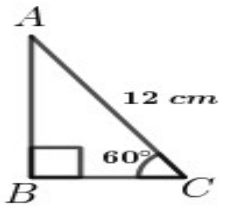
WANDOOR GANITHAM - S S L C MODEL QUESTION PAPER 2021

PREE 3 **DETAILED ANSWER KEY - QUESTION PAPER 3**

Qn no.	Key
	For questions from 1 to 5 one score each .
1	**First term of an arithmetic sequence of algebraic form 3 n + 1 is _____** **(3 , 1 , 4 , 6)**
	Answer . $3\times1+1 = 3+1=4$
2	**The sum of the central angles of an arc and its alternate arc is _____** **(180^0 , 90^0 , 270^0 , 360^0)**
	Answer . **360^0 (Angle around a point)**
3	**Which number is to be added to $x^2 + 12x + 20$ to get a perfect square ?** **(144 , 36 , 16 , 400)**
	Answer . **16**
4	**In the figure $\angle B=90^o, \angle C=60^o, AC=12\,cm$. What is the length of BC ?** **($6\sqrt{2}cm$, $6\sqrt{3}cm$, $12\,cm$, $6\,cm$)** 
	Answer . $6\,cm$
5	**Which among the following is a point on the y- axis ?** **((0 , 1) , (2 , 0) , (1 , 1) , (2 , 2))**
	Answer . **(0 , 1)**

For questions from 6 to 10 carries 2 scores each .

6 **Consider the arithmetic sequence 7 , 11 , 15 , ...**

a) What is its common difference ?

b) Find the position of the term got by adding 40 to the tenth term of this sequence ?

Answer .

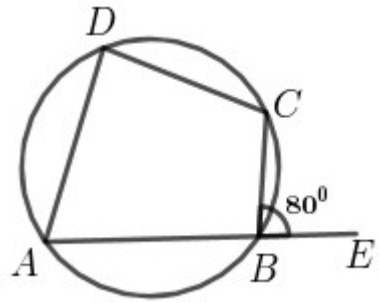
a) Common difference = 11 – 7 = 4

b) $x_{10} + 40 = x_{10} + 10 \times 4 = x_{10} + 10 \times d = x_{20}$

7 **In the figure < CBE = 80 ^{0}**

a) What is the measure of < ABC ?

b) What is the measure of < ADC ?



Answer .

a) < ABC = 100^0 (linear pair)

b) < ADC = 80^0 (Opposite angles of a cyclic quadrilateral are supplementary)

8 **Consider the line passing through the points (1 , 2) and (3 , 7) .**

a) What is its slope ?

b) Write the coordinates of another point on this line ?

Answer .

a) $Slope = \frac{7-2}{3-1} = \frac{5}{2}$

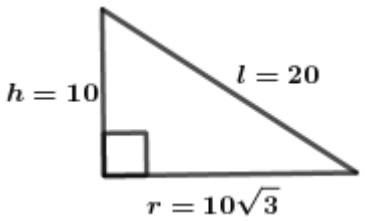
b) $(5,12)$ **(** $(7,17)$ **or** $(9,22)$ **or** $(11,27)$ **or .....)**

9 **The slant height of a cone is 20 centimetres and it makes an angle 30^0 with its radius**

a) What is its radius ?

b) Compute its curved surface area ?

Answer .



a) Radius = $10\sqrt{3}\ cm$

b) Curved surface area = $\pi rl = \pi \times 10\sqrt{3} \times 20$

$= 200\sqrt{3}\ \pi\ cm$

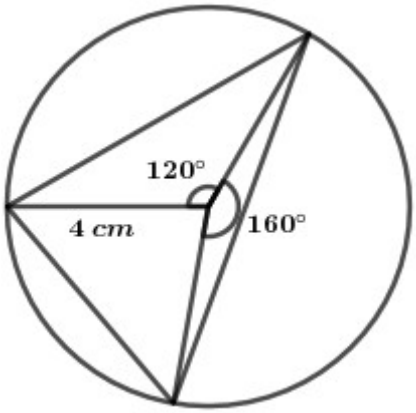
10 **Write** $36x^2 - 49$ **as the product of two first degree polynomials ?**

Answer .

$36x^2 - 49 = (6x)^2 - 7^2 = (6x+7)(6x-7)$

For questions from 11 to 20 carries 3 scores each .

11 **The vertices of a triangle are points on a circle of radius 4 centimetres . If two angles of this triangle are 60^0 and 80^0 , draw the triangle .**



12 **6^{th} term of an arithmetic sequence is 25 and its 10^{th} term is 41 .**

a) What is its common difference ?

b) What is algebraic form ?

c) Find the position of 201 in this sequence ?

Answer .

a) $common\ difference = \dfrac{term\ difference}{position\ difference} = \dfrac{41-25}{10-6} = \dfrac{16}{4} = 4$

b) Algebraic form = $dn + f - d = 4n + 5 - 4 = 4n + 1 \qquad (f = x_6 - 5d = 25 - 5 \times 4 = 5)$

c) $4n + 1 = 201 \implies 4n = 201 - 1 = 200 \implies n = \dfrac{200}{4} = 50$

13 **Numbers from 1 to 25 are written on slips of paper and put in a box . A slip is to be drawn from it .**

a) What is the probability that the number written in it is an even number ?

b) What is the probability that the number written in it is an odd number ?

c) What is the probability that the number written in it is a perfect square ?

Answer .

a) Favourable results = 2 , 4 , 6 , 8 , 10 , 12 , 14 , 16 , 18 , 20 , 22 , 24

probability that the number written in it is an even number

$$= \frac{Number\ of\ favourable\ results}{Total\ number\ of\ results} = \frac{12}{25}$$

b) Favourable results = 1 , 3 , 5 , 7 , 9 , 11 , 13 , 15 , 17 , 19 , 21 , 23 , 25

probability that the number written in it is an odd number

$$= \frac{Number\ of\ favourable\ results}{Total\ number\ of\ results} = \frac{13}{25}$$

c) Favourable results = 1 , 4 , 9 , 16 , 25

probability that the number written in it is a perfect square

$$= \frac{Number\ of\ favourable\ results}{Total\ number\ of\ results} = \frac{5}{25}$$

14 **The marks of 8 students in an exam are given below .**

44 , 73 , 57 , 34 , 62 , 44 , 38 , 48

a) What is the mean mark ?

b) What is the median mark ?

Answer .

a) $Mean = \frac{44+73+57+34+62+44+38+48}{8} = \frac{400}{8} = 50$

b) 34 , 38 , 44 , 44 , 48 , 57 , 62 , 73

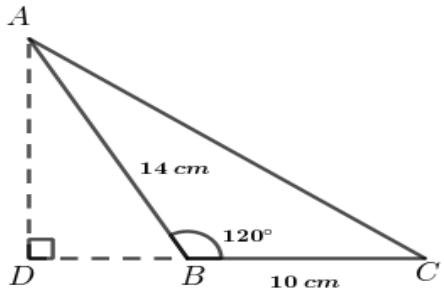
$Median = \frac{44+48}{2} = \frac{92}{2} = 46$

15 **In the figure** $\angle ABC = 120^0, \angle D = 90^0, AB = 14\,cm, BC = 10\,cm$

a) What is the measure of $\angle ABD$ **?**

b) What is the length of AD **?**

c) What is the area of the triangle ABC **?**



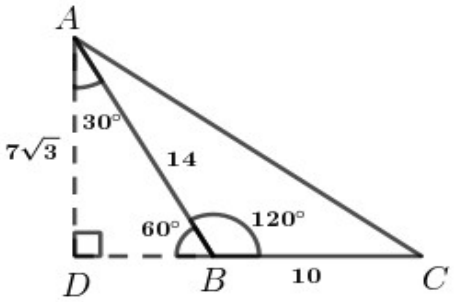
Answer .

a) $\angle ABD = 60^0$ **(linear pair)**

b) $AD = 7\sqrt{3}\ cm$

c) Area of the triangle ABC $= \frac{1}{2} \times 10 \times 7\sqrt{3}$

$= 35\sqrt{3}\ sq.cm$



16 **In a second degree polynomial** $p(x)$ **,** $p(2)=0, p(3)=0$ **and the coefficient of** x^2 **is 1 .**

a) Write a factor of $p(x)$ **?**

b) Write $p(x)$ **as the product of two first degree polynomials ?**

c) What number should be subtracted from $p(x)$ **to get a second degree polynomial with** $x-1$ **as a factor ?**

Answer .

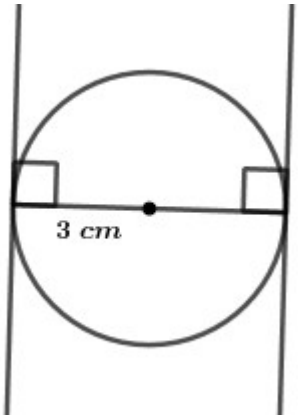
a) $(x-2)$ **or** $(x-3)$

b) $p(x) = (x-2)(x-3)$

c) 2 $\left(p(1) = (1-2)(1-3) = -1 \times -2 = 2 \right)$

17 **Draw a circle of radius 3 centimetres and draw a diameter . Draw tangents through the ends of this diameter .**

Answer .



18 **From a circular sheet of radius 12 centimetres , a sector of central angle 120^0 is cut out and made into a cone .**

a) What is the slant height of the cone ?

b) What is the base radius of the cone ?

c) What is the base radius of another cone made by rolling up the remaining portion of the circular sheet ?

Answer .

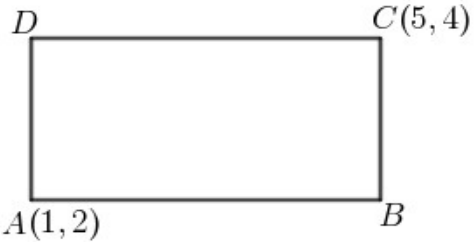
a) Slant height of the cone = radius of the sector = 12 cm

b) $\frac{x}{360} = \frac{r}{R}$ ==> $\frac{120}{360} = \frac{r}{12}$ ==> $r = \frac{120 \times 12}{360} = 4\ cm$

c) $\frac{240}{360} = \frac{r}{12}$ ==> $r = \frac{240 \times 12}{360} = 8\ cm$

19 **In the figure ABCD is a rectangle and its sides are parallel to the axes .**

The coordinates of A are (1 , 2) and those of C are (5 , 4) .



a) What are the coordinates of B and D ?

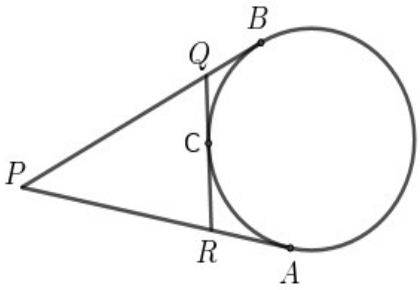
b) Write the coordinates of the point of intersection of the diagonals ?

Answer .

a) $B(5,2)$ **,** $D(1,4)$

b) $(\frac{1+5}{2}, \frac{2+4}{2}) = (\frac{6}{2}, \frac{6}{2}) = (3,3)$ **(Diagonals of a rectangle bisect each other)**

20 **In the figure , tangents through the points A and B of a circle intersect at P . QR is a tangent through C**



a) Which other line has the same length as that of PA ?

b) Which other line has the same length as that of RC?

c) Prove that the perimeter of the triangle PQR is double the length of PA ?

Answer .

a) $PA = PB$ **(The tangents to a circle from a point are of the same length)**

b) $RC = RA$

c) Perimeter of the triangle PQR = $PQ + QR + PR = PQ + QC + RC + PR$

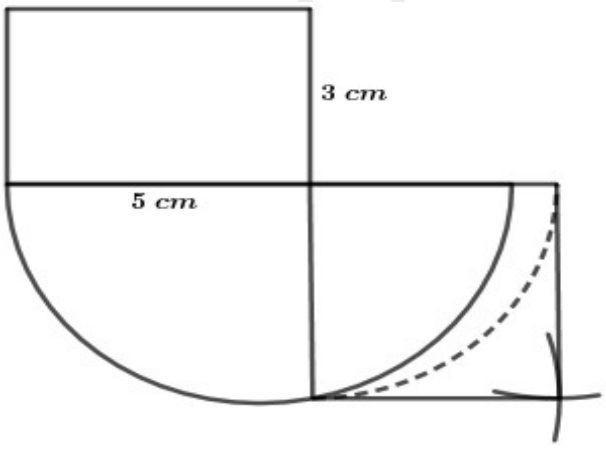
$= PQ + QB + RA + PR \quad (QC = QB)$

$= PB + PA = PA + PA = 2\,PA$

For questions from 21 to 30 carries 4 scores each .

21 **Draw a rectangle of width 5 cm and height 3 cm . Draw a square of the same area .**

Answer .



22 **a) What is the common difference of the sequence 6 , 11 , 16 , ... ?**

b) What is the common difference of the sequence 9 , 14 , 19 , ... ?

c) What is the difference between the 15^{th} terms of the above sequences ?

d) What is the difference between the sum of first 15 terms of the above sequences ?

Answer .

a) $11-6 = 5$

b) $14-9 = 5$

c) 3

d) $15\times3 = 45$

23 **A man standing away from the bottom of a tower sees its top at an elevation of 60^0.**

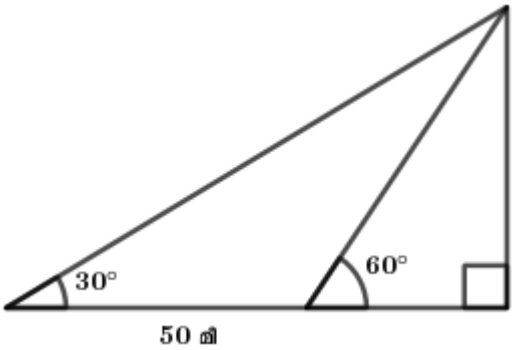
Standing back by 50 metres , he sees it an elevation of 30^0 .

a) Draw a rough figure based on the given details ?

b) What is the height of the tower ?

Answer .

a)

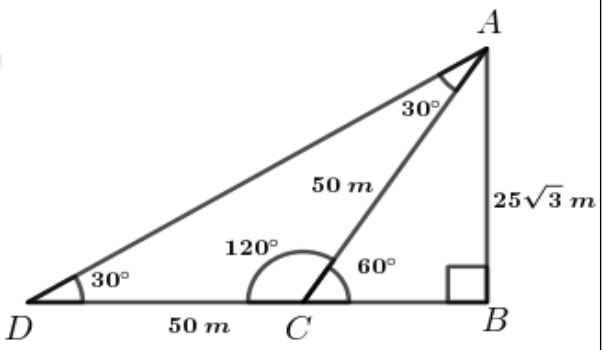


b) Take the height of the tower as AB .

$< ACD = 180-60 = 120^0$

$< D = < DAC = 30^0$ ==> $CD = AC = 50\ m$

In triangle ABC , $AB = 25\sqrt{3}$



(The sides of a triangle of angles $30^0, 60^0, 90^0$ are in the ratio $1:\sqrt{3}:2$)

Height of the tower = $AB = 25\sqrt{3}\ m$

24 **The figure shows two parallel sides of a square extended by 6 centimetres to make a rectangle .The area of the new rectangle is 391 square - centimetres .**

	a) Write a second degree equation by taking the side of the square as x **b) Compute the length of the side of the square .**
	Answer . **a)** $x(x+6)=391$ ==> $x^2+6x=391$ **b)** $x^2+6x+3^2=391+3^2$ $(x+3)^2=391+9=400$ $x+3=\sqrt{400}=20$ $x=20-3=17\ cm$
25	**The base perimeters of two cones are in the ratio 2 : 3 and their heights are in the ratio 5 : 4 .** **a) If the height of the first cone is taken as 5h , what is the height of the second cone?** **b) What is the ratio of the base radii of the cones ?** **c) What is the ratio of the volume of the cones ?** **d) What is the volume of the second cone , if the volume of the first cone is** 400π **cubic centimetres ?**
	Answer . **a)** $4h$ **b) Ratio of the base radii = Ratio of the base perimeters =** $2:3$ **c) Ratio of the volume of the cones =** $\frac{1}{3}\times\pi\times(2r)^2\times5h\ :\ \frac{1}{3}\times\pi\times(3r)^2\times4h$ $= \frac{\frac{1}{3}\times\pi\times4r^2\times5h}{\frac{1}{3}\times\pi\times9r^2\times4h}=\frac{20}{36}=5:9$ **d) Volume of the second cone =** $\frac{400\pi\times9}{5}=720\pi\ cm^3$
26	**A circle is drawn with the line joining the points A (1 , 3) and B (7 , 3) as diameter .** **a) What are the coordinates of the centre of the circle ?**

	b) Compute the radius of the circle ? **c) Write the coordinates of another point on a line passing through the point (0 , 3) parallel to the x - axis ?** **d) Write the coordinates of a point at which the line passing through the centre of the circle perpendicular to the diameter AB meets the circle ?**
	Answer . **a) Coordinates of the centre of the circle** = $(\frac{1+7}{2}, \frac{3+3}{2})$ = $(\frac{8}{2}, \frac{6}{2})$ = $(4, 3)$ **b) Radius of the circle** = 3 **c) (1 , 3) or Any point with y – coordinate 3 .** **d)** $(4, 3+3) = (4, 6)$ **or** $(4, 3-3) = (4, 0)$ **(Diameter AB is parallel to the x – axis . So the line perpendicular to AB is parallel to the y – axis)**
27	**If** $p(x) = x^2 - 6x + k$ **a) Find** $p(2)$ **?** **b) Find the value of** k **if** $x-2$ **is a factor of** $p(x)$ **?** **c) Write** $p(x)$ **as the product of two first degree polynomials by substituting the value of** k **.**
	Answer . **a)** $p(2) = 2^2 - 6 \times 2 + k = 4 - 12 + k = -8 + k$ **b)** $p(2) = 0$ ==> $-8 + k = 0$ => $k = 8$ **c)** $p(x) = x^2 - 6x + 8 = (x-2)(x-4)$

28 **45 households in a neighbourhood are sorted according to their monthly income in the table below .**

Monthly income (Rs)	Number of households
10000	5
20000	7
30000	8
40000	10
50000	8
60000	7

a) If the households are arranged in increasing order of monthly income , what is the monthly income of the household at the 21st position ?

b) If the households are arranged in increasing order of monthly income , the monthly income of the household at what position is taken as the median ?

c) Find the median of the monthly income ?

Answer .

Monthly income	Number of households
Upto 10000	5
Upto 20000	12
Upto 30000	20
Upto 40000	30
Upto 50000	38
Upto 60000	45

a) monthly income of the 21st household = Rs 40000

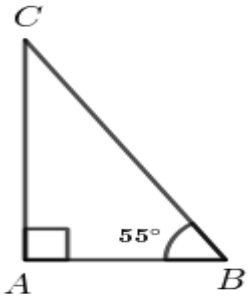
b) $N = 45$

$$\frac{N+1}{2} = \frac{45+1}{2} = \frac{46}{2} = 23$$

Median = monthly income of the 23rd household .

c) Median of the monthly income = Rs 40000

29 **In the triangle ABC , $\angle A = 90^0, \angle B = 55^0$.**



a) What is the measure of $\angle C$?

b) Which among the following is $\sin 55^0$?

($\frac{AB}{BC}$, $\frac{AC}{BC}$, $\frac{AC}{AB}$, $\frac{AB}{AC}$)

c) Similarly write $\cos 35^0$ from this triangle ?

d) What is the relation connecting $\sin x^0$ and $\cos(90-x)^0$ if an acute angle of a right triangle is x^0 ?

Answer .

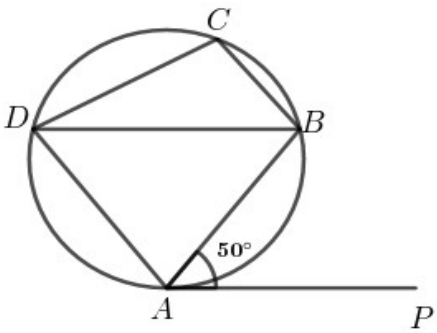
a) $\angle C = 90 - 55 = 35^0$

b) $\sin 55^0 = \frac{AC}{BC}$

c) $\cos 35^0 = \frac{AC}{BC}$

d) $\sin x^0 = \cos(90-x)^0$

30 **In the figure PA is a tangent . BD is a line parallel to PA . < BAP = 50^0**



a) What is the measure of < ADB ?

b) What is the measure of < ABD ?

c) What is the measure of < DCB ?

Answer .

a) $\angle ADB = 50^0$ **(In a circle , the angle which a chord makes with the tangent at one end on any side is equal to the angle which it makes on the part of the circle on the other side)**

b) $\angle ABD = 50^0$ **(** $\angle BAP = 50^0$ **, alternate angle)**

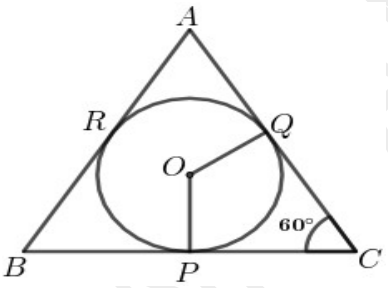
c) $<BAD = 180-(50+50) = 180-100 = 80^0$

(Sum of the angles of a triangle is 180^0)

$<DCB = 180-80 = 100^0$ **(ABCD is cyclic , opposite angles of a cyclic quadrilateral are supplementary)**

For questions from 31 to 45 carries 5 scores each .

31 **a) In the figure the circle touches the sides of the triangle ABC at P , Q and R . If < C = 60^0 , what is the measure of < POQ ?**

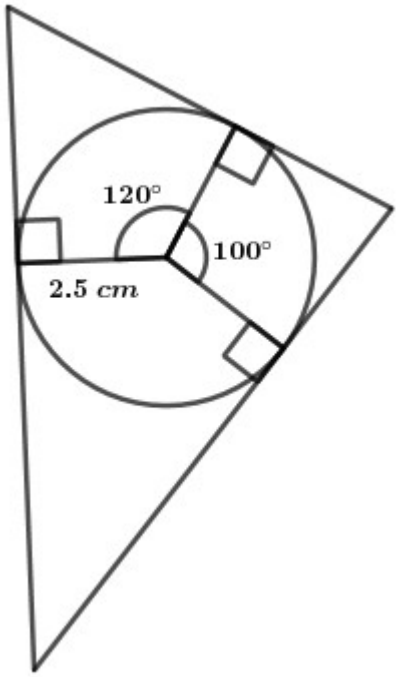


b) Draw a circle of radius 2.5 cm . Draw the triangle with two angles 60º and 80º and all its as tangents to this circle .

Answer .

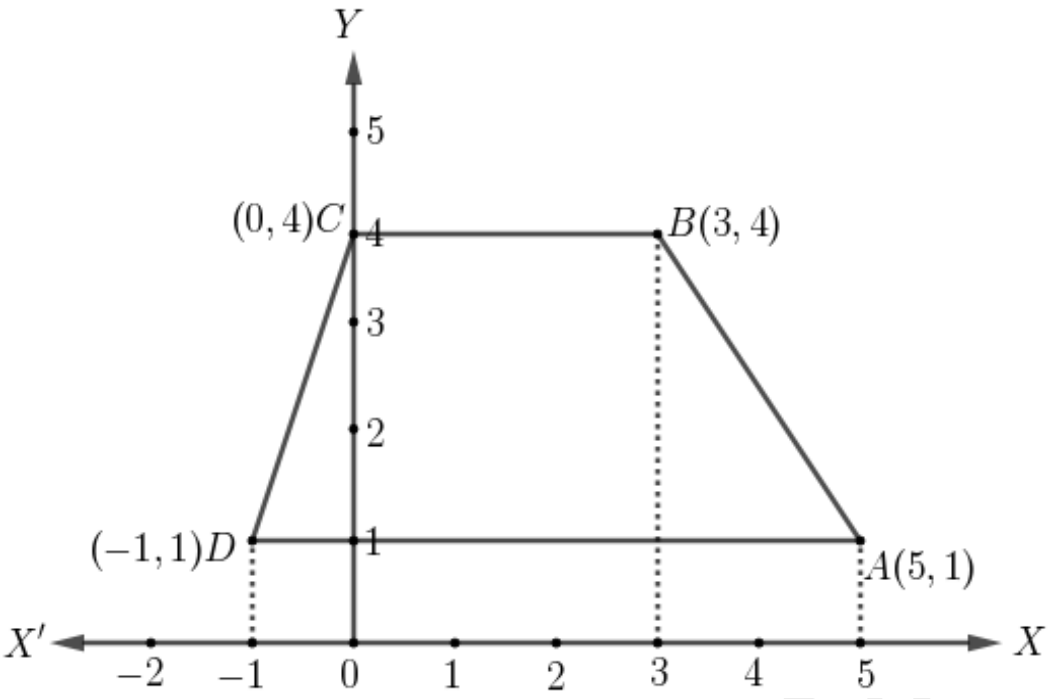
a) $<POQ = 180-60=120^0$ **(In a circle , the angles between the radii through two points and the angle between the tangents at these points are supplementary)**

b)



32	**Look at the number pattern given below.** **1** **2 3** **4 5 6** **7 8 9 10** **.....** **a) Write the next line of this pattern ?** **b) How many numbers are there in the 20^{th} line ?** **c) What is the last number in the 19^{th} line ?** **d) What are the first and last number in the 20^{th} line ?**
	Answer . **a)** 11 12 13 14 15 **b)** 20 **c) Last number in the 19^{th} line =** $\frac{19\times20}{2} = 190$ **d) First number in the 20^{th} line =** $190 + 1 = 191$ **Last number in the 20^{th} line =** $\frac{20\times21}{2} = 210$
33	**a) Draw the axes and mark the points A (5 , 1) , B (3 , 4) , C (0 , 4) and D (-1 , 1)** **b) Write the most suitable name for the quadrilateral ABCD ?** **c) Find its area ?**
	Answer . **b) Trapezium .** **c) Area =** $\frac{1}{2}\times(6+3)\times3 = \frac{1}{2}\times9\times3 = \frac{27}{2}\ sq.cm$

a)



34 **1 added to the product of two consecutive even numbers gives 361.**

a) Write a second degree equation by taking the smaller number as x .

b) Find the numbers ?

Answer .

a) $x(x+2)+1=361$ ==> $x^2+2x+1=361$

b) $(x+1)^2=361$

$x+1=\sqrt{361}=19$

$x=19-1=18$

Numbers = 18 , 20

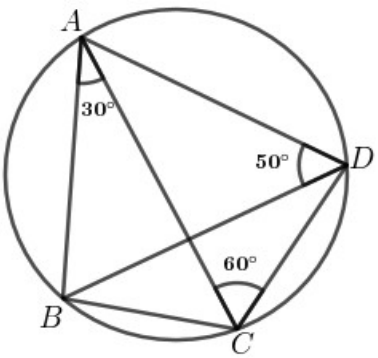
35 **In the figure < BAC= 30 ^{0}, < ADB= 50 ^{0}, < ACD= 60 ^{0}**

a) What is the measure of < BDC ?

b) What is the measure of < ACB ?

c) What is the measure of < ABD ?

d) What is the central angle of the arc BCD ?



	Answer . **a)** $<BDC = 30^0$ **(The angles made by an arc on its alternate arc are same)** **b)** $<ACB = 50^0$ **c)** $<ABD = 60^0$ **d)** $<BAD = 70^0$ **(** $<BCD = 110^0$ **, ABCD is a cyclic quadrilateral)** **Central angle of the arc BCD =** $2\times<BAD = 2\times70^0 = 140^0$ **(The central angle of an arc is double the angle made by it on the alternate arc)**
36	**Consider the arithmetic sequence 5 , 8 , 11, ...** **a) What is its common difference ?** **b) What is its algebraic form ?** **c) What is its 20^{th} term ?** **d) What is the sum of first 20 terms of this sequence ?** **e) What is the sum of first 20 terms of the sequence 9 , 12 , 15 , ... ?**
	Answer . **a) Common difference =** $8-5=3$ **b) Algebraic form =** $dn+f-d = 3n+5-3 = 3n+2$ **c)** $x_{20} = 3\times20+2 = 60+2 = 62$ **d)** $Sum = \frac{20}{2}\times(5+62) = 10\times67 = 670$ **e)** $670+20\times4 = 670+80 = 750$
37	**A (1 , 2) , B (5 , 6) and C (7 , 4) are the vertices of a triangle .** **a) Compute the lengths of the sides of the triangle ?** **b) Prove that ABC is a right triangle ?** **c) What are the coordinates of the centre of the circumcircle of the triangle ABC ?**

	Answer . **a)** $AB=\sqrt{(5-1)^2+(6-2)^2}=\sqrt{4^2+(4)^2}=\sqrt{16+16}=\sqrt{32}$ $BC=\sqrt{(7-5)^2+(4-6)^2}=\sqrt{(2)^2+(-2)^2}=\sqrt{4+4}=\sqrt{8}$ $AC=\sqrt{(7-1)^2+(4-2)^2}=\sqrt{6^2+2^2}=\sqrt{36+4}=\sqrt{40}$ **b)** $AB^2 + BC^2 = (\sqrt{32})^2 + (\sqrt{8})^2 = 32 + 8 = 40 = (\sqrt{40})^2 = AC^2$ **ABC is a right triangle .** **c) Coordinates of the centre of the circumcircle of the triangle ABC =** $(\frac{1+7}{2}, \frac{2+4}{2})$ $= (\frac{8}{2}, \frac{6}{2})$ $= (4, 3)$ **(The centre of the circumcircle of a right triangle is the midpoint of its hypotenuse)**
38	**Consider the polynomial** $p(x)=x^2-10x+16$ **a) Find** $p(1)$ **?** **b) Write a factor of** $p(x)-p(1)$ **?** **c) Write** $p(x)-p(1)$ **as the product of two first degree polynomials ?**
	Answer . **a)** $p(1)=1^2-10\times1+16 = 1 - 10 + 16 = 7$ **b)** $x-1$ **c)** $p(x) - p(1) = x^2 - 10x + 16 - 7 = x^2 - 10x + 9 = (x-1)(x-9)$
39	**A cone of maximum volume is carved out from a solid cylinder of base radius 12 centimetres and height 20 centimetres .** **a) Compute the volume of the cylinder ?** **b) Compute the volume of the cone ?**

c) The remaining portion of the cylinder is melted and recast in to small cones of base radius 6 centimetres and height 10 centimetres . How many small cones can be made ?

Answer .

a) Volume of the cylinder = $\pi \times r^2 \times h$ = $\pi \times 12^2 \times 20$ = $\pi \times 144 \times 20$

= $2880\pi\ cm^3$

b) Volume of the cone = $\frac{1}{3}$ **x Volume of the cylinder**

= $\frac{1}{3} \times 2880\pi$ = $960\pi\ cm^3$

c) Volume of the remaining portion of the cylinder = $2880\pi - 960\pi$

= $1920\pi\ cm^3$

Volume of the small cone = $\frac{1}{3} \times \pi \times 6^2 \times 10$ = $\frac{1}{3} \times \pi \times 36 \times 10$

= $120\pi\ cm^3$

Number of small cones = $\frac{\text{Volume of the remaining portion of the cylinder}}{\text{volume of the small cone}}$

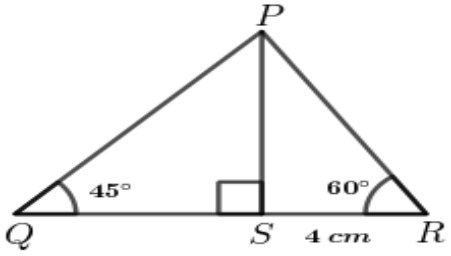
= $\frac{1920\pi}{120\pi}$ = 16

40 **In the figure** $<Q = 45^\circ, <S = 90^\circ, <R = 60^\circ, SR = 4\,cm$

a) What is the length of PS **?**

b) What is the length of QS **?**

c) What is the measure of $<QPR$ **?**



d) What is the ratio of the sides of a triangle with angles 45^0 , 60^0 , 75^0

Answer .

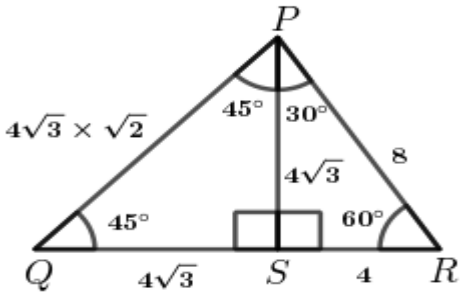
a) $PS = 4\sqrt{3}\ cm$

b) $QS = 4\sqrt{3}\ cm$

c) $< QPR = 75^0$

d) $PQ = 4\sqrt{3} \times \sqrt{2} = 4\sqrt{6}\ cm$, $PR = 8\ cm$

$PR : PQ : QR = 8 : 4\sqrt{6} : (4\sqrt{3}+4) = 2 : \sqrt{6} : (\sqrt{3}+1)$

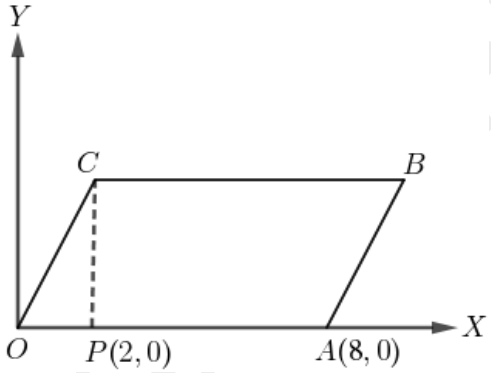


41 **In the figure OABC is a parallelogram . CP is the perpendicular from C to its opposite side . Area of the parallelogram is 40 square centimetres .**

a) What is the length of OA ?

b) Find the distance between the sides OA and BC

c) What are the coordinates of B and C ?

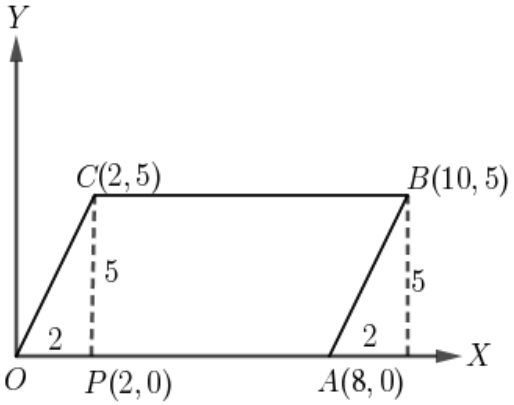


Answer .

a) $OA = 8\ cm$

b) $8 \times CP = 40$ ==> $CP = \frac{40}{8} = 5$ സെ. മീ

c) $C(2,5)$, $B(10,5)$



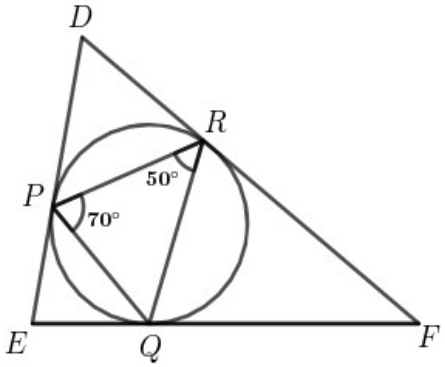
42 **In the figure circle touches the sides of the triangle DEF at P, Q and R .**

< QPR = 70^0 , < PRQ = 50^0

a) What is the measure of < EQP ?

b) What is the measure of < E ?

c) What is the measure of < F ?



Answer .

a) $\angle EQP = 50^0$ **(In a circle , the angle which a chord makes with the tangent at one end on any side is equal to the angle which it makes on the part of the circle on the other side)**

b) $EP = EQ$ **(The tangents to a circle from a point are of the same length)**

$\angle EQP = \angle EPQ = 50^0$ ==> $\angle E = 180 - (50+50) = 180 - 100 = 80^0$

(Sum of the angles of a triangle is 180^0)

c) $\angle RQF = 70^0$

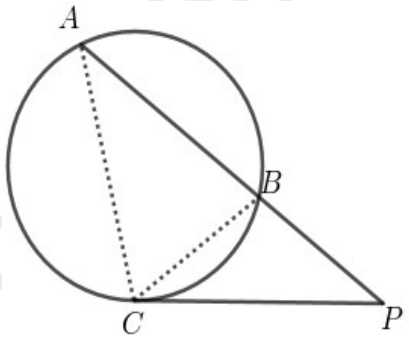
$FQ = FR$ ==> $\angle RQF = \angle QRF = 70^0$ ==> $\angle F = 180 - (70+70) = 180 - 140 = 40^0$

43 **In the figure , chord AB is extended to meet the tangent through C at P .**

a) If < BCP = 30^0 , What is the measure of < BAC ?

b) Prove that the angles of triangles APC and BPC are same ?

c) Prove that PA x PB = PC^2 ?



Answer .

a) $\angle BAC = 30^0$ **(In a circle , the angle which a chord makes with the tangent at one end on any side is equal to the angle which it makes on the part of the circle on the other side)**

b) $\angle BCP = \angle BAC$

$\angle APC = \angle BPC$ **(Common angle)**

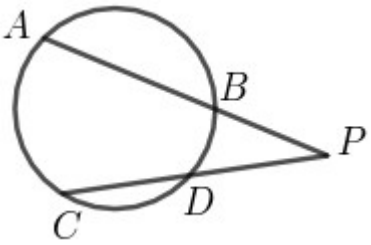
$\angle ACP = \angle CBP$ **(If two angles of two triangles are equal, their third angles are also equal)**

c) $\frac{PA}{PC} = \frac{PC}{PB}$ ==> $PA \times PB = PC \times PC$ ==> $PA \times PB = PC^2$

(Sides of two triangles having same angles change in the same ratio)

44 **In the figure chords AB and CD of the circles are extended to meet at P .**

PA = 24 cm , AB = 18 cm .The length of PC is 10 cm more than that of PD .



a) What is the length of PB ?

b) PC x PD = ...

c) Write down a second degree equation by taking the length of PD as x .

d) Compute the length of PC ?

Answer .

a) $PB = 24 - 18 = 6\ cm$

b) $PC \times PD = PA \times PB$

c) $PD = x$ ==> $PC = x + 10$

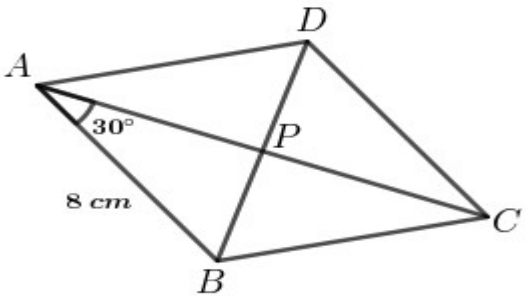
$(x+10)x = 24 \times 6$ ==> $x^2 + 10x = 144$

d) $x^2 + 10x + 25 = 144 + 25$ ==> $(x+5)^2 = 169$

$x+5 = \sqrt{169} = 13$ ==> $x = 13 - 5 = 8$ ==> $PD = 8\ cm$

$PC = x + 10 = 8 + 10 = 18$

45 **In rhombus $ABCD$, the diagonals intersect at P . $AB = 8\,cm$, $< BAP = 30^\circ$**



a) What is the measure of $< APB$?

b) What is the length of PB ?

c) Compute the lengths of the diagonals ?

Answer .

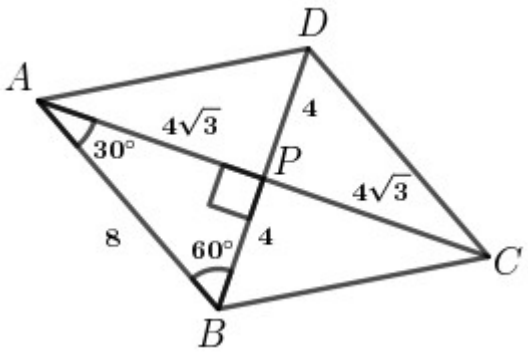
a) $< APB = 90^0$ **(The diagonals of a rhombus bisect each other at right angles)**

b) $PB = 4\ cm$

c) $BD = 4+4 = 8\ cm$

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

$AC = 4\sqrt{3}+4\sqrt{3} = 8\sqrt{3}\ cm$



(The sides of a triangle of angles $30^0, 60^0, 90^0$ **are in the ratio** $1:\sqrt{3}:2$ **)**