probability that both toys will show even numbers?

A)5/21   B)9/42   C)11/42   D)4/21

Answer: B

Explanation:
The probability that first toy shows the even number = 10/21.
Since, the toy is not replaced there are now 9 even numbered toys and total 20 toys left.
Hence, probability that second toy shows the even number = 9/20.
Required probability = (10/21)*(9/20) = 9/42

66. The ages of the two persons differ by 20 years. If 5 year ago, the older one be 5 times as old as the younger one, then their present ages, in a year are?

A)25, 5   B)30, 10   C)35, 15   D)50, 30

Answer: B

Explanation:
Let the age be x and y years now.
Then, x – y =20……(i) and
(x-5) = 5(y-5)….(ii)
On solving both equation
we get x= 30 and y =10.

67. At what angle the hands of a clock are inclined at 15 minutes past 5 ?

A)72 ½   B)67 ½   C)58 ½
        D)64

Answer: B
Explanation
At 15 min past 5, the minutes hand is at 3 and hour hand slightly ahead of 5. Now, the angle through which hour hand shifts in 15 min = (15 * 1/2) = 7.5 degree Angle at 15 min past 5 = 60 + 7.5 = 67.5 degree.

68. Vishal goes to a shop to buy a radio costing Rs 2568. The rate of sales tax is 7%. He tells the shopkeeper to reduce the price of the radio to such an extent that he has to pay Rs 2568, inclusive of all sales tax. Find the reduction needed in the price of the radio?

A)Rs 168   B)Rs 169   C)Rs 170   D)Rs 172

Answer: A

69. Two motor cars were sold for Rs 9,900 each, gaining 10% on one and losing 10% on the other. The gain or loss percent in the whole transaction is?

A)neither loss no gain   B)1% gain   C)100/99 % profit   D)1% loss

Answer: D

Explanation:

In such transaction where SP is same and also gain % and loss % is same there is always a loss and such loss % => (common gain or loss % / 10)2 = (10/10)2 = 1% loss

70. A person covers half his journey by bus at 60 km/hr, half the remaining half by train at 30 km/hr and the rest by cycle at 10 km/hr. Find the average speed during the entire journey?

A)15 km/hr   B)24 km/hr   C)20 km/hr   D)33.33 km/hr

Answer: B

71. The average of three numbers is 135. the largest number is 180 and the difference between the others is 25. The smallest number is?

A)130   B)125   C)120   D)100

Answer: D

Explanation:

Given, (x-25)+x+180/ 3 = 135
=> x=125
Hence smallest number is (125 – 25) = 100.

72. A motorboat whose speed is 15 km/hr in still water goes 30km downstream and comes back in four and a half hours. The speed of the stream is?

A) 4.5 km/hr   B)6 km/hr   C)7 km/hr   D)5 km/hr

Answer: D

Explanation:

Let the speed of the stream be 's' km/hr.
Then, upward speed = (15-s) km/hr and downward speed = (15+s) km/hr
Therefore, 30/(15+s) + 30/(15-s) = -4.5
On solving this equation we get, s= 5km/hr.

73. If the difference between the simple interest and the compound interest compounded annually at the rate of 12% per annum on Rs 5000 for two years will be?

A)Rs 17.50   B)Rs 36   C)Rs 45   D)Rs 72

Answer: D

Explanation:

Difference between CI and SI is
= {5000(1 + 12/100)2 – 5000 } – {(5000*12*2)/100}
=> 5000((784-625)/625) – 1200 = Rs 72.

74. Two equal sums of money were invested, one at 4% and the other at 9/2 %. At the end of 7year, the simple interest received from the latter exceeded that received from the former by Rs 31.50. Each sum was?

A)Rs 700   B)Rs 900   C)Rs800   D)Rs 1000

Answer: B

Explanation:

Let the sum be Rs x
Then, (x *9/2 *7)/100 – (x*4*7)/100 = 31.50

=> 7x/100* 1/2 = 63/2
=> x = Rs 900.

75. A and B weave a carpet in 10 days and 15 days respectively. They begin to work together but B leaves after 2 days. In what time will A complete the remaining work?

A) 7 days   B)8 days   C)19/3 days   D)20/3 days

Answer: D

76. Rs 770 has been divided among A,B and C such that A receives 2/9th of what B and C together receives. Then A's share is?

A) Rs 140   B)Rs 154   C)Rs 165   D)Rs 170

Answer: A

Explanation:

A+B+C = 770………(i)
A= 2/9*(B+C)………(ii)   From
eq (i) and (ii)   A+
9A/2 = 770 11A =770*2 A= 140
Thus A's share is Rs 140.

77. In a mixture of 45L the ratio of milk and water is 3:2. How much water must be added to make the ratio 9:11?

A)10L   B)15L   C)17L   D)20L

Answer: B

Explanation:

Quantity of milk = 3/5 * 45 = 27 L
Quantity of water = 2/5 * 45 = 18L
Let x litre of water be added to get the ratio 9:11
Then, (18+x)/27 = 11/9
On solving it we get , x= 15

EXERCISE:

1 How many of the integers between 25 and 45 are even ?
A)21   B)20   C)11   D)10

2. If taxi fares were Rs 1.00 for the first 1/5 mile and Rs 0.20 for each 1/5 miles thereafter. The taxi fare for a 3-mile ride was
A)Rs 1.56   B)Rs 2.40   C)RS 3.00   D)Rs 3.80

3. A merchant sells an item at a 20 percent discount. but still makes a gross profit of 20 percent of the cost.What percent of cost would be gross profit on the item have been if it had been sold without the discount?

A)20%   B)40%   C)50%   D)60%

4. A millionaire bought a job lot of hats 1/4 of which were brown. The millionaire sold 2/3 of the hats including 4/5 of the brown hats. What fraction of the unsold hats were brown.
A)1/60   B)1/15   C)3/20   D)3/5

5.How many integers n greater than and less than 100 are there such that,if the digits of n are reversed, the resulting integer is n+9 ?
A)5   B)6   C)7   D)8

6.An investor purchased a shares of stock at a certain price.If the stock increased in price Rs 0.25 per share and the total increase for the x shares was Rs 12.50, how many shares of stock had been purchased ?
A)25   B)50   C)75   D)100

7.At a special sale, 5 tickets can be purchased for the price of 3 tickets. If 5 tickets are purchased at the sale, the amount saved will be What percent of the original price of the 5 tickets?
    A) 20%   B) 33.3%   C) 40%   D) 60%

8.Working independently, Tina can do a certain job in 12 hours. Working independently, Ann can do the same job in 9 hours. If Tina Works independently at the job for 8 hours and then Ann works independently, how many hours will it take Ann to complete the remainder of the jobs?
    A) 2/3   B) 3/4   C) 3   D) 2

9.A decorator bought a bolt of d m number of red chips in any one stack ?
    A) 7   B) 6   C) 5   D) 4

10.A sink has 12 lits of water some quantity of water is taken out. if the remainng water is 6 litresless then the water taken out then quantity of water taken out is.
    A) 3   B) 6   C) 9   D) 1

11. which is the 4 digit number whose second digit is thrice the first digit and 3'rd digit is sum of 1'st and 2'nd and last digit is twice the second digit.
A)2674   B)1349.   C)3343   D)3678

12. In a straight highway 2 cars starts from the same point in opposite directions each travels for 8 Kms and takeleft turn then travel for 6 Kms what is the distance between them now.
A)16   B)20   C)25   D)10

13 A warehouse had a square floor with area 10,000 sq.meters. A rectangular addition was built along one entire side of the warehouse that increased the floor by one-half as much as the original floor. How many meters did the addition extend beyond the original buildings?
A)10   B)20   C)50   D)200

14 . A digital wristwatch was set accurately at 8.30 a.m and then lost 2 seconds every 5 minutes. What time was indicated on the watch at 6.30 p.m of the same day if the watch operated continuously that time ?
A)5:56   B)5:58   C)6.00   D)6.26

15. A 5 litre jug contains 4 litres of a salt water solution that is 15 percent salt. If 1.5 litres of the solution spills out of the jug, and the jug is then filled to capacity with water, approximately what percent of the resulting solution in the jug is salt?
A)7.5%   B)9.5%   C) 10.5%   D)12%

16 A bag contains a total of 90 coins in the form of 20 paise and 25 paise coins. If the total value of coins in the bag is Rs.21, find the no of 25 paise coins in the bag?
A)60   B)55   C)65   D)70

17. Ten years ago, the age of anand was one third the age of bala at that time,the present age of bala is 12 years more than the present age of anand. Find the present age of anand?
A)16   B)18   C)20
        D)22

 18. The Present ages of A & B are in the ratio of 9:7. 13 years ago their ages were in the ratio 25:18. What is the difference of their ages ?
A)14   B)16   C)18   D)20

19. The sum of a two digit number and the number formed by reversing its digits is 110.if the tens digit is 2 more than the units digit. find the number?
A)64   B)46   C)24   D)42

20. Ajay and sita are two of Mr.kumars sons. jay has half as many brothers as sisters.sita has as many brothers as sisters. Find the number of children Mr.kumarhas ?
A)7   B)8   C)6
        D)9

21. A car covers 4 successive 3km stretches at speed of 10kmph,20kmph,30kmph&:60kmph resp. Its average speed is?
A)20   B)50   C)30   D)40

22 By selling 99 pens, a trader gains the cost of 33 pens.find his gain percentage?
        A)   33 1/3%   B)66 2/3%   C)50%
D)75%

23. How many kgs of Basmati rice costing Rs.42/kg should a shopkeeper mix with 25 kgs of ordinary rice costing Rs.24 per kg so that he makes a profit of 25% on selling the mixture at Rs.40/kg?

   A) 40 kgs   B)20kgs   C) 10 kgs   D) 60 kgs

24. A certain sum of money amounts to Rs1125 in 5 years and to Rs1200 in 8 years. Find the sum and the rate of interest.

   A) 2.5% p.a.   B) 5.5% p.a.   C) 6.5% p.a.   D) 4.5% p.a.

25 . A, Band C started a business by investing Rs 2,20,000, Rs 3,50,000 and Rs 4,50,000.Find the share out of an annual profit of Rs 10200?

   A) 22:35:45   B) 22:55:45   C) 25:35:45   D) 15:35:45

26.3 numbers have an average of 30.if the two numbers are 14 and 28.third number is ?

A)28   B)38   C)48   D)22

27. If there are 6 arithmetic means between 5 and 33 then common difference is?

   A) 4   B)8   C)10   C)12

28. In a geometric progression, the first term and the common ratio are both equal to 2.find the fourth term.

A)16   B)18   C)30   D)40

29. 14 men can do a work in 5 days working 4 hours a day. In how many days can 7 men do the same work, working in 10 hours a day?

A)4   (B)8   (C)12   (D)16

30. What is the highest power of 3 in 200!?

A)97   (B)197   (C)65   (D)48

31. In a kilometer race, A beats B by 200 mtr and C by 360 mtr.In a race of 500 mtr by how many meters does B beat C ?

A)80   (B)200   (C)100   (D)160

32. Pipe A can fill a tank in 6hrs.due to leak at bottom it takes 9 hours to fill the tank.In what time the leak alone can empty the full tank?

A)16   (B)15   (C)18   (D)17

33. In how many seconds does a 180m long train moving at 108kmph cross a platform of length 150 mtr?

A)11 sec   (B)9 sec   (C)8 sec   (D)7 sec

34. What is the total surface area of the hemisphere,whose radius is 10.5cm?

A)1049.5   (B)1039.5   (C)999.5   (D)1085.5

35. 5 persons are sitting in a round table in such a way that the tallest person always sits next to the smallest person?

A)12   B)15   C)18   D)20

36. If a boat is moving in upstream with velocity of 14 km/hr and goes downstream with a velocity of 40 km/hr, then what is the speed of the stream ?

   A) 13 km/hr   B) 26 km/hr   C) 34 km/hr   D) none of these

37. A can have a piece of work done in 8 days, B can work three times faster than the A, C can workfive times faster than A. How many days will they take to do the work together ?

    A) 3 days   B) 8/9 days   C) 4 days   D) can't say

38. A car travels a certain distance taking 7 hrs in forward journey, during the return journey increased speed 12km/hr takes the times 5 hrs. What is the distance traveled.

    A) 210 kms   B) 30 kms   C) 20 kms   D) none of these

39. If on an item a company gives 25% discount, they earn 25% profit. If they now give 10% discount then what is the profit percentage.

    A) 40%   B) 55%   C) 35%   D) 30%

40. A certain number of men can finish a piece of work in 10 days. If however there were 10 men less it will take 10 days more for the work to be finished. How many men were there originally?

    A) 110 men   B) 130 men   C) 100 men   D) none of these

41. In simple interest what sum amounts of Rs.1120/- in 4 years and Rs.1200/- in 5 years ?

    A) Rs. 500   B) Rs. 600   C) Rs. 800   D) Rs. 900

42. If a sum of money compound annually amounts of thrice itself in 3 years. In how many years will it become 9 times itself.

    A) 6   B) 8   C) 10   D) 12

43. Two trains move in the same direction at 50 kmph and 32 kmph respectively. A man in the slower train observes the 15 seconds elapse before the faster train completely passes by him. What is the length of faster train ?

    A) 100m   B) 75m   C) 120m   D) 50m

44. How many mashes are there in 1 squrare meter of wire gauge if each mesh is 8mm long and 5mm wide ?

    A) 2500   B) 25000   C) 250   D) 250000

45. The price of sugar increases by 20%, by what % should a housewife reduce the consumption of sugar so that expenditure on sugar can be same as before ?

    A) 15%   B) 16.66%   C) 12%   D) 9%

46. A man spends half of his salary on household expenses, 1/4th for rent, 1/5th for travel expenses, the man deposits the rest in a bank. If his monthly deposits in the bank amount 50, what is his monthly salary?

    A) Rs.500   B) Rs.1500   C) Rs.1000   D) Rs. 900

47. 15 men take 21 days of 8 hrs. each to do a piece of work. How many days of 6 hrs.each would it take for 21 women if 3 women do as much work as 2 men?

    A) 30   B) 20   C) 19   D) 29

48. A cylinder is 6 cms in diameter and 6 cms in height. If spheres of the same size are made from the material obtained, what is the diameter of each sphere?

    A) 5 cms   B) 2 cms   C) 3 cms   D) 4 cms

49. The difference b/w the compound interest payble half yearly and the simple interest on a certain sum lent out at 10% p.a for 1 year is Rs 25. What is the sum?

    A) Rs. 15000   B) Rs. 12000   C) Rs. 10000   D) none of these

50. What is the smallest number by which 2880 must be divided in order to make it into a perfect square ?

    A) 3   B) 4   C) 5   D) 6

51. A father is 30 years older than his son however he will be only thrice as old as the son after 5 years what is father's present age ?

    A) 40 yrs   B) 30 yrs   C) 50 yrs   D) none of these

52. Narasimha, Madhu and pavan started a business by investing Rs.1,20,000, Rs.1,35,000 and Rs 1, 50,000 respectively. Find the share of Pavan, out of an annual profit of Rs.56,700.

    A) Rs.16,800   B) Rs.18,900   C) Rs.21,000   D) none

53. A starts business with Rs. 35,000 and after 5 months, B joins with A as his partner. After a year, the profit is divided in the ratio 2:3. What is B's contribution in the capital?

    A) Rs .7500   B) Rs. 8000   C) Rs. 8500   D) Rs. 9000

54. Anand and Deepak started a business investing Rs. 22,500 and Rs.35,000 respectively. Out of a total profit of Rs.13,800, Deepak's share is _____

    A) Rs.5,400   B) Rs.7,200   C) Rs.8,400   D) Rs.9,400

55. Out of four numbers ,the average of first three is 16 and that of the last three is 15. If the last number is 18,the first number is :

    A) 20   B) 21   C) 23   D) 25

56. A batsman makes a score of 87 runs in the 17th inning and thus increases his average by 3 . Find his average after 17th inning.

    A) 39   B) 38   C) 38.5   D) 39.5

57. Three years ago , the average age of A, B and C was 27 years and that of B and C 5 years ago years. A's present age is :

    A) 30 yrs   B) 35 yrs   C) 40 yrs   D) 48 yrs

58. The average of six numbers is 30. If the average of first four is 25 and that of last three is 35, the fourth number is :

    A) 25   B) 30   C) 35   D) 40

59. A and B are partners in a business. A contributes 1/4 of the capital for 15 months and B received 2/3 of the profit .For how long B's money was used.

    A) 6 months   B) 9 months   C) 10 months   D) 1 year

60. At an election a candidate who gets 84% of the votes is elected by a majority of 476 votes. What is the total number of votes polled?

     A) 672   B) 700   C) 749   D) 848

61. A man buys a cycle for Rs.1400 and sells it at loss of 15%. What is the selling price of the cycle?

     A) Rs.1090   B) Rs.1160   C) Rs.1202   D) Rs.1190

62. A shopkeeper purchased 70 kg of potatoes for Rs.420 and sold the whole lot at the rate of Rs 6.50 per kg .What will be his gain percent?

     A) 4 1/6 %   B) 6 1/4 %   C) 8 1/3 %   D) 20%

63. By selling 300 apples a seller gains the selling price of 60 apples. The gain percent of the seller is

     A) 200   B) 20%   C) 25%   D) 16 2/3%

64. The average monthly salary of 8 workers and one supervisor in a factory was $430. When the supervisor, whose salary was $870 per month, retired, a new person was appointed and then the average salary of 9 people was $400 per month. The salary of the new supervisor is:

     A). $700   B).$600   C).$430   D). $400

65. The average score of 35 students in a class is 37. If every student is given 3 grace marks, the new average of the class is:

A). 45   B). 34   C). 43   D). 40

66. The average age of a group of 10 students is 14 years. If 5 more students join the group, the average age rises by 1 year. The average age of the new students is:

A). 15 years   B).17 years   C).16 years   D). 18 years

67. It rained as much as on Wednesday as on all the other days of the week combined. If the average rainfall for the whole week was 3 cms, How much did it rain on Wednesday?

A). 3 cms   B).10.5 cms   C).15 cms   D). 2.62 cms

68. 1) B is mother of D but D is not daughter of B.

2) A is son of M and brother of G.

3) G is sister of D

Which of the following cannot be referred from the given information ?

     A) B has 3 children   B) M has two sons C) G is younger to B.D) A is younger to D

69. A contractor undertook to make 15 km of roadway in 40 weeks. In 10 weeks, 3 km was complete by 180 men working 8 hours a day. The men then agreed to work 1 hour a day overtime, And some boys were engaged to assist them, the work was finished in the stipulated time(40 weeks). How many boys were employed, if the work of 3 boys is equal to that of 2 men?

     A) 70   B) 50   C) 60   D) 80

70. The average of ten numbers is 7 .If each number is multiplied by 12 , then the average of new set of numbers is :

    A) 7   B) 19   C) 82   D) 84

71. In an examination, a student scores 4 marks for every correct answer and loses 1 mark for every wrong answer. If he attempts all 75 questions and secures 125 marks, the number of questions he attempts correctly, is :

    A) 35   B) 40   C) 42   D) 46

72. A car moves at the speed of 80 km/hr. what is the speed of the car in metres per secon?

A). 8 m/sec   B).20×19 m/sec   C).21×29 m/sec   D). 22×29 m/sec

73. When not moving on the sidewalk, Maya can walk the length of the sidewalk in 7 minutes. If she stands on the sidewalk as it moves, she can travel the length in 4 minutes. If Maya walks on the sidewalk as it moves, how many minutes will it take her to travel the same distance? Assume she always walks at the same speed, and express your answer as a decimal to the nearest tenth.

    A) 3.6   B) 2.5   C) 3.8   D) 2.8

74. The ages of Old and Young total 48. Old is twice as old as Young was when Old was half as old as Young will be when Young is three times as Old was when Old was three times as old as Young. How old is Old?

 A) Old-42, Young-26   B) Old-38, Young-22 C) Old-30, Young-18 D) Old-28, Young-14

75. Mr.P and Mr.Q can build a wall in 10 days; Mr.Q&Mr.R can take 14 days to build the same wall; and Mr.P and Mr.R can do it in 8 days. Who among them will take more time when they work alone?

A). p   B).q   C). r   D). data inadequate

76. In a class of boys and girls Vikas's rank is 9th and Tanvi's rank is 17th .Vikas's rank among the boys in that class is 4th from the top and 18th from the bottom and Tanvi's rank among the girls is 8th from top and 21st from bottom. In the order of rank, how many girls are there between Tanvi and Vikas?

    A) 1   B) 2   C) 5   D) 3

77. Rajan and Rakesh started a business and invested Rs.20000 and Rs.25000 respectively. After 4 months Rakesh left and Mukesh joined by investing Rs.15000. At the end of the year there was a profit of Rs.4600. What is the share of Mukesh?

A). Rs.1500   B). Rs.1400   C). Rs.1300   D). Rs.1200

78. Plastic strap are wound around large cardboard boxes to reinforce them during shipping. Suppose the end of the strap must overlap 7/16 inch to fasten. How long is the plastic strap around the box of dimensions 28 5/16 inch $\times$ 24 9/16 inch

A). 106 3/16   B).96 3/16   C).105 3/16   D). 107 3/16

79. In a game each person is dealt three cards from a deck of 52 cards and a player is said to have a winning deck if & only if he or she has a king, queen & a jack each , irrespective of the color of the sign. What is the total possible number of winning decks for this game?

A)1   B)128   C)16   D)64

80. In a group of cows and hens, the number of legs are 14 more than twice the number of heads. The number of cows is :

A).5   B). 7   C). 10   D). 12

81. If six persons sit around a table, the probability that some specified three of them are always together is

A)1/20   B)3/10   C)1/5   D)4/5

82. Out of four numbers ,the average of first three is 16 and that of the last three is 15 .If the last number is 18,the first number is :

     A) 20   B) 21   C) 23   D) 25

83. Mr. X has to build a wall 1000 meters long in 50 days. He employs 56 men but at the end of 27 days finds that only 448 meters are built. How many more men must be employed so that the work may be finished in time?

A)58   B)81   C)38   D)25

84. In a certain office, 72% of the workers prefer tea and 44% prefer coffee. If each of them prefers tea or coffee and 40 like both, the total number of workers in the office is :

A). 200   B). 240   C). 250   D). 320

85. P & Q can draw a picture in 144 hours; Q & R can draw a same picture in 240 hours; P & R can finish it in 180 hours. What will be the time taken by P alone to draw the picture?

     A) 280 hours   B) 240 hours   C) 200 hours   D) 300 hours

86 If numerator of a fraction is increased by 200% and denominator by 250%, the resultant fraction is   3/ 14 .What is the original fraction?

     A) 3 14   B) 2 3   C) 1 6   D) none of these

87. A man standing at a point P is watching the top of a tower, which makes an angle of elevation of 30° with the man's eye. The man walks some distance towards the tower to watch its top and the angle of the elevation becomes 45°. What is the distance between the base of the tower and the point P?

A) 9 units   B) 33 units   C) Data inadequate   D) 12 units

88. ▢1000 is to be divided among A, B and C so that A gets twice as B and B gets thrice as C. The share of C will be

A) 600   B) 300   C) 200   D) 100

89. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?

A) 120 metres   B) 180 metres   C) 324 metres   D) 150 metres

90. Ten years ago, P was half of Q's age. If the ratio of their present ages is 3 : 4, what will be the total of their present ages?
A) 45   B) 40   C) 35   D) 30

91. Three pipes A, B and C can fill a tank from empty to full in 30 minutes, 20 minutes and 10 minutes, respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P, Q and R, respectively. What is the proportion of the solution R in the liquid in the tank after 3 minutes?
A) 6 /11   B) 5/ 11   C) 7/ 11   D) 8 11

92. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse from the ships is 30° and 45°, respectively. If the lighthouse is 100 m high, the distance between the two ships is:
A) 300 m   B) 173 m   C) 273 m   D) 200 m

93. A bag contains 25 paise, 50 paise and □1 coins. There are 220 coins in all and the total amount in the bag is □160. If there are thrice as many □1 coins as there are 25 paise coins, then what is the number of 50 paise coins?
A) 60   B) 40   C) 120   D) 80

94. A basket contains 5 red, 3 green and 7 black balls. If a ball is drawn at random from the basket, what is the probability that it will be (i) red? (ii) black?
A) 1/15 and 7/15   B) 1/3 and 7/ 15   C) 1/15 and 5 /15   D) 2/ 7 and 5/15

95. The total area of a circle and a square is equal to 5450 sq.cm. The diameter of the circle is 70 cms. What is the sum of the circumference of the circle and the perimeter of the square?
A) 360 cm   B) 270 cm   C) 380 cm   D) none

Answer :

1) D	2) D	3) C	4) C	5) D	6)B
7) C	8) C	9) C	10) A	11) B	12)B
13) C	14) D	15) A	16) A	17) A	18)A
19) A	20) A	21) A	22) A	23)B	24)A
25) A	26)C	27) A	28) A	29) A	30)B
31) B	32) C	33) A	34) B	35)A	36)A
37) B	38) B	39)D	40) A	41) C	42)A
43)B	44) B	45)B	46) C	47) A	48)C
49) C	50) C	51) A	52) C	53) D	54) A
55) B	56) A	57) C	58) A	59) C	60)B
61)D	62) C	63) C	64) B	65)D	66)D
67) B	68) A	69)B	70) A	71) B	72)D
73) B	74) C	75)B	76) B	77) D	78)A
79) B	80) B	81) B	82)B	83) D	84)C
85) B	86)D	87) C	88) D	89)D	90)C
91) A	91)C	93) A	94) B	95)C	