Class IX Session 2025-26
Subject - Mathematics
Sample Question Paper - 6

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study-based questions carrying 4 marks each with sub-parts of the values of 1,1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

Section A

1. An irrational number between 2 and 2.5 is **[1]**

a) $\sqrt{22.5}$ b) $\sqrt{12.5}$

c) $\sqrt{5}$ d) $\sqrt{11}$

2. The taxi fare in a city is as follows: For the first kilometer, the fare is ₹8 and for the subsequent distance it is ₹5 per kilometer. Taking the distance covered as x km and total fare as ₹y, write a linear equation for this information. **[1]**

a) y = 5x – 3 b) x = 5y – 3

c) y = 5x + 3 d) x = 5y + 3

3. The point whose ordinate is 4 and which lies on y-axis is **[1]**

a) (4, 0) b) (1, 4)

c) (4, 2)		d) (0, 4)

4. A histogram is a pictorial representation of the grouped data in which class intervals and frequency are respectively taken along **[1]**

a) vertical axis only
b) horizontal axis only
c) vertical axis and horizontal axis
d) horizontal axis and vertical axis

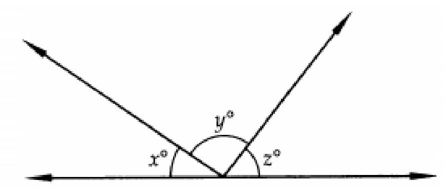
5. How many linear equations can be satisfied by x = 2 and y = 3? **[1]**

a) three
b) many
c) only one
d) two

6. The boundaries of surfaces are **[1]**

a) lines and curves
b) points
c) surfaces
d) curves

7. In Fig. if $\frac{y}{x} = 5$ and $\frac{z}{x} = 4$, then the value of x is **[1]**



a) 12°
b) 8°
c) 15°
d) 18°

8. The figure formed by joining the mid-points of the adjacent sides of a rhombus is a **[1]**

a) trapezium
b) Parallelogram
c) rectangle
d) square

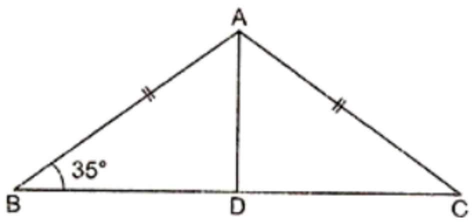
9. The value of $x^3 + y^3 + 15xy - 125$ when x + y = 5 is **[1]**

a) 2
b) 3
c) 1
d) 0

10. The graph of the line x = 3 passes through the point. **[1]**

a) (0, 3)
b) (3, 2)
c) (3, 0)
d) (2, 3)

11. ABC is an isosceles triangle such that AB = AC and AD is the median to base BC. Then, ∠BAD = **[1]**



a) 35°
b) 110°
c) 70°
d) 55°

12. The diagonals AC and BD of a rectangle ABCD intersect each other at P. If ∠ABD = 50^o, then ∠DPC = **[1]**

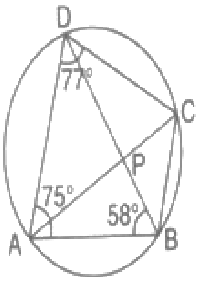
a) 70^o

b) 100^o

c) 80^o

d) 90^o

13. In the given figure, ABCD is a cyclic quadrilateral in which $\angle BAD = 75^o$, $\angle ABD = 58^o$ and $\angle ADC = 77^o$, AC and BD intersect at P. the measure of $\angle DPC$ is **[1]**



a) 105^o

b) 94^o

c) 92^o

d) 90^o

14. The decimal expansion of the number $\sqrt{2}$ is **[1]**

a) non-terminating non-recurring

b) non-terminating recurring

c) a finite decimal

d) 1.41421

15. Any point on the x-axis is of the form **[1]**

a) (x, y)

b) (x, 0)

c) (0, y)

d) (x, x)

16. In a triangle, an exterior angle at a vertex is 95° and its one of the interior opposite angle is 55°, then the measure of the other interior angle is **[1]**

a) 55°

b) 40°

c) 85°

d) 90°

17. If p(x) = $x^3 - x^2 + x + 1$, then the value of $\frac{p(-1)+p(1)}{2}$ is **[1]**

a) 0

b) 2

c) 3

d) 1

18. The volume of two spheres are in the ratio 216 : 125. The difference of their surface areas, if the sum of their radii is 11 units, is _____. **[1]**

a) 45π sq. units

b) 50π sq. units

c) 44π sq. units

d) 38π sq. units

19. **Assertion (A):** If the area of an equilateral triangle is $81\sqrt{3}$ cm^2, then the semi perimeter of triangle is 20 cm. **[1]**
Reason (R): Semi perimeter of a triangle is s = $\frac{a+b+c}{2}$, where a, b, c are sides of triangle.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** There are infinite number of lines which passes through (2, 14). **[1]**
Reason (R): A linear equation in two variables has infinitely many solutions.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

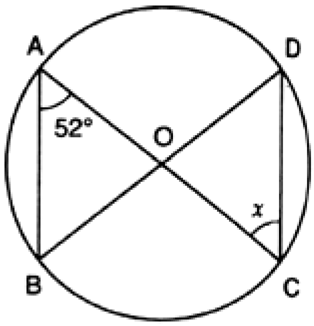
d) A is false but R is true.

Section B

21. Two circles of radii 5 cm and 3 cm intersect at two points and the distance between their centres is 4 cm. Find the length of the common chord. **[2]**

22. Find the area of a triangle whose perimeter is 180 cm and two of its sides are 80 cm and 18 cm. Hence calculate the altitude of the triangle taking the longest sides as base. **[2]**

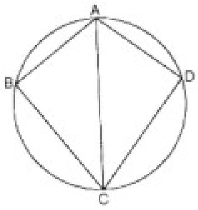
23. If O is the centre of below circle, find the value of x in given figure: **[2]**



24. In the figure, **[2]**

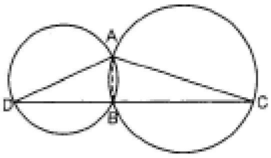
i. $\angle BAC = 70^o$ and $\angle DAC = 40^o$, then find $\angle BCD$

ii. $\angle BAC = 60^o$ and $\angle BCA = 60^o$, then find $\angle ADC$



OR

In the given figure, two circles intersect at two points A and B. AD and AC are diameters to the two circles. Prove that B lies on the line segment DC.



25. If the point (3, 4) lies on the graph of the equation 3y = ax + 7, find the value of a. **[2]**

OR

Find whether $(\sqrt{2}, 4\sqrt{2})$ is the solution of the equation x – 2y = 4 or not?

Section C

26. State whether the following statements are true or false. Give reasons for your answers. **[3]**

(i) Every natural number is a whole number.

(ii) Every integer is a whole number.

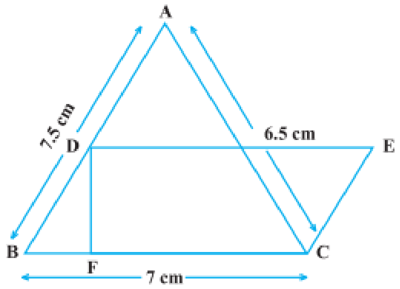
(iii) Every rational number is a whole number.

27. Show that p - 1 is a factor of p^{10} - 1 and also of p^{11} - 1. **[3]**

28. A rhombus sheet, whose perimeter is 32 m and whose one diagonal is 10 m long, is painted on both sides at the rate of ₹ 5 per m^2. Find the cost of painting. **[3]**

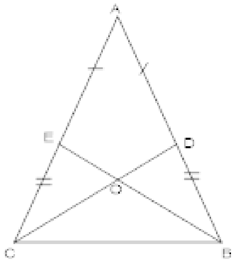
OR

In Fig., $\triangle$ABC has sides AB = 7.5 cm, AC = 6.5 cm and BC = 7 cm. On base BC a parallelogram DBCE of same area as that of $\triangle$ABC is constructed. Find the height DF of the parallelogram.



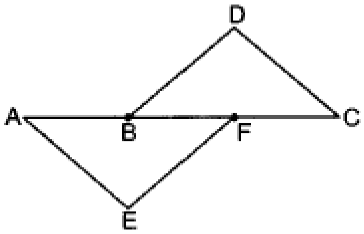
29. A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required. **[3]**

30. If AE = AD and BD = CE. Prove that $\triangle AEB \cong \triangle ADC$ **[3]**



OR

In given figure, it is given that AB = CF, EF = BD and $\angle$AFE = $\angle$CBD. Prove that $\triangle AFE \cong \triangle CBD$.



31. Write the answer of each of the following questions: **[3]**

i. What is the name of horizontal and the vertical lines drawn to determine the position of any point in the Cartesian plane?
ii. What is the name of each part of the plane formed by these two lines?
iii. Write the name of the point where these two lines intersect.

Section D

32. Simplify: $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$. **[5]**

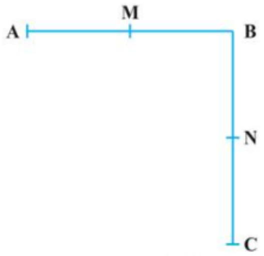
OR

If a = 3 + $2\sqrt{2}$, then find the value of:

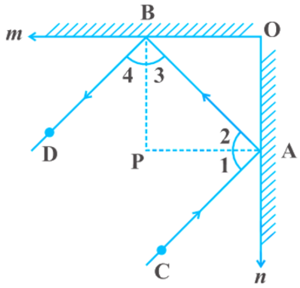
i. $a^2 + \frac{1}{a^2}$
ii. $a^3 + \frac{1}{a^3}$

33. i. AB = BC, M is the mid-point of AB and N is the mid-point of BC. Show that AM = NC. **[5]**

ii. BM = BN, M is the mid-point of AB and N is the mid-point of BC. Show that AB = BC.

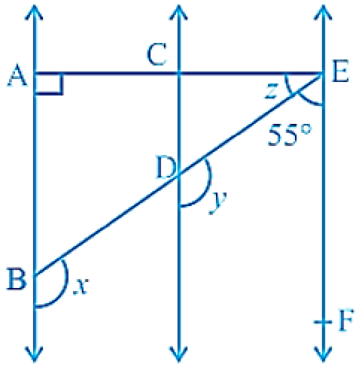


34. In figure, m and n are two plane mirrors perpendicular to each other. Show that the incident ray CA is parallel to reflected ray BD. **[5]**



OR

Fig., AB || CD and CD || EF. Also, EA ⊥ AB. If ∠BEF = 55°, find the values of x, y and z.



35. The following table gives the distribution of students of two sections according to the marks obtained by them: **[5]**

Section A		**Section B**	
Marks	Frequency	Marks	Frequency
0-10	3	0-10	5
10-20	9	10-20	19
20-30	17	20-30	15
30-40	12	30-40	10
40-50	9	40-50	1

Represent the marks of the students of both the sections on the same graph by frequency polygons. From the two polygons compare the performance of the two sections.

Section E

36. **Read the following text carefully and answer the questions that follow:** **[4]**

Once four friends Rahul, Arun, Ajay and Vijay went for a picnic at a hill station. Due to peak season, they did not get a proper hotel in the city. The weather was fine so they decided to make a conical tent at a park. They were carrying 300 m^2 cloth with them. As shown in the figure they made the tent with height 10 m and diameter

14 m. The remaining cloth was used for the floor.

i. How much Cloth was used for the floor? (1)

ii. What was the volume of the tent? (1)

iii. What was the area of the floor? (2)

OR

What was the total surface area of the tent? (2)

37. **Read the following text carefully and answer the questions that follow:** **[4]**

Peter, Kevin James, Reeta and Veena were students of Class 9th B at Govt Sr Sec School, Sector 5, Gurgaon. Once the teacher told **Peter to think a number x and to Kevin to think another number y** so that the difference of the numbers is 10 (x > y).

Now the teacher asked James to add double of Peter's number and that three times of Kevin's number, the total was found 120.

Reeta just entered in the class, she did not know any number.

The teacher said Reeta to form the 1st equation with two variables x and y.

Now Veena just entered the class so the teacher told her to form 2nd equation with two variables x and y.

Now teacher Told Reeta to find the values of x and y. Peter and kelvin were told to verify the numbers x and y.

i. What are the equation formed by Reeta and Veena? (1)

ii. What was the equation formed by Veena? (1)

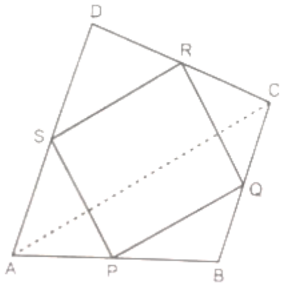
iii. Which number did Peter think? (2)

OR

Which number did Kelvin think? (2)

38. **Read the following text carefully and answer the questions that follow:** **[4]**

Modern curricula include several problem-solving strategies. Teachers model the process, and students work independently to copy it. Sheela Maths teacher of class 9^{th} wants to explain the properties of parallelograms in a creative way, so she gave students colored paper in the shape of a quadrilateral and then ask the students to make a parallelogram from it by using paper folding.



i. How can a parallelogram be formed by using paper folding? (1)

ii. If ∠RSP = 30^o, then find ∠RQP. (1)

iii. If ∠RSP = 50^o, then find ∠SPQ? (2)

OR

If SP = 3 cm, Find the RQ. (2)

Solution

Section A

1.

(c) $\sqrt{5}$

Explanation:

$\sqrt{5}$ = 2.23606797749978969, Which is a non-terminating and non- repeating decimal therefore it is an irrational and also lies between 2 and 2,5

2.

(c) y = 5x + 3

Explanation:

Taxi fare for first kilometer = ₹8

Taxi fare for subsequent distance = ₹5

Total distance covered = x

Total fare = y

Since the fare for first kilometer = ₹8

According to problem, Fare for (x - 1) kilometer = 5(x - 1)

So, the total fare y = 5(x - 1) + 8

$\Rightarrow$ y = 5(x - 1) + 8

$\Rightarrow$ y = 5x – 5 + 8

$\Rightarrow$ y = 5x + 3

Hence, y = 5x + 3 is the required linear equation.

3.

(d) (0, 4)

Explanation:

Given ordinate of the point is 4 and it lies on Y-axis, so its abscissa is zero. Hence, the required point is (0, 4).

4.

(d) horizontal axis and vertical axis

Explanation:

In a histogram the class limits are marked on the horizontal axis and the frequency is marked on the vertical axis. Thus, a rectangle is constructed on each class interval.

5.

(b) many

Explanation:

There are infinite many eqution which satisfy the given value x = 2, y = 3

for example

x + y = 5

x - y = -1

3x - 2y = 0

etc.......

6. **(a)** lines and curves

Explanation:

lines and curves.

7.

(d) 18°

Explanation:

In the given figure, we have x°.y° and z° forming a linear pair, therefore these must be supplementary.

That is,

$x + y + z = 180^o$ ...(1)

Also,

$\frac{y}{x} = 5$

y = 5x ...(2)

And

$\frac{z}{x} = 4$

z = 4x ...(3)

Substituting (ii) and (iii) in (i), we get:

x + 5x + 4x = 180°

10x = 180°

$x = \frac{180^\circ}{10}$

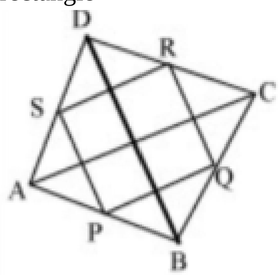
$x = 18^o$

8.

(c) rectangle

Explanation:

rectangle



Let ABCD be a rhombus and P,Q,R and S be the mid-points of sides AB, BC, CD and DA respectively.

In $\triangle$ABD and $\triangle$BDC we have

SP $\parallel$ BD and SP = $\frac{1}{2}$BD ..... (1) [By mid-point theorem]

RQ $\parallel$ BD and RQ = $\frac{1}{2}$BD ..... (2) [By mid-point theorem]

From (1) and (2) we get,

SP $\parallel$ RQ

PQRS is a parallelogram

As diagonals of a rhombus bisect each other at right angles.

$\therefore$ AC$\perp$BD

Since, SP $\parallel$ BD, PQ $\parallel$ AC and AC$\perp$BD

$\therefore$ SP$\perp$PQ

$\therefore \angle QPS = 90^o$

$\therefore$ PQRS is a rectangle.

9.

(d) 0

Explanation:

Given: x + y = 5 $\Rightarrow$ x = 5 - y

$x^3 + y^3 + 15xy - 125$

Putting the value of x, we get

$(5 - y)^3 + y^3 + 15(5 - y)y - 125$

$= 125 - y^3 - 3 \times 5 \times y(5 - y) + y^3 + 15(5 - y)y - 125$

$= 125 - y^3 - 75y + 15y^2 + y^3 + 75y - 15y^2 - 125$
$= 0$

10.

(b) (3, 2)

Explanation:

The graph of line x = 3 is a line parallel to the y-axis.

Hence, its passes through (3, 2), satisfying x =3.

11.

(d) 55°

Explanation:

It is given that $\angle B = 35°$, AB = AC and Ad is the median of BC

We know that in isosceles triangle the median from he vertex to the unequal side divides it into two equal part at right angle.

Therefore,

$\angle ADB = 90°$

$\angle B = \angle ADB + \angle A = 180°$ (Property of triangle)

$35° + 90° + \angle A = 180°$

$\angle A = 180° - 125°$

$\angle A = 55°$

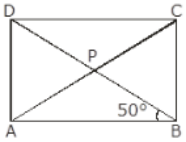
12.

(c) 80^o

Explanation:

Given,

ABCD is a rectangle



Diagonals AC & BD intersect each other at P

$\angle ABD = 50^o$

$\because$ diagonals of rectangle bisect each other and are equal in length

$\Rightarrow \angle ABD = \angle PDC$ [alternate angles]

$\Rightarrow \angle PDC = \angle PCD = 50°$

In $\triangle DPC$

$\Rightarrow \angle DPC + \angle PCD + \angle PDC = 180^o$

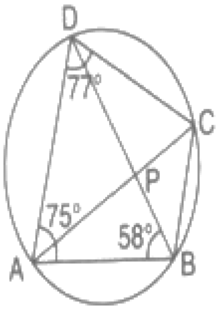
$\Rightarrow \angle DPC + 50^o + 50^o = 180^o$

$\Rightarrow \angle DPC = 180^o - 100^o = 80^o$

13.

(c) 92^o

Explanation:



Since AD acts as a chord also, So, $\angle ABD = \angle ACD = 58^0$

Again as CD also acts as a chord also, therefore,

$\angle$DBC = $\angle$DAC

Now, $\angle$ABC = $\angle$ABD + $\angle$DBC

Also, $\angle$ADC + $\angle$ABC = 180^o

$\Rightarrow$ $\angle$ABC = 180^o - 77^o = 103^o

And therefore

$\angle$DBC = 103^o - 58^o = 45^o

Hence, $\angle$DAC = 45^o

Since,

$\angle$DAC = 45^o

So, $\angle$CAB = 75^o - 45^o = 30^o

But, $\angle CAB = \angle BDC$

$\Rightarrow \angle BDC = 30^0$

Now, In triangle CPD,

$\angle$C + $\angle$P + $\angle$D = 180^o

$\Rightarrow$ 58^o + $\angle$P + 30^o = 180^o

$\Rightarrow$ $\angle$P = 180^o - 30^o - 58^o = 92^o

14. **(a)** non-terminating non-recurring

Explanation:

As $\sqrt{2}$ is an irrational number, so its decimal representation will be non terminating , non recurring.

15.

(b) (x, 0)

Explanation:

at x axis the value of y co-ordinate is zero

16.

(b) 40°

Explanation:

Let the other interior opposite angle be x°.

Then, we have x° + 55° = 95°

$\Rightarrow$ x°= 95°- 55° = 40°

17. **(a)** 0

Explanation:

p(x) = x^3 - x^2 + x + 1

= $\frac{p(-1)+p(1)}{2}$

= $\frac{(-1)^3-(-1)^2+(-1)+1+(1)^3-(1)^2+(1)+1}{2}$

= $\frac{-1-1-1+1+1-1+1+1}{2}$

= $\frac{0}{2}$

= 0

18.

(c) 44π sq. units

Explanation:

Let r_1 and r_2 be radii of two spheres. According to question,

$\frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{216}{125} \Rightarrow \left(\frac{r_1}{r_2}\right)^3 = \frac{216}{125} \Rightarrow \frac{r_1}{r_2} = \frac{6}{5}$ ...(i)

Given, r_1 + r_2 = 11 ...(ii)

From (i) and (ii), we get r_1 = 6 units, r_2 = 5 units

$\therefore$ Required difference = $4\pi r_1^2 - 4\pi r_2^2$

$= 4\pi\left(6^2 - 5^2\right) = 4\pi \times 11 = 44\pi$ sq. units.

19.

(d) A is false but R is true.

Explanation:

Area of an equilateral triangle = $\frac{\sqrt{3}}{4}a^2$, where a is side of triangle

$81\sqrt{3} = \frac{\sqrt{3}}{4}a^2$

81 $\times$ 4 = a^2

324 = a^2

a = 18 cm

s = $\frac{18+18+18}{2}$ = 27 cm

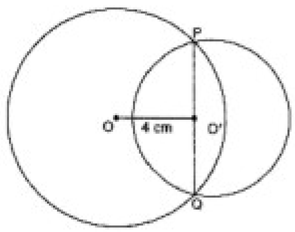
20.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

Through a point infinite lines can be drawn. Through (2, 14) infinite number of lines can be drawn. Also a line has infinite points on it hence a linear equation representing a line has infinite solutions.

Section B

21. 

We know that if two circles intersect each other at two points, then the line joining their centres is the perpendicular bisector of their common chord.

$\therefore$Length of the common chord

= PQ =2O'P

= 2 $\times$ 3cm = 6cm

22. Let a = 80 cm and b = 18cm, perimeter = 180 cm

$\therefore 180 = a + b + c = 80 + 18 + c$

c = 82 cm

Now, $S = \frac{180}{2} = 90$cm

$\therefore$ Area of triangle $= \sqrt{90(90-80)(90-18)(90-82)}$

$= \sqrt{90 \times 10 \times 72 \times 8}$sq $\quad cm$

= 720 sq cm

The longest side of the triangle is 82 cm

Let h cm be the length of altitude corresponding to the longest side.

23. Given that, $\angle$BAC = 52°

$\angle$BDC = $\angle$BAC = 52° ... (Angle in same segment)

Since, OD = OC

Then, $\angle$ODC = $\angle$OCD (Opposite angles to equal radii)

$\Rightarrow$ x = 52°.

24. i. $\angle$BCD = 180° - $\angle$BAD ($\therefore$ Opposite angles of a cyclic quadrilateral are supplementary)

= 180° - ($\angle$BAC + $\angle$DAC)

= 180° - (70° + 40°) = 70°

ii. $\angle CBA = 180^o - (\angle BAC + \angle BCA)$ (∴Opposite angles of a cyclic quadrilateral are supplementary)

$= 180^o - (60^o + 20^o) = 100^o$

$\angle ADC = 180o - \angle CBA$

$= 180^o - 100^o = 80^o$

OR

In the given diagram join AB. Also $\angle ABD = 90°$ (because angle in a semicircle is always 90°)

Similarly, we have $\angle ABC = 90°$

So, $\angle ABD + \angle ABC = 90° + 90° = 180°$

Therefore, DBC is a line i.e., B lies on the line segment DC.

25. If the point (3, 4) lies on the graph of the equation

3y = ax + 7, then

3(4) = a(3) + 7

⇒ 12 = 3a + 7

⇒ 3a = 12 – 7

⇒ 3a = 5

⇒ a = $\frac{5}{3}$

OR

x-2y=4

Put x = $\sqrt{2}$, y = $4\sqrt{2}$ in given equation, we get

$\sqrt{2} - 2(4\sqrt{2}) = \sqrt{2} - 8\sqrt{2} = -7\sqrt{2}$

which is not 4.

∴ $(\sqrt{2}, 4\sqrt{2})$ is not a solution of given equation.

Section C

26. (i) Consider the whole numbers and natural numbers separately.

We know that whole number series is $0, 1, 2, 3, 4, 5$.....

We know that natural number series is $1, 2, 3, 4, 5$.....

So, we can conclude that every number of the natural number series lie in the whole number series.

Therefore, we conclude that, yes every natural number is a whole number.

(ii) Consider the integers and whole numbers separately.

We know that integers are those numbers that can be written in the form of $\frac{p}{q}$,where $q = 1$

Now, considering the series of integers, we have $\ldots. -4, -3, -2, -1, 0, 1, 2, 3, 4$.....

We know that whole number series is $0, 1, 2, 3, 4, 5$.....

We can conclude that all the numbers of whole number series lie in the series of integers. But every number of series of integers does not appear in the whole number series.

Therefore, we conclude that every integer is not a whole number.

(iii) Consider the rational numbers and whole numbers separately.

We know that rational numbers are the numbers that can be written in the form $\frac{p}{q}$ where $q \neq 0$

We know that whole number series is $0, 1, 2, 3, 4, 5$.....

We know that every number of whole number series can be written in the form of $\frac{p}{q}$ as

$\frac{0}{1}, \frac{1}{1}, \frac{2}{1}, \frac{3}{1}, \frac{4}{1}, \frac{5}{1} \ldots..$

We conclude that every number of the whole number series is a rational number. But, every rational number does not appear in the whole number series. like $\frac{2}{3}, \frac{5}{6}$

Therefore, we conclude that every rational number is not a whole number.

27. If p - 1 is a factor of $p^{10} - 1$, then $(1)^{10} - 1$ should be equal to zero.

Now, $(1)^{10} - 1 = 1 - 1 = 0$

Therefore, p - 1 is a factor of $p^{10} - 1$.

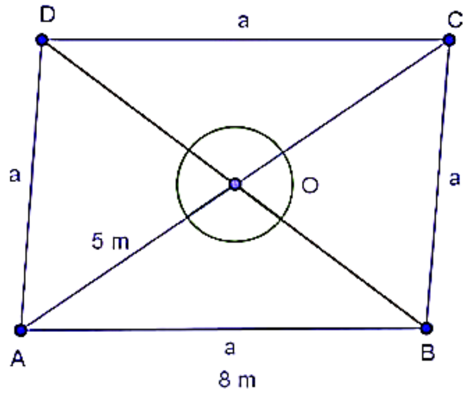
Again, if p – 1 is a factor of $p^{11} - 1$, then $(1)^{11} - 1$ should be equal to zero.

Now, $(1)^{11} - 1 = 1 - 1 = 0$

Therefore, p – 1 is a factor of $p^{11} - 1$.

Hence, p – 1 is a factor of $p^{10} - 1$ and also of $p^{11} - 1$.

28.



Since perimeter = 32 m

$\Rightarrow$ 4a = 32m [perimeter of rhombus = 4 $\times$ side]

$\Rightarrow$ a = 8m

Let, AC = 10 $\Rightarrow$ OA = $\frac{1}{2}$AC = $\frac{1}{2}$ $\times$ 10 = 5m

$\therefore$ $OB^2 = AB^2 - OA^2$ [by pythagaros theorem]

$\Rightarrow$ OB = $\sqrt{8^2 - 5^2}$ = $\sqrt{64 - 25}$ = $\sqrt{39}$m

Now, BD = 2OB = $2\sqrt{39}$ m

$\therefore$ Area of sheet = $\frac{1}{2}$ $\times$ BD $\times$ AC = $\frac{1}{2}$ $\times$ $2\sqrt{39}$ $\times$ 10 = $10\sqrt{39}$ m^2

$\therefore$ Cost of printing on both sides at the rate of ₹ 5 per m^2

= ₹ 2 $\times$ $10\sqrt{39}$ $\times$ 5

= ₹ 625.00

OR

Now, first determine the area of $\triangle$ ABC

The sides of a triangle are given as,

AB = a = 7.5 cm, BC = b = 7 cm and CA = c = 6.5 cm

Now, semi-perimeter of a triangle,

$s = \frac{a+b+c}{2} = \frac{7.5+7+6.5}{2} = \frac{21}{2}$ = 10.5 cm

$\therefore$ Area of $\triangle$ABC $= \sqrt{s(s-a)(s-b)(s-c)}$ [by Heron's formula]

$= \sqrt{10.5(10.5-7.5)(10.5-7)(10.5-65)}$

$= \sqrt{10.5 \times 3 \times 3.5 \times 4} = \sqrt{441}$ = 21 cm^2 ...(i)

Now, area of parallelogram BCED = Base $\times$ Height

= BC $\times$ DF = 7 $\times$ DF

According the question,

Area of $\triangle$ABC is equal to the Area of parallelogram BCED..

$\Rightarrow$ 21 = 7 $\times$ DF [from Eqs. (i) and (ii)]

$\Rightarrow$ DF $= \frac{21}{7}$ = 3 cm

Hence, the height of parallelogram is 3 cm.

29. For heap of wheat

Diameter = 10.5 m

$\therefore$ Radius (r) = $\frac{10.5}{2}$ cm = 5.25 m

Height (h) = 3 m

$\therefore$ Volume = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times (5.25)^2 \times 3$

= 86.625 m^3

Slant height, $l = \sqrt{r^2 + h^2}$

$= \sqrt{(5.25)^2 + (3)^2} = \sqrt{27.5625 + 9}$

$= \sqrt{36.5625}$ = 6.05 m

$\therefore$ Curved surface area =πrl

= $\frac{22}{7}$ × 5.25 × 6.05 = 99.825 m^2

$\therefore$ The area of the canvas required is 99.825 m^2

30. We have,

AE = AD [GIVEN] ...(1) and CE = BD [GIVEN] ...(2)

$\Rightarrow$ AE + CE = AD + BD [adding equation (1) & (2)]

$\Rightarrow$ AC = AB ...(3)

Now, in $\triangle$AEB and $\triangle$ADC,

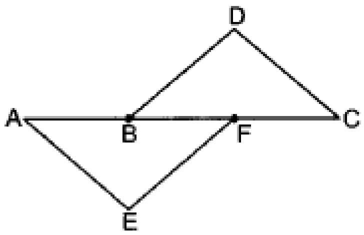
AE = AD [given]

$\angle$EAB = $\angle$DAC [common]

AB = AC [from (3)]

$\triangle$AEB $\cong$ $\triangle$ADC [by SAS]

OR



In triangles AFE and CBD (in above shown figure) , we have

AB = CF (Given)

Adding BF on both the sides, we get:-

AB + BF = CF + BF

or, AF = BC

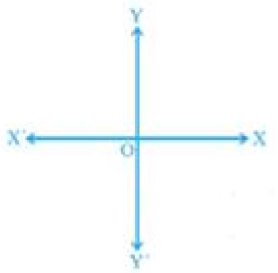
Now in triangles AFE and CBD, we have AF= CB (Proved above)

$\angle$AFE = $\angle$CBD (Given)

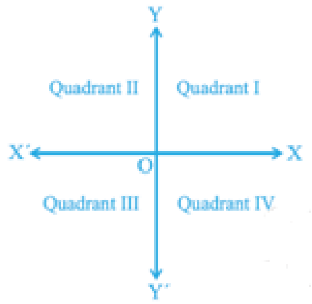
and EF = BD (Given) .So, according to SAS congruency criteria of triangles;

$\triangle$AFE $\cong$ $\triangle$CBD Hence, proved.

31. i. The horizontal line that is drawn to determine the position of any point in the Cartesian plane is called as x-axis. The vertical line that is drawn to determine the position of any point in the Cartesian plane is called as y-axis



ii. The name of each part of the plane that is formed by x-axis and y-axis is called as quadrant.



iii. The point, where the x-axis and the y-axis intersect is called as origin.

Section D

32. $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

$= \frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} \times \frac{\sqrt{10}-\sqrt{3}}{\sqrt{10}-\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} \times \frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}-\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}} \times \frac{\sqrt{15}-3\sqrt{2}}{\sqrt{15}-3\sqrt{2}}$

$= \frac{7\sqrt{3}(\sqrt{10}-\sqrt{3})}{10-3} - \frac{2\sqrt{5}(\sqrt{6}-\sqrt{5})}{6-5} - \frac{3\sqrt{2}(\sqrt{15}-3\sqrt{2})}{15-18}$

$= \sqrt{3}(\sqrt{10} - \sqrt{3}) - 2\sqrt{5}(\sqrt{6} - \sqrt{5}) + \sqrt{2}(\sqrt{15} - 3\sqrt{2})$

$= \sqrt{30} - 3 - 2\sqrt{30} + 10 + \sqrt{30} - 6$
$= 2\sqrt{30} - 9 - 2\sqrt{30} + 10 = 1$

OR

i. Given, $a = 3 + 2\sqrt{2}$

and $\frac{1}{a} = \frac{1}{3+2\sqrt{2}}$

Now, $\frac{1}{a} = \frac{1}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}} = \frac{3-2\sqrt{2}}{3^2-(2\sqrt{2})^2} = \frac{3-2\sqrt{2}}{9-8}$

$\therefore \quad \frac{1}{a} = 3 - 2\sqrt{2}$

$a + \frac{1}{a} = 3 + 2\sqrt{2} + 3 - 2\sqrt{2} = 6$

$\left(a + \frac{1}{a}\right)^2 = a^2 + \frac{1}{a^2} + 2$

$6^2 = a^2 + \frac{1}{a^2} + 2$

$\Rightarrow \quad a^2 + \frac{1}{a^2} = 36 - 2$

$\Rightarrow \quad a^2 + \frac{1}{a^2} = 34$

ii. Now,

$\left(a + \frac{1}{a}\right)^3 = a^3 + \frac{1}{a^3} + 3 \times a^2 \times \frac{1}{a} + 3 \times a \times \frac{1}{a^2}$

$\Rightarrow \left(a + \frac{1}{a}\right)^3 = \left(a^3 + \frac{1}{a^3}\right) + 3\left(a + \frac{1}{a}\right)$

$6^3 = a^3 + \frac{1}{a^3} + 3 \times 6$

$\Rightarrow a^3 + \frac{1}{a^3}$

$= 216 - 18 = 198$

33. i. From the above figure, We have AB = BC…(1) [Given]

Now, A, M, B are the three points on a line, and M lies between A and B such that M is the mid point of AB [Given], then AM + MB = AB …(2) Also B, N, C are three points on a line such that N is the mid point of BC [Given]

Similarly, BN + NC = BC....(3)

So, we get AM + MB = BN + NC

From (1), (2), (3) and Euclid's first axiom

Since M is the mid-point of AB and N is the mid-point of BC, therefore

2AM = 2NC i.e. AM = NC

Hence, AM = NC. Proved

Using axiom 6, things which are double of the same thing are equal to one another.

ii. From the above figure, We have BM = BN …(1) [Given]

As M is the mid-point of AB [Given] , so that

BM = AM…(2)

And N is the mid-point of BC [Given]

BN = NC…(3)

From (1), (2) and (3) and Euclid's first axiom, we get

AM = NC…(4)

Adding (4) and (1), we get

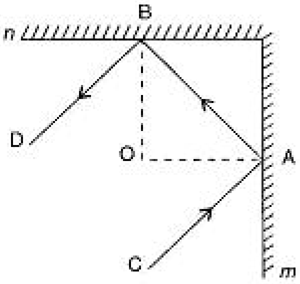
AM + BM = NC + BN

Hence, AB = BC Proved

[By axiom 2 if equals are added to equals, the wholes are equal]

34. At B, draw BO ⊥ n and at A. draw AO ⊥ m.

Let BO and AO meet at O.



as, Perpendiculars to two perpendicular lines are also perpendicular.

$\therefore \angle AOB = 90^o$

In $\triangle AOB$, $\angle AOB + \angle OAB + \angle OBA = 180^o$

(as,The sum of the three angles of a triangle is 180^o)

$\Rightarrow 90^o + \frac{1}{2}\angle CAB + \frac{1}{2}\angle ABD = 180^o$

(as, By law of reflection, Angle of incidence = Angle of reflection

$\therefore \angle CAO = \angle OAB = \frac{1}{2}\angle CAB$ and $\angle ABO = \angle OBD = \frac{1}{2}\angle ABD$)

$\Rightarrow \frac{1}{2}(\angle CAB + \angle ABD) = 90^o$

$\Rightarrow \angle CAB + \angle ABD = 180^o$

But these angles from a pair of supplementary consecutive interior angles.

$\therefore$ Ray CA || Ray BD.

OR

Since corresponding angles are equal.

$\therefore x = y$ ... (i)

We know that the interior angles on the same side of the transversal are supplementary.

$\therefore y + 55^o = 180^o$

$\Rightarrow y = 180^o - 55^o = 125^o$

So, $x = y = 125^o$

Since AB || CD and CD || EF.

$\therefore$ AB || EF

$\Rightarrow \angle EAB + \angle FEA = 180^o$ [$\because$ Interior angles on the same side of the transversal EA are supplementary]

$\Rightarrow 90^o + z + 55^o = 180^o$

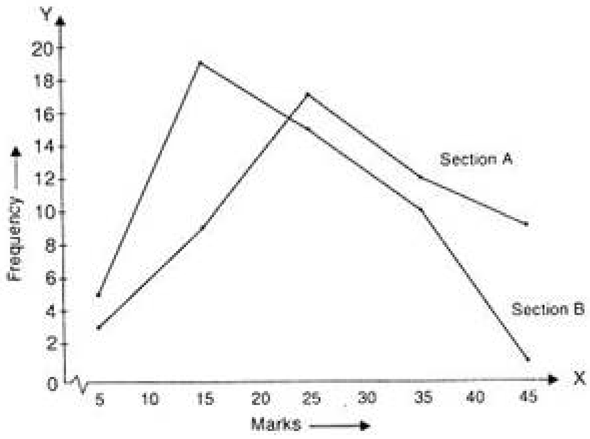
$\Rightarrow z = 35^o$

35. For section A

Classes	**Class-Marks**	**Frequency**
0-10	5	3
10-20	15	9
20-30	25	17
30-40	35	12
40-50	45	9

For section B

Classes	**Class-Marks**	**Frequency**
0-10	5	5
10-20	15	19
20-30	25	15
30-40	35	10
40-50	45	1



Section E

36. i. Height of the tent h = 10 m

Radius r = 7 cm

Thus Latent height l = $\sqrt{r^2 + h^2}$ = $\sqrt{7^2 + 10^2} = \sqrt{149}$ = 12.20 m

Curved surface of tent = $\pi rl = \frac{22}{7} \times 7 \times 12.2$ = 268.4 m^2

Thus the length of the cloth used in the tent = 268.4 m^2

The remaining cloth = 300 - 268.4 = 31.6 m^2

Hence the cloth used for the floor = 31.6 m^2

ii. Height of the tent h = 10 m

Radius r = 7 cm

Thus the volume of the tent = $\frac{1}{3}\pi r^2 h$

= $\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 10$

= 513.3 m^3

iii. Radius of the floor = 7 m

Area of the floor = $\pi r^2 = \frac{22}{7} \times 7 \times 7$

= 154 m^2

OR

Radius of the floor r = 7 m

Latent height of the tent l = 12.2 m

Thus total surface area of the tent = $\pi r(r + l)$

= $\frac{22}{7} \times 7(7 + 12.2)$

= 22 $\times$ 19.2

= 422.4 m^2

37. i. x - y = 10

2x + 3y = 120

ii. 2x + 3y = 120

iii. x - y = 10 ...(1)

2x + 3y = 120 ...(2)

Multiply equation (1) by 3 and to equation (2)

3x - 3y + 2x + 3y = 30 + 120

$\Rightarrow$ 5x = 150

$\Rightarrow$ x = 30

Hence the number thought by Prateek is 30.

OR

We know that x - y = 10 ...(i) and 2x + 3y = 120 ...(ii)

Put x = 30 in equation (i)

30 - y = 10

$\Rightarrow$ y = 40

Hence number thought by Kevin = 40.

38. i. By joining mid points of sides of a quadrilateral one can make parallelogram.

S and R are mid points of sides AD and CD of ΔADC, P and Q are mid points of sides AB and BC of ΔABC, then by mid-point theorem SR || AC and SR = $\frac{1}{2}$AC similarly PQ || AC and PQ = $\frac{1}{2}$AC.

Therefore SR || PQ and SR = PQ

A quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel.

Hence PQRS is parallelogram.

ii. $\angle$RQP. = 30^o, Opposite angles of a parallelogram are equal.

iii. Adjacent angles of a parallelogram are supplementary.

Thus, $\angle RSP + \angle SPQ = 180^o$

$50^o + \angle SPQ = 180^o$

$\angle SPQ = 180^o - 50^o$

$= 130^o$

OR

RQ = 3 cm

Opposite side of a parallelogram are equal.