SSLC Model Examination
February-2023
MATHEMATICS
English Version.
Detailed Solutions with Questions.

Prepared by Dr.V.S.RaveendraNath.

Question: 1

Write the next two terms of the arithmetic sequence 5,12,19,……..

Solution:-

Given sequence = 5, 12, 19, ...

f = 2 , d = 12 − 5 = 7

∴ the next two terms = 26 and 33.

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Question: 2.

Natural numbers from 1 to 10 are written on paper slips and put in a box. If one slip is taken from the box, without looking, then what is the probability of the number on the slip being a multiple of 3 ?

olution:-

Given1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

Total number of slips = 10 (N)

Mulyiple of three= 3, 6, znd 9

ie., n(f) = 3

Hebce the required probability

$$= n(F) / n(N) = \frac{3}{10} .$$

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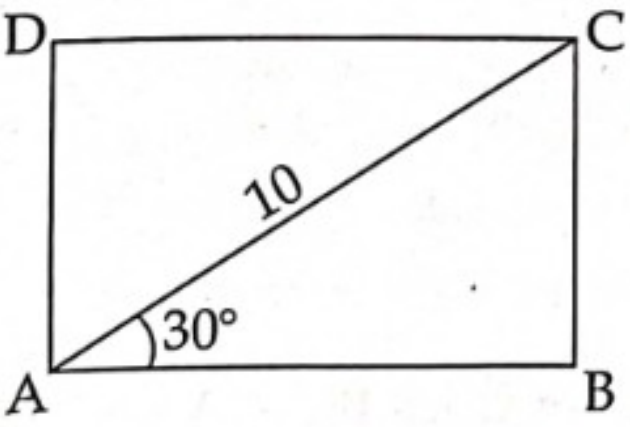
Question: 3.

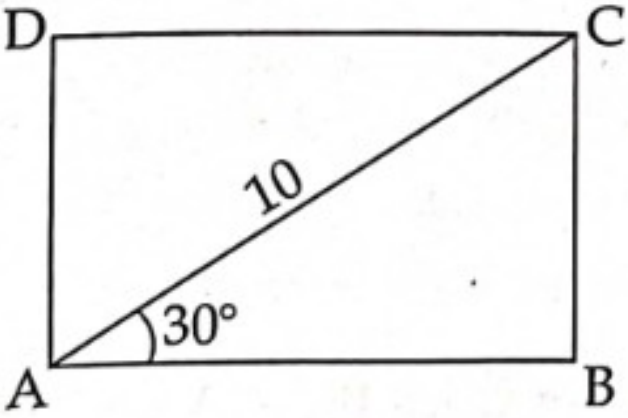


ABCD is a rectangle. $\angle CAB = 30°$, AC = 10 centimetres

(a) Find the length of BC

(b) Find the length of AB

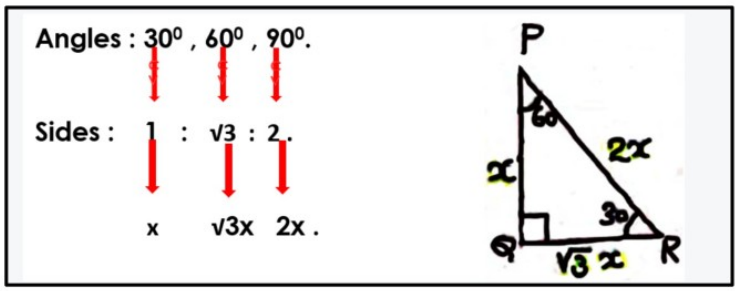
Solution:-



In rt.ΔABC
30^0 ,60^0 ,90^0
ie., 1: √3:2.

a) Lebgth of BC

$$= \frac{10}{2} = 5\text{cm.}$$



b) Length of AB

= 5×√3 = 5√3 cm.

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Question: 4.

Find the median of first 9 even numbers.

Solution:-

Given the first nine even numbers

= 2,4,6,8,10,12,14,16,18,20

The given data br odd numbers

$$\therefore \text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{ term .}$$

$$= \left(\frac{9+1}{2}\right)^{th} \text{ term} = \left(\frac{10}{2}\right)^{th} \text{ term}$$

5^{th} tern = 10

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Question: 5.

The sum of first 5 terms of an arithmetic sequence is 145.

(a) Find the third term

(b) If the common difference of this sequence is 4, write the terms.

Solution:-

Given $S_5 = 145$.

a). Third term $(x_3) = \frac{145}{5} = 29.$

b) . Given d = 4

∴ The terns are 29,33,37,40,…….

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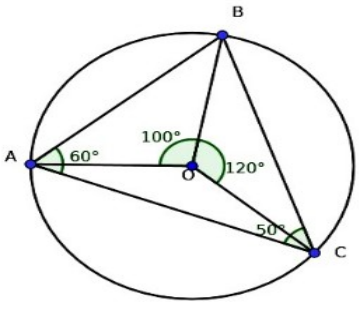
Question: 6.

Draw a circle of radius 3 centimetres. Draw a triangle of angles 50°, 60°, 70° and vertices on this circle.

Solution:-



Construction:

Draw a circle with radius 3cm O as the center. Draw OB and make an ∠AOB = 100° (2 × 50 = 100).make an ∠BOC= 120° .(2 × 60 = 120) and join AB,BC and AC.

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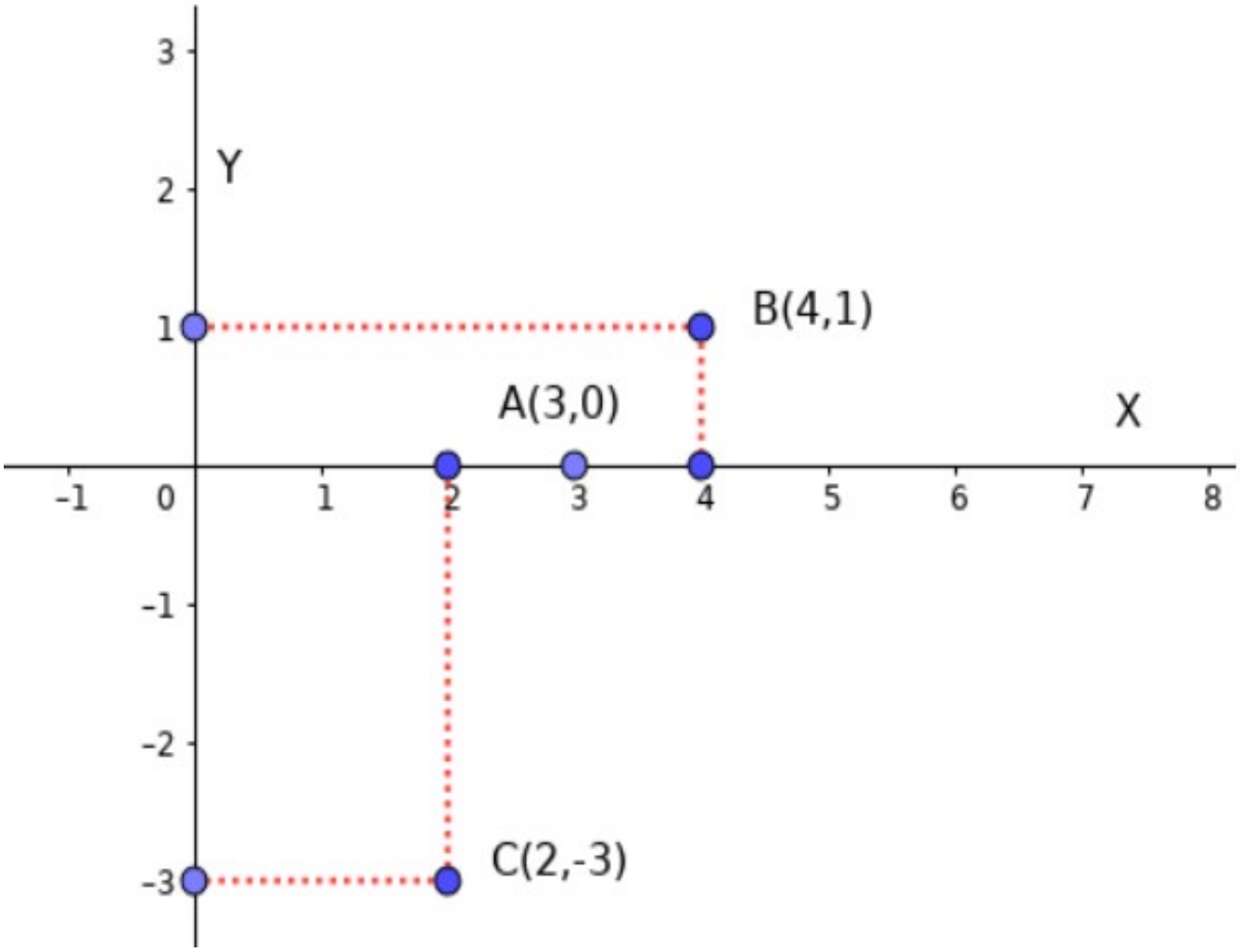
Question: 7.

Draw the x and y axes and mark the points A(3, 0), B(4, 1), C(2, −3).

Solution:-



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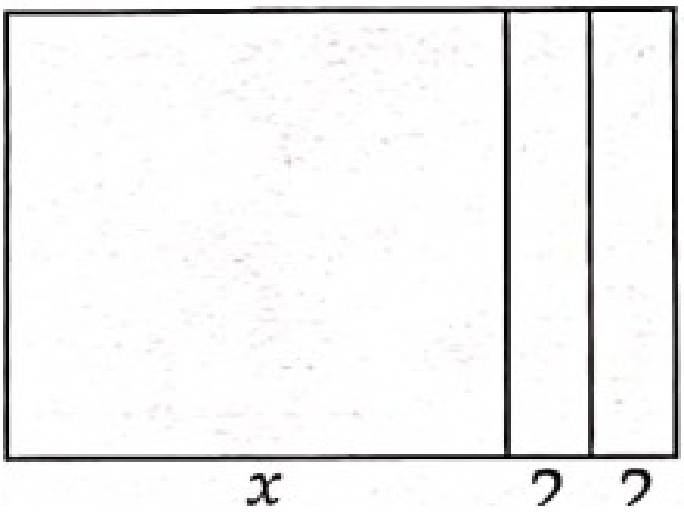
Question: 8.



A square and two rectangles of the same height are kept together as in the picture. The width of the rectangles are 2 centimetres. Total area of the picture is 96 square centimetres.

(a) Taking the side of the square as x centimetres, write an equation representing the given details.

(b) Find the length of one side of the square.

Solution:-

Given the width of tjd rectangle

= 2m.

Area of the rectangle = 96 sw.m.

a) By given details

ie., $x(x + 4) = 96$

b) $x(x + 4) = 96 \Rightarrow x^2 + 4x = 96$

(square completion method)

$x^2 + 4x + 4 = 96 + 4$

$(x + 2)^2 = 100$. (take roots)

ie., $x + 2 = 10$; $x = 10 - 2 = 8$.

$\therefore$ Lebgth of one side = 8m.

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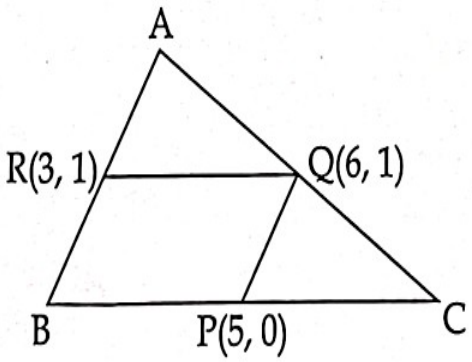
Question: 9.



In triangle ABC, P(5, 0), Q(6, 1), R(3, 1) are the mid-points of sides BC, CA and AB respectively.

(a) What is the most suitable name for the quadrilateral BPQR ?

(b) Find the coordinates of B and C.

Solution:-

a) By ibspection ,see that be a Parallelogram

b). B = (3 + 5 − 6 , 1 + 0 − 1) = (2 , 0)1

C = (10 − 2 , 0) = (8 , 0)

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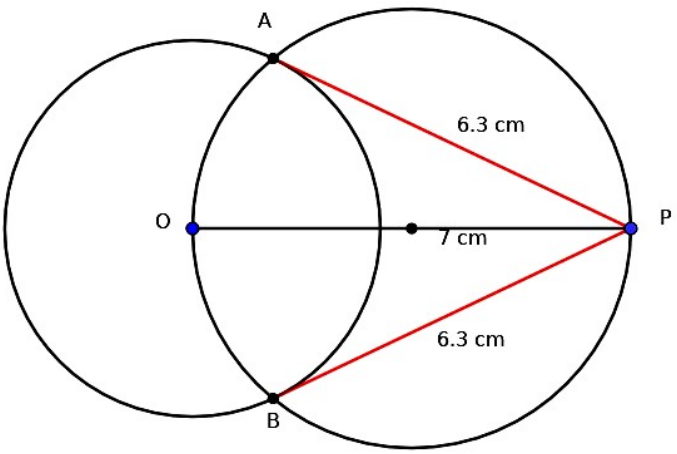
Question 10.

10. Draw a circle of radius 3 centimetres. Mark a point 7 centimetres away from the centre. Draw tangents from this point to the circle.

Solution

Construction.

Draw a circle with a radius 3cm O as its center. Draw OP= 7cm line



and draw perpendicular to OP .Draw a circle OQ as radius and cut it A and B . Join AP and BP becomes the tangents.

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Question 11.

A sequence is written by adding 3 to the multiples of 4.

(a) Write the algebraic form of the sequence.

(b) Find the tenth term of the sequence.

(c) Is 100 a term of this sequence ? Why ?

Solution

Given sequence = 7, 11, 15 ……

f = 7, d = 4

a). . Algebraic form = dn + f − d

= 4b + 7 – 4 = 4n + 3.

b) x_{10} = f + 9 ; 7 + 9 × 4 = 7 +36 = 43.

c). No

The remainder got when divide 100 by 4 is not 3

OR

100 – 43 = 57 is not a multiple of 4,100 is not a term.

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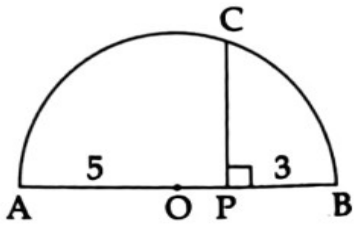
Question 12.

(a)



In the picture, AB is a diameter of the semicircle. PC is perpendicular to AB. AP = 5 centimetres and PB = 3 centimetres. Find the length of PC.

(b) Draw a square of area 15 square centimetres.

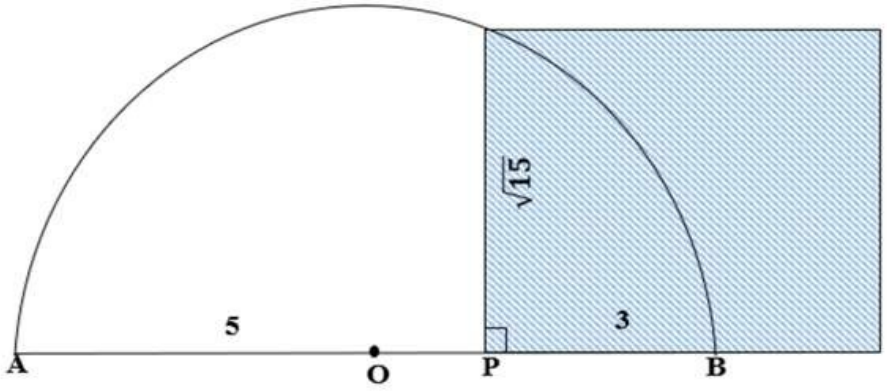
Solution

a) We know that , $PA \times PB = PC^2$

$PC^2 = 5 \times 3 = 15$

$PC = \sqrt{15}$

b)



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Question 13.

Perimeter of a rectangle is 80 centimetres. Its area is 384 square centimetres. Find the length and breadth of the rectangle.

Solution

Giveb perimeter = 80cm

Aera = 38*4cm*²

ie., 2(; +b) – 80. ; l + b = $\frac{80}{2}$ = 40.

Let 'x' be the length

ie., Breadth = 40 − x.

Given Aera = 38*4cm*²

$ie., x(40 - x) = 384$

$40x - x^2 = 384$

$x^2 - 40x = -384$

(square completion method)

$x^2 - 40x + 400 = -384 + 400 = 16.$

$(x + -20)^2 = 16$

Take root

$ie., x - 20 = \sqrt{16} = \pm 4$

$x - 20 = 4\ x = 4 + 20 = 24$

$x - 20 = -4\ x = -4 + 20 = 16$

Hebce **length =24cm and**

Breadt = 16cm.

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Question 14.

In class 10A, there are 25 boys and 20 girls. In 10B, there are 26 boys and 24 girls. One student is to be selected from each class.

(a) What is the probability of both being girls ?

(b) What is the probability of both being boys ?

(c) What is the probability of one boy and one girl ?

Solution

	Class 10A	Class 10B
Boys	25	26
Girls	20	24
Total	45	50

Total m x n = 45 x 50 = 2250.

a). Probability both being girls

m x n = 20 x 24 = 480

n(F) / n(N) = 480 /2250

$$= \frac{16}{75} .$$

b) robability both being boys

m x n = 25 x 26 = 650

$n(F) / n(N) = 650/2250$

$= \frac{13}{45}$.

c) Probability of one boy and one girl

$$\frac{25\times54+20\times26}{45\times50} = \frac{112}{225} .$$

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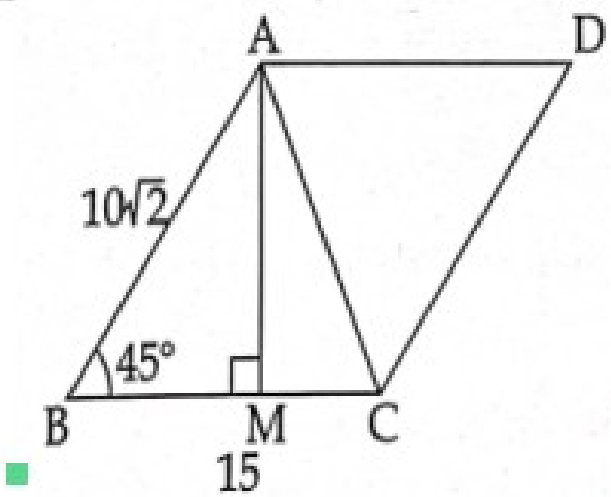
Question .15.



ABCD is a parallelogram. BC = 15 centimetres ; $\angle B = 45°$, AB = $10\sqrt{2}$ centimetres. AM is perpendicular to BC.

(a) Find the length of AM and BM.

(b) What is the length of MC ?

(c) Calculate the length of diagonal AC.

Solution

Given, BC = 15c,, ∠B = 48^0 ,

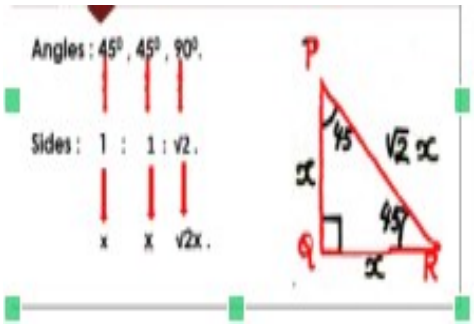
B = 10√2 cm , AM perpendicular BC

a) . See the fig.,rt. ΔAMB,angles atr 4

45^0 ,45^0 ,$90^{0.}$, ie., 1: 1: √2.

Hence AM = 10cn, BM = 10cm.

b) . MC = 15 – 10 = 5cm.



c). In ths fig. Consider rt.Δ AMC,

By Pythagoras Theorem,

AC = √(102 + 52) = √ (100+25) =√125

= 5√5cm.

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Question 16.

Consider the polynomial $P(x)=x^2-11x+21$

(a) Find $P(2)$

(b) Find $P(x)-P(2)$

(c) Write $P(x)-P(2)$ as the product of two first degree polynomials.

Solution

Given, $P(x) = x^2 - 11x + 21$.

a) . $P(2) = 2^2 - 11x\,2 + 21$

$= 4 - 22 + 21$

$= 3$

b) $P(x) - P(2) = x^2 - 11x + 21 - 3$

$= x^2 - 11x + 18$

c) $x^2 - 11x + 18 = (x-2)(x-9)$.

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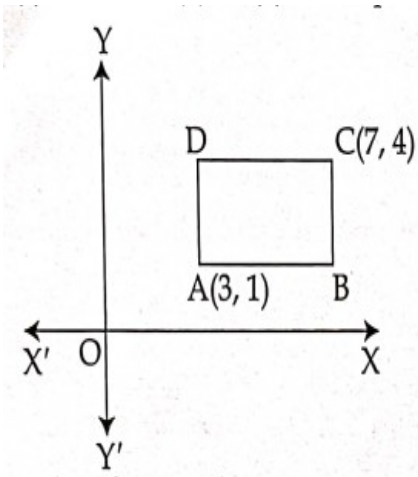
Question 17.



Sides of rectangle ABCD are parallel to the axes. The coordinates of A and C are (3, 1) and (7, 4) respectively.

(a) Find the coordinates of B and D.

(b) Find the length of diagonal of the rectangle.

Solution

a). B(7,1) D (3,4)

b). AC = √ (7-3) ^{2} + (1-4)^2

=√(16 + 9) =√25 = 5 units.

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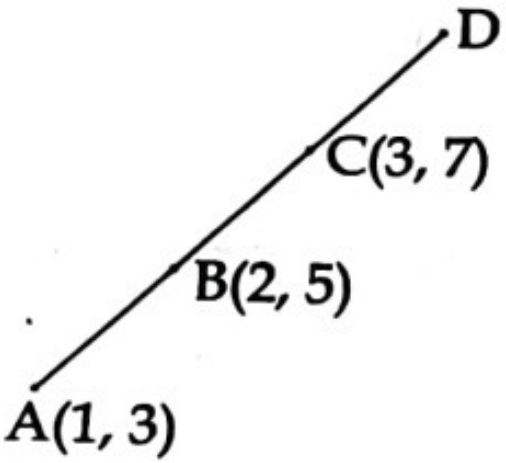
Question 18.



A(1, 3), B(2, 5), C(3, 7) and D are points on a line such that AB = BC = CD.

(a) Find the coordinates of D.

(b) Find the slope of the line.

(c) Find the equation of this line.

Solution

a).D = (4 , 9)

b) . Slop

$$= \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{5-3}{2-1}$$

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

$$= 2$$

c) $(1, 3)$ (x, y)

$$\frac{y-3}{x-1} = \frac{2}{1}$$

$$2(x-1) = 1(y-3)$$

$$2x - 2 = y - 3$$

$$2x - y + 1 = 0$$

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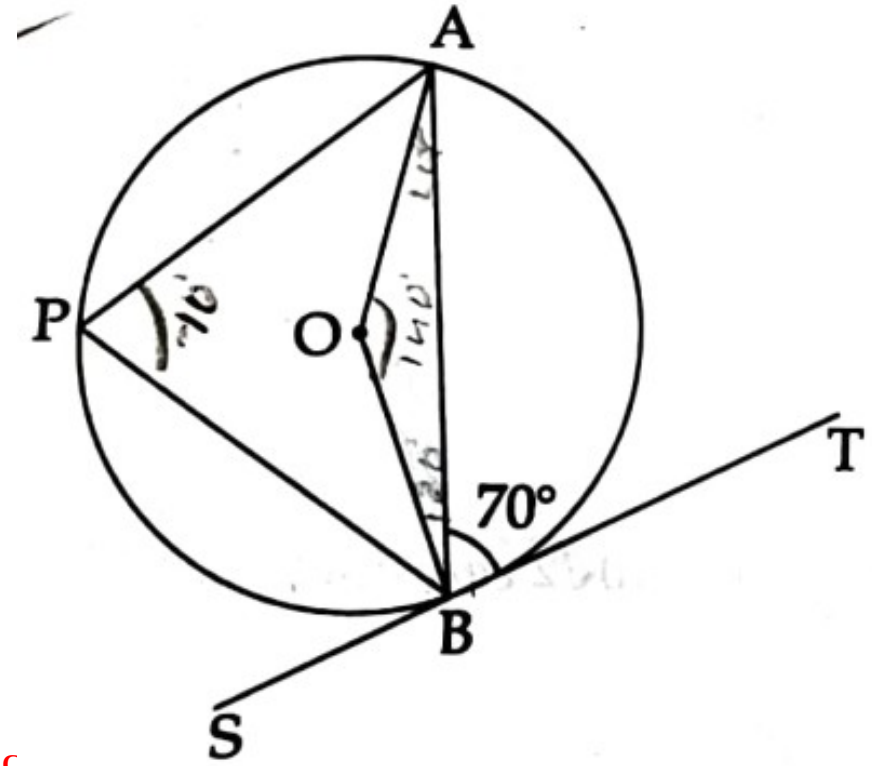
Question 19.



In the figure, O is the centre of the circle. AB is a chord of the circle and BT is a ta
$\angle ABT = 70°$. Find the measures of the angles given below.

(a) $\angle OBT$ (b) $\angle OBA$ (c) $\angle AOB$ (d) $\angle APB$

Solution

a) $\angle OBT = 90^0$

[Angle b/w radius abd tabgent]

b). $\angle OBA = 20^0$ [90 – 70 = 20].

c). $\angle AOB = 180 - (20 + 20)$

$= 180 - 40 = 140^0$.

d). $\angle APB = \frac{140}{2} = 70^0$.

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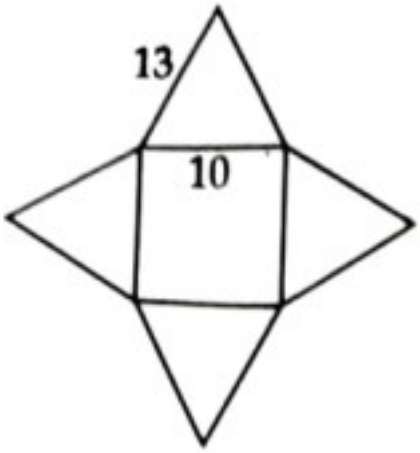
Question 20.



A square pyramid is made using a cardboard piece in the shape as shown in the figure. The side of the square is 10 centimetres. Equal sides of the triangles are 13 centimetres.

(a) Find the slant height of the square pyramid.

(b) Calculate the surface area of the square pyramid

Solution

Giveb , side of the square = 10cm.

Side of the triangle (e) = 13cm.

a) Slabt height

$l^2 = 13^2 - 5^2$

$= 169 - 25 = 144$

$l = \sqrt{144} = 12.$

Slabt height = 12cm.

$T.S.A = a^2 + 2al$

$= 10^2 + 2 \times 10 \times 12$

$= 10 + 240 = 340cm^2$.

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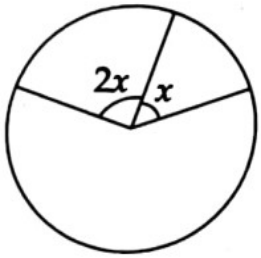
Question 21.

Two sectors are cut out from a circle. The central angle of the larger sector is double that of the smaller. Each sector is rolled up to make cone.



a) The slant height of the cone made from the smaller sector is 10 centimetres. What is the slant height of the other cone ?

b) Write the ratio of the radii of the two cones.

c) Find the ratio of the base areas of the cones.

d) Find the ratio of their curved surface areas.

Solution

a) Hear we know that the slsnt height of the cone = the radiud of the sector or circle.

∴ Slant height = 10cm.

b) ratio of radii = 1 : 2.

c) Ratio of area = 1: 4.

d) Ratio of TSA = 1 : 2.

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The sum of the 8^{th} and 19^{th} terms of an arithmetic sequence is 125.

(a) What is the sum of the 7^{th} and 20^{th} terms ?

(b) If the 6^{th} term is 40, then find the 21^{st} term.

(c) Find the sum of first 26 terms.

Solution

Given, sum of 8^{th} and 19^{th} tern of an arithmetic sequence = 235.

a). ie., $x_8 + x_{19} = 125$

$\therefore \quad x_7 + x_{20} = 125$

b). $x_6 + x_{21} = 125$.

$x_{21} = 125 - 40 = 85.$

$$\text{c) } S_{26} = \frac{26}{2}(x_1 + x_{26})$$

$$= 13 \times 125$$

$$= 1625$$

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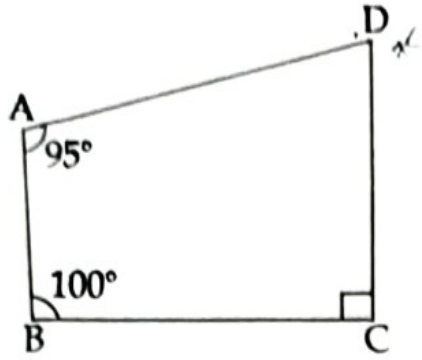
Question 23.



In quadrilateral ABCD, $\angle A = 95°$, $\angle B = 100°$, $\angle C = 90°$

(a) Find the measure of $\angle D$.

(b) If we draw a circle with BD as diameter, then check whether the vertices A and C are outside, on or inside the circle.

(c) If a circle is drawn through the points A, B and C, where would be the point D with respect to that circle ?

Solution

a) . $\angle D = 360 - (100 + 90 + 95)$

$= 75^0$.

b) A is inside the circle1- [$\angle C = 90$]

C is on the circle [$\angle A > 90$]

c) Out side the circle. [$\angle D < 90$]

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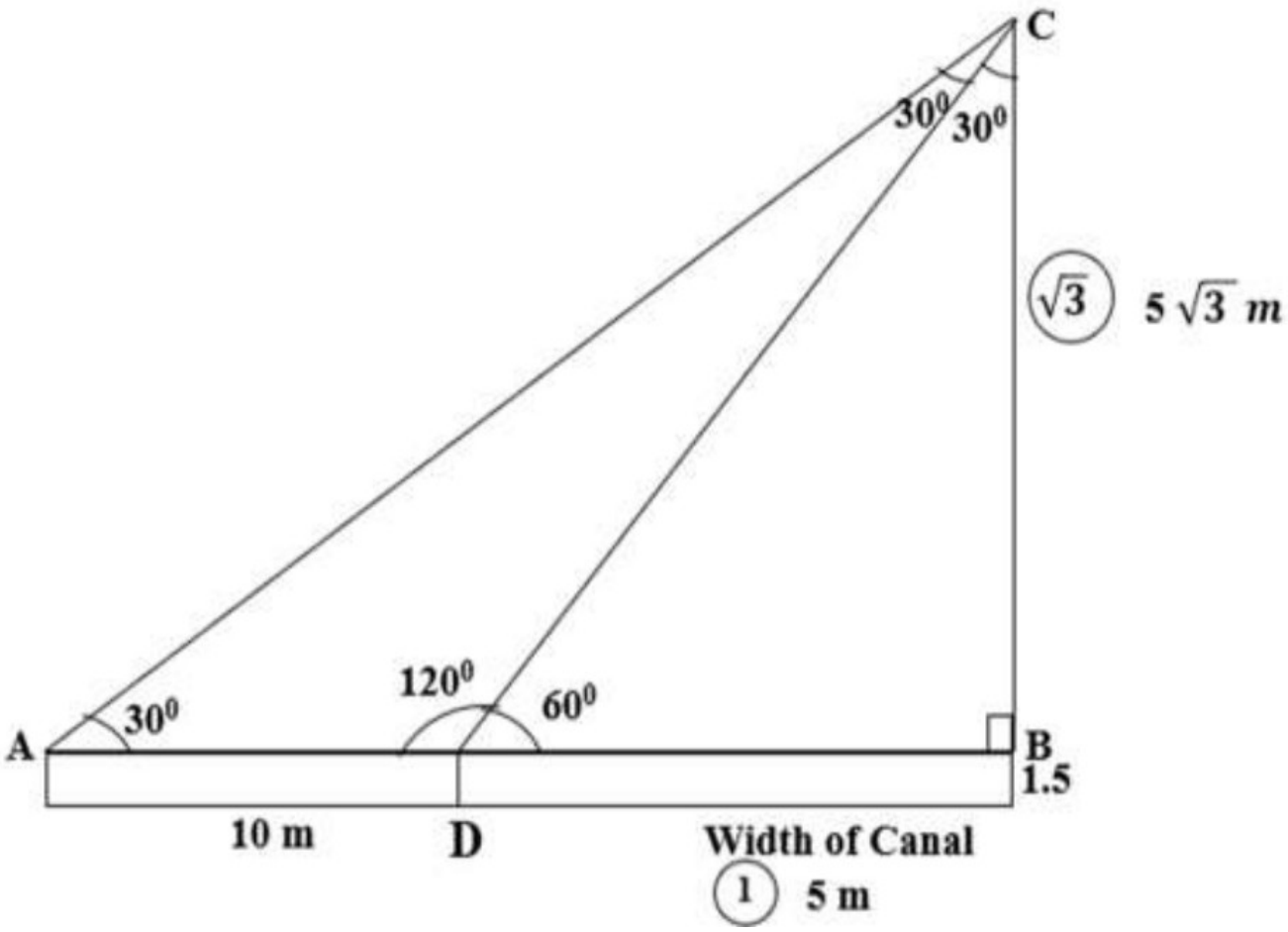
Question 24.

A boy standing at the edge of a canal sees the top of a tree at the other edge at an elevation of 60°. Stepping 10 metres back, he sees the tree at an elevation of 30°. The boy is 1.5 metres tall.

(a) Draw a rough figure.

(b) Calculate the width of the canal and the height of the tree.

Solution



Rt. ΔABC , angles are 30^0 , 60^0 , 90^0 .

ie., 1: √3 :2

5: 5√3: 10

Width of the canal = 5 m

Height of the tree = 1.5 + 5√3 m.

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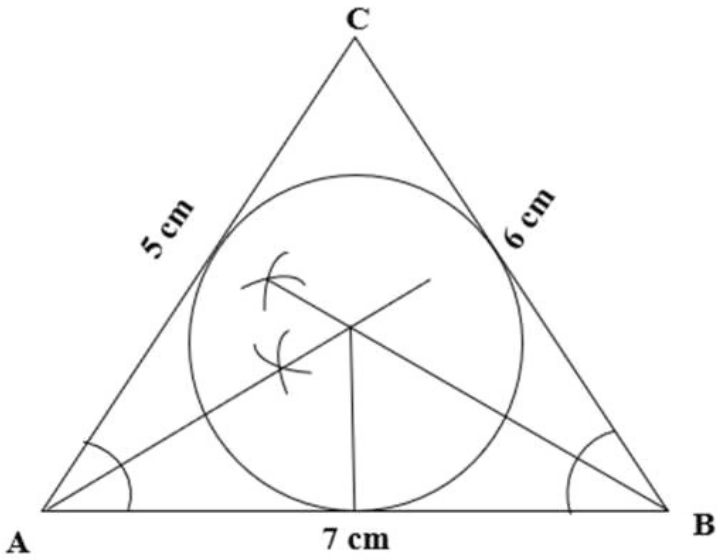
Question 25.

Draw a triangle ABC in which AB=7 centimetres, BC=6 centimetres, AC=5 centimetres. Draw its incircle. Measure and write the radius of the incircle.

Solution



Radius = 1.6cm.

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Question 26.

(a) A solid metallic sphere of radius 6 centimetres is cut into two equal halves. What is the surface area of each hemisphere ?

(b) One of these hemispheres is melted and recast to make a cone of the same radius. Find the height of the cone.

Solution

Given radius = 6cm.

a) . TSA = $3\pi r^2$ =3 $\pi \times 6 = 108\ \pi$ sq . Cm

b). Volume of the hemisphere = $\frac{2}{3}\ \pi r^3$.

$$= \frac{2}{3} \times \pi \times 6^3 = 216\pi\ .$$

Volume of a cone = $\frac{1}{3}\ \pi\ r^2\ h$.

Height of the cone = 216π . / $\frac{1}{3}\pi\ r^2$.

= 12 cm.

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Question 27.

. Consider the circle with centre at the origin and radius 10 units.

(a) Find the coordinates of the points where this circle cuts the x and y axes.

(b) Check whether P(6, 8) is a point on this circle.

(c) Write the equation of this circle.

Solution

a) (10, 0) , (-10, 0), (0,10), (0, -10)

b) Radius + $\sqrt{(8-0)^2 + (6-0)^2} = \sqrt{64 + 36}$

$= \sqrt{100} = 10$

Yes giveb point on the circle.

c) . Equation of the circle $X^2 + y^2 = r^2$

$x^2 + y^2 = 10^2 = 100$

$x^2 + y^2 = 100$

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Question 28.

The table below shows the students of a maths club sorted according to their heights.

Height (Centimetre)	Number of Students
120-130	2
130-140	7
140-150	10
150-160	5
160-170	1
Total	25

(a) When the heights are written in ascending order, height of which student is taken as the median height ?

(b) Find the median height.

Solution

Height	Frwqurbc es	< height	cf
1420 - 130	2	130	2
130 - 140	7	< 140	9
140 - 150	10	< 150	19
150 - 160	5	< 160	24
160 - 170	1	< 170	25
Totzl	25		

B = 25

Nedian = $\left(\frac{n+1}{2}\right)^{\text{th}}$ **student** $= \left(\frac{25+1}{2}\right)$th

13 th student.

b) d = $\frac{150-140}{10} = \frac{3.}{10}$ **= 1.**

Here $x_{10} = 140 + \frac{d}{2} = 140 + \frac{1}{2}$

= 140.50.

$x_{13} = x_{10} + 3d$

$= 140.5 + 3 \times 1 = 140.5 + 3$

= 143.50.

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Question 29.

Let's find natural numbers which can be written as the sum of consecutive natural numbers.

- $3=1+2$
- $5=2+3$
- $6=1+2+3$
- $7=3+4$
- $9=4+5$
- $10=1+2+3+4$
- $11=5+6$
- $12=3+4+5$

- All odd numbers other than 1, can be written as the sum of two consecutive natural numbers.
- Even numbers, which are powers of 2 (2, 4, 8, 16 .....) cannot be written as the sum of consecutive natural numbers.
- The even numbers which are not powers of 2 can be written as the sum of three or more consecutive natural numbers.

(a) Write 13 as the sum of consecutive natural numbers

(b) Write 14 as the sum of consecutive natural numbers.

(c) Write 101 as the sum of consecutive natural numbers.

(d) Find the numbers between 20 and 100 that cannot be written as the sum of consecutive natural numbers.

Solution

a) 13 = 6 + 7

bb) 14 = 2 + 3 + 4 + 5

c) 101 = 50 + 51

d) $2^5 = 32$, $2^6 = 64$.

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Detailed Solutions with Questions.

Prepared by Dr.V.S.RaveendraNath.