MATHS SAMPLE PAPER

PART-A

Section-I

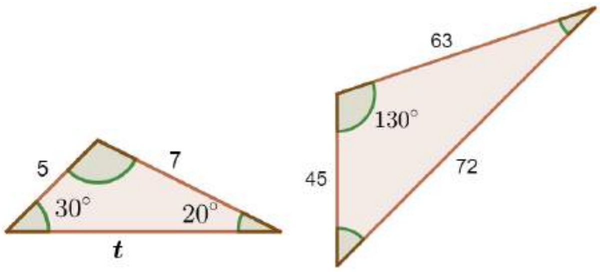
Section I has 16 questions of 1 mark each.

1. If the sum of the roots of the equation $3x^2-(3k-2)\ x-(k-6) = 0$ is equal to the product of its roots, then calculate k?

2. How many polynomials can be formed with — 2 and 5 as zeroes?

3. In a cyclic quadrilateral ABCD, $\angle A = (2x + 4)°$, $\angle B = (y + 3)°$, $\angle C = (2y + 10)°$ and $\angle D = (4x - 5)°$, the find the value of $\angle A$.

4. In the figure, what is the value of t?



OR

If ABC is an isosceles triangle, right angled at C. Prove that $AB^2 = 2AC^2$.

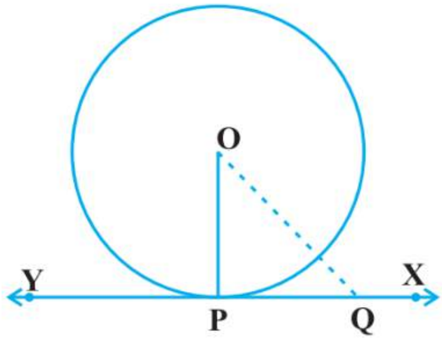
5. If $\sec\theta = \frac{1}{x}$, find the value of $\sin\theta$ in terms of x.

OR

Find the value of $\sin^2 30° - \cos^2 60° + tan45° - cosec45°$.

6. If α and β are the roots of equation $x^2 + ax + b = 0$, then a + b equals _______ .

7. In the following figure, if OQ = 13 cm and PQ = 12 cm, then calculate the radius of circle.



8. Find how many integers between 200 and 500 are divisible by 8.

9. If the distance between the points (4, k) and (1, 0) is 5, then what can be the possible values of k?

10. The ratio of the height of a tower and the length of its shadow on the ground is √3:1. What is the angle of elevation of the sun?

11. If first term of an AP is 5 and the 10^{th} term is 45, then sum of first ten terms of the AP is ______.

OR

In an A.P the first term is equal to twice of the fourth term of that A.P, then d/a = ______, where 'd' is common difference and 'a' is first term.

12. If cos θ = 0.6, then 5sinθ – 3tanθ = ______.

13. Given ΔABC ~ ΔPQR, if $\frac{AB}{PQ} = \frac{1}{3}$, then find $\frac{ar\Delta ABC}{ar\Delta PQR}$

14. Find a rational number between √2 and √3.

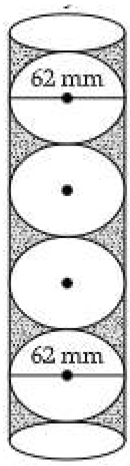
15. If the total surface area of a solid hemisphere is 462 cm^2, its radius is ______.

16. Find the value of k for which the roots of equation $3x^2 - 10x + k = 0$ are reciprocal of each other?

Section II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. Case Study based-1: Five tennis balls, diameter 62 mm are placed in cylindrical card tubes (as shown in figure)



(i) Find the radius of the tennis balls

(a) 30 mm

(b) 29 mm

(c) 31 mm

(d) 32 mm

(ii) Volume of 1 ball is equal to

(a) 125 cm^3

(b) 123.5 cm^3

(c) 120.30 cm^3

(d) 124.84 cm^3

(iii) Find the height of the tube

(a) 300 mm

(b) 320 mm

(c) 310 mm

(d) 301 mm

(iv) Find the volume of the tube

(a) 963 cm^3

(b) 966.3 cm^3

(c) 939.23 cm^3

(d) 936.29 cm^3

(v) Find the volume of unfilled space (shaded area) in the tube.

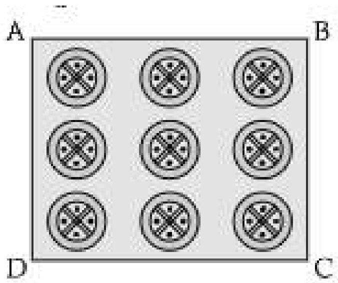
(a) 310.9 cm^3

(b) 312.09 cm^3

(c) 301.90 cm^3

(d) 321.09 cm^3

18. Case Study based-2 : In a school, a Design exam is conducted in Class X. Rubina wins 1st prize. She made a square embroider handkerchief with 9 circular thread designs on it.



(i) On a square handkerchief, nine circular designs each of radius 7 cm are made (see in figure). Find the circumference of one of the circular design.

(a) 41 cm

(b) 42 cm

(c) 43 cm

(d) 44 cm

(ii) Find the total area of 9 circles if radius of each circle is 7 cm.

(a) 1380 cm^2

(b) 1385 cm^2

(c) 1386 cm^2

(d) 1384 cm^2

(iii) The area of circle having 'r' is equal to

(a) πr^2

(b) πr^3

(c) $2\pi r^2$

(d) $3\pi r^2$

(iv) If radius of circle is 4r, the area of circle is equal to

(a) 50.20 r^2 sq. units

(b) 50.28 r^2 sq. units

(c) 51.24 r^2 sq. units

(d) 52.24 r^2 sq. units

(v) Area of square is equal to

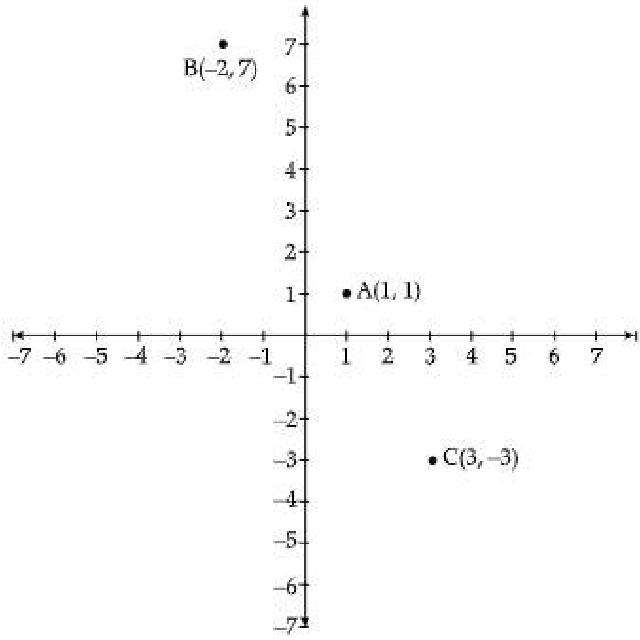
(a) 4a

(b) a^2

(c) 2a

(d) 3a

19. Case study based -3: The given figure shows the arrangement of chairs in a classroom. Dinesh, Mohan and Sohan are seated at A(1, 1), B(–2, 7) and C(3, –3) respectively



(i) Find the distance between Dinesh and Sohan.

(a) $2\sqrt{5}$ units

(b) $2\sqrt{3}$ units

(c) $2\sqrt{7}$ units

(d) $3\sqrt{2}$ units

(ii) Find the distance between Dinesh and Mohan.

(a) $5\sqrt{3}$ units

(b) $5\sqrt{2}$ units

(c) $3\sqrt{5}$ units

(d) $2\sqrt{5}$ units

(iii) Name the quadrant in which Sohan is seated.

(a) I quadrant

(b) II quadrant

(c) III quadrant

(d) IV quadrant

(iv) Name the quadrant in which Dinesh is seated.

(a) I quadrant

(b) II quadrant

(c) III quadrant

(d) IV quadrant

(v) Which of the following is the correct distance formula.

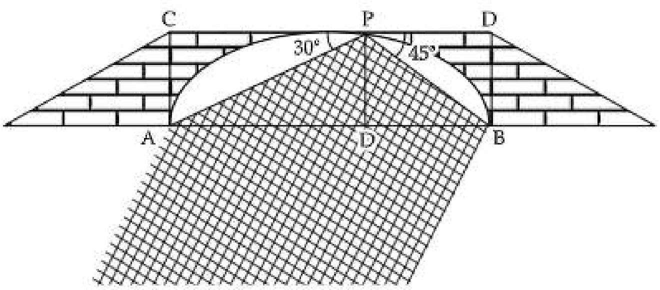
(a) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(b) $[(x_1 - x_2) + (y_1 - y_2)]^2$

(c) $(x_1 + x_2)^2 + (y_1 - y_2)^2$

(d) $(x_1 - x_2) - (y_1 + y_2)^2$

20. Case study based -4: From a point on a bridge across a river, the angle of depression of the banks on opposite sides of the river 30° and 45°, respectively



(i) If the bridge is at a height of 3 m from the banks, find the width of the river

(a) $2(\sqrt{3} + 1)$ m

(b) $(\sqrt{3} + 1)$ m

(c) $(\sqrt{3} + 2)$ m

(d) $3(\sqrt{3} + 1)$ m

(ii) Name the ΔAPD.

(a) Acute Angled triangle

(b) Right Angled triangle

(c) Obtuse Angled triangle

(d) Equilateral triangle

(iii) In ΔAPD, $\tan 30^o = ?$

(a) AD/DP

(b) AP/AD

(c) PD/AD

(d) AD/AP

(iv) The value of $\tan 45^o$ is equal to

(a) 0

(b) 2

(c) 1

(d) $1/\sqrt{3}$

(v) The value of tangent in right angle triangle is equal to

(a) $\frac{\text{Perpendicular}}{\text{Base}}$

(b) $\frac{\text{Base}}{\text{Perpendicular}}$

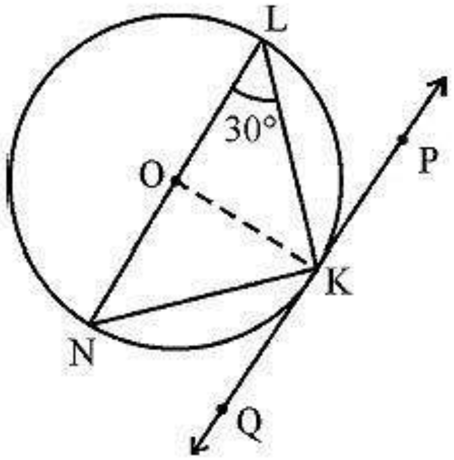
(c) $\frac{\text{Hypotenuse}}{\text{Base}}$

(d) $\frac{\text{Perpendicular}}{\text{Hypotenuse}}$

PART–B

Section III

21. In Figure, O is the center of the circle and LN is a diameter. If PQ is a tangent to the circle at K and KLN = 30°, find PKL.



22. If the point (x, y) is equidistant from the points (a + b, b – a) and (a – b, a + b), prove that bx = ay.

23. For what value of n are the n^{th} terms of two A.P.'s 63, 65, 67, ... and 3, 10, 17, ... equal?

24. In what ratio does the point P(–4, 6) divide the line segment joining the points A(– 6, 10) and B(3, –8) ?

25. Five years hence, the age of Anjali will be three times that of Dimple. Five years ago, Anjali's age was seven times that of Dimple. What are their present ages?

OR

Solve the following equations and find the value of k, where
$k = (y - x)^3$.

$2x - y = 11$ and $x + y = 25$

26. In an equilateral triangle of side 'a'cm and height of one of its altitude as 'h' cm, prove that $a = \frac{2}{\sqrt{3}}h$.

Section IV

27. A circus tent is in the shape of a cylinder surmounted by a conical top of same diameter. If their common diameter is 56 cm, the height of cylindrical part is 6 m and the total height of the tent above the ground is 27 m, find the area of canvas used in making the tent.

28. The difference between the radii of the smaller circle and the larger circle is 7 cm and the difference between the areas of the two circles is 1078 sq.cm. Find the radius of the smaller circle.

29. Find the coordinates of a point on the x-axis which is equidistant from the points A(2, −5) and B(−2, 9).

30. A game consists of tossing a one-rupee coin 3 times and noting the outcome each time. Ramesh wins the game if all the tosses give the same result (i.e. three heads or three tails) and loses otherwise. Find the probability of Ramesh losing the game.

31. In a circle of radius 21 cm, an arc subtends an angle of 60^{o} at the centre. Find the area of sector formed by the arc.

32. Show that if the roots of the following quadratic equation are equal, then ad = bc

$$x^2\left(a^2+b^2\right)+2(ac+bd)x+\left(c^2+d^2\right)=0$$

33. Solve for x :

$$\frac{x+3}{x-2}-\frac{1-x}{x}=\frac{17}{4};x\neq 0,2$$

Section V

34. If the ratio of the 11th term of an AP to its 18th term is 2 : 3, find the ratio of the sum of the first five terms to the sum of its first 10 terms.

35. A straight highway leads to the foot of a tower. A man standing on its top observes a car at an angle of depression of 30°, which is approaching the foot of tower with a uniform speed. 6 seconds later, the angle of depression of the car becomes 60°. Find the time taken by the car to reach the foot of tower from this point.

36. From a rectangular block of wood, having dimensions 15cm × 10 cm × 3.5 cm. a pen stand is made by making four conical depressions. The radius of each one of the depression is 0.5 cm and the depth is 2.1 cm. Find the volume of wood left in the penstand.

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HINTS & SOLUTIONS
Maths Sample paper

1. Let the roots of the given quadratic equation $3x^2-(3k-2)x-(k-6)=0$ be α and β.

Now,

sum of roots = α+β = (3k-2)/3 and,

product of roots = αβ = -(k-6)/3

[∵ <u>If α and β are the roots of quadratic equation $ax^2+bx+c=0$ then α+β = -b/a and αβ = c/a</u>]

According to question-

sum of roots = product of roots

∴ α+β = αβ

⇒ (3k-2)/3 = -(k-6)/3

⇒ 3k-2 = -k+6

⇒ 4k = 8

∴ k = 2

Hence, the value of k is 2.

2. Infinitely Many

3. We know that, In a cyclic quadratic opposite angles are supplementary.

∠A + ∠C = 180°

⇒ 2x + 4 + 2y + 10 = 180

⇒ 2(x + y) = 166

⇒ x + y = 83

⇒ y = 83 − x [1]

Also, ∠B + ∠D = 180°

⇒ y + 3 + 4x − 5 = 180

⇒ 4x + y = 182

⇒ 4x + 83 − x = 182 [From 1]

⇒ 3x = 99

⇒ x = 33°

⇒ ∠A = 2(33) + 4 = 70°

4. In ΔABC and ΔA′B′C′

$\frac{AB}{A'B'} = \frac{5}{45} = \frac{1}{9}$

$\frac{AC}{A'C'} = \frac{7}{63} = \frac{1}{9}$

Also, In ΔABC

∠A + ∠B + ∠C = 180°

⇒ ∠A + 30° + 20° = 180°

⇒ ∠A = 130°

So here, $\frac{AB}{A'B'} = \frac{AC}{A'C'}$

∠A = ∠A′

⇒ ΔABC ~ ΔA′B′C′ [By SAS Similarity]

⇒ $\frac{AB}{A'B'} = \frac{AC}{A'C'} = \frac{BC}{B'C'}$

$\Rightarrow \frac{1}{9} = \frac{t}{72}$

⇒ t = 8 units

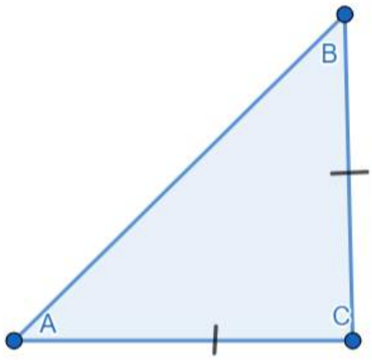
OR

By Pythagoras theorem,

$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$

$AB^2 = AC^2 + BC^2$

[Given: AC = BC, as it is an isosceles triangle]



$AB^2 = 2AC^2$

Hence, Proved.

5. We know that,

$\sec\theta = \frac{1}{\cos\theta}$

Therefore, cosθ = x

Now,

$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + x^2 = 1$

$\sin^2\theta = 1 - x^2$

$\sin\theta = \sqrt{1 - x^2}$

OR

To Find: $\sin^2 30° - \cos^2 60° + tan45° - cosec45°$

We know that,

$sin30° = \frac{1}{2}, cos60° = \frac{1}{2}, tan45° = 1 \text{ and } cosec45° = \sqrt{2}$

Putting the values, we get,

$$\sin^2 30° - \cos^2 60° + tan45° - cosec45° = \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2 + 1 - \sqrt{2}$$

$$\sin^2 30° - \cos^2 60° + tan45° - cosec45° = 1 - \sqrt{2}.$$

6. For a quadratic equation, we know that

$$\text{sum of roots} = -\frac{\text{coefficient of x}}{\text{coefficient of x}^2}$$

$$\Rightarrow \alpha + \beta = -\frac{a}{1}$$

⇒ -a = α + β[1]

$$\text{Product of roots} = \frac{\text{constant term}}{\text{coefficient of x}^2}$$

$\Rightarrow \alpha\beta = \frac{b}{1}$

$\Rightarrow b = \alpha\beta$ [2]

From [1] and [2], we have

$\Rightarrow b + a = \alpha\beta - \alpha - \beta$

7. We know that, tangent through a circle is perpendicular to the radius through point of contact.

$\Rightarrow OP \perp XY$ and ΔOPQ is a right-angled triangle

$\Rightarrow OP^2 + PQ^2 = OQ^2$

$\Rightarrow r^2 + 12^2 = 13^2$ [$\because$ OP = radius (r)]

$\Rightarrow r^2 = 169 - 144 = 25 \Rightarrow r = 5$ cm

8. 37

9. ± 4

10. 60°

11. We know, sum of 'n' terms of an AP

$S_n = \frac{n}{2}(a + a_n)$

Where a and a_n are first and last term respectively.

Here, a = 5

n = 10

$a_n = 45$

Putting values, we get

$S_{10} = \frac{10}{2}(45 + 5) = 250$

OR

We know that nth term of an A.P is given by,

$a_n = a + (n - 1)d$

where, a = first term, n = number of terms, and d = common difference.

Therefore,

First term = a

Fourth term, $a_4 = a + (4 - 1)d$

$a_4 = a + 3d$

According to question,

a = 2(a + 3d)

a = 2a + 6d

a = -6d

$\frac{d}{a} = -\frac{1}{6}$

12. Given cos θ = 0.6

$\sin\theta = \sqrt{1 - \cos^2\theta}$

$\Rightarrow \sin\theta = 0.8$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\Rightarrow \tan\theta = \frac{4}{3}$

According to the question, the required problem needs us to find

5 sin θ- 3 tan θ

$= 5 \times 0.8 - 3 \times \frac{4}{3}$

= 4 – 4 = 0

13. 1/9

14. 1.5 (This question can have multiple solutions)

15. Let the radius of solid sphere be r cm

Total surface area of solid hemisphere = $3\pi r^2$

Given, total surface area of solid hemisphere = 462 cm^2

∴ $3\pi r^2 = 462\ cm^2$

⇒ $3 \times 22/7 \times r^2 = 462\ cm^2$

⇒ $r^2 = 462 \times 1/3 \times 7/22\ cm^2 = 49\ cm^2$

⇒ r = 7 cm

16. k = 3

17. (i) Answer: 31 mm

(ii) Answer: 124.84 cm^3

(iii) Answer: 310 mm

(iv) Answer: 936.29 cm^3

(v) Answer: 321.09 cm^3

18. (i) Answer: 44 cm

(ii) Answer: 1386 cm^2

(iii) Answer: πr^2

(iv) Answer: 50.28 r^2 sq. units

(v) Answer: a^2

19. (i) Answer: 2√5 units

(ii) Answer: 3√5 units

(iii) Answer: IV quadrant

(iv) Answer: I quadrant

(v) Answer: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

20. (i) Answer: 3(√3 + 1) m

(ii) Answer: Right Angled triangle

(iii) Answer: PD/AD

(iv) Answer: 1

(v) Answer: $\frac{\text{Perpendicular}}{\text{Base}}$

21. OK =OL

∠OKL = ∠OLK =30°

OK ⊥ QP

∠OKP = 90°

Thus ∠PKL = 90° - 30° = 60°

22. Given P(x, y) is equidistant from points A(a + b, b - a) and B(a - b, b + a).

To find, prove that bx = ay.

∴ $PA^2 = PB^2$

Using distance formula,

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

$\Rightarrow (a+b-x)^2 + (b-a-y)^2 = (a-b-x)^2 + (a+b-y)^2$

$\Rightarrow (a+b-x)^2 - (a-b-x)^2 = (a+b-y)^2 - (b-a-y)^2$

$\Rightarrow$
$(a+b-x+a-b-x)(a+b-x-a+b+x)=(a+b-y+b-a-y)(a+b-y-b+a+y)$
$\Rightarrow (2a-2x)(2b)=(2b-2y)(2a)$
$\Rightarrow (a-x)(b)=(b-y)(a)$
$\Rightarrow ab-bx=ab-ay$
$\Rightarrow bx=ay$, proved.

23. a = 63
d = $a_2 - a_1$ = 65 − 63 = 2
n^{th} term of this A.P. = a_n = a + (n − 1) d
a_n = 63 + (n − 1) 2 = 63 + 2n − 2
a_n = 61 + 2n
3, 10, 17, …
a = 3
d = $a_2 - a_1$ = 10 − 3 = 7
n^{th} term of this A.P. = 3 + (n − 1) 7
a_n = 3 + 7n − 7
a_n = 7n − 4
It is given that, n^{th} term of these A.P.s are equal to each other.
Equating both these equations, we obtain
61 + 2n = 7n − 4
61 + 4 = 5n
5n = 65
n = 13

24.

Then, the co-ordinates of P are given by

$$P\left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$$

Here, we have

$x_1 = -6$, $y_1 = 10$

$x_2 = 3$, $y_2 = -8$

and $m_1 = K$ $m_2 = 1$

So, the co-ordinate of P are

$$P\left[\frac{K(3)+(1)(-6)}{K+1}, \frac{K\times(-8)+(1)10}{K+1}\right]$$
$$=P\left[\frac{3K-6}{K+1}, \frac{-8K+10}{K+1}\right]$$

But the co-ordinates of P are given as (-4, 6)

$\therefore \frac{3K-6}{K+1} = -4$

$\Rightarrow 3K-6 = -4(K+1)$

$\Rightarrow 3K-6 = -4K-4$

$\Rightarrow 3K+4K = -4+6$

$\Rightarrow 7K = 2$

$\Rightarrow K = \frac{2}{7}$

and $\frac{-8k+10}{k+1} = 6$

$\Rightarrow -8k+10 = 6(k+1)$

$\Rightarrow -8k+10 = 6k+6$

$\Rightarrow -8k-6k = 6-10$

$\Rightarrow -14k = -4$

$\Rightarrow k = \frac{4}{14} = \frac{2}{7}$

$\Rightarrow k = \frac{2}{7}$ in each case.

$\therefore$ The required ratio is 2 : 7

25. Let the present age of Anjali be x and of Dimple be y.
Five years hence,
Age of Anjali = (x + 5) years
Age of Dimple = (y + 5) years
Age of Anjali = 3(Age of Dimple)
x + 5 = 3(y + 5)
x + 5 = 3y + 15
x – 3y = 10……(1)
Five years ago,
Age of Anjali = (x – 5)
Age of Dimple = (y – 5)
Age of Anjali = 7(Age of Dimple)
x – 5 = 7(y – 5)
x – 5 = 7y – 35
x – 7y = -30……(2)
Subtracting equation 2 from equation 1, we get,
(x – 3y) – (x – 7y) = 10 – (-30)
x – 3y – x + 7y = 10 + 30

4y = 40

y = 10 years

Putting the value of 'y' in equation 1, we get,

x − 3 × 10 = 10

x − 30 = 10

x = 40 years

Hence, the age of Anjali is 40 years and age of Dimple is 10 years.

OR

Let

2x − y = 11 …..(1)

x + y = 25….(2)

Multiplying equation 2 with 2, we get,

2(x + y) = 2 × 25

2x + 2y = 50…..(3)

Subtracting equation 2 from equation 3, we get,

(2x + 2y) − (2x - y) = 50 − 11

2x + 2y − 2x + y = 39

3y = 39

y = 13

Putting the value of 'y' in equation (2), we get,

x + 13 = 25

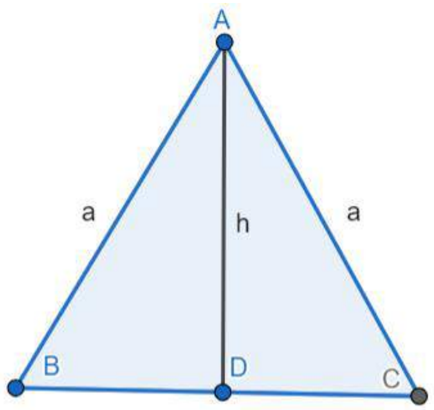
x = 12

Therefore, x = 12 and y = 13

Now, k = $(13 - 12)^3 = (1)^3 = 1$

Hence, the value of k is 1

26.



Theorem: Altitude of an equilateral triangle bisects the corresponding side.

Therefore, BD = CD = ½ a

Now, in ΔADC,

AD = hcm

CD = ½ acm

AC = acm

Applying the Pythagoras theorem, we get,

$AC^2 = AD^2 + CD^2$

$a^2 = h^2 + (a/2)^2$

$$a^2 = h^2 + \frac{a^2}{4}$$

$$h^2 = a^2 - \frac{a^2}{4}$$

$$h^2 = \frac{4a^2 - a^2}{4}$$

$$h^2 = \frac{3a^2}{4}$$

$$h = \frac{\sqrt{3}}{2}a$$

$$a = \frac{2}{\sqrt{3}}h$$

Hence, Proved.

27. Diameter of Cylinder(d)= 56 m
Radius of Cylinder(r) = 56/2 m = 28 m [Hence, Radius is the half of the Diameter].
Height of Cylindrical part = 6m
Now,
C.S.A of Cylinder = 2 x π x r x h.
C.S.A = 2 x 22/7 x 28 x 6
C.S.A = 2 x 22 x 4 x 6
C.S.A = 1056 m^2

Again,
Cylinder is surmounted by Cone.
So,
Radius of Cone = Radius of Cylinder = 28 m
Height of Cone = Total height of tent-Height of Cylinder = (27-6) m = 21 m

Now,
We are required to find out Slant Height of Cone, For which there is a Formula,
$l^2 = r^2 + h^2$
l = 35 m.

Now,
C.S.A of Cone = π x r x l
C.S.A = 22/7 x 28 x 35
C.S.A = 22 x 4 x 35
C.S.A = 3080 m^2
Now,
Total Area covered by Canvas = C.S.A of Cylinder + C.S.A of Cone
Total area = (1056+3080) m^2
Total area = 4136 m^2

28. Let the radius of the smaller circle be r cm
Then, radius of bigger circle =(r+7) cm
Given, $\pi(r+7)^2 - \pi(r)^2 = 1078\pi(r+7)^2 - \pi(r)^2 = 1078$
$\pi(r^2+14r+49) - \pi r^2 = 1078$
$\pi r^2 + 14\pi r + 49\pi - \pi r^2 - 1078$

$14 \times 227 \times r + 49 \times 227 = 1078$

$44r + 154 = 1078$

$44r = 924$
r = 21cm

29. We have to find a point on x-axis. Therefore, its y-coordinate will be 0.

Let the point on x-axis be (x, 0)

$(x - 2)^2 + 25 = (x - 2)^2 + 81$

$x^2 + 4 - 4x + 25 = x^2 + 4 + 4x + 81$

$8x = 25 - 81$

$8x = -56$

$x = -7$

Therefore, the point is (-7, 0).

30. The possible outcomes are:

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

Number of total possible outcomes = 8

Number of favourable outcomes = 2 {i.e., TTT and HHH}

P (Hanif will win the game) = $\frac{Favourabe\ outcomes}{Total\ outcomes}$

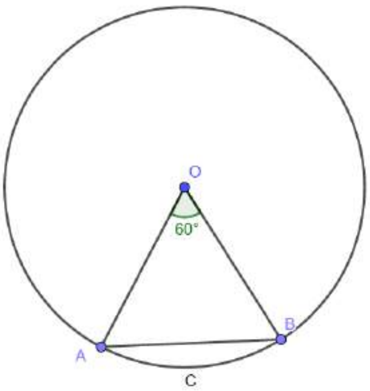
$= \frac{2}{8}$

$= \frac{1}{4}$

P (Hanif will lose the game) = $1 - \frac{1}{4}$

$= \frac{3}{4}$

31.



Radius (r) of circle = 21 cm

The angle subtended by the given arc = 60°

Length of an arc of a sector of angle θ = $\frac{\theta}{360^\circ} \times 2\Pi r$

(i) Length of arc ACB = $\frac{60^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 21$

$= \frac{1}{6} \times 2 \times 22 \times 3$

= 22 cm

(ii) Area of sector OACB = $\frac{\theta}{360^\circ} \Pi r^2$

$= \frac{60^\circ}{360^\circ} \times \frac{22}{7} \times 21 \times 21$

$= \frac{1}{6} \times \frac{22}{7} \times 21 \times 21$

= 231 cm^2

32. $(a^2+b^2)x^2+2(ac+bd)x+(c^2+d^2)=0$

has equal roots. This means that the discriminant equals zero.
Thus,

$$(2(ac+bd))^2-4(a^2+b^2)(c^2+d^2)=0$$
$$4(ac)^2+8abcd+4(bd)^2-4(ac)^2-4(ad)^2-4(bc)^2-4(bd)^2=0$$
$$-4(ad)^2-4(bc)^2+8abcd=0$$
$$(ad)^2+(bc)^2-2(ad)(bc)=0$$
$$(ad-bc)^2=0$$
$$ad-bc=0$$
$$\boxed{ad=bc}$$

33. We have

(x + 3)/(x - 2) - (1 - x)/x = 17/4

⇒ x(x + 3) - (1 - x) (x - 2)/x(x - 2) = 17/4

⇒ $2x^2 + 2/x^2 - 2x = 17/4$

⇒ $8x^2 + 8 = 17x^2 - 34x$

⇒ $9x^2 - 34x - 8 = 0$

By using factorization method, we get

⇒ $9x^2 - 36x + 2x - 8 = 0$

⇒ 9x(x - 4) + 2(x - 4) = 0

⇒ (x - 4) (9x + 2) = 0

⇒ x - 4 = 0 or 9x + 2 = 0

⇒ x = 4, - 2/9 (As x can't be negative)

⇒ x = 4

But here, x = 4, - 2/9

34.

$$\frac{a_{11}}{a_{18}}=\frac{a+10d}{a+17d}=\frac{2}{3}$$

or, $2(a+17d)=3(a+10d)$

$$a=4d \quad \text{........(i)}$$

Now $$\frac{S_5}{S_{10}}=\frac{\frac{5}{2}(2a+4d)}{\frac{10}{2}[2a+9d]}$$

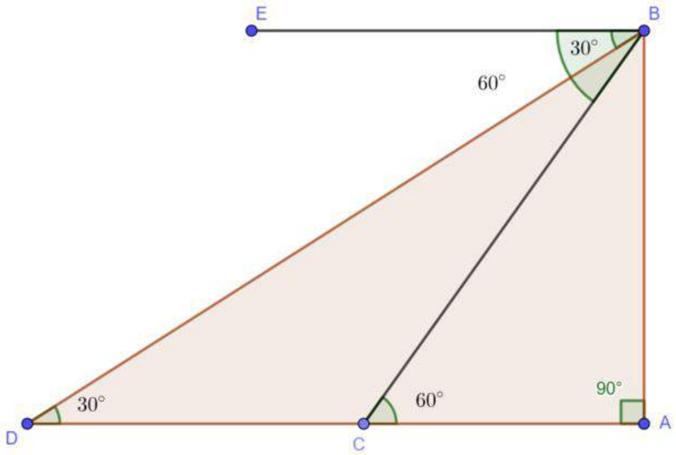
Putting the value of a = 4d

$$\text{or, } \frac{\frac{5}{2}(8d+4d)}{5(8d+9d)}$$

$$\frac{12d}{34d} = \frac{6}{17}$$

Hence $S_5 : S_{10} = 6:17$

35.



Let AB is the tower and AD is the highway.

Now from triangle ADB,

tan 30° = AB/AD

⇒ 1/√3 = AB/AD

⇒ AB = AD/√3 ....(1)

Again from triangle ACB

tan 60° = AB/AC

⇒ √3 = AB/AC

⇒ AB = AC√3 ....(2)

from equation 1 and 2

AD/√3 = AC√3

⇒ (DC + CA)/√3 = AC√3

⇒ DC + CA = AC√3×√3

$\Rightarrow$ DC + CA = 3AC

$\Rightarrow$ 3AC - Ac = CD

$\Rightarrow$ 2AC = CD

$\Rightarrow$ AC = CD/2

Since time taken by car to cover CD = 6 Second

So, time taken by car to cover AC = 6/2 = 3 seconds.

36. Depth (h) of each conical depression = 1.4 cm

Radius (r) of each conical depression = 0.5 cm

Volume of wood = Volume of cuboid - 4 × Volume of cones

$= lbh - 4 \times \frac{1}{3}\pi r^2h$

$= 15 \times 10 \times 3.5 - 4 \times \frac{1}{3} \times \frac{22}{7} \times (\frac{1}{2})^2 \times 1.4$

= 525 – 1.47

= 523.53 cm^3

Hence,

The volume of wood in the entire stand= 523.53 cm^3

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