

KBPE Class 10th Maths Question Paper With Solution 2020

QUESTION PAPER CODE S 1531

Answer any three questions from 1 to 4. Each question carries 2 scores.

$$[3 * 2 = 6]$$

Question 1: [a] Write the 6th term of the arithmetic sequence 1, 25, 49, 73, 97

.....

[b] How many perfect square terms are there in the arithmetic sequence 97, 73, 49,?

Solution:

[a] Given an arithmetic sequence is 1, 25, 49, 73, 97,

First term (f) = 1

$$d = 25 - 1 = 24.$$

$$T_6 = a + (n - 1)d$$

$$6^{\text{th}} \text{ term} = f + 5d$$

$$\Rightarrow 1 + 5 \times 24$$

$$\Rightarrow 1 + 120 = 121$$

[b] Given an arithmetic sequence is 97, 73, 49,

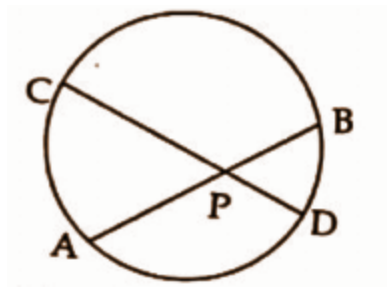
The perfect square numbers are 1, 4, 9, 16,

Hence the given sequence is 97, 73, 49, 25, 1.

From the above sequence, the perfect square numbers are 49, 25, and 1.

$\therefore$ The number of perfect square terms are 3.

Question 2: Chords AB and CD are intersecting at P. AB = 10cm, PB = 4cm, PD = 3cm.



- [a] What is the length of PA?
 [b] Find the length of the PC.

Solution:

Given:

$$AB = 10\text{cm}$$

$$PB = 4\text{cm}$$

$$PD = 3\text{cm}$$

$$[a] \text{ } PA = AB - PB$$

$$= 10 - 4$$

$$= 6\text{cm}$$

$$[b] \text{ } PC \times PD = PA \times PB$$

$$PC = [PA \times PB] / [PD]$$

$$= [6 \times 4] / 3$$

$$= 8\text{cm}$$

Question 3: Write the polynomial $p(x) = x^2 - 4$ as the product of two first degree polynomials.

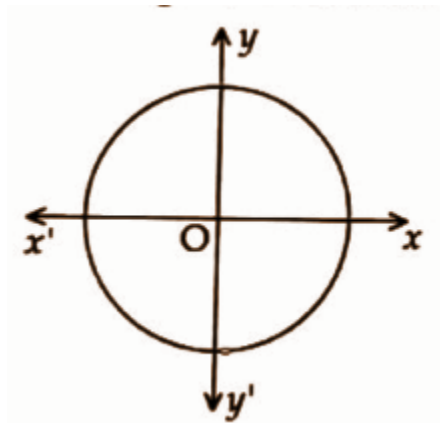
Solution:

$$\text{Given polynomial} = p(x) = x^2 - 4$$

$$\text{First-degree polynomial } x^2 - 4$$

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

Question 4: In the figure, O is the centre of the circle and $x^2 + y^2 = 25$ is the equation of the circle.



[a] What is the radius of the circle?

[b] Write the equation of the circle whose centre is at origin and the radius is 3.

Solution:

Given circle is $x^2 + y^2 = 25$

[a] $x^2 + y^2 = r^2$

$r^2 = 25$

$r = \sqrt{25} = 5$

$\therefore r = 5$

The radius of the circle is 5 units.

[b] Given radius = 3

Hence the equation of the circle = $x^2 + y^2 = r^2$.

$\Rightarrow x^2 + y^2 = 3^2$

$\Rightarrow x^2 + y^2 = 9$

Answer any five questions from 5 to 11. Each question carries 3 scores. [5 * 3 = 15]

Question 5: [a] Write the first term and the common difference of the arithmetic sequence whose algebraic expression is $3n + 5$.

[b] The first term of an arithmetic sequence is 8 and the common difference is 5. Write its algebraic form.

Solution:

Given $x_n = 3n + 5$

[a] If $n = 1$, then the first term can be obtained.

First term $= 3 \times 1 + 5 = 3 + 8 = 8$

Common difference $= 3$ [$\because$ coefficient of n be the d]

[b] Given $f = 8$

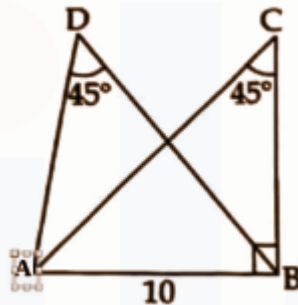
$d = 5$

$x_n = d_n + f - d$

$= 5n + (8 - 5)$

$= 5n + 3$

Question 6: In the figure, $\angle ABC = 90^\circ$, $\angle C = \angle D = 45^\circ$, $AB = 10$ cm.



[a] What is the length of AC?

[b] What is the radius of the circumcircle of triangle ABC?

[c] What is the radius of the circumcircle of triangle ABD?

Solution:

In right $\triangle ABC$, the angles are $45^\circ, 45^\circ, 90^\circ$

$\Rightarrow 1 : 1 : \sqrt{2}$

$\Rightarrow AB : BC : AC$

$\Rightarrow x : x : x\sqrt{2}$

$\Rightarrow 10 : 10 : 10\sqrt{2}$

[a] The length of $AC = 10\sqrt{2}$ cm.

[b] The radius of the circumcircle of $\triangle ABC$

$=$ Half of the hypotenuses AC

$$= 10 \sqrt{2} / 2$$

$$= 5\sqrt{2} \text{ cm}$$

[c] The radius of the circumcircle of $\triangle ABD$

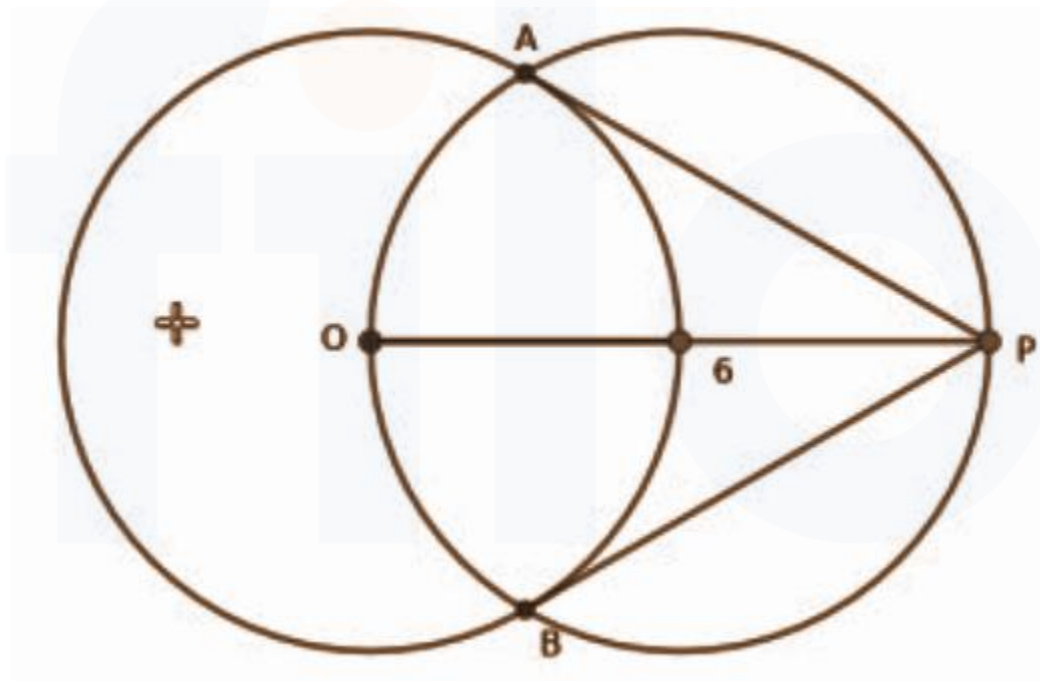
= Half of the hypotenuses AC

$$= 10 \sqrt{2} / 2$$

$$= 5\sqrt{2} \text{ cm}$$

Question 7: Draw a circle of radius 3cm. Mark a point P at a distance of 6cm from the centre of the circle. Draw tangents from P to the circle.

Solution:



Question 8: [a] What is the common difference of the arithmetic sequence $x - 1, x, x + 1, \dots$

[b] If $x - 1$ is an even number, what is the next even number?

[c] Prove that the product of 2 consecutive even numbers added to 1 gives a perfect square.

Solution:

[a] Given sequence $x - 1, x, x + 1, \dots$

$$d = x - (x - 1)$$

$$= x - x + 1$$

$$d = 1$$

[b] Given even number $= x - 1$

Next even number

$$= x - 1 + 2$$

$$= x + 1$$

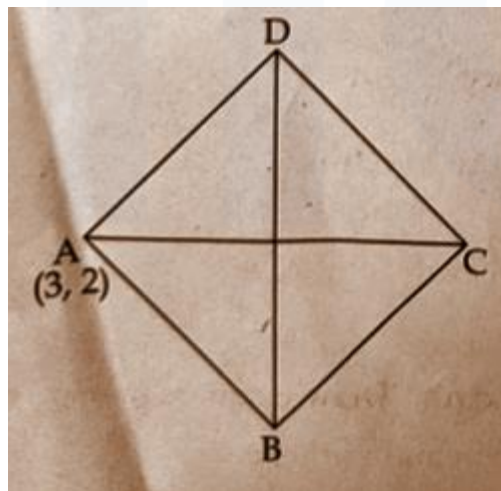
[c] Let consecutive two even number be $(x - 1)$ and $(x + 1)$

By question, the product of two consecutive numbers is $+ 1$,

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

Here x^2 being a perfect square.

Question 9: In the figure, ABCD is a square. Its diagonals are parallel to the coordinate axes. $AC = 6$ and the coordinates of A is $(3, 2)$. Write the coordinates of the vertices of C, B and D.



Solution:

Given, the coordinates of A $= (3, 2)$

AC be parallel to the x-axis.

$\therefore$ The coordinates of C

$$= (3 + 6, 2)$$

$$= (9, 2)$$

The coordinates of the midpoint of AC = (6,2)

It is known that the diagonals are equal in a square.

$\therefore$ The coordinates of B

$$= (6, 2 - 3)$$

$$= (6, -1)$$

The coordinates of D

$$= (6, 2 + 3)$$

$$= (6, 5)$$

Hence the coordinates of A = (3, 2)

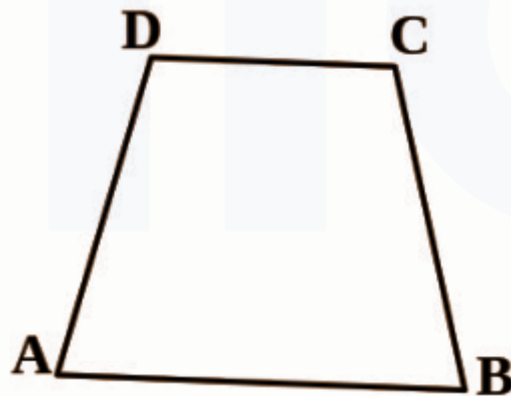
The coordinates of B = (6, -1)

The coordinates of C = (9, 2)

The coordinates of D = (6, 5)

Question 10: In the figure, ABCD is a cyclic quadrilateral.

Also, $\angle A + \angle D = 210^\circ$, $\angle D + \angle C = 250^\circ$.



[a] What is $\angle A + \angle C$?

[b] Find the measures of $\angle A$ and $\angle C$.

Solution:

Given that $\angle A + \angle D = 210^\circ$, $\angle D + \angle C = 250^\circ$,

[a] $A + C = 180^\circ$ (cyclic quadrilateral)

$$A + D = 210 \rightarrow (1)$$

$$D + C = 250 \rightarrow (2)$$

Adding (1) + (2)

$$\Rightarrow A + C + 2D = 460$$

$$\Rightarrow 180 + 2D = 460$$

$$\Rightarrow 2D = 280$$

$$D = 140^\circ$$

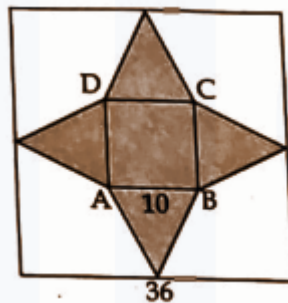
$$[b] A = 210 - 140$$

$$A = 70^\circ$$

$$C = 250 - 140$$

$$C = 110^\circ$$

Question 11: The figure of a square sheet paper is shown below. Length of one side of the paper sheet is 36cm and $AB = 10$ cm. The shaded portion is cut out and folded into a square pyramid.



[a] What is the length of the base of the pyramid?

[b] What is the slant height of the pyramid?

[c] Find the lateral surface area of the pyramid.

Solution:

Given, Side of the paper sheet = 36cm

$AB = 10$ cm

[a] Base edge of the pyramid

$AB = 10$ cm

[b] Slant height of the pyramid
 $= [36 - 10] / 2$
 $= 26 / 2$
 $= 13\text{cm} [\because a + 2l = 36, \text{ side of the larger square}]$

[c] Lateral surface area = $2al$
 $= 2 \times 10 \times 13$
 $= 260 \text{ cm}^2$

Answer any seven questions form 12 to 21. Each question carries 4 scores. $[7 * 4 = 28]$

Question 12:

[a] What is the sum of the first 5 terms of the arithmetic sequence 1, 3, 5, 7?

[b] What is the sum of the first n terms of the arithmetic sequence 1, 3, 5, 7?

[c] Find the sum of the first n terms of the arithmetic sequence $(1 / n), (3 / n), (5 / n), (7 / n) \dots\dots$

[d] What is the sum of the first 2020 terms of the arithmetic sequence $(1 / 2020), (3 / 2020), (5 / 2020), (7 / 2020) \dots\dots$

Solution:

[a] Given sequence = 1, 3, 5, 7,

$$\text{Sum} = n^2$$

Here $n = 5$

$$\begin{aligned} \therefore \text{The sum of the first 5 terms} \\ &= 5^2 \\ &= 25 \end{aligned}$$

[b] The sum of the first n terms = n^2

[c] Given sequence = $(1 / n), (3 / n), (5 / n), (7 / n) \dots\dots$

$$\text{The sum of the first n terms} = n^2 / n = n$$

[d] Given sequence $(1 / 2020), (3 / 2020), (5 / 2020), (7 / 2020), \dots$

The sum of the first n terms $= n^2 / n = n$

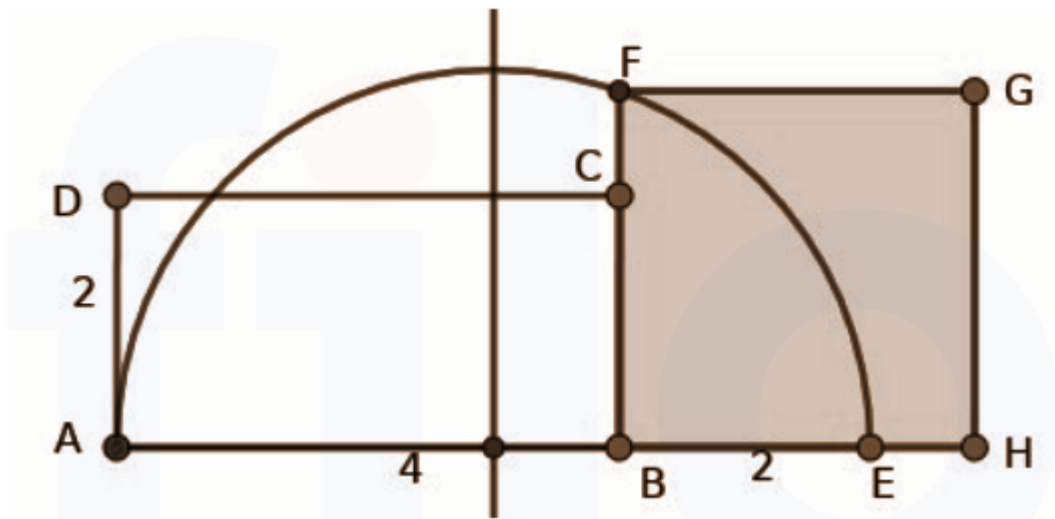
The sum of the first 2020 terms

$= n$

$= 2020$

Question 13: Draw a rectangle of length 4cm and breadth 2cm. Draw a square having the same area of the rectangle.

Solution:



- Construct a rectangle ABCD with length 4cm and breadth 2cm.
- Extend the line AB to BE, such that $BE = BC$.
- Draw a semi-circle with AE as diameter.
- Draw a parallel line BF through B and then BF as length, draw the square BFGH.

Question 14: In a school, the total number of students in 10 A division is equal to the number of students in 10 B. One student is to be selected from each division. The number of boys in 10 A is 20. The probability of selecting a boy from 10 A is $(2 / 5)$ and that of class B is $(3 / 5)$.

[a] How many students are there in 10 A?

[b] What is the probability of selecting a girl from 10 A?

[c] How many boys are there in 10 B?

[d] What is the probability of both the selected students being boys?

Solution:

Class	XA	XB
Boys	20	30
Girls	30	20
Total	50	50

Given the probability of boys in XA = $2 / 5$

Given the probability of boys in XB = $3 / 5$

[a] Number of boys in XA

$$= 20 \times [5 / 2]$$

$$= 50$$

[b] Probability of girl from XA

$$= 1 - [2 / 5]$$

$$= [5 - 2] / 5$$

$$= 3 / 5$$

[c] Number of boys in X B

$$= 50 \times [3 / 5]$$

$$= 10 \times 3$$

$$= 30$$

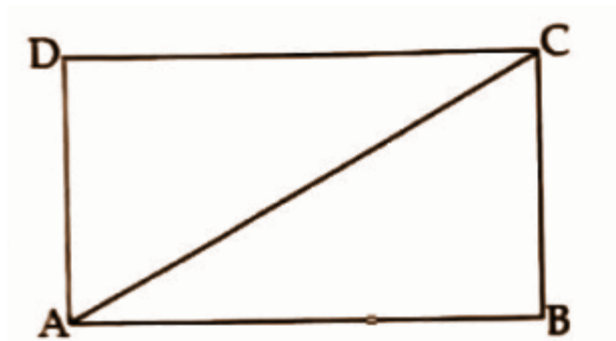
[d] Both being boys

$$= [2 / 5] \times [3 / 5]$$

$$= 6 / 25$$

Question 15: Perimeter of the rectangle in the figure is

36cm. AC = $\sqrt{164}$ cm.



[a] What is $AB + BC$?

[b] Find the length of AB .

Solution:

Given the perimeter = 36cm

$$AC = \sqrt{164} \text{ cm}$$

$$[a] 2(l + b) = 36$$

$$\therefore AB + BC = 36 / 2$$

$$= 18\text{cm}$$

$$[b] \text{ Let } AB = x, BC = 18 - x$$

Since $\triangle ABC$ is right-angled, according to Pythagoras theorem,

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

$$164 = x^2 + (18 - x)^2$$

$$x^2 + 324 - 36x + x^2 = 164$$

$$2x^2 - 36x = 164 - 324 = -160$$

Dividing by 2

$$x^2 - 18x = -80 \text{ [square completion method]}$$

$$x^2 - 18x + 81 = -80 + 81$$

$$(x - 9)^2 = 1$$

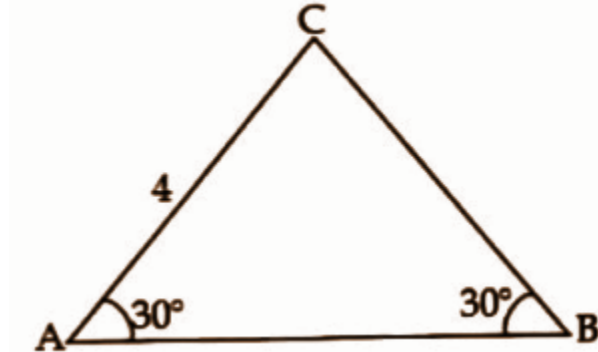
$$x - 9 = \pm 1$$

$$x - 9 = 1 \text{ or } x - 9 = -1$$

$$x = 10 \text{ or } 8$$

So, $AB = 10 \text{ cm}$.

Question 16: In triangle ABC, $\angle A = \angle B = 30^\circ$, $AC = 4\text{cm}$.



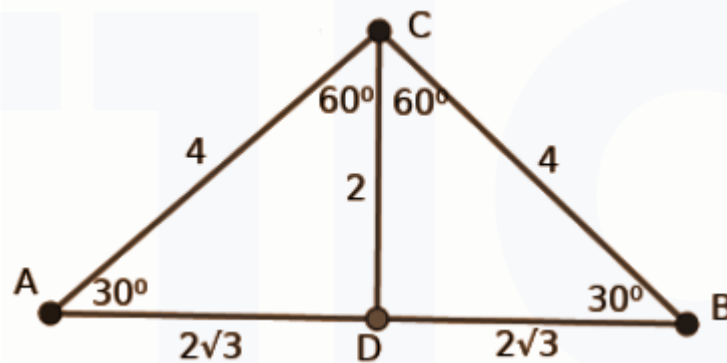
[a] What is the length of BC?

[b] Find the length of AB.

[c] In triangle PQR, $PQ = 4\sqrt{3}\text{ cm}$, $\angle P = \angle Q = 30^\circ$.

Draw the triangle.

Solution:



Given ,

$$\angle A = \angle B = 30^\circ$$

$$AC = 4\text{cm}$$

Draw $CD \perp AB$.

In right $\triangle ADC$,

$$30^\circ : 60^\circ : 90^\circ$$

$$1 : \sqrt{3} : 2$$

$$DC : AD : AC$$

$$x : x\sqrt{3} : 2x$$

$$2 : 2\sqrt{3} : 4$$

$$DC = 2$$

$$AD = 2\sqrt{3}$$

$$AC = 4$$

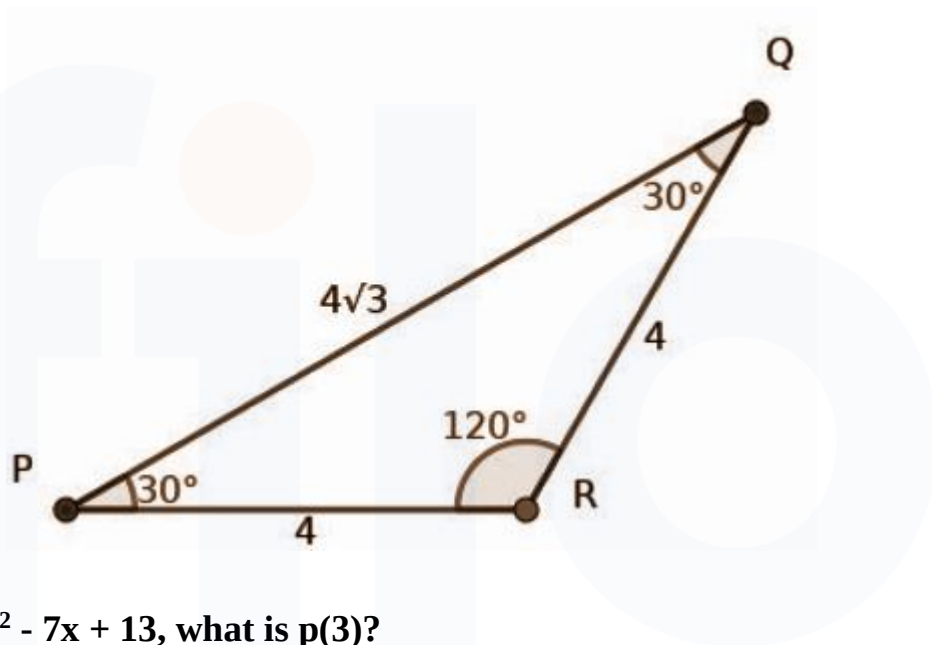
$$[a] \text{ Length of } BC = AC = 4\text{cm}$$

$$[b] \text{ Length of } AB = AD + DB$$

$$= 2\sqrt{3} + 2\sqrt{3}$$

$$= 4\sqrt{3}\text{cm}$$

[c] Draw $PR = 4\text{cm}$ and make R be 120° and join PQ . $\triangle PRQ$ is the required triangle.



Question 17:

[a] If $p(x) = x^2 - 7x + 13$, what is $p(3)$?

[b] Write the polynomial $p(x) - p(3)$ as the product of two first degree polynomials.

[c] Find the solutions of the equation $p(x) - p(3) = 0$.

Solution:

[a] Given polynomial

$$p(x) = x^2 - 7x + 13$$

$$p(3) = 3^2 - 7 \times 3 + 13$$

$$= 9 - 21 + 13$$

$$= 1$$

$$[b] p(x) - p(3) = x^2 - 7x + 13 - 1$$

$$= x^2 - 7x + 12$$

$$= (x - 3)(x - 4)$$

Hence the product two first degree polynomial $= (x - 3)(x - 4)$

$$[c] p(x) - p(3) = 0$$

$$x^2 - 7x + 12 = 0$$

$$\Rightarrow (x - 3)(x - 4) = 0$$

$$\Rightarrow (x - 3) = 0 \text{ or } (x - 4) = 0$$

ie., $x = 3$ or $x = 4$.

Hence the solution is $x = 3$ and 4 .

Question 18: In the figure, O is the centre of both circles. AB and AC touch the small circle at P and Q. A, B and C are points on the larger circle.



[a] If $AP = 5\text{cm}$, then what is the length of AQ ?

[b] Prove that $AB = AC$.

[c] If $AP = 5\text{cm}$ and $\angle A = 90^\circ$, then what is the radius of the small circle?

Solution:

[a] Given $AP = 5\text{ cm}$

Hence the length of $AQ = 5\text{cm}$. [$\because$ Same tangents from A]

[b] AB and AC are tangents

$OP \perp AB$ and $OQ \perp AC$ [$\because$ Chord bisector theorem]

$AP = BP$ and $AQ = QC$

$AB = AC$

[c] Given $\angle A = 90^\circ$

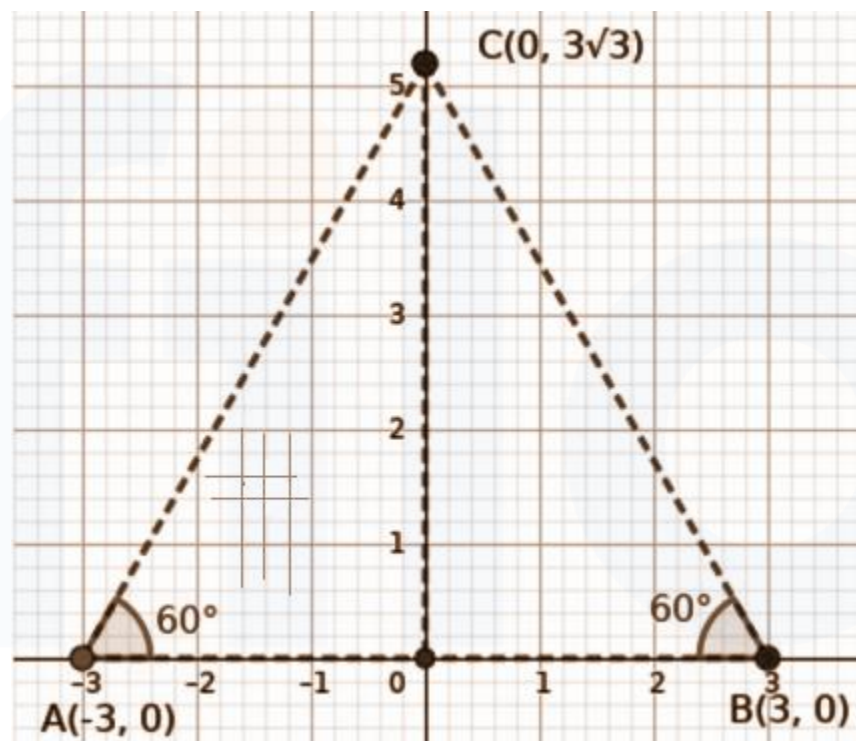
So it can be seen that APOQ is a square.

[$\because$ OP and OQ be radii $\therefore \angle APO = \angle AQO = 90^\circ$. ie., $\angle POQ = 90^\circ$]

Hence the radius of the small circle = 5cm.

Question 19: Draw the coordinate axes and mark the points A $(-3, 0)$, B $(3, 0)$, C $(0, 3\sqrt{3})$.

Solution:



Question 20: A sector of radius 12cm and the central angle 120° is rolled up to a cone.

[a] What is the slant height of the cone?

[b] Find the radius and height of the cone.

[c] What is the central angle of the sector to be used to make a cone of base radius $\sqrt{2}$ cm and height 4cm?

Solution:

[a] The radius of the sector = 12cm [The radius of the sector to be the slant height of the cone]

$$[b] r / l = x^{\circ} / 360^{\circ}$$

$$\Rightarrow r / 12 = 120 / 360$$

$$\Rightarrow 360r = 12 \times 120$$

$$\Rightarrow r = [12 \times 120] / 360$$

$$\therefore r = 4\text{cm}$$

$$\text{Radius} = 4\text{cm}$$

$$h = \sqrt{l^2 - r^2}$$

$$= \sqrt{12^2 - 4^2}$$

$$= \sqrt{144 - 16}$$

$$= \sqrt{128}$$

$$= 8\sqrt{2} \text{ cm}$$

$$[c] r / l = x^{\circ} / 360^{\circ}$$

$$\text{Central angle } (x^{\circ}) = [360 \times r] / l$$

To find 'l'

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

$$r = \sqrt{2}, h = 4\text{cm}$$

$$\therefore l = \sqrt{4^2 + \sqrt{2}^2}$$

$$= \sqrt{16 + 2}$$

$$= \sqrt{18}$$

$$= 3\sqrt{2}$$

$$\therefore \text{Center angle } (x^{\circ}) = 360 \times r / l$$

$$= [360 \times \sqrt{2}] / [3\sqrt{2}]$$

$$= 120^{\circ}$$

Question 21:

[a] What is the slope of the line passing through the points (5, 0) and (3, 2)?

Write the equation of the line.

[b] The x coordinate of a point on the line $x - y = 5$ is 5. What is the y coordinate of that point?

[c] Write the coordinates of the point of intersection of the lines $x + y = 5$ and $x - y = 5$.

Solution:

[a] Given points are (5, 0) and (3, 2).

$$\text{Slope} = [y_2 - y_1] / [x_2 - x_1]$$

$$= [2 - 0] / [3 - 5]$$

$$= 2 / -2$$

$$= -1$$

Equation of the line is

$$y - y_1 = m(x - x_1)$$

$$= y - 0$$

$$= -1(x - 5)$$

$$y = -x + 5$$

$x + y - 5 = 0$ is the equation.

[b] If $x = 5$, then

$$5 - y = 5$$

$$-y = 5 - 5$$

$$= 0$$

The y coordinate of that point is 0.

[c] Given $x + y = 5$ and $x - y = 0$.

$$x + y = 5 \rightarrow (1)$$

$$x - y = 0 \rightarrow (2)$$

Solve (1) and (2),

x and $y = 5$, and 0

So the coordinates = (5, 0).

Answer any five questions from 22 to 28. Each question carries 5 scores. [5 * 5 = 25]

Question 22: Sum of the first four terms of an arithmetic sequence is 72. Sum of first n terms is also 72.

[a] What is the 5th term of the sequence?

[b] Find the sum of the first five terms.

[c] Write the sequence.

Solution:

Given sum of the first 4 terms = 72

Sum of the first 9 terms = 72

[a] 5th term (x_5) = (S_9) / 9

$$= 72 / 9$$

$$= 8$$

[b] Sum of the first 5 terms (S_5)

$$= S_4 + x_5$$

$$= 72 + 8$$

$$= 80$$

[c] $X_3 = (S_5) / 5$

$$= 80 / 5$$

$$= 16$$

$$X_3 + 2d = X_5$$

$$16 + 2d = 8$$

$$2d = -8$$

$$d = -4$$

$$X_1 = X_3 - 2d$$

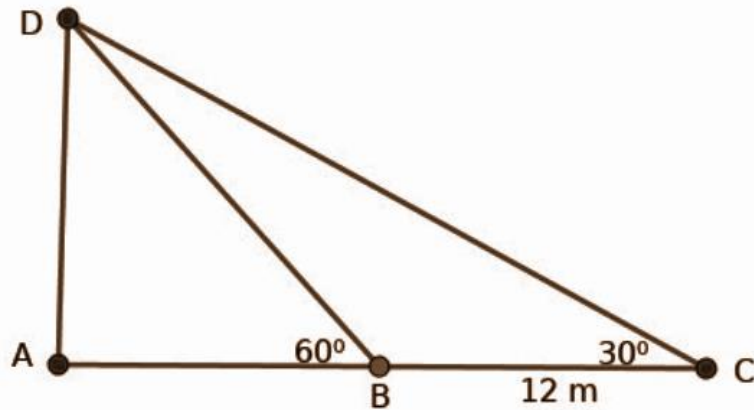
$$= 16 - [2 \times -4]$$

$$= 24$$

The sequence = 24, 20, 16, 12, 8,.....

Question 23: A boy standing at the edge of a canal sees the top of a tree on the other edge at an elevation of 60°. Stepping 12m back, he sees it at an elevation of 30°. Find the height of the tree.

Solution:



Let AB be the height of the tree.

B be the first position of the boy.

C be the second position of the boy.

$$BC = 12$$

$$\angle C = 30^\circ$$

$$\angle BPA = 60^\circ$$

$$\angle PBA = 30^\circ$$

$$\angle A = 90^\circ$$

$\triangle CBD$ is an isosceles triangle.

$$\therefore BC = BD = 12$$

From right $\triangle BAP$,

$$30^\circ; 60^\circ; 90^\circ$$

$$1 : \sqrt{3} : 2$$

$$\Rightarrow AD : AB : BD$$

$$\Rightarrow x : x\sqrt{3} : 2x$$

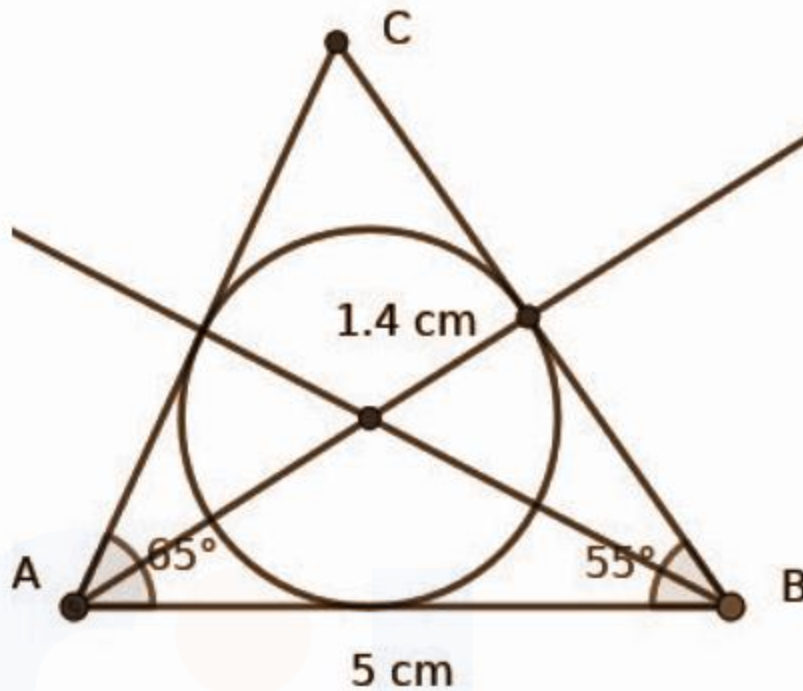
$$\Rightarrow 6 : 6\sqrt{3} : 12$$

$$\therefore AB = 6\sqrt{3}$$

Hence the height of the tree = $6\sqrt{3}\text{m}$.

Question 24: In $\triangle ABC$, $AB = 5\text{cm}$, $\angle A = 65^\circ$, $\angle B = 55^\circ$. Draw the triangle ABC and the incircle. Measure the radius of the incircle.

Solution:



Question 25: A circle is drawn with $(5, 3)$ as a centre. $(5, 6)$ is a point on the circle.

[a] What is the radius of the circle?

[b] Write the equation of the circle.

[c] What is the distance from the centre of the circle to the x-axis?

[d] What is the length of the tangents from the origin to the circle?

Solution:

[a] Radius of the circle $= 6 - 3 = 3$ units

[b] Equation of the circle

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

$$\Rightarrow (x - 5)^2 + (y - 3)^2 = 3^2$$

$$\Rightarrow x^2 - 10x + 25 + y^2 - 6y + 9 = 9$$

$$\Rightarrow x^2 + y^2 - 10x - 6y + 25 = 0$$

[c] The distance from the centre of the circle to the x-axis is the radius of the circle $= 3$ units.

[d] The length of the tangents from the origin to the circle = 5 units. [The x-axis being itself a tangent.]

Question 26:

[a] The radius of a solid sphere is 6cm. Find its volume and surface area.

[b] It is cut into two equal halves. What is the total surface area of each hemisphere? What is the volume of a hemisphere?

Solution:

[a] Given radius = 6cm;

$$\begin{aligned}\text{Volume} &= \left[\frac{4}{3} \right] \pi r^3 \\ &= \left[\frac{4}{3} \right] \pi 6^3 \\ &= 288\pi \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Total Surface Area} &= 4\pi r^2 \\ &= 4\pi \times 6^2 \\ &= 144\pi \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{[b] Total Surface Area of hemisphere} &= 3\pi r^2 \\ &= 3\pi \times 6^2 \\ &= 108\pi \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{The volume of hemisphere} &= \left[\frac{2}{3} \right] \pi r^3 \\ &= \left[\frac{2}{3} \right] \pi 6^3 \\ &= 144\pi \text{ cm}^3\end{aligned}$$

Question 27: The table below shows, children of a class sorted according to their marks in the examination.

Marks	Number of Children
0-10	4
10-20	7
20-30	10
30-40	12
40-50	8
	41

[a] If we arrange the children from the one with the least mark to the one with the greatest, then what will be the assumed mark of the 12th student?

[b] Compute the median mark.

Solution:

Class	Frequency	Marks	Cumulative Frequency
0 - 10	4	<10	4
10 - 20	7	<20	11
20 - 30	10	<30	21
30 - 40	12	<40	33
40 - 50	8	<50	41
Total	41		

[a] Assumed mark of the 12th student

$$= 20 + [30 - 20] / [10 \times 2]$$

$$= 20 + 1 / 2$$

$$= 20.5$$

$$[b] N / 2 = 41 / 2 = 20.5$$

Median class = 20 - 30

$$l = 20$$

$$F = 11$$

$$f = 10$$

$$\text{Median} = l + [(N / 2 - F) / f] \times c$$

$$= 20 + [(20.5 - 11) / 10] \times 10$$

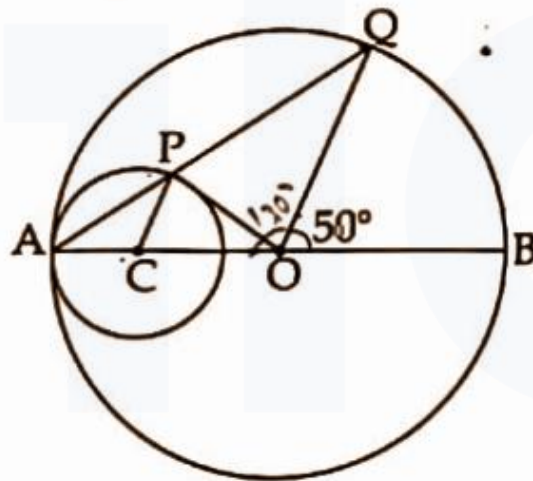
$$= 20 + [9.5 / 10] \times 10$$

$$= 20 + 9.5$$

$$= 29.5$$

$$\therefore \text{Median mark} = 29.5$$

Question 28: In the figure, O is the centre of the large circle. The centre of the small circle is C. OP is a tangent to the small circle. $\angle BOQ = 50^\circ$.



[a] $\angle OAQ = ?$

[b] $\angle OCP = ?$

[c] $\angle APO = ?$

[d] $\angle POQ = ?$

Solution:

Given $\angle BOQ = 50^\circ$

[a] Since $\triangle AOQ$ is isosceles, their base angles are equal.

$$AOQ = 180 - 50 = 130$$

$$\angle A = \angle Q = [180 - 130] / 2$$

$$= 50 / 2$$

$$= 25^{\circ}$$

$$\therefore \angle OAQ = 25^{\circ}$$

$$[b] \angle OCP = 25^{\circ} \times 2 = 50^{\circ}$$

$$[c] \angle APO = 25^{\circ} + 90^{\circ} = 115^{\circ}$$

$$[d] \angle POQ = 180^{\circ} - (50 + \angle AOP)$$

$$= 180^{\circ} - 50^{\circ} - 40^{\circ}$$

$$= 90^{\circ}$$

Question 29: Read the following passage. Understand the mathematical concept in it and answer the questions that follow. Each question carries 1 score. [6 * 1 = 6]

The common difference of the arithmetic sequence 15, 14, 13, 12, 11, 10 is $14 - 15 = -1$. The first term of the sequence is 15 and the 15th term is $15 + 14 * -1 = 15 - 14 = 1$. Similarly, the 4th term is 12 and the 12th term is 4. Its 16th term is $x_{16} = 15 + 15 * -1 = 15 - 15 = 0$. So, the sum of the first 31 terms is also 0. That is if the nth term of an arithmetic sequence with common difference -1 is m, then the mth term is n and the (m + n)th term is 0.

[a] 7th term of an arithmetic sequence is 10 and the 10th term is 7. What is the common difference?

[b] What is the 21st term of the arithmetic sequence 21, 20, 19....

[c] 5th term of an arithmetic sequence is 17 and the 17th term is 5. Which term of the sequence is 0?

[d] 5th term of an arithmetic sequence is 17 and the 17th term is 5. What is the 44th term?

[e] 1st term of an arithmetic sequence is n and the nth term is 1. What is the (n + 1)th term?

[f] The 1st term of an arithmetic sequence is n and the n^{th} term is 1. Sum of how many terms, starting from the first term, of this sequence is 0?

Solution:

[a] The common difference $d = -1$

[b] 21st term becomes 1.

[c] 22nd term becomes 0.

[d] 44th term = $0 - 22 = -22$

[e] The $(n + 1)^{\text{th}}$ term is 0.

[f] 0 is the sum of $(2n + 1)^{\text{th}}$ term.

