The correct answer is B.

Q10. Let the radius of the required circle be r cm.

Area of required circle = area of circle of radius 8 cm + area of circle of radius 6 cm

$\Rightarrow \pi r^2 = \pi (8 \text{ cm})^2 + \pi (6\text{cm})^2$

$\Rightarrow r^2 = 64 \text{ cm}^2 + 36 \text{ cm}^2$

$\Rightarrow r^2 = 100 \text{ cm}^2$

$\Rightarrow r = 10 \text{ cm}$

Thus, the diameter of the required circle is 2× 10 cm = 20 cm.

The correct answer is C.

Q11. Let E be the event of getting both heads or both tails.

The sample space for the given experiment is {(H, H), (H, T), (T, H), (T, T)}

Total number of outcomes = 4

Favorable outcomes = {(H, H), (T,T)}

Favorable number of outcomes = 2

Required probability, P (E) = $\frac{\text{Favorable number of outcomes}}{\text{Total number of outcomes}}$

$= \frac{2}{4} = \frac{1}{2}$

Q12. The given quadratic equation is mx (5x – 6) + 9 = 0

$\therefore 5mx^2 - 6mx + 9 = 0$ .....(1)

For equation (1) to have equal roots, the discriminant of the equation D should be 0.

$\Rightarrow (-6m)^2 - 4 \times 5\ m \times 9 = 0$

$\Rightarrow 36m^2 - 180m = 0$

$\Rightarrow 36m\ (m - 5) = 0$

$\Rightarrow m = 0$ or $m - 5 = 0$

$\Rightarrow m = 5$ (If m = 0, then equation (1) will not be a quadratic equation)

Thus, the value of mi is 5.

Q 13. It is given that the distance between the points P (x, 4) and Q (9, 10) is 10 units.

Let $x_1 = x$, $y_1 = 4$, $x_2 = 9$, $y_2 = 10$

Applying distance formula, if is obtained.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$10 = \sqrt{(9 - x)^2 + (10 - 4)^2}$

$10 = \sqrt{81 + x^2 - 18x + 36}$

$10 = \sqrt{x^2 - 18x + 117}$

On squaring both sides, it is obtained.

$100 = x^2 - 18x + 117$

$\Rightarrow x^2 - 18x + 17 = 0$

$\Rightarrow x^2 - 17x - x + 17 = 0$

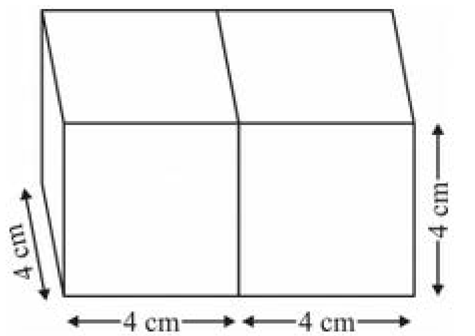
$\Rightarrow x\ (x - 17) - 1\ (x - 17) = 0$

$\Rightarrow$ (x -1) (x – 17) = 0

$\Rightarrow$ x = 1, 17

Thus, the values of x are 1 and 17.

Q14. If two cubes of sides 4 cm are joined end to end, then the length (l), breadth (b) and height (h) of the resulting cuboid are 8 cm, 4 cm, and 4 cm, respectively.



∴ Surface area of the resulting cuboid = 2 (lb +bh + lh)

= 2 (8 cm × 4 cm + 4 × 4 cm = 8 cm ×4 cm)

= 2 × (32 + 16 +32) cm^2

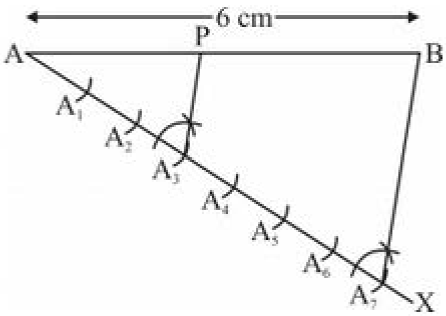
= 160 cm^2

Thus, the surface area of the resulting cuboid is 160 cm^2.

Q15. A point P can be marked on a line segment of length 6 cm which divides the line segment in the ratio of 3:4 as follows.

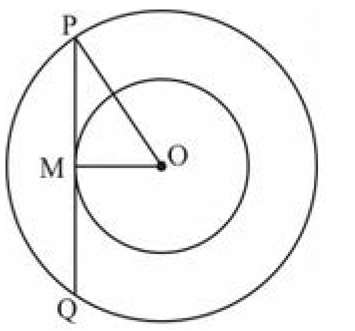
(1) Draw line segment AB of length 6 cm and draw a ray AX making an acute angle with line segment AB.
(2) Locate 7 (3+4) points, A_1. A_2, A_3, A_4 ………….A_7, on AX such that $AA_1 = A_1A_2 = A_2A_3$ and so on.
(3) Join BA_7.
(4) Through the point A_3, draw a line parallel to BA_7 (by making an angle equal to $\angle AA_7B$ at A_3),

intersecting AB at point P.



P is the point that divides line segment AB of length 6 cm in the ratio of 3: 4.

Q16. Let O be the centre of the two concentric circles. Let PQ be the chord of larger circle touching the smaller circle at M. This can be represented diagrammatically as:



We have PQ = 48 cm.

Radius of the smaller circle, OM = 7 cm

Let the radius of the larger circle be r, i.e. OP = r

Since PQ is a tangent to the inner circle, OM $\perp$ PQ

Thus, OM bisects PQ.

$\Rightarrow$ PM = MQ = $\frac{48}{2}$ cm = 24 cm

Now applying Pythagoras Theorem in ΔOPM

$OP^2 = OM^2 + PM^2$

$\Rightarrow OP^2 = (7\text{ cm})^2 + (24\text{cm})^2 = (49+576)\text{ cm}^2 = 625\text{ cm}^2 = (25\text{ cm})^2$

$\Rightarrow$ OP = 25 cm

∴ Radius of the larger circle is 25 cm.

Thus, the value of r is 25 cm.

Q17. The given A. P. is 17, 12, 7, 2, …….

First term, a = 17

Common difference, d = 12 - 17 = -5

If -150 is a term of the given A.P., then for a natural number n, $a_n = -150$

$\Rightarrow$ a + (n-1) d = -150

$\Rightarrow$17+ (n-1) (-5) = -150

$\Rightarrow$(-5) (n -1) = -150 -17 = -167

$\Rightarrow$ n -1 = $\frac{167}{5}$

$\Rightarrow$n = $\frac{167}{5}$ +1 = $\frac{172}{5}$= 34.4

Now, 34.4 is not a natural number.

Thus, -150 is not a term of the A.P, 17, 12, 7, 2 ……….

Q18. Perimeter of the shaded region = Length of APB + Length of ARC + Length CQD + Length of DSB

Now, perimeter of APB = $\frac{1}{2} \times 2\pi\,(\frac{7}{2})$ cm = $\frac{22}{7} \times \frac{7}{2}$ cm = 11 cm

Perimeter of ARC= $\frac{1}{2} \times 2\pi\,(7\text{cm}) = \frac{22}{7} \times 7\text{cm} = 22$ cm

Perimeter of CQD = $\frac{1}{2} \times 2\pi\,(\frac{7}{2}\,\text{cm}) = \frac{22}{7} \times \frac{7}{2}$ cm = 11 cm

Perimeter of DSB = $\frac{1}{2} \times 2\pi\,(7\text{cm}) = \frac{22}{7} \times 7\text{cm} = 22$ cm

Thus, perimeter of the shaded region = 11 cm + 22 cm +11 cm = 66 cm

OR

Let the radius of the circle be r.

It is given that perimeter of the circle is 44 cm.

$\therefore 2\pi r = 44$ cm

$\Rightarrow 2 \times \frac{22}{7} \times r = 44$ cm

$\Rightarrow r = 7$ cm

Area of a quadrant of a circle

$= \frac{1}{4} \times \pi r^2 = \frac{1}{4} \times \frac{22}{7} \times (7\text{cm})^2$

$= \frac{1}{4} \times \frac{22}{7} \times 49\text{ cm}^2 = 38.5\text{ cm}^2$

Thus, the area of a quadrant of the given circle is 38.5 cm^2.

Q19. Let the two given vertices be A (3, 0) and B (6, 0).

Let the coordinates of the third vertex be C (x, y).

It is given that the triangle ABC is equilateral.

Therefore, AB = BC = CA (Sides of an equilateral triangle)

$\Rightarrow \sqrt{(6-3)^2+(0-0)^2}=\sqrt{(x-6)^2+(y-0)^2}=\sqrt{(x-3)^2+(y-0)^2}$

$\Rightarrow 9 = (x - 6)^2 + y^2 = (x - 3)^2 + y^2$

$\therefore (x- 6)^2 + y^2 = (x - 3)^2 + y^2$

$\Rightarrow -12x + 36 = -6x + 9$

$\Rightarrow -6x = -27$

$\Rightarrow x = \frac{9}{2}$

Now, $y^2 + (x - 6)^2 = 9$

$\Rightarrow y^2 + (\frac{9}{2} - 6)^2 = 9 \quad (\because x = \frac{9}{2})$

$\Rightarrow y^2 = 9 - \frac{9}{4}$

$\Rightarrow y^2 = \frac{27}{4}$

$\Rightarrow y = \pm\sqrt{\frac{27}{4}} = \pm\frac{3\sqrt{3}}{2}$

Thus, the coordinates' of the third vertex are $(\frac{9}{2}, \frac{3\sqrt{3}}{2})$ or $(\frac{9,}{2} - \frac{3\sqrt{3}}{2})$

OR

Let Q (7, k) divide the line segment joining P (5, 4) and (9,-2) in the ratio λ: 1

$\therefore$ Coordinates of the Point Q = $(\frac{9\lambda+5}{\lambda+1}, \frac{-2\lambda+4}{\lambda+1})$

$\therefore \frac{9\lambda+5}{\lambda+1} = 7$ and $k = \frac{-2\lambda+4}{\lambda+1}$

$\Rightarrow 9\lambda + 5 = 7\lambda + 7$

$\Rightarrow 2\lambda = 2$

$\Rightarrow \lambda = 1$

Now, k = $\frac{-2\lambda+4}{\lambda+1}$

$\Rightarrow$ k = $\frac{-2\times1+4}{1+1}$

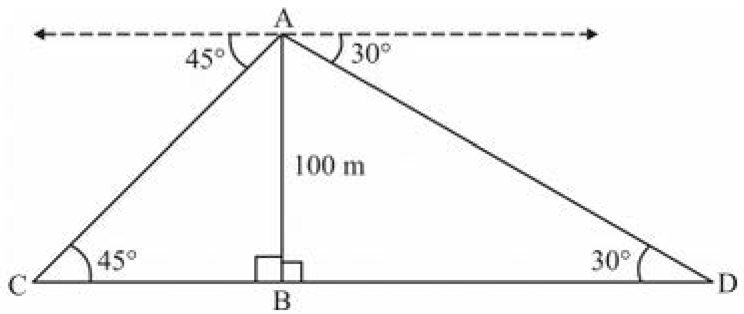
$\Rightarrow$k = $\frac{-2+4}{2}$

$\Rightarrow$ k =1

Thus, the value of k is 1.

Q20.

The given information can be diagrammatically represented as,



Here, AB is the tower of height 100 m. The Points C and D are the position of the two cars.

In right ΔACB,

tan 45° = $\frac{AB}{BC}$

$\Rightarrow$ 1 = $\frac{100\,m}{BC}$

$\Rightarrow$ BC = 100 m

In right ΔABD

tan 30° = $\frac{AB}{BD}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{100\text{m}}{BD}$

$\Rightarrow$BD = $100\sqrt{3}$ m

Distance between the two cars = CD

= BC +CD

= 100m +$100\sqrt{3}$m

= 100m +100×1.73m

= 100m + 173 m

= 273 m

Thus, the distance between two cars is 273 m.

Q21 The sample space of the given experiment is:

$$S = \left\{\begin{matrix} (1,1), & (1,2), & (1,3), & (1,4), & (1,5), & (1,6) \\ (2,1), & (2,2), & (2,3), & (2,4), & (2,5), & (2,6) \\ (3,1), & (3,2), & (3,3), & (3,4), & (3,5), & (3,6) \\ (4,1), & (4,2), & (4,3), & (4,4), & (4,5), & (4,6) \\ (5,1), & (5,2), & (5,3), & (5,4), & (5,5), & (5,6) \\ (6,1), & (6,2), & (6,3), & (6,4), & (6,5), & (6,6) \end{matrix}\right\}$$

∴ n (S)= 36

Let E be the event that the product of numbers obtained on the upper face is a perfect square

∴ E = {(1,1), (1,4), (2,2), (3,3), (4,1), (4,4), (5,5), (6,6)}

∴ n (E) = 8

$$P(E) = \frac{n(E)}{n(S)} = \frac{8}{36} = \frac{2}{9}$$

OR

The set of possible outcomes of the given experiment are:

S = {HHH, HHT, HTH, HTT, THH, THT, TTH, TTT}

Let E be the event of getting three heads or three tails.

∴E = {HHH, TTT}

∴ Probability of winning = P (E)

$$= \frac{n(E)}{n(S)} = \frac{2}{8} = \frac{1}{4}$$

∴ Probability of losing = P (E')

= 1- P (E)

$$= 1 - \frac{1}{4} = \frac{3}{4}$$

Therefore, the probability that Hanif will lose the game is $\frac{3}{4}$.

Q22.

Height of the bucket (which is in the shape of a frustum of a cone), h = 15 cm

Radius of one end of bucket, R = 14 cm

$\Rightarrow$ a + 15 = 18

$\Rightarrow$ a = 18 -15

$\Rightarrow$ a =3

Therefore, the first term and the common difference of the AP are 3 and 5 respectively

Thus, the A.P. is 3, 3+5, 3+ (2×5), 3+ (3×5) ....

That is 3, 8, 13, 18...

Q25. The given quadratic equation is $2\sqrt{3}x^2 - 5x + \sqrt{3} = 0$

Comparing with the standard from $ax^2 + bx + c = 0$

The value of a, b and c are

$a = 2\sqrt{3}$, $b = -5$, $c = \sqrt{3}$.

$\sqrt{D} = \sqrt{b^2 - 4ac} = \sqrt{25 - 4 \times 2\sqrt{3} \times \sqrt{3}}$

$= \sqrt{25 - 24} = \sqrt{1}$

$= 1$

$\therefore x = \frac{-b \pm \sqrt{D}}{2a}$

$= \frac{5 \pm 1}{2 \times 2\sqrt{3}}$

$= \frac{6}{4\sqrt{3}}$ or $\frac{4}{4\sqrt{3}}$

$= \frac{3}{2\sqrt{3}}$ or $\frac{1}{\sqrt{3}}$

$= \frac{\sqrt{3}}{2}$ or $\frac{\sqrt{3}}{3}$

Therefore, the roots of the given quadratic equation are $\frac{\sqrt{3}}{2}$ and $\frac{\sqrt{3}}{3}$.

Q26. Radius of the given circle = 35 cm

Area of the minor segment = Area of sector OAB – area of ΔAOB

Area of section OAB = $\frac{\theta}{360°}\times\pi r^2$

$= \frac{90°}{360°}\times\frac{22}{7}\times(35\text{cm})^2$

$= \frac{1}{4}\times\frac{22}{7}\times 1225\text{ cm}^2$

$= 962.5\text{ cm}^2$

Area of ΔAOB = $\frac{1}{2}\times OA\times OB$

$= \frac{1}{2}\times 35\text{cm}\times 35\text{cm}^2$

$= 612.5\text{ cm}^2$

∴ Area of the minor segment = $962.5\text{ cm}^2 - 612.5\text{ cm}^2 = 350\text{ cm}^2$

Area of the major segment = Area of the circle – area of the minor segment

Area of the circle = $\pi r^2 = \frac{22}{7}\times(35\text{ cm})^2 = 3850\text{ cm}^2$

Thus, the area of the major segment APB = $3850\text{ cm}^2 - 350\text{ cm}^2 = 3500\text{ cm}^2$

Q27. A ΔPQ'R' whose sides are $\frac{3}{4}$ of the corresponding sides of ΔPQR can be drawn as follows.

Step1. Draw a ΔPQR with side PQ = 5 cm, PR = 6 cm and ∠P = 120°

Step2. Draw a ray PX making an acute angle with PR on the opposite side of vertex Q.

Q34. Let a and d respectively be the first term and the common difference of the given A. P

The sum of first four terms

$S_4 = 40$

$\Rightarrow \frac{4}{2}\{2a + (4-1)d\} = 40$

$\Rightarrow 2a + 3d = 20$ .... (1)

The sum of first 14 terms

$S_{14} = 280$

$\Rightarrow \frac{14}{2}\{2a + (14 - 1)d\} = 280$

$\Rightarrow 2a + 13d = 40$ .... (2)

Subtracting equation (1) from equation (2)

$(2a + 13d) - (2a + 3d) = 40 - 20$

$\Rightarrow 10d = 20$

$\Rightarrow d = 2$

Substituting d = 2 in equation (1),

$2a + 3\times 2 = 20$

$\Rightarrow 2a = 20 - 6 = 14$

$\Rightarrow a \frac{14}{2} = 7$

$\therefore$Sum of first n terms, $S_n = \frac{n}{2}\{2a + (n-1)d\}$

$= \frac{n}{2}\{2\times 7 + (n-1)\times 2\}$

$= \frac{n}{2}\{14+2n-2\}$

$= \frac{n}{2}(2n+12)$

$= \frac{n}{2} \times 2(n+6)$

$= n(n+6)$

$= n^2 + 6n$

OR

The first 30 integers divisible by 6 are 6 , 12, 18 ……180

Sum of first 30 integers

= 6 + 12 + 18 +…. + 180

$= \frac{30}{2}(6 + 180)$ $[S_{n=\frac{n}{2}(a+1)}]$

=15 × 186

= 2790