

6. in $\triangle ABC$ and $\triangle DEF$ it is given that $AB = DE$ and $BC = EF$ in order that $\triangle ABC \cong \triangle DEF$, we must have [1]

a) $\angle C = \angle F$

b) $\angle A = \angle D$

c) $\angle B = \angle E$

d) None of these

7. Which of the following is not a solution of $2x - 3y = 12$? [1]

a) (0, -4)

b) (2, 3)

c) (6, 0)

d) (3, -2)

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

a) 2

b) 3

c) 0

d) 1

9. $(125)^{-1/3} = ?$ [1]

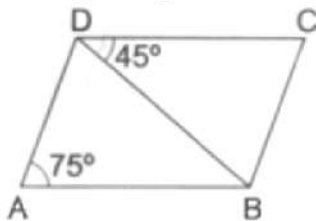
a) $-\frac{1}{5}$

b) -5

c) $\frac{1}{5}$

d) 5

10. In the given figure, ABCD is a parallelogram in which $\angle BDC = 45^\circ$ and $\angle BAD = 75^\circ$. Then, $\angle CBD = ?$ [1]



a) 60°

b) 45°

c) 75°

d) 55°

11. The value of $64^{-1/3} \left(64^{1/3} - 64^{2/3} \right)$, is [1]

a) -2

b) 1

c) -3

d) $\frac{1}{3}$

12. The force applied on a body is directly proportional to the acceleration produced on it. The equation to represent the above statement is [1]

a) $y = kx$

b) $y = x$

c) $y + x = 0$

d) none of these

13. The measure of an angle is five times its complement. The angle measures [1]

a) 75°

b) 65°

c) 25°

d) 35°

14. Choose the rational number which does not lie between $-\frac{2}{3}$ and $-\frac{1}{5}$ [1]

a) $-\frac{7}{20}$

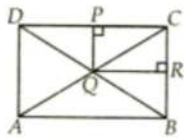
b) $-\frac{3}{10}$

c) $-\frac{1}{4}$

d) $\frac{3}{10}$

15. Let C be the mid-point of an arc AB of a circle such that $m\widehat{AB} = 183^\circ$. If the region bounded by the arc ACB and line segment AB is denoted by S, then the centre O of the circle lies [1]

- a) on AB and bisect AB
b) on the segment AB
c) in the exterior of S
d) in the interior of S
16. A(-6, 3) be a point on the graph. Draw $AL \perp x - axis$. The co-ordinates of L are [1]
a) (-6, 3)
b) (0, 0)
c) (-6, 0)
d) (0, -6)
17. How many linear equations can be satisfied by $x = 2$ and $y = 3$? [1]
a) only one
b) none of these
c) many
d) two
18. If $x + 2$ and $x - 1$ are the factors of $x^3 + 10x^2 + mx + n$, then the values of m and n are respectively. [1]
a) 5 and - 3
b) 17 and - 8
c) 23 and -19
d) 7 and - 18
19. **Assertion (A):** ABCD and PQRC are rectangles and Q is a midpoint of AC. Then DP = PC. [1]

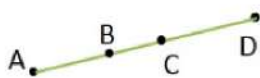


Reason (R): The line segment joining the midpoint of any two sides of a triangle is parallel to the third side and equal to half of it.

- 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):** If $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, then $\sqrt{5} = \sqrt{2} + \sqrt{3}$. [1]
Reason (R): Square root of a positive real number always exists.
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. Ram and Ravi have the same weight. If they each gain weight by 2 kg, how will their new weights be compared? [2]
22. In fig., if $AC = BD$, then prove that $AB = CD$ [2]



23. Name the quadrant in which the following points lie :(i) (2, 3)(ii) (-3, 4)(iii) (-3, -10) [2]
24. Rationalise the denominator of: $\frac{3-2\sqrt{2}}{3+2\sqrt{2}}$. [2]

OR

Simplify the following by rationalizing the denominator : $\frac{30}{5\sqrt{3}-3\sqrt{5}}$

25. How many metres of cloth, 2.5 m wide, will be required to make a conical tent whose base radius is 7 m and height 24 m? [2]

OR

Find the surface area of a sphere of radius 5.6 cm.

Section C

26. Simplify the following by rationalizing the denominator: $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}}$ [3]

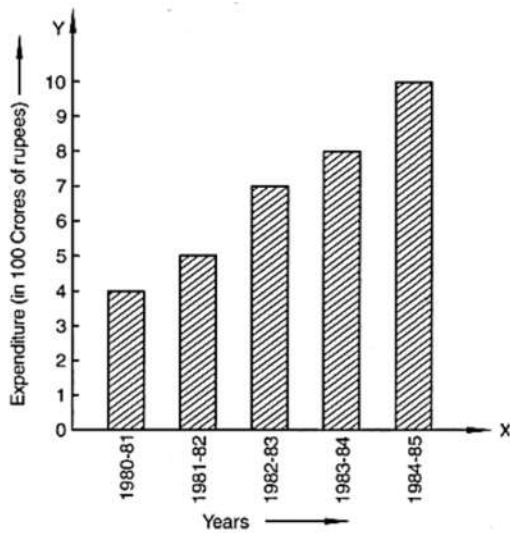
27. The following table shows the number of scooters sold by a dealer during six consecutive years. Draw a bar graph to represent this data. [3]

Year	2011	2012	2013	2014	2015	2016
Number of scooters sold (in thousands)	16	20	32	36	40	48

28. ABCD is a rhombus in which altitude from D to side AB bisects AB. Find the angles of the rhombus. [3]

29. Find four solutions for the following equation: $12x + 5y = 0$ [3]

30. Read the bar graph given in Figure and answer the following questions [3]



- What information is given by the bar graph?
- What was the expenditure on health and family planning in the year 1982-83?
- In which year is the increase in expenditure maximum over the expenditure in previous year? What is the maximum increase?

OR

The production of oil (in lakh tonnes) in some of the refineries in India during 1982 was given below:

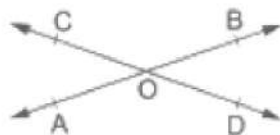
Refinery:	Barauni	Koyali	Mathura	Mumbai	Florida
Production of oil (in lakh tonnes)	30	70	40	45	25

Construct a bar graph to represent the above data so that the bars are drawn horizontally.

31. Factorise: $(2x - 3y)^3 + (3y - 4z)^3 + (4z - 2x)^3$ [3]

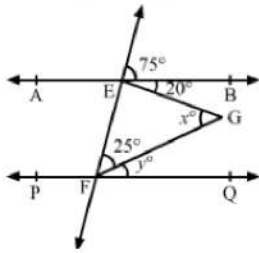
Section D

32. Two lines AB and CD intersect at a point O such that $\angle BOC + \angle AOD = 280^\circ$, as shown in the figure. Find all the four angles. [5]



OR

In the given figure, $AB \parallel PQ$. Find the value of x and y .



33. A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of Rs.2 per square metre, if the radius of the base is 14 metres. [5]
34. The base of a triangular field is three times its altitude. If the cost of sowing the field at Rs.58 per hectare is Rs.783, find its base and height. [5]

OR

Find the area of a triangular field whose sides are 91 m, 98 m and 105 m in length. Find the height corresponding to the longest side.

35. Factorize: $x^3 - 2x^2 - x + 2$ [5]

Section E

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

Rainwater harvesting system is a technology that collects and stores rainwater for human use.

Anup decided to do rainwater harvesting. He collected rainwater in the underground tank at the rate of $30 \text{ cm}^3/\text{sec}$.



- (i) What will be the equation formed if the volume of water collected in x seconds is taken as $y \text{ cm}^3$? and also find amount of water collected in 2 hours?
- (ii) Write the equation in standard form.
- (iii) How much water will be collected in 60 sec?

OR

How much time will it take to collect water in 900 cm^3 ?

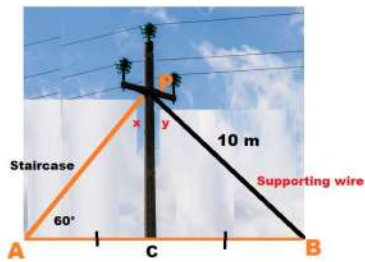
37. **Read the text carefully and answer the questions:** [4]

As shown In the village of Surya there was a big pole PC. This pole was tied with a strong wire of 10 m length.

Once there was a big spark on this pole, thus wires got damaged very badly. Any small fault was usually repaired with the help of a rope which normal board electricians were carrying on bicycles.

This time electricians need a staircase of 10 m so that it can reach at point P on the pole and this should make

60° with line AC.



- (i) Show that $\triangle APC$ and $\triangle BPC$ are congruent.
- (ii) Find the value of $\angle x$.

OR

Find the value of $\angle y$.

- (iii) What is the value of $\angle PBC$?

38. Read the text carefully and answer the questions:

[4]

While dusting a maid found a button whose upper face is of red color, as shown in the figure. The diameter of each of the smaller identical circles is $\frac{1}{4}$ of the diameter of the larger circle whose radius is 16 cm.



- (i) Find the area of each of the smaller circle.
- (ii) Find the area of the larger circle.

OR

Find the area of quadrant of a smaller circle.

- (iii) Find the area of the black colour region.

Solution

CBSE SAMPLE PAPER - 01

Class 09 - Mathematics

Section A

1. (b) (0, -3)

Explanation: Since, it lies 3 units in the negative direction of the y-axis so its ordinate will be -3 and it also lies on the y-axis so, its abscissa will be zero, because x-coordinate of any point on y-axis is zero.
Thus, point will be (0, -3).

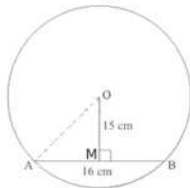
2. (d) 24 cm^2

Explanation: Perpendicular = $\sqrt{10^2 - 8^2} = \sqrt{100 - 64} = \sqrt{36} = 6 \text{ cm}$
Area of triangle = $\frac{1}{2} \times \text{Base} \times \text{Perpendicular}$
 $= \frac{1}{2} \times 8 \times 6$
 $= 24 \text{ sq cm}$

3. (c) 17 cm

Explanation:

We will represent the given data in the figure



In the diagram, AB is the given chord of 16 cm length and OM is the perpendicular distance from the centre to AB.

We know that perpendicular from the centre to any chord divides it into two equal parts.

So, $AM = MB = \frac{16}{2} = 8 \text{ cm}$.

Now consider right triangle $\triangle OMA$ and by using Pythagoras theorem $\angle OMA = 90^\circ$

$$AO^2 = AM^2 + OM^2$$

$$AO^2 = 8^2 + 15^2$$

$$AO^2 = 64 + 225 = 289$$

$$AO = \sqrt{289} = 17 \text{ cm}$$

4. (a) X-axis

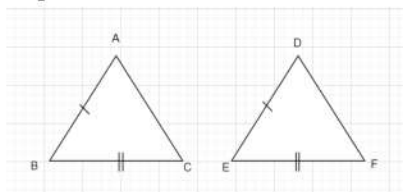
Explanation: Histogram states that a two dimensional frequency density diagram is called as a histogram. The histograms are diagrams which represent the class interval and the frequency in the form of a rectangle. There will be as many adjoining rectangles as there are class intervals.

5. (a) 0.709

Explanation: $\frac{1}{\sqrt{2}} = \frac{1}{1.41} = 0.709$

6. (c) $\angle B = \angle E$

Explanation:



Given, $AB = DE$ and $BC = EF$

for, $\angle B = \angle E$

$\triangle ABC \cong \triangle DEF$ [SSA]

7. (b) (2, 3)

Explanation: We have to check (2, 3) is a solution of $2x - 3y = 12$ if (2, 3) satisfy the equation then (2, 3) solution of $2x - 3y = 12$



$$\text{LHS} = 2x - 3y$$

$$2 \times 2 - 3 \times 3$$

$$4 - 9 = -5$$

$$\text{RHS} = -5$$

$$\text{LHS} \neq \text{RHS}$$

So (2, 3) is not a solution of $2x - 3y = 12$

8. (c) 0

Explanation: $p(x) = x^3 - x^2 + x + 1$

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

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

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

$$= \frac{0}{2}$$

$$= 0$$

9. (c) $\frac{1}{5}$

Explanation: $(125)^{-1/3}$

$$= (5^3)^{-1/3}$$

$$= 5^{-1}$$

$$\frac{1}{5}$$

10. (a) 60°

Explanation: As per the question

$$\angle \text{BAD} = \angle \text{BCD} = 75^\circ \text{ (opposite angles of parallelogram)}$$

Now, in $\triangle \text{BCD}$,

$$\angle \text{BCD} + \angle \text{CBD} + \angle \text{BCD} = 180^\circ$$

$$45^\circ + \angle \text{CBD} + 75^\circ = 180^\circ$$

$$\angle \text{CBD} = 60^\circ$$

11. (c) -3

Explanation: $64^{-\frac{1}{3}} \left(64^{\frac{1}{3}} - 64^{\frac{2}{3}} \right)$

$$= (4^3)^{-\frac{1}{3}} \left[4^{3 \times \frac{1}{3}} - (4)^{3 \times \frac{2}{3}} \right]$$

$$= 4^{3 \times \left(-\frac{1}{3}\right)} \left[4^{3 \times \frac{1}{3}} - 4^{3 \times \frac{2}{3}} \right]$$

$$= 4^{-1} [4^1 - 4^2]$$

$$= \frac{1}{4} [4 - 16]$$

$$= \frac{1}{4} (-12)$$

$$= -3$$

12. (a) $y = kx$

Explanation: let force applied be y and acceleration produced be x

The force applied on a body is directly proportional to the acceleration produced on it.

$$y \propto x$$

$$y = kx$$

where k is proportionality constant

13. (a) 75°

Explanation: Let the measure of the required angle be x°

Then, the measure of its complement will be $(90 - x)^\circ$

$$\therefore x = 5(90 - x)$$

$$\Rightarrow x = 450 - 5x$$

$$\Rightarrow 6x = 450$$

$$\Rightarrow x = 75^\circ$$



14. (d) $\frac{3}{10}$

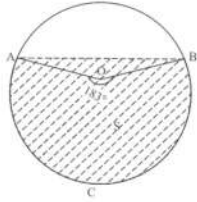
Explanation: Since $\frac{3}{10} > -\frac{2}{3}$ and $\frac{3}{10} > -\frac{1}{5}$

15. (d) in the interior of S

Explanation:

Given: $m\widehat{AB} = 183^\circ$ and C is mid-point of arc ABO is the centre.

With the given information the corresponding figure will look like the following,



From the figure, so the centre of the circle O lies inside the shaded region S.

16. (c) (-6, 0)

Explanation: Since AL perpendicular to x-axis,

So, point L lies on x-axis, and we know that for any point on x-axis y-ordinate is zero.

So, we have L = (-6, 0)

17. (c) many

Explanation: There are infinite many equation which satisfy the given value $x = 2, y = 3$

for example

$$x + y = 5$$

$$x - y = -1$$

$$3x - 2y = 0$$

etc.....

18. (d) 7 and -18

Explanation: It is given $(x + 2)$ and $(x - 1)$ are the factors of the polynomial

$$f(x) = x^3 + 10x^2 + mx + n$$

$$\text{i.e., } f(-2) = 0 \text{ and } f(1) = 0$$

Now

$$f(-2) = (-2)^3 + 10(-2)^2 + m(-2) + n = 0$$

$$-8 + 40 - 2m + n = 0$$

$$\Rightarrow -2m + n = -32$$

$$\Rightarrow 2m - n = 32 \dots (i)$$

$$f(1) = (1)^3 + 10(1)^2 + m(1) + n = 0$$

$$1 + 10 + m + n = 0$$

$$m + n = -11 \dots (ii)$$

Solving equation (i) and (ii) we get

$$m = 7 \text{ and } n = -18$$

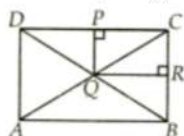
19. (b) Both A and R are true but R is not the correct explanation of A.

Explanation:

In $\triangle ADC$, Q is the midpoint of AC such that $PQ \parallel AD$.

P is the mid-point of DC

$DP = PC$ [Using converse of midpoint theorem]



20. (d) A is false but R is true.

Explanation: $\sqrt{2} + \sqrt{3} \neq 5$

$$\sqrt{3} + \sqrt{2} = 1.732 + 1.414 = 3.146 \neq \sqrt{5} \text{ as } \sqrt{5} = 2.236$$

Section B

21. Let x kg be the weight each of Ram and Ravi. On gaining 2 kg, the weight of Ram and Ravi will be $(x + 2)$ each. By Euclid's second axiom, when equals are added to equals, the wholes are equal. Therefore, the weight of Ram and Ravi are again equal.

22. $AC = BD \dots$ [Given] \dots (1)

$AC = AB + BC \dots$ [Point B lies between A and C] \dots (2)

$BD = BC + CD \dots$ [Point C lies between B and D] \dots (3)

Substituting (2) and (3) in (1), we get

$$AB + BC = BC + CD$$

$$\Rightarrow AB = CD \dots$$
 [Subtracting equals from equals]

23. (i) I quadrant

(ii) II quadrant

(iii) III quadrant

$$\begin{aligned} 24. & \frac{3-2\sqrt{2}}{3+2\sqrt{2}} \\ &= \frac{3-2\sqrt{2}}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}} \\ &= \frac{(3-2\sqrt{2})^2}{(3)^2 - (2\sqrt{2})^2} \\ &= \frac{3^2 - 2 \times 3 \times 2\sqrt{2} + 2\sqrt{2}^2}{9 - 4 \times 2} \\ &= \frac{9 - 12\sqrt{2} + 8}{9 - 8} \\ &= \frac{17 - 12\sqrt{2}}{1} \\ &= 17 - 12\sqrt{2} \end{aligned}$$

OR

$$\begin{aligned} \frac{30}{5\sqrt{3}-3\sqrt{5}} &= \frac{30}{5\sqrt{3}-3\sqrt{5}} \times \frac{5\sqrt{3}+3\sqrt{5}}{5\sqrt{3}+3\sqrt{5}} \\ &\text{(Multiplying the numerator and denominator by } 5\sqrt{3} + 3\sqrt{5} \text{)} \\ &= \frac{30(5\sqrt{3}+3\sqrt{5})}{(5\sqrt{3})^2 - (3\sqrt{5})^2} = \frac{30(5\sqrt{3}+3\sqrt{5})}{75-45} \\ &= \frac{30(5\sqrt{3}+3\sqrt{5})}{30} = \frac{5\sqrt{3}+3\sqrt{5}}{1} \end{aligned}$$

25. We have radius of the conical tent, $r = 7$ m

Height of the conical tent, $h = 24$ m

$$\text{Now, } l = \sqrt{r^2 + h^2} = \sqrt{49 + 576} = \sqrt{625} = 25 \text{ m}$$

$$\text{Curved surface area of the cone} = \pi rl = \frac{22}{7} \times 7 \times 25 = 550$$

Width of the cloth = 2.5 m

$$\text{Therefore, Length of the cloth} = \frac{\text{area of the cloth}}{\text{width of the cloth}} = \frac{550}{2.5} = 220 \text{ m}$$

OR

$r = 5.6$ cm

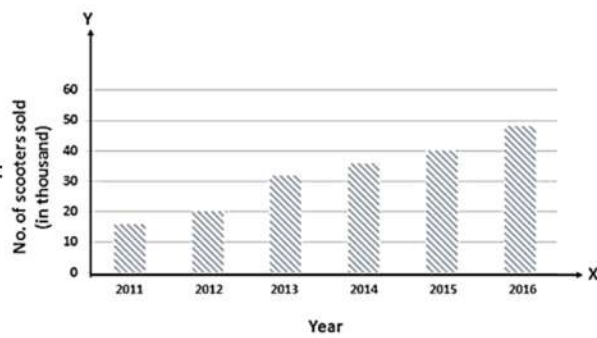
Surface area of a sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times (5.6)^2 = 394.24 \text{ cm}^2$$

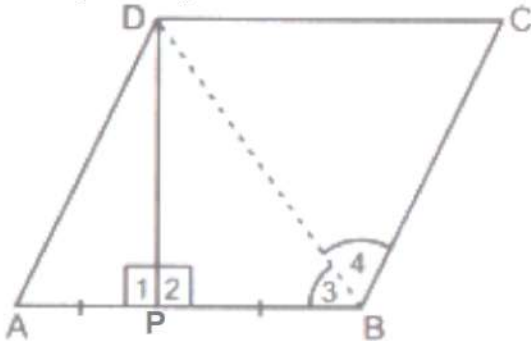
Section C

$$\begin{aligned} 26. & \frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}} \\ &= \frac{(4+\sqrt{5})(4+\sqrt{5}) + (4-\sqrt{5})(4-\sqrt{5})}{(4-\sqrt{5})(4+\sqrt{5})} \\ &= \frac{(4+\sqrt{5})^2 + (4-\sqrt{5})^2}{(4-\sqrt{5})(4+\sqrt{5})} \\ &= \frac{\{(4)^2 + 2(4)(\sqrt{5}) + (\sqrt{5})^2\} + \{(4)^2 - 2(4)(\sqrt{5}) + (\sqrt{5})^2\}}{(4)^2 - (\sqrt{5})^2} \\ &= \frac{(16+8\sqrt{5}+5) + (16-8\sqrt{5}+5)}{16-5} = \frac{42}{11} \end{aligned}$$

27. The bar graph for the given data is shown below:



28. The required diagram is shown below:



In $\triangle APD$ and $\triangle BPD$, we have

$AP = BP$ [Given]

$\angle 1 = \angle 2$ [\because Each equal to 90°]

$PD = PD$ [Common side]

So, by SAS Criterion of congruence, we have

$\triangle APD \cong \triangle BPD$

$\therefore \angle A = \angle 3$ [CPCT]

But, $\angle 3 = \angle 4$ [\because Diagonals bisect opposite angles of a rhombus]

$\Rightarrow \angle A = \angle 3 = \angle 4$ (1)

Now, $AD \parallel BC$

SO, $\angle A + \angle ABC = 180^\circ$ [\because Sum of consecutive interior angles is 180°]

$\Rightarrow \angle A + \angle 3 + \angle 4 = 180^\circ$

$\Rightarrow \angle A + \angle A + \angle A = 180^\circ$ [by Using (1)]

$\Rightarrow 3\angle A = 180^\circ$

$\Rightarrow \angle A = \frac{180^\circ}{3} = 60^\circ$

Now, $\angle ABC = \angle 3 + \angle 4$

$= 60^\circ + 60^\circ$

$= 120^\circ$ [\because Opposite angles of a rhombus are equal]

$\therefore \angle ADC = \angle ABC = 120^\circ$ [\because Opposite angles of a rhombus are equal]

29. $12x + 5y = 0$

$\Rightarrow 5y = -12x$

$\Rightarrow y = \frac{-12}{5}x$

Put $x = 0$, then $y = \frac{-12}{5}(0) = 0$

Put $x = 5$, then $y = \frac{-12}{5}(5) = -12$

Put $x = 10$, then $y = \frac{-12}{5}(10) = -24$

Put $x = 15$, then $y = \frac{-12}{5}(15) = -36$

$\therefore (0, 0), (5, -12), (10, -24)$ and $(15, -36)$ are the four solutions of the equation $12x + 5y = 0$

30. i. The bar graph gives the information about the expenditure on health and family planning during 6th five year plan in India.

ii. The expenditure on health and family planning in the year 1982 - 1983 = ₹700 crores.....

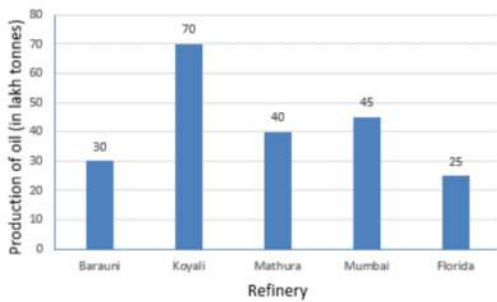
iii. 1984-85 is the year in which the increase in expenditure was maximum over the expenditure in the previous year.

The maximum increase = $1000 - 780 = 220$ crores.

OR

The production of oil (in lakh tonnes) in some of the refineries in India during 1982





31. Let $a = 2x - 3y$, $b = 3y - 4z$, $c = 4z - 2x$

then $a + b + c = 2x - 3y + 3y - 4z + 4z - 2x = 0$

$\therefore a^3 + b^3 + c^3 = 3abc$

$(2x - 3y)^3 + (3y - 4z)^3 + (4z - 2x)^3 = 3(2x - 3y)(3y - 4z)(4z - 2x)$

$= 3(2x - 3y)(3y - 4z) \times 2(2z - x)$

$= 6(2x - 3y)(3y - 4z)(2z - x)$

Section D

32. We know that if two lines intersect, then the vertically-opposite angles are equal.

Let $\angle BOC = \angle AOD = x^\circ$

$\angle BOC + \angle AOD = 280^\circ$

$x + x = 280^\circ$

$\Rightarrow 2x = 280^\circ$

$\Rightarrow x = 140^\circ$

$\therefore \angle BOC = \angle AOD = 140^\circ$

Also, let $\angle AOC = \angle BOD = y^\circ$

We know that the sum of all angles around a point is 360°

$\therefore \angle AOC + \angle BOC + \angle BOD + \angle AOD = 360^\circ$

$\Rightarrow y + 140 + y + 140 = 360^\circ$

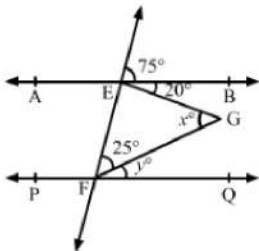
$\Rightarrow 2y = 80^\circ$

$\Rightarrow y = 40^\circ$

Hence, $\angle AOC = \angle BOD = 40^\circ$

$\therefore \angle BOC = \angle AOD = 140^\circ$ and $\angle AOC = \angle BOD = 40^\circ$

OR



Given, $AB \parallel PQ$

Let CD be the transversal cutting AB and PQ at E and F , respectively.

Then,

$\angle CEB + \angle BEG + \angle GEF = 180^\circ$ [Since CD is a straight line]

$\Rightarrow 75^\circ + 20^\circ + \angle GEF = 180^\circ$

$\Rightarrow \angle GEF = 85^\circ$

We know that the sum of angles of a triangle is 180° .

$\therefore \angle GEF + \angle EGF + \angle EFG = 180$

$\Rightarrow 85^\circ + x + 25^\circ = 180^\circ$

$\Rightarrow x^\circ + 110^\circ = 180^\circ$

$\Rightarrow x^\circ = 180^\circ - 110^\circ$

$\Rightarrow x^\circ = 70^\circ$

And

$\angle FEG + \angle BEG = \angle DFQ$ [Corresponding Angles]

$\Rightarrow 85^\circ + 20^\circ = \angle DFQ$

$\Rightarrow \angle DFQ = 105^\circ$

$$\angle EFG + \angle GFQ + \angle DFQ = 180^\circ \text{ [Since CD is a straight line]}$$

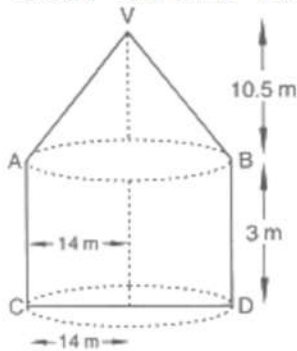
$$\Rightarrow 25^\circ + y^\circ + 105^\circ = 180^\circ$$

$$\Rightarrow y^\circ = 50^\circ$$

$$\therefore x^\circ = 70^\circ \text{ and } y^\circ = 50^\circ$$

33. Let r metres be the radius of the base of the cylinder and h metres be its height $\Rightarrow l_1 = \sqrt{306.25} \text{m} = 17.5 \text{m}$

Then, $r = 14 \text{m}$ and $h = 3 \text{m}$



$$\text{Now we have Curved surface area of the cylinder } = 2\pi rh \text{m}^2 = \left(2 \times \frac{22}{7} \times 14 \times 3\right) \text{m}^2 = 264 \text{m}^2$$

Let r_1 m be the radius of the base, h_1 m be the height and Z m be the slant height of the cone. Then, $r_1 = 14 \text{m}$, $h_1 = (13.5 - 3) \text{m} = 10.5 \text{m}$

$$\therefore l_1 = \sqrt{r_1^2 + h_1^2}$$

$$\Rightarrow l_1 = \sqrt{14^2 + (10.5)^2} \text{m} = \sqrt{196 + 110.25} \text{m}$$

Therefore Curved surface area of the cone = $\pi r_1 l_1$

$$= \frac{22}{7} \times 14 \times 17.5 \text{m}^2 = 770 \text{m}^2$$

So, Total area which is to be painted = Curved surface area of the cylinder + Curved surface area of the cone....

$$= (264 + 770) \text{m}^2 = 1034 \text{m}^2$$

Now for Fence, total cost of painting = Rs.(1034 × 2) = Rs.2068 .

34. Let the height of the triangle be h meter

$$\therefore \text{Base} = 3h \text{ meter [given]}$$

Now,

$$\text{Area of triangle} = \frac{\text{Total cost}}{\text{Rate}} = \frac{783}{58} = 13.5 \text{ ha} = 135000 \text{ m}^2$$

We have:

$$\text{Area of triangle} = 135000 \text{ m}^2$$

$$\Rightarrow \frac{1}{2} \times \text{Base} \times \text{Height} = 135000$$

$$\Rightarrow \frac{1}{2} \times 3h \times h = 135000$$

$$\Rightarrow h^2 = \frac{135000 \times 2}{3}$$

$$\Rightarrow h^2 = 90000$$

$$\Rightarrow h = 300 \text{ m [taking square root both sides]}$$

Thus, we have

$$\text{Height} = h = 300 \text{ m}$$

$$\text{Base} = 3h = 900 \text{ m.}$$

OR

Let:

$$a = 91 \text{ m, } b = 98 \text{ m, and } c = 105 \text{ m}$$

$$\therefore s = \frac{a+b+c}{2} = \frac{91+98+105}{2} = 147 \text{ m}$$

$$\Rightarrow s = 147 \text{ m}$$

By Heron's formula, we have:

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{147(147-91)(147-98)(147-105)}$$

$$= \sqrt{147 \times 56 \times 49 \times 42}$$

$$= \sqrt{7 \times 3 \times 7 \times 2 \times 2 \times 2 \times 7 \times 7 \times 7 \times 7 \times 3 \times 2}$$

$$= 7 \times 7 \times 7 \times 2 \times 3 \times 2$$

$$= 1446 \text{ m}^2$$

We know that the longest side is 105 m.

Thus, we can find out the height of the triangle corresponding to 42 cm.

$$\text{Area of triangle} = 4116 \text{ m}^2$$

$$\Rightarrow \frac{1}{2} \times \text{Base} \times \text{Height} = 4116 \Rightarrow \frac{1}{2} \times (105)(\text{Height}) = 4116$$

$$\Rightarrow \text{Height} = \frac{4116 \times 2}{105} = 78.4 \text{ m}$$

35. $x^3 - 2x^2 - x + 2$

We need to consider the factors of 2, which are $\pm 1, \pm 2$

Let us substitute 1 in the polynomial $x^3 - 2x^2 - x + 2$ to get

$$(1)^3 - 2(1)^2 - (1) + 2 = 1 - 2 - 1 + 2 = 0$$

Thus, according to factor theorem, we can conclude that $(x - 1)$ is a factor of the polynomial

$$x^3 - 2x^2 - x + 2$$

Let us divide the polynomial $x^3 - 2x^2 - x + 2$ by $(x - 1)$, to get

$$\begin{array}{r} \overline{) x^3 - 2x^2 - x + 2} \\ \underline{x^3 - x^2} \\ -x^2 - x \\ \underline{-x^2 + x} \\ -2x + 2 \\ \underline{-2x + 2} \\ 0 \end{array}$$

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

$$= (x - 1)(x^2 + x - 2x - 2)$$

$$= (x - 1)[x(x + 1) - 2(x + 1)]$$

$$= (x - 1)(x - 2)(x + 1)$$

Therefore, we can conclude that on factorizing the polynomial $x^3 - 2x^2 - x + 2$, we get

$$(x - 1)(x - 2)(x + 1)$$

Section E

36. Read the text carefully and answer the questions:

Rainwater harvesting system is a technology that collects and stores rainwater for human use.

Anup decided to do rainwater harvesting. He collected rainwater in the underground tank at the rate of $30 \text{ cm}^3/\text{sec}$.



(i) Let 'x' be time taken and y be amount of water collected as per given statement.

$$\text{Equation is } 30x = y$$

Now when $x = 2 \text{ hours} = 120 \text{ sec}$

$$y = 30 \times 120 = 3600 \text{ cm}^3$$

(ii) $30x - y + 0 = 0$

Standard form of a linear equation in two variables is $ax + by + c = 0$

(iii) Since, $y = 30x$

$$\begin{aligned} \text{If } x = 60, \text{ then, } y &= 30 \times 60 \\ &= 1800 \end{aligned}$$

Required volume is 1800 cm^3 .

OR

Since, $y = 30x$

If $y = 900$, then, $900 = 30x$

$$x = \frac{900}{30} = 30$$

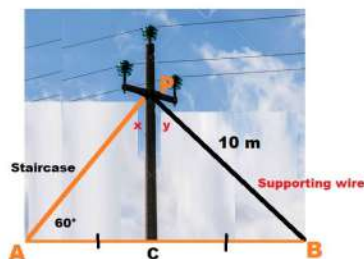
Required time is 30 sec.

37. Read the text carefully and answer the questions:

As shown In the village of Surya there was a big pole PC. This pole was tied with a strong wire of 10 m length.

Once there was a big spark on this pole, thus wires got damaged very badly. Any small fault was usually repaired with the help of a rope which normal board electricians were carrying on bicycles.

This time electricians need a staircase of 10 m so that it can reach at point P on the pole and this should make 60° with line AC.



(i) In $\triangle APC$ and $\triangle BPC$

$AP = BP$ (Given)

$CP = CP$ (common side)

$\angle ACP = \angle BCP = 90^\circ$

By RHS criteria $\triangle APC \cong \triangle BPC$

(ii) In $\triangle ACP$

$\angle APC + \angle PAC + \angle ACP = 180^\circ$

$\Rightarrow x + 60^\circ + 90^\circ = 180^\circ$ (angle sum property of \triangle)

$\Rightarrow \angle x = 180^\circ - 150^\circ = 30^\circ$

$\angle x = 30^\circ$

OR

In $\triangle APC$ and $\triangle BPC$

Corresponding part of congruent triangle

$\angle X = \angle Y$

$\Rightarrow \angle Y = 30^\circ$ (given $\angle X = 30^\circ$)

(iii) In $\triangle APC$ and $\triangle BPC$

Corresponding part of congruent triangle

$\angle PAC = \angle PBC$

$\Rightarrow \angle PBC = 60^\circ$ (given $\angle PAC = 60^\circ$)

38. Read the text carefully and answer the questions:

While dusting a maid found a button whose upper face is of red color, as shown in the figure. The diameter of each of the smaller identical circles is $\frac{1}{4}$ of the diameter of the larger circle whose radius is 16 cm.



(i) Let r and R be the radii of each smaller circle and larger circle respectively.

d and D are diameter of each smaller circle and larger circle respectively.

We have, $d = \frac{1}{4}D$

$$\Rightarrow r = \frac{1}{4}R \Rightarrow r = \frac{1}{4} \times 16 \Rightarrow r = 4 \text{ cm}$$

$$\text{Area of smaller circle} = \pi r^2$$

$$= \frac{22}{7} \times 4 \times 4 = 50.28 \text{ cm}^2$$

(ii) Let r and R be the radii of each smaller circle and larger circle respectively.

$$\text{We have, } d = \frac{1}{4}D$$

$$\Rightarrow r = \frac{1}{4}R \Rightarrow r = \frac{1}{4} \times 16 \Rightarrow r = 4 \text{ cm}$$

$$\text{Area of larger circle} = \pi R^2$$

$$= \frac{22}{7} \times 16 \times 16 = \frac{5632}{7} = 804.57 \text{ cm}^2$$

OR

Let r and R be the radii of each smaller circle and larger circle respectively.

$$\text{We have, } d = \frac{1}{4}D$$

$$\Rightarrow r = \frac{1}{4}R \Rightarrow r = \frac{1}{4} \times 16 \Rightarrow r = 4 \text{ cm}$$

Area of quadrant of a smaller circle

$$= \frac{1}{4} \times 50.28 = 12.57 \text{ cm}^2$$

(iii) Let r and R be the radii of each smaller circle and larger circle respectively.

$$\text{We have, } d = \frac{1}{4}D$$

$$\Rightarrow r = \frac{1}{4}R \Rightarrow r = \frac{1}{4} \times 16 \Rightarrow r = 4 \text{ cm}$$

Area of the black colour region = Area of larger circle - Area of 4 smaller circles

$$= 804.57 - 4 \times 50.28 = 603.45 \text{ cm}^2$$

