

VAIBHAVAM 2022

MATHEMATICS

Prepared by Mathematics Teachers of Muvattupuzha Educational District

ARITHMETIC SEQUENCES

1. In the Arithmetic sequence 3, 10, 17 ,.....
 - a) What is the common difference ?
 - b) Find the 10th term of this sequence ?

2. The algebraic form of an arithmetic sequence is $3n + 5$.
 - a) Find the first term ?
 - b) Find the 15th term of this sequence ?
 - c) Can the difference between any two terms of this sequence be 200 .Why ?

3. If the 6th term of an arithmetic sequence is 40 and 9th term is 58 then
 - a) Find common difference ?
 - b) Find the 21st term ?
 - c) Calculate the sum of the first 21 terms ?

- 4)
 - a)Write an arithmetic sequence with common difference 7.
 - b)What is the remainder got when the terms of this sequence are divided by 7 ?
 - c)Is 266 a term of this sequence?
 - d) Write down the algebraic form of this sequence.

- 5) The fifth term of an arithmetic sequence is 17 and its 10th term is 32.
 - a) What is the first term?

- b) What is the common difference?
- c) Find the position of 92 in this sequence.

6) Sum of first n terms of an arithmetic sequence is $3n^2 - 8n$.

- a) Find the common difference
- b) Find the algebraic expression

7) Consider the Arithmetic sequence 5,9,13,.....

- a) Find 10th term of the sequence
- b) Find the sum of first 28 terms of this sequence
- c) Which is the first three digit number in this sequence?

8) The algebraic form of the sum of n terms of an arithmetic sequence is $n^2 + 3n$.

- a) Find the first term?
- b) What is the common difference.
- c) Find the sum of first 20 terms

9) Consider the sequence of two digit numbers which leaves a remainder 2 when divided by 5

- a) Find the first term.
- b) What is the last term.
- c) Find the number of terms in the sequence.
- d) Find the sum of these terms.

10) The 4th term of an arithmetic sequence is 32 and 10th term is 68.

- a) What is the common difference
- b) Find the first term.

c) Find the algebraic form of this sequence.

11) Write an arithmetic sequence ending with the digits 1 and 6.

12) What is the common difference of the arithmetic sequence 8, 11, 14...

13) Is 1, 4, 9, 16... an arithmetic sequence? Why?

14) The sum of first 5 terms of an arithmetic sequence is 200.

a) Find its middle term.

b) Write an arithmetic sequence of this type.

15) Write the missing terms of the arithmetic sequence 15, __, 23, __,

16) 5, 8, 11, ... is an arithmetic sequence.

a) Write its algebraic form.

b) Write its 25th term .

c) Is 100 a term of this sequence?

17) a) Write the sequence of the multiples of 3

b) Which is the first two digit multiple of 3?

c) How many two digit numbers which are multiples of 3?

18) The 5th term and 10th term of an arithmetic sequence are 24 and 49 respectively.

a) Find its common difference.

- b) Which is its first term?
- c) Write the sequence.
- d) Write its 30th term .
- e) Find the sum of its first 30 terms.

19) Which of the Sequence below is an Arithmetic sequence?

- a) 1,5,10..,
- b) 1,4,9....
- c) 5,8,11....
- d) 2,3,5....

20) a) Write an Arithmetic sequence with first term 1 and common difference 5?

b) Write another sequence multiplying 2 and adding 3 to each term of the above sequence.

21) The algebraic expression of an Arithmetic sequence is $X_n = 4n + 1$.

- a) Find the first term?
- b) What is the remainder when the terms are divided by 4?
- c) Is 200 a term of this sequence?

22) In an Arithmetic sequence, the 6th term is 17 and the 13th term is 38.

- a) Find the common difference?
- b) Find the first term?
- c) Write the Arithmetic sequence.
- d) Write the algebraic form of the sequence.

23) The sum of an Arithmetic sequence is $S_n = 2n^2 - n$.

- a) Find the first term?

- b) Find the common difference?
- c) Write the Arithmetic sequence.
- d) Write the algebraic form of the Arithmetic sequence.
- e) Find the sum of first 10 terms.

24) What is the common difference of the arithmetic sequence 6,11,16,21....?

- 25) a) Write down the sequence of natural numbers leaving remainder 1 on division by 5.
b) write the number of terms in this sequence

26) The 4th term of an arithmetic sequence is 32 and 12th the term is 56.

- a) What is its common difference?
- b) Write the first 5 terms of this sequence.

27) Algebraic form of an arithmetic sequence is $3n-1$, what is the first term and common difference of this sequence.

28) In the Arithmetic sequence 3, 10, 17 ,.....

- a) What is the common difference ?
- b) Find the 10th term of this sequence ?

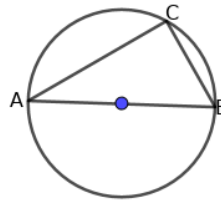
29) The algebraic form of an arithmetic sequence is $3n + 5$.

- a) Find the first term ?
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- 30) If the 6th term of an arithmetic sequence is 40 and 9th term is 58 then
- Find common difference ?
 - Find the 21st term ?
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- 31) a) Write an arithmetic sequence with common difference 7.
- What is the remainder got when the terms of this sequence are divided by 7 ?
 - Is 266 a term of this sequence?
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- 32) The fifth term of an arithmetic sequence is 17 and its 10th term is 32.
- What is the first term?
 - What is the common difference?
 - Find the position of 92 in this sequence.
- 33) Sum of first n terms of an arithmetic sequence is $3n^2 - 8n$.
- Find the common difference
 - Find the algebraic expression
- 34) Consider the Arithmetic sequence 5,9,13,.....
- Find 10th term of the sequence
 - Find the sum of first 28 terms of this sequence
 - Which is the first three digit number in this sequence?

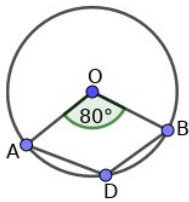
Circles and Tangents

1. In the figure AB is the diameter of the circle. Find $\angle ACB$?



(30° , 60° , 90° , 45°)

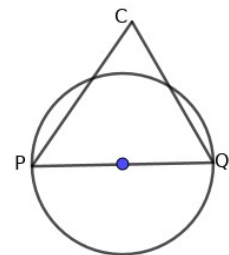
- 2.



In the figure $\angle AOB = 80^\circ$. Find $\angle ADB$?

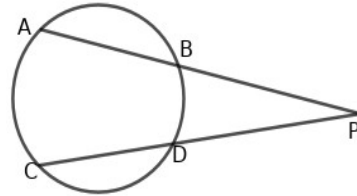
(40° , 80° , 140° , 60°)

3. PQ is the diameter of the circle and C is a point outside the circle, then $\angle PCQ$ is



(less than 90° , equal to 90° , greater than 90°)

5. In the figure AB and CD are two chords intersect at P.
If PA= 10 cm, AB=6 cm and PC=20 cm, find PD.



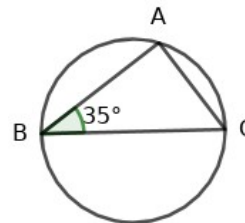
(2cm, 6cm, 10cm, 12cm)

6. If the central angle of an arc is 140° . What is the central angle of its alternative arc ?

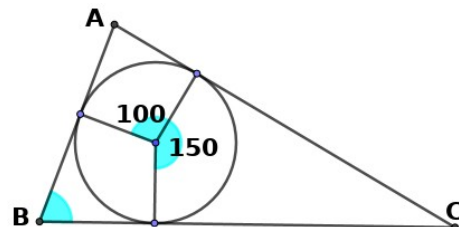
(70° , 140° , 220° , 40°)

- 7.

If BC is the diameter,
what is the measure of $\angle C$?



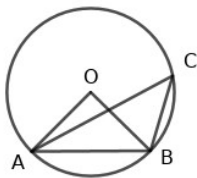
(35° , 55° , 100° , 145°)



8) Find $\angle B$ of $\triangle ABC$

(70° , 55° , 110° , 75°)

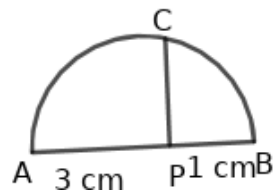
9.



Triangle AOB is an equilateral triangle. What is the measure of $\angle ACB$?

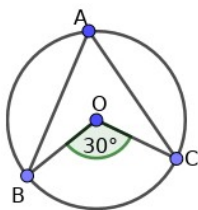
(30° , 45° , 60° , 90°)

10. What is the length of PC? PC is perpendicular to the diameter AB.



(4 cm, $\sqrt{4}$ cm, $\sqrt{3}$ cm, 3cm)

11.

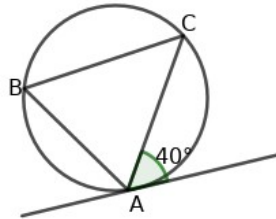


What is the measure of $\angle A$?

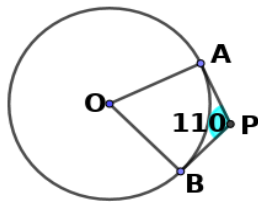
(15° , 30° , 60° , 45°)

12. From the figure find $\angle ABC$.

(30° , 40° , 60° , 90°)



13.



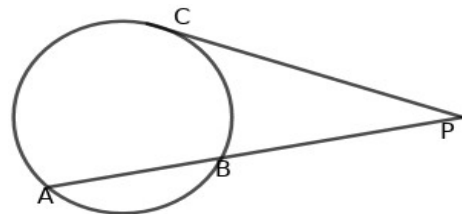
PA and PB are tangents

If $\angle APB = 110^\circ$, find $\angle AOB$.

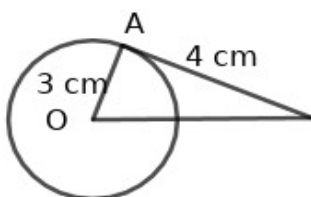
(110° , 35° , 70° , 45°)

14. Find PC from the figure, if $PB = 4\text{cm}$ and $AB = 6\text{cm}$.

($\sqrt{12}$ cm, $\sqrt{10}$ cm, $\sqrt{40}$ cm, $\sqrt{20}$ cm)



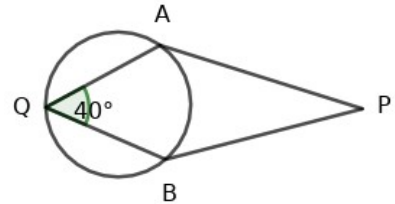
15.



What is the length of OP ? PA is the tangent

P (3 cm, 4cm, 5cm,7cm)

16. In the figure PA and PB are two tangents from the point P. If $\angle AQB = 40^\circ$, find $\angle APB$.

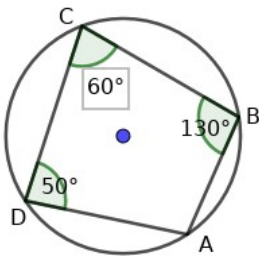


(40° , 80° , 100° , 140°)

17. If the length of the tangent drawn from the point $6\sqrt{2}$ cm away from the circle is equal to radius. What is the length of tangent ?

(3 cm, 6cm, 9cm, 12cm)

18.

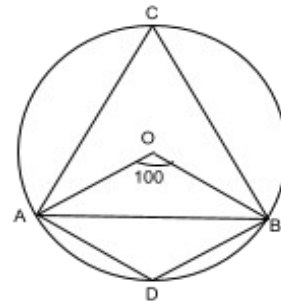


ABCD is a cyclic quadrilateral. What is the measure of $\angle BAD$?

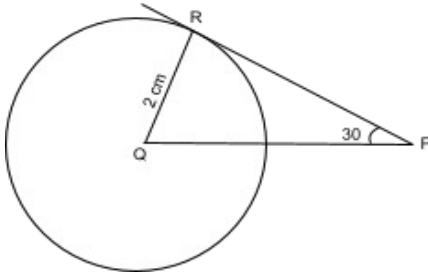
(60° , 130° , 90° , 120°)

19. O is the center of the circle and AB is a chord. $\angle AOB = 100^\circ$.

Find i) $\angle ACB$ ii) $\angle ADB$



20)

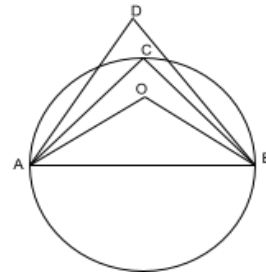


PR is a tangent to the circle and Q is the centre of the circle. $QR = 2$ cm.

Find $\angle Q$ b) Find PR

21. In the figure $\angle ADB + \angle AOB + \angle ACB = 270$

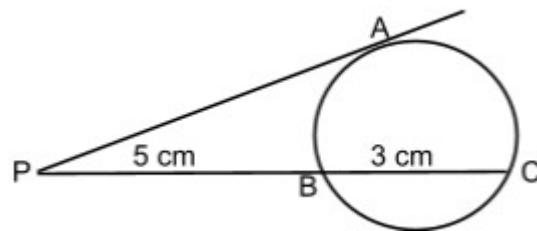
$\angle AOB = 110$. Find $\angle ACB$ and $\angle ADB$.



22)

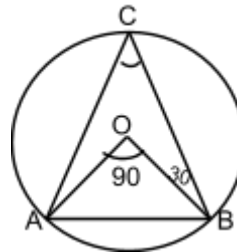
In the figure given, PA is a tangent. $PB = 5$ cm, $BC = 3$ cm

Find the length of PA.

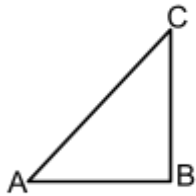


23) In the figure $\angle AOB = 90^\circ$, $\angle OBC = 30^\circ$. Find

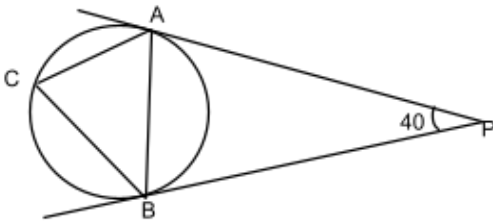
$\angle ACB$ and $\angle OAC$



24) ABC is a right triangle with $\angle B = 90^\circ$. If we draw a circle with AC as diameter. Where is the position of B. If BC is diameter, where is the position of A?

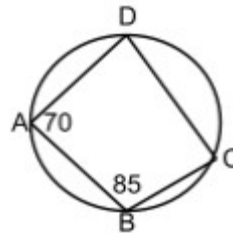


25) PA & PB are tangents. $\angle P = 40^\circ$, $CA = CB$. Find all angles of $\triangle ABC$.

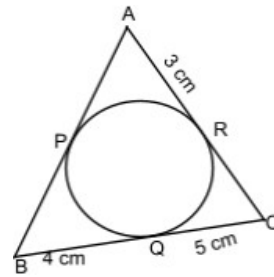


26) In the figure, find

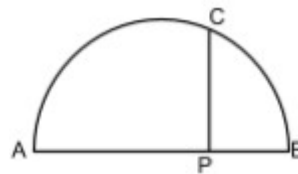
- a) $\angle ADC$
- b) $\angle BCD$



27) The picture shows a triangle formed by three tangents of a circle. Find the perimeter of $\triangle ABC$.
Given $AR = 3\text{cm}$, $BQ = 4\text{cm}$ and $CQ = 5\text{cm}$

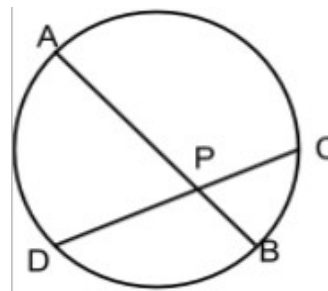


28) AB is a diameter and PC perpendicular to AB. PC = 4 cm, PB = 2 cm. Find the Length of PA and radius of circle.



29) AB & CD are two chords intersecting at P. AB = 15 cm, PB = 3 cm, PD = 9 cm. Find

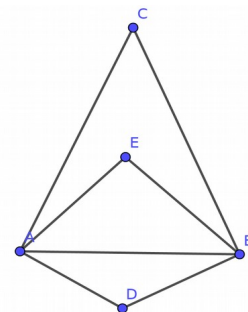
- a) Length of PA
- b) Length of PC



30. In the figure $\angle AEB = 90^\circ$, $\angle C = 50^\circ$, $\angle D = 130^\circ$

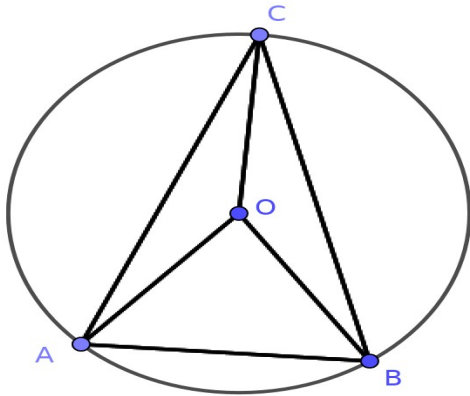
a) If a circle is drawn with AB as diameter, where is the position of E?

b) Write the position of points C and D with respect to this circle



c) Is it possible to draw a circle through the four points A, B, C and D. Why?

31. In the figure O is the centre of the circle $\angle OAC = 20^\circ$, $\angle OBC = 30^\circ$



a) What is the measure of $\angle ACB$

b) What is the measure of $\angle AOB$

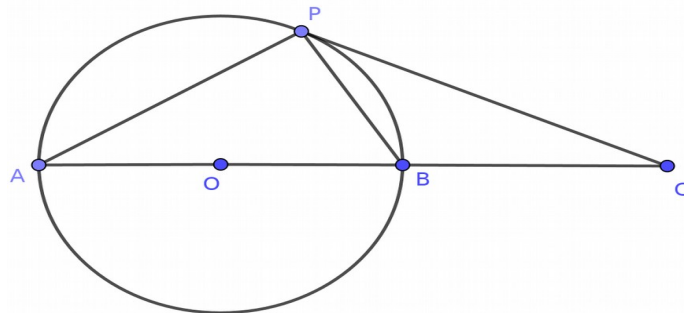
32. In the figure O is the centre of the circle and PC is a tangent to the circle $\angle PAB = 20^\circ$

Find

a) $\angle BPC$

b) $\angle APC$

c) $\angle PCB$

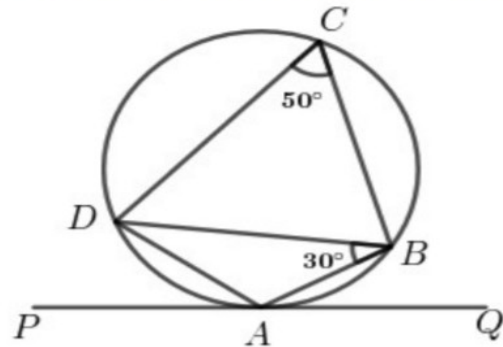


33)

In the figure PQ is a tangent .

$$\angle ABD = 30^\circ, \angle BCD = 50^\circ$$

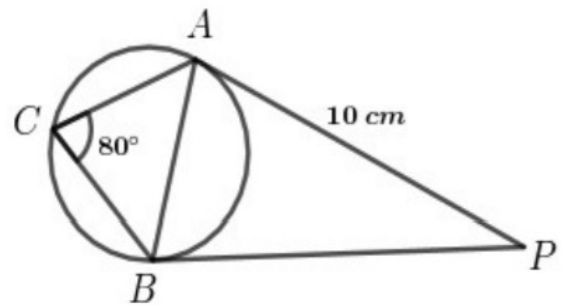
- What is the measure of $\angle BAD$?
- What is the measure of $\angle PAD$?
- What is the measure of $\angle ADB$?



34)

In the figure , tangents through the points A and B intersect at P . $AC = BC$, $PA = 10$ cm

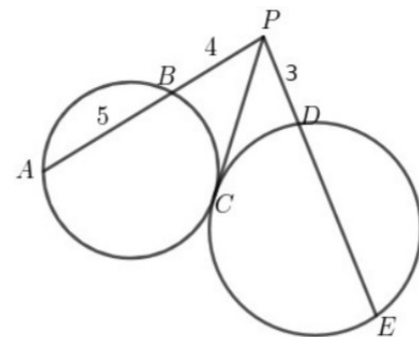
- What is the measure of $\angle ABP$?
- What is the length of PB ?
- What is the measure of $\angle APB$?



35)

In the figure two circles intersect at C and CP is a common tangent to both the circles .
 $AB = 5$ cm , $PB = 4$ cm , $PD = 3$ cm

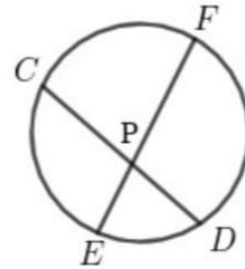
- What is the length of PA ?
- What is the length of the tangent PC ?
- What is the length of DE ?



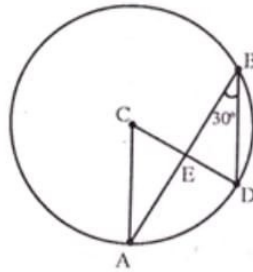
36). In the figure two chords EF and CD intersect at P .

EF = 11cm, EP = 2cm. The length of PC is double the length of PD

- a) What is the length of PF?
- b) PC X PD =
- c) What is the length of CD?



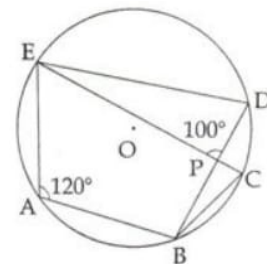
37)



In the figure, C is the centre of the circle and $\angle ABD = 30^\circ$

- a) What is the measure of $\angle ACD$?
- b) If $\angle ABD = \angle CAB$ and $AB = 6$ cm, find the radius of the circle.

38. In the figure O is the centre of the circle and A,B,C,D,E are the points on it



$\angle EAB = 120^\circ$

$\angle EPD = 100^\circ$

Write the measures of $\angle EDB$, $\angle ECB$ and $\angle DBC$

39).

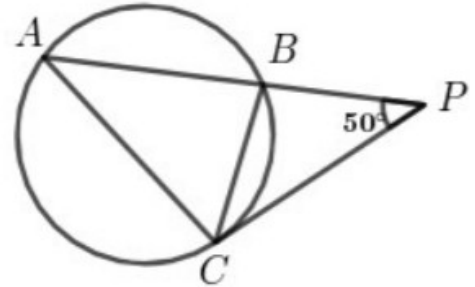
In the figure PC is a tangent .

$\angle BPC = 50^\circ$, $BC = BP$

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

b) What is the measure of $\angle BAC$?

c) What is the measure of $\angle ABC$?



40) O is the centre of the circumcircle of triangle ABC .If $\angle OBC = 30^\circ$

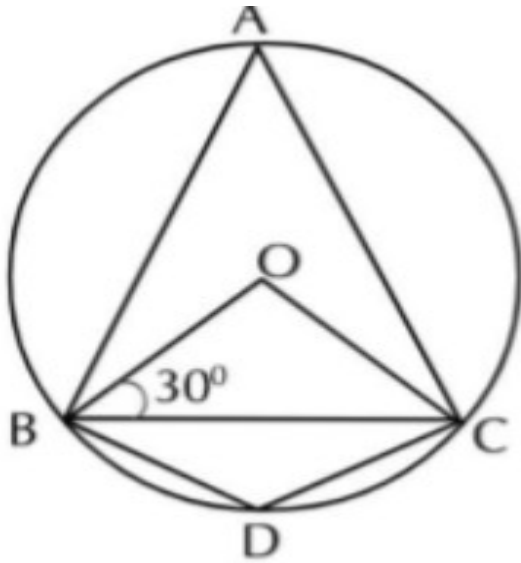
e) $\angle BCO =$ -----

f) $\angle BOC =$ -----

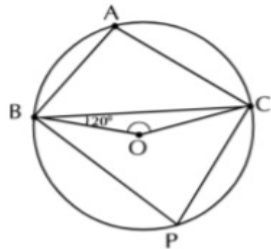
g) $\angle BAC =$ -----

h) If $\angle OBC = x$ find $\angle BAC$

i) If $\angle OBC = x$ find $\angle BOC$



41) In the figure O is the centre of the circle . $\angle CBO=20$



a) $\angle OCB=$ -----

b) $\angle BOC=$ -----

c) $\angle P =$ -----

d) $\angle A=$ -----

e) $\angle A=x$ $\angle CBO=y$ then find $x-y$

42) In the figure O is the centre of the circle. PQ is a tangent through A

$\angle OCD=25$ $\angle OAD=45$ and $\angle BAQ=35$. Find the angles given below

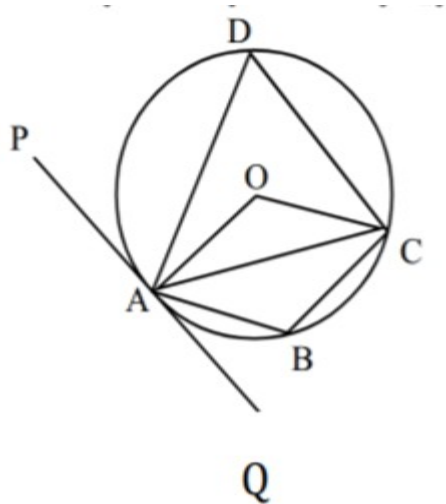
a) $\angle ADC=$ -----

b) $\angle AOC = \dots\dots$

c) $\angle ABC = \dots\dots\dots$

d) $\angle PAD = \dots\dots\dots$

e) $\angle BAO = \dots\dots\dots$



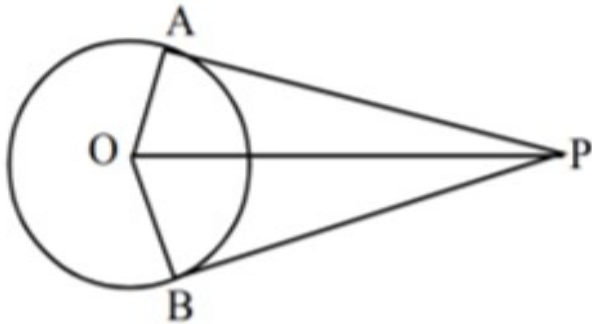
43) PA and PB are two tangents of circle with centre O. $OA = 5$ cm
 $OP = 13$ cm.

a) $PA = \dots\dots\dots$

b) $PB = \dots\dots\dots$

c) Find the area of triangle OAP.

d) Find the area of the quadrilateral OAPB .



a) $\angle R = \dots\dots\dots$

b) $\angle BPR = \dots\dots\dots$

c) In triangle BPR $\angle B = \dots\dots\dots$

d) Find the measures of the three angles of triangle ABC.

44) In the figure given below O is the centre of the circle . $\angle ABO = 40^\circ$ $\angle OAC = 30^\circ$

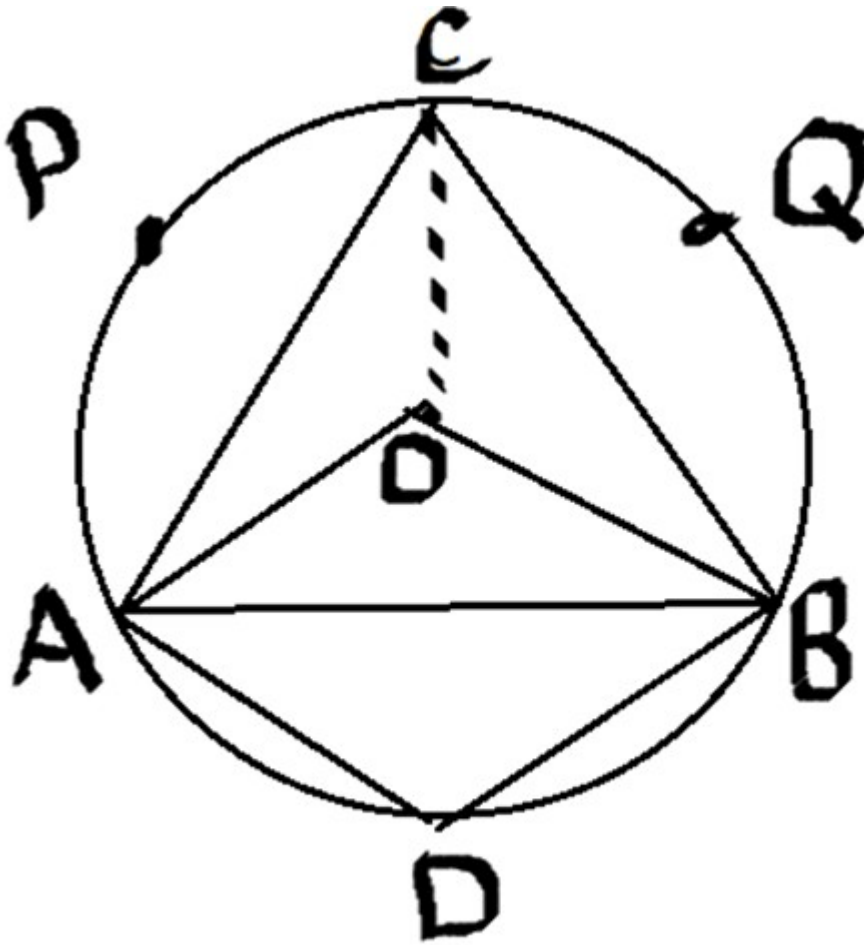
a) $\angle OAB = \dots\dots\dots$

b) $\angle AOB = \dots\dots\dots$

c) $\angle ACB = \dots\dots\dots$

d) Find the central angle of the arc APC

e) $\angle ADB = \dots\dots\dots$

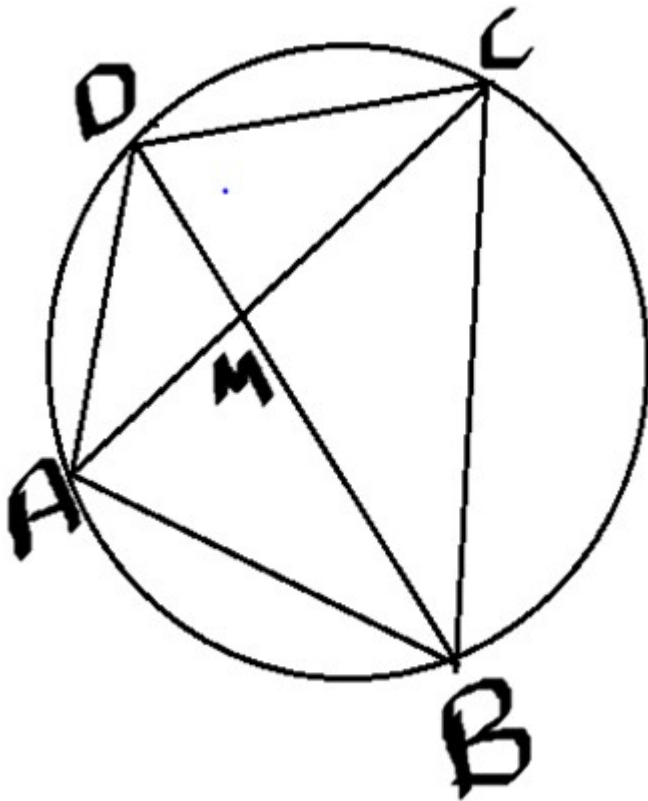


45) In the figure four corners of the quadrilateral ABCD are on the circle.

a) Find the measures of $\angle BAC$, $\angle CAD$, $\angle ABD$.

b) Find the measures of all angles of the quadrilateral ABCD.

c) Find the measures of the angles between the diagonals.

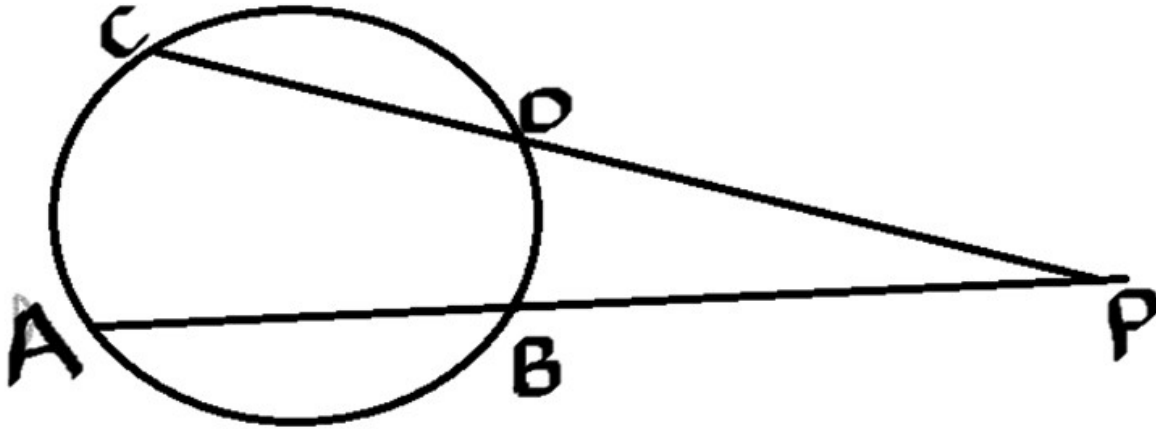


46) In the figure chords AB and CD are extended to meet at the point P.

a) Find the equal angles in triangle APC and triangle PBD.

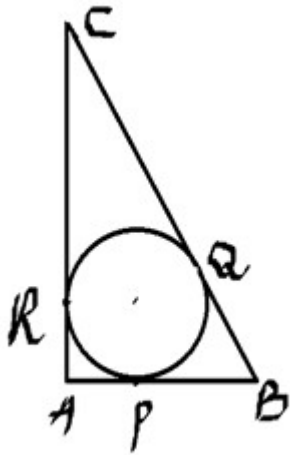
b) Prove that $PA \times PB = PC \times PD$.

c) If $PB = 4\text{cm}$, $AB = 5\text{cm}$, $PD = 3\text{cm}$. Find the value of CD.

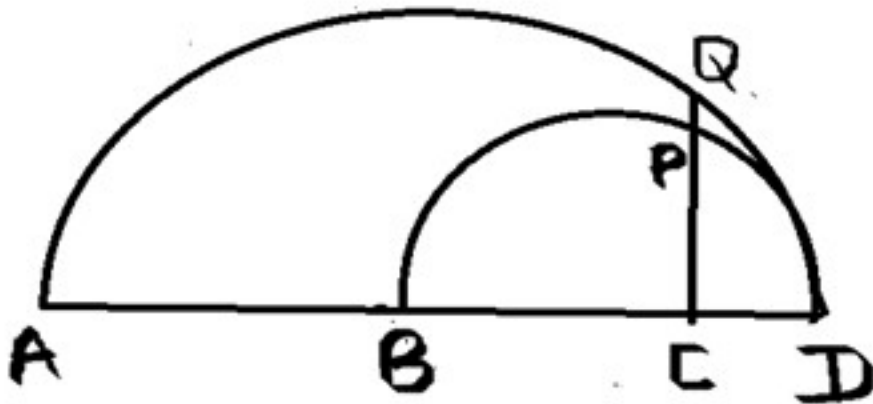


47) In the figure triangle ABC is a right triangle . Incircle of the triangle touches the sides at P,Q,R.If $AB=5$ cm, $AC=12$ cm.

- Find length of BC.
- Find the perimeter of triangle ABC.
- Find the area of triangle ABC.
- Find the radius of the circle.



48)



In the figure $AD=10\text{cm}$ $BD=6\text{cm}$ $CD=2\text{cm}$.

- a) $AC \times CD = \dots\dots\dots$
- b) Find the length of CQ .
- c) Find the length of CP .
- d) Hence find PQ .

Mathematics of chance

1 A Square got by joining the midpoints of a bigger Square . If we put a dot in the figure ,without looking into it. What is the probability of being the dot in the shaded region?



2 What is the probability of 5 Sundays in December?

($2/7, 3/7, 4/7, 1/7$)

3 What is the probability of getting 3, when a dice is thrown?

($3/6, 1/6, 2/6, 6/6$)

4 What is the probability of 53 Sundays in a leap year ?

($1/7, 2/7, 3/7, 1$)

5 A man says that the probability of an egg is rotten, out of his 300 eggs is $\frac{1}{6}$. Then what will be the total number of rotten eggs?

6 One is asked to say a 2 digit number what is the probability of it being perfect square.

7 One is asked to say the name of a month. What is the probability of it being 30 days

8 One is asked to say a three digit number.

a) How many three digit numbers are in the counting numbers ?

b) What is the probability that the middle digit is Zero ?

9 What is the probability of getting 5 Sundays in December in a calendar year?

10 There are 36 beads in a box. Some are white and some are black. The probability of drawing a white bead is $\frac{1}{4}$.

a) What is the probability of drawing a black bead ?

b) How many black beads are there in the box ?

11 A person is asked to say a number from 1 to 50.

a) What is the probability of saying a prime number?

b) What is the probability of saying an even prime number?

c) What is the probability of saying a perfect square ?

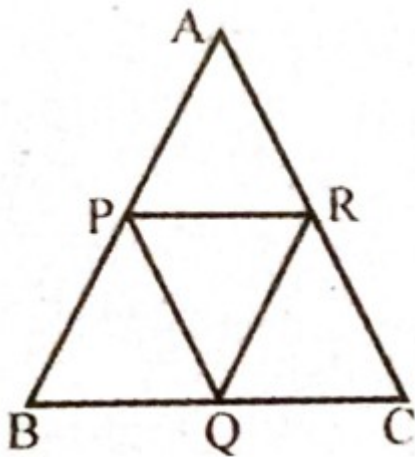
12. A number is chosen from the numbers 1 to 20

a) What is the probability of getting a number multiple of 5?

b) What is the probability of getting a prime number

c) What is the probability of getting an even number?

13 P,Q,R are the midpoints of the sides of triangle ABC. Another triangle is drawn by joining these points. A fine dot is placed into the figure without looking into the picture.



a) What is the probability of falling the dot in triangle PQR.

b) What is the probability of falling the dot outside the triangle PQR.

14. A vessel contains 4 black beads ,6 white beads, and 10 red beads .In another vessel contains 7 black beads ,5 white beads , and 8 red beads . If we take one bead from each vessel , without looking into it.

a) What is the probability of being same colour ?

b) What is the probability of both being different colours ?

c) What is the probability of getting at least one black bead ?

Second degree equations

1. The sum of a number and its square is 0. What is the number ?
 a) 2 b) -1 c) -2 d) 1
2. 2 is added to the product of 2 consecutive odd numbers gives 101 what are the number ?
3. When each side of a square is increased by 4 cm, the area becomes 144 square centimetre
 - a. If the length of the original square is taken as x cm, what will be the length of the side of the new square ?
 - b. Compute the length of the original square ?
4. In the equation $x^2 - 8x + 16 = 0$.
 - a) Find the discriminant.
 - b) How many solutions does the equation have? Write the solution.
5. What number must be added on both sides of $x^2 - 10x = 39$ to make it a perfect square?
 Hence find the solution.
6. One side of a rectangle is 6 m longer than the other side,
 - a) If the length of one side as x cm, what will be the length of other side.
 - b) If the area of the rectangle is 160 sq.cm. then find length of two sides.
7. a) What is the value of $2x^2 + 3x$ when $x = 1$
 b) For which natural number R , value of $2x^2 + 3x$ becomes 275. (3)
8. The Algebraic form for the sum of first n terms of a mathematics sequence is $2n^2 + 8n$. How many consecutive terms of the sequence, starting from the first are to be added to get a second degree equation
9. The difference of the length of perpendicular sides of a right triangle is 10 cm and its area is 72 square cm. Find the length of the perpendicular sides? (3 marks)
10. a) What number is added to $x^2 + 4x$ to get a perfect square ?

b) The sum of the square of a natural number and four times of that number is 221. Then form a second degree equation in x .

c) what is the number?

11. When 4 cm is subtracted from each side of a square, the area becomes 144 cm^2 .

a) Take the side of the large square as x . Find the side of the small square.

b) Form an equation and find the side of the large square and the small square.

12. $P(x) = x^2 - 9x + 20$

(a). Write it as a product of two first degree polynomials.

b). Write the solutions of the equation when $P(x) = 0$

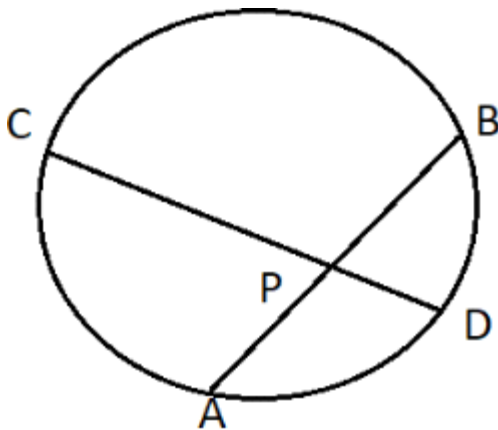
13. The product of two positive numbers is 96 and their difference is 4

a) If the first number is ' x ' what is the other number?

b) Form the equation and find the two numbers.

14. The sum of the square of a number and 8 times the number is 308 what is the number?

15. In a circle two chords AB and CD intersect at 'P' is $AB = 22 \text{ cm}$, $CD = 20 \text{ cm}$, $PA:PB = 3:8$



- a) Find the length of PA and PB.
- b) If $PC=x$ then find PD.
- c) Find the length of PC and PD.

16. The squares are taken from a calendar. Each square contains a day number

- a) If $A=x$ write B, C, and D
- b) If $C+D=22$ then form a second degree equation in x
- c) Find x by solving the equation.

| | | |
|---|---|---|
| A | B | C |
| | D | |

- d) Write B, C and D

17. The perimeter of a rectangle is 42 cm and its area is 20 sq.cm

- a) what is the sum of length and breadth
- b) If the length is taken as ' x ' what is its breadth
- c) Find the length and breadth

18. A pond of rectangular shape is to be constructed with perimeter 42 m and diagonal 15m.

- a) If breadth of the pond is taken as ' x ' what is its length
- b) Form the second degree equation and hence find the length and breadth of the pond.

19. The difference between two numbers is 3

a) If the first number is taken as 'x' , find the second number.

b) If the difference between their reciprocal is $\frac{3}{40}$ find the numbers.

20. The smallest side of a right triangle is 4 less than its hypotenuse. Third side is 2 more than the smallest side .

a) If the Smallest side is x then write the length of hypotenuse and third side?

b) Write the equation connecting the sides of the triangle.

c) What is the length of the smallest side?

d) Write the sides of the triangle.

21. The perimeter of a right angled triangle is 36cm .The length of the hypotenuse is 15cm.

a) Find the sum of its perpendicular sides.

b) If the smallest side is 'x' what is the length of the other side?

c) Find the length of its sides?

22. A rectangular playground is 80 m long and 70 m wide with a path around it, the area of the path alone is 160 metre square.

a) If the width of the path alone is X cm then what is the Length and width of the playground including the path?

b) what is the area of the playground?

c) what is the area of the playground including the path?

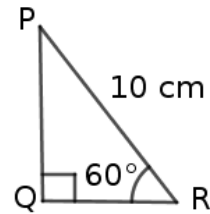
d) write the algebraic expression indicating the area of the path.

e) Find the width of the path formed by the second degree equation.

Trigonometry

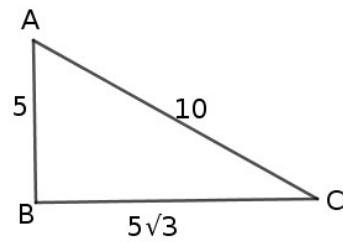
1. Find the length of PQ from the following.

(5 , $5\sqrt{3}$, $5\sqrt{2}$, $10\sqrt{3}$)



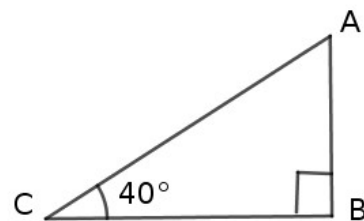
2. In the figure what is the measure of $\angle A$.

(30° , 45° , 60° , 90°)



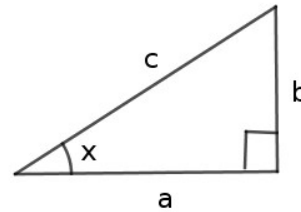
3. In $\triangle ABC$ $\angle B = 90^\circ$, $\angle C = 40^\circ$. What is $\sin 40^\circ$ from the following?

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



4. What is $\tan x^\circ$ from the following?

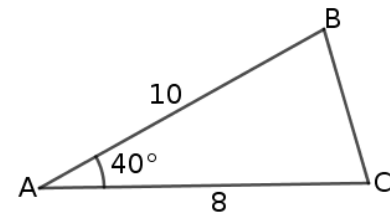
$$\left(\frac{b}{c}, \frac{a}{c}, \frac{b}{a}, \frac{a}{b} \right)$$



5. In $\triangle ABC$, $AB = 10$ cm, $AC = 8$ cm, $\angle A = 40^\circ$. What is the perpendicular distance from A to BC?

$$(\sin 40 = 0.6428 \quad \cos 40 = 0.766$$

$$\tan 40 = 0.8391)$$



6. AB is a chord of a circle with centre O. $\angle AOB = 70^\circ$, $AB = 16$ cm, What is the diameter of the circle?

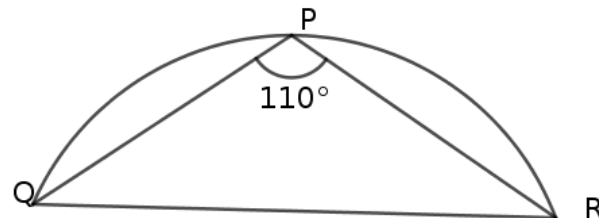
$$(\sin 35 = 0.5736, \cos 35 = 0.8192, \tan 35 = 0.7002)$$

7. The ratio of the angles of a triangle is 1:1:2,

a) What is the ratio of their sides?

b) If the length of the longest side is 10 cm, what is the length of the other sides?

8. In the figure $QR = 20$ cm $\angle P = 110^\circ$. Find the radius of the arc.



$$(\sin 70 = 0.9397, \cos 70 = 0.3420, \tan 70 = 2.7475)$$

9. In $\triangle ABC$ $\angle A = 35^\circ$, $AB = 8$ cm, $AC = 12$ cm

a) What is the perpendicular distance from C to AB?

b) Find the area of triangle ABC.

10. A ladder is leaning against a wall. The foot of the ladder is 3 metres away from the wall. The angle made by the ladder and the ground is 35° . How high is the top of the ladder from the ground.

$$(\sin 35 = 0.57, \cos 35 = 0.82, \tan 35 = 0.70)$$

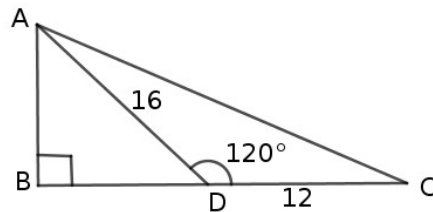
11. When the sun is seen at an angle of elevation 60° , the length of the shadow of a tree is 15m

- draw the rough figure
- What is the height of the tree?
- What is the length of the shadow when sun is seen angle of elevation 30° ?

12. A chord is drawn at a distance of 4 cm from the centre of a circle. The angle made by the chord at the centre of the circle is 120°

- what is the radius of the circle?
- what is the length of AB?

13 In the figure $\angle ADC = 120^\circ$, $AD = 16$ cm, $CD = 12$ cm



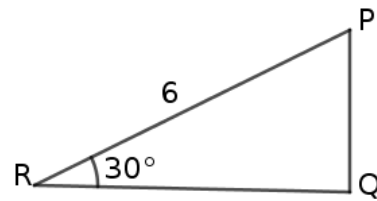
- what is angle BDA?
- find the length of AB
- find the length of BC

14. A chord of length 8 cm make an angle 140° at a point on a circle. Find the radius of the circle.

$$(\sin 40 = 0.643, \cos 40 = 0.766)$$

15. In the figure $\angle Q = 90^\circ$, $\angle R = 30^\circ$, $PR = 6$ cm

- What is angle P?
- What is the length of QR?
- What is the area of ΔPQR ?

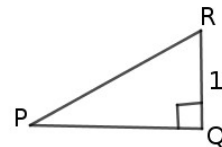


16. In ΔABC , $AB = 10$ cm, $\angle A = 40^\circ$, $\angle B = 100^\circ$

- What is the perpendicular distance from C to AB?
- What is the area of ΔABC ?

$$(\sin 80 = 0.9848, \cos 80 = 0.1736)$$

17. In the figure $\angle Q = 90^\circ$, $QR = 1$ cm, $\sin P = \frac{1}{2}$



- What is the length of PR?

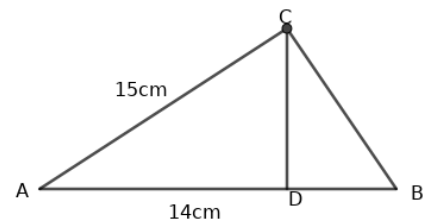
- b. Find the length of PQ?
- c. What is the measure of $\angle P$?
- d. $\sin 60^\circ = \dots$

18. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with the ground. The distance between the foot of the tree and the point at which the top touches the ground is 16 m.

- a) At what height the tree is broken?
- b) Find the total length of the tree.

19. In $\triangle ABC$, $AB = 14$ cm, $AC = 15$ cm, and in $\triangle ACD$, $\sin A = \frac{4}{5}$. Find the following

- a) The perpendicular distance from C to AB.
- b) Find the area of the triangle.
- c) Find the length of the side BC.



20. Looking from one edge of a river sees the top of a tree on the other side at an angle of elevation 60° . Stepping 20m back sees the top of the tree at an angle of elevation 30° .

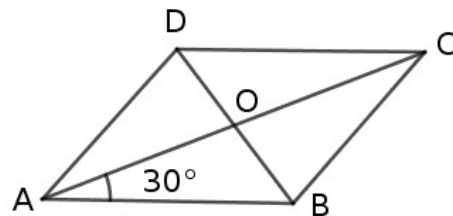
- a) Draw a rough figure.
- b) Find the height of the tree.
- c) Find the width of the river.

21. A man of height 1.2 m standing 28m away from a tower sees the top of the tower at an angle of elevation 65° . What is the height of the tower?

($\sin 65 = 0.91$, $\cos 65 = 0.42$, $\tan 65 = 2.14$)

22. The diagonals of the Rhombus ABCD cuts at O. $\angle OAB = 30^\circ$. The length of one side of the Rhombus is 8 cm then,

- a) What is $\angle OBA$?
- b) What is the length of the diagonal AC?
- c) What is the length of the diagonal BD?



d) Find the area of the Rhombus.

23. From the top of a 10m high building a man of height 1.6 m sees the top of a tower at an angle of elevation 50° and the bottom at an angle of depression 20° ,

- a) What is the distance between the building and the tower?
- b) What is the height of the tower?

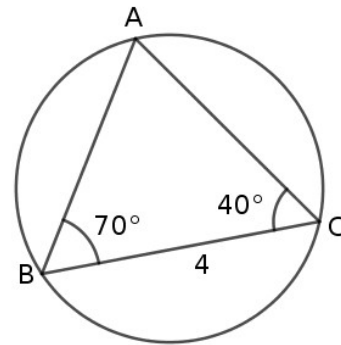
24. A man standing on the top of a tower of height 50m sees the the top of a building at an angle of depression 40° and the bottom at an angle of depression 60° .

- a) Draw a rough figure and write the measures.
- b) Find the distance between the tower and the building.
- c) Find the height of the building.

($\sin 40 = 0.6428$, $\cos 40 = 0.766$, $\tan 40 = 0.8391$)

25. In the figure $\angle B = 70^\circ$, $\angle C = 40^\circ$, $BC = 4$ cm.

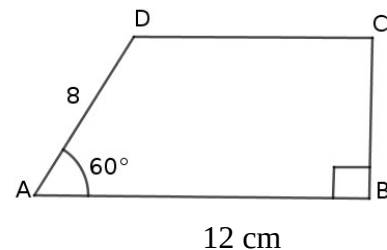
- a) What is the measure of $\angle A$?
- b) What is the diameter of the circle ?
- c) What is the length of AB?
- d) What if the length of AC ?
- e) Find the perimeter ΔABC .



26. ABCD is a trapezium. $AB = 12$ cm , $AD = 8$ cm , $\angle A = 60^\circ$,

a) What is the perpendicular distance between AB and CD?

- b) Find the length of CD.
- c) Find the area of trapezium ABCD.



27. The distance between two buildings is 30m. A man standing on the top of the small building sees the bottom of the large building at an angle of depression 65° and the top at an angle of elevation 20° .

- a) Draw a rough figure.
- b) Find the heights of the two buildings .

Coordinates, Geometry and Algebra

1. Write among the following is point on Y axis.
a) (0, 1) b) (2,3)
c) (-2, 0) d) (1,0)

2. Write among the following is point on X axis.
a) (4, 0) b) (0,-7)
c) (4, 3) d) (0, 4)

3. Write among the following is a point neither on X axis nor on Y axis?
a) (4, 0) b) (0,-7)
c) (4, 3) d) (0, 0)

4. Find the point on the line parallel to X axis passing through the point (0,3)?
a) (0, 1) b) (-3, 0)
c) (-3,-3) d) (-3, 3)

5. What is the distance between origin and (4,3)?

6. A circle with centre (2,0) passes through the point (-4,0). Write the co- ordinates of the other point?

7. (1,0), (5,0) are the end points of a diameter of the circle. Find the co-ordinates of the centre?

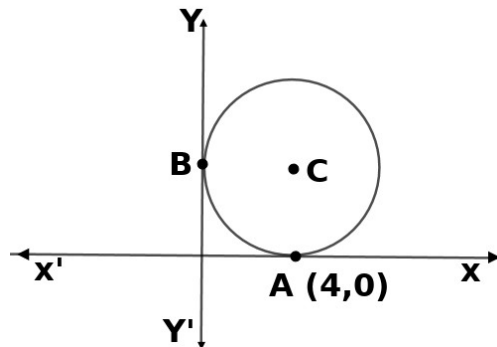
8. (6,0) is a point on a circle with centre (0,0).Find the radius of the circle?

9. A quadrilateral is formed by joining the points A(1,1), B(-1,1), C(-1,-1), D(1,-1) in order,
- Suggest a suitable name to this figure.
 - What is the length of its diagonal?
10. If (x, y) is a point equidistant from the points(7,5) and (4,3), prove that $6x + 4y = 49$.
11. Find the coordinates of the point on x axis which is equidistant from the points (-5,8) and (6,-4)
12. The vertices of a parallelogram ABCD are A(0, 0), B(4, 1) ,C(6, 4)
- Find the coordinates of D.
 - Find the length of AB?
13. If the coordinates of the vertices of a rhombus are A(2, 0), B(5,-5), C(8,0), D(5, 5). Find its area.
14. A circle has centre (2,4) and radius 5 units
- Check whether this circle passes through the point (2,0)
 - Write the coordinates of the point at which this circle cut X axis.
15. Classify the following points as, points on x axis, points on y axis and points not on axes (5, 0) , (10, 9), (0, 7), (-2, -3) , (-1, 0) , (0, -4)
16. Draw X axis and Y axis and mark the points (-3, 1), (2, 2), (0, 4), (-2, -1)
17. The sides of rectangle ABCD are parallel to the axes.
- If A(3, 7) and C(7, 9), then find the coordinates of B and D.
 - Find the lengths of AB and BC.

- c) What is the area of the rectangle?
18. $(-2, -3)$, $(4, 5)$ are the end points of the diameter of a circle.
- what is the length of the diameter?
 - Find the radius of the circle.
 - If the coordinates of the centre is $(1, 1)$, check whether $(5, 4)$ is a point on the circle or not?
19. The three vertices of a rectangle ABCD are $A(0,0)$, $B(8,0)$, $C(8,4)$.
- Write the coordinates of D?
 - What is the perimeter of rectangle?
 - Calculate the area of the rectangle.
20. Find the area of the rhombus ABCD with coordinates of its vertices are $A(2,0)$, $B(5, -5)$, $C(8, 0)$ and $D(5, 5)$.
21. A circle with centre $(3,2)$ passes through the point $(6,3)$.
- Find the radius of the circle.
 - Check whether each of the points with coordinates $(0, 2)$, $(3, 6)$, $(0, 3)$ are inside, outside or on the circle?
22.
 - Write the coordinates of the origin.
 - Find the distance of the point $(-3,4)$ from the origin.
 - Find the area of the rectangle with the above coordinates as the opposite vertices.
23.
 - Show that $A(6, 4)$, $B(5, -2)$ and $C(7, -2)$ are the vertices of an isosceles triangle.
 - What is the perpendicular distance from the vertex A to the side BC?

24. In the figure, C is the centre of the circle . X axis and Y axis are the tangents of the circle through the points A and B. If the coordinates of A is (4,0) then

- What is the coordinates of B?
- Find the coordinates of the centre of the circle.
- What is the radius of the circle?



25. Triangle ABC is an equilateral triangle. A(1, 1), B(7, 1) then

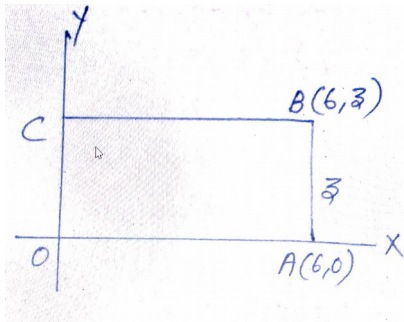
- Find the length of one side.
- What is the length of perpendicular distance from C to AB?
- Write the coordinates of C.
- Find the area of the triangle.

26. (3,-1) is a point on the circle with centre (6, 3)

- Find the radius of the circle.
- Check whether the circle touches the Y-axis.
- Find the coordinates of the point of intersection of the circle with the X-axis.

27. Prove that the triangle with vertices (0, 0), (10, 0) and (5,5 $\sqrt{3}$) is equilateral.

28. a) A line is drawn by joining the points $A(3, 2)$, $B(8, 2)$.
Which is the axis parallel to this line?
- b) Write the coordinates of any two other points on this line.
- c) What is the length of AB ?
- d) Write the coordinates of two points on a line that is perpendicular to AB and passing through A .
29. Draw axes x and y . Mark the point $(3, 4)$. Draw a circle with origin as a centre and passes through the point $(3, 4)$.
30. In the figure, $OABC$ is a rectangle and its breadth is 3.
- a) Write the coordinates of the vertices B and C .
- b) Find the length of the diagonal of the rectangle.



31. a) Prove that $P(4, 5)$, $Q(4, 2)$, $R(8, 2)$ are the vertices of a right-angled triangle.
- b) Find the coordinates of midpoints of the sides of this triangle.
- c) Find the coordinates of the circumcentre of this triangle.
- d) Find the circumradius.
32. A line is drawn by joining the points $A(3, -1)$ and $B(13, -9)$
- a) If C is the midpoint of the line AB , find its coordinates.

- b) If a circle is drawn with C as centre, and passing through A and B, what is its radius?
- c) Check whether (4, -10) is a point on the circle.
- d) Write the equation of the circle.
33. a) Without drawing co-ordinate axes mark the points (3,5) and (7,8) with left -right,top -bottom positions correct.
- b) If (3, 5) and (7, 8) are the opposite vertices of a rectangle with sides parallel to the co-ordinate axes find the other two vertices of the rectangle.
- c) Find the area of the rectangle.
34. The co-ordinates of two opposite vertices of a rectangle are (7, 8) and (1, 3).
- a) Without drawing co-ordinate axes, mark these points as the vertices of a rectangle with left -right, top -bottom positions correct.
- b) Find the co-ordinates of other two vertices of the rectangle.
- c) What is the length of its diagonals?
35. Draw axes and mark the point (-2,-2)
- a) Write the co-ordinates of B which is 4 units away parallel to y axis in the upward direction.
- b) Write the co-ordinates of C which is 6 units in the right of B parallel to x axis.
- c) Write the co-ordinates of D which is 4 units above C on the line parallel to y axis.
- d) What is the distance between A and D?
36. If (4,6) and (5,3) are the opposite vertices of a rectangle with sides parallel

to the co-ordinate axes .

- a) Find the other two vertices of the rectangle.
- b) Find the length of its sides.
- c) Find the length of its diagonals.

37. (a) Draw x axis and y axis and mark the points A(2, 0) B(5, 0) and C(7, 3)
(b) If ABCD is a parallelogram, write the co-ordinates of D
(c) Draw parallelogram ABCD
(d) Find the height of the parallelogram if one of the angle is 60° .
(e) What is the area of the parallelogram.
38. (a) Draw x axis and y axis and mark the points (6,5) (8,7) and (9,10)
(b) If the above points are to be the vertices of a parallelogram, what will be the fourth vertex?
(c) Find the length of sides of the parallelogram.
(d) Find the length of two diagonals of the parallelogram.
39. The vertices of a triangle are A(2, 1), B(3, 4) and C(-3, 6) .
a) Find the length of the sides of the triangle.
b) Prove that ΔABC is a right angled triangle.
40. A circle passing through the points (9, 3), (7, -1) and (1, -1).
a) Write the co-ordinate of the centre of the circle.
b) Find the radius of the circle.
41. A line is drawn by joining two points A (2,5) and B(7,10).
a) What is the slope of this line?
b) Find another point on this line.
c) Find the coordinates of the point that divides the line in the ratio 3: 2

42. If $P(2,4)$ and $Q(6,8)$ are the ends of a line then
- What are the coordinates of the midpoint of the line?
 - Find the coordinates of the point which divides the line PQ in the ratio $1:3$
 - Find the distance between the midpoint of PQ which divides PQ in the ratio $1:3$
43. The equation of a circle is $x^2+y^2=36$
- Find the coordinates of its centre.
 - What is its radius?
 - Check whether $(3, 4)$ is a point on this circle .
44. $P(1, 2)$, $Q(7,4)$, $R(5,0)$ are the vertices of triangle PQR . A , B , C are the midpoints of the sides PQ , QR , PR respectively.
- Write the coordinates of A , B , C .
 - Find the length of sides AB , BC and AC .
 - Prove that triangle ABC is a right angled triangle.
45. The line AB is the perpendicular bisector of PQ . $P(-4, 0)$; $Q(0, 4)$
- Draw a rough figure and find the relation between AP and AQ .
 - Find AP^2 and AQ^2
 - Prove that $x+y = 0$
46. (a)Write down the coordinates of the point of intersection of the lines $x - 2y + 8 = 0$ and $2x + y + 1 = 0$.
- (b)Write the coordinates of the point where these lines intersect Y axis?
47. Can $A(-3,-7)$, $B(0,2)$, $C(2,8)$ be the vertices of a triangle.
- 48.The endpoints of a diameter of a circle are $(3,-4)$ and $(9,-9)$:
- Find the midpoint of the diameter.

- b) Find the radius of the circle.
- c) Write the equation of the circle.
- d) Check whether the point $(3, -1)$ is a point on the circle.

49. $T(2,5)$, $U(4,6)$, $V(9,10)$ then

- a) Find the slope of TV .
- b) Find the equation of the line TV .
- c) Are T, U, V in a line.
- d) Find the centroid of triangle TUV .

50. The equation of the line is $Y = 2X$

- a) A is the point on the line. If x coordinate of A is -2 , find its y coordinate?
- b) If a circle is drawn with center A and radius 5 , find the equation of the circle.
- c) Verify whether a circle of radius 5 centered at A passes through the point $B(5,5)$.

51. $A(3,2)$, $B(9,4)$, $C(7,10)$ are any three points, to draw a circle through AC as diameter

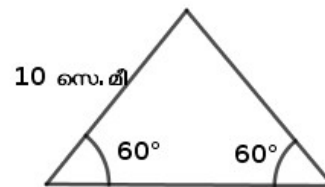
- a) Find the center of the circle.
- b) What is the radius of the circle?
- c) Write down the equation of the circle.
- d) Prove that circle passes through the point B .

52. The line joining the points with coordinates $(4,-3)$ and $(0,1)$ is drawn

- a) What is the length of this line?
- b) What are the coordinates of the midpoint of this line?
- c) What is the equation to determine the X coordinate of the points where this circle intersects the X -axis? find the coordinates of these points using this equation.

SOLIDS

- What is the slope of a square pillar 24 cm by 1 foot and a height of 9 cm?
(8 cm, 12 cm, 15 cm, 24 cm)
- What is the height of a square pyramid if all its edges are equal, one edge is 12 cm?
(6 cm, $6\sqrt{2}$ cm, 12 cm, $12\sqrt{2}$ cm)
- What is the height of a cone if its radius and slant height are 6 cm and 10
(4 cm, 6 cm, 8 cm, 10 cm)
- What is the ratio of the radius and slant height of a cone made from a semicircle?
(1: 2, 2: 1, 2: 3, 3: 2)
- If the base perimeter of a tent in the shape of square pyramid is 80 m and 26 m .
 - What is the slant height of the tent?
 - How many square meters of tarpaulin sheet is required to cover the sides of the tent?
- In the figure, the dimensions of the lateral faces of a square pyramid are given.
Find the length of base edge and slant height.



- A cone is made from a sector of central angle 90° . The radius of the sector is 12 cm
 - What is the slant height of the cone?
 - Find the radius of the cone.
- What is the radius and center angle of the sector used to make a cone whose slant height is 20 cm and its radius is 10 cm?
- Meera made a square pyramid of base edge 10 cm and height 6 c.m. Manu made a square pyramid of base edge 5 cm and height 24 cm . Find the volumes of the two pyramids and compare them.

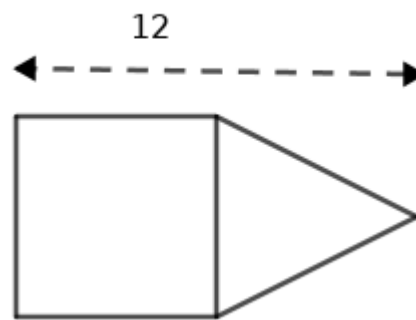
10. The ratio between the base edges of two square pyramids is 1: 2 .The ratio between their heights is 2:3. The volume of the first pyramid is 10 cubic cm .What is the volume of the second pyramid ?
11. A circular piece of paper with a radius 18 cm is divided into 9 equal sectors.
- What is the center angle of each sector ?
 - What is the slant height of a cone made from the sector ?
 - What is the curved area of the cone ?
- 12 If the radius and slope of a cone are 8 cm and 10 cm, respectively.
- Find the curved surface area of the cone.
 - Find the total surface area.
13. The lateral faces of a square pyramid are isosceles triangles. If the lateral edge is 20 cm,
- Find the total surface area of the column.
 - Find the volume.
14. The radius and height of a cylinder made of wax are 6 cm and 12 cm, respectively. If a cone of same radius and height is made from this,
- What is the volume of the cone ?
 - How many cones with a radius of 1 cm and a height of 12 cm can be made from the remaining wax?
15. The circumference of a circular pillar is 16π cm and its slope is 17 cm.
- What is the radius of the foot?
 - What is the height?
 - See volume.
16. Two hemispheres are joined together to form one sphere. The surface area of each hemisphere is 60 cc. What is the surface area of the sphere?
17. A hemisphere is fitted on one end of a cylinder and a cone to the other end. The common radius is 3 cm and total length is 15 cm.
- Draw an approximate picture and mark the dimensions.
 - What is the height of the cylinder?
 - Find the volume of this solid.
18. The ratio between the diameters of two hemispheres is 2: 5.
- Write the ratio of their radii.

b) The surface area of the second hemisphere is 50 sq. cm. Then calculate the surface area of the first hemisphere.

19. a) The radius of a solid sphere is 9 cm. Calculate surface area and volume of the sphere.
 b) This sphere is divided into two hemispheres. What is the surface area of the hemisphere?
 c) Find the volume of the hemisphere.

20. The total length of a given figure is 12 cm. The height and diameter of the cylinder is 6 cm each,

- a) Calculate the height of the cone.
 b) Calculate the volume of a given shape.



21. A solid is in the shape of a cone fitted to the flattened face of hemisphere. The height of the cone is equal to the diameter. It melts and make spheres with one-third the diameter of the hemisphere.

- a) What is the volume of the solid if the radius of the hemisphere is 'r'?
 b) What is the number of metal spheres?

22. A cone is made from an 8 cm semicircular paper. Calculate the slant height, circumference, radius, curved surface area and height of the cone.

23. (a) The radius of a solid sphere is 15 cm. Find the surface area and volume of the sphere. (b) If it is melted and made 9 solid spheres of the same size, what is the volume of a sphere?

- c) What is the radius of the small sphere?

24. A solid metal cone with radius 6 cm and height 24 cm is melted down to form eight spheres of the same size.

- (a) Find the volume of the cone.
 (b) What is the volume of a sphere?

- (c) What is the radius of the sphere?
- (d) What is the total surface area of the spheres?

Polynomials

1. Write the factors of the second degree polynomial $P(x) = x^2 - 1$
2. Write third degree polynomial for which $P(1)=0$, $P(2)=0$, $P(3)=0$
- 3 $P(x) = x^2 - 7x + 11$, Find the value of $P(2)$
- 4 $P(x) = x^2 - 5x + 7$. Find the remainder when $P(x)$ is divided by $(x + 3)$?

5. Choose the correct answer from the bracket
 If $(x-2)$ is a factor of the polynomial $P(x)$, then what is $P(2)$
 [2, -2, 0, 1]

6. Find the value of a , if $x + a$ is a factor of the polynomial $P(x) = x^3 + ax^2 - 2x + a + 4$
7. Write the polynomial $x^2 - 6x + 8$ as the product of two first degree polynomials.
8. Write the polynomial $x^2 - 4$ as the product of two first degree polynomials
9. If $P(x) = 2x^2 - 3x + 1$ then
 - a) What number is $P(1)$
 - b) Write a first degree polynomial which is a factor of $P(x)$
10.
 - a) If $(x-1)$ is a factor of $P(x) = x^2 + 2x + k$ What is k ?

 - b) Find the other first degree factor of the polynomial $P(x)$

11. Write down the second degree polynomial $P(x)$ with $P(2 + \sqrt{5}) = 0$ and $P(2 - \sqrt{5}) = 0$.
12. When the polynomial $2x^3 + kx^2 + 17x - 2$ is divided by $(x-2)$ and $(x-3)$ we get the same remainder.
 - a) Find the value of k .
 - b) Check whether $(x-1)$ is a factor of this polynomial.
13. The remainder on dividing $p(x) = 5x^2 + kx + 19$ by $(x-3)$ is -5
 - a) What is the number k ?
 - b) What is the remainder on dividing $p(x)$ by $(x-4)$?

- c) What number should be added to $p(x)$ to get a polynomial for which $(x-4)$ is a factor
14. If $(x-2)$ is a factor of the polynomial $3x^3-2x^2+Kx-6$, then what is the value of K ?
15. Consider the polynomial $p(x)=ax^3-x^2-bx-1$
- Find $p(1)$
 - What is the relation between a and b if $x-1$ is a factor of $p(x)$
 - What is the relation between a and b if $x+1$ is a factor of $p(x)$
 - Will, $p(x)$ have both $(x+1)$ and $(x-1)$ as factors for any numbers a and b ? Justify.
16. If $P(x) = x^2-7x+13$
- What is $P(3)$
 - Write the polynomial $P(x) - P(3)$
 - Write the polynomial $P(x) - P(3)$ as the product of two first degree polynomials
 - Find the solutions of the equation $P(x) - P(3) = 0$

Statistics

1. A cricket player taken scores from 6 matches are given below

10, 16, 20, 25, 28, 15

- a) Find the mean of the scores?
- b) If he scores 120 runs in the 7th match, then what is the mean?
- c) What is its median?

2. Find the mean and median of the measures given below

- a) 12, 10, 14, 11, 16, 11, 17, 18, 13, 11, 15
- b) 10, 20, 30, 40, 50, 60, 70, 80
- c) 30, 38, 39, 40, 32, 33, 37, 32.5, 31

3. The table below shows the number of children in a class sorted according to their heights

| Height | No. of children |
|---------|-----------------|
| 130-140 | 7 |
| 140-150 | 9 |
| 150-160 | 10 |
| 160-170 | 10 |
| 170-180 | 9 |

If the students are directed to stand in a line according to the order of their heights starting from the smallest, then

- a) The height of the child at what position is taken as the median?

b)What is the assumed height of the child in17th position?

c)Find the median height?

4)The weight of (in kg) 7 members in a family are given

48,14,75,52,66,26,18

Find the

(a)mean of their weight

(b)median of their weight

5)The marks achieved by a student in 10 subjects are given below

32,64,48,72,50,46,28,58,24,34

Find the median of the marks

6)Consider the natural numbers from 1 to 50

a)How many multiples of 7 are there ?

b)Find the mean of such numbers ?

c)Also find their median ?

7) The height of 17 students in a class are given below

| Height(cm) | Number of students |
|------------|--------------------|
| 153 | 2 |
| 154 | 1 |
| 156 | 3 |
| 157 | 2 |
| 159 | 3 |

| | |
|-----|---|
| 160 | 4 |
| 165 | 2 |

Calculate the median height

(8)The table below shows the workers in a factory according to their daily wages

| Daily wages | Number of workers |
|-------------|-------------------|
| 500 | 4 |
| 600 | 2 |
| 700 | 7 |
| 800 | 5 |
| 900 | 6 |
| 1000 | 4 |
| 1100 | 2 |

Calculate

- a) The median of daily wages
- b) How many of them have wages above median

9) The marks scored by 6 students in an examination with mean score 35 is given below.

26, 21, 32, x , 45, 48

- a) Find the value of X .
- b) What is the median score

10) The table below shows the students of a class sorted according to their scores in a test.

Score: 8, 15, 20, 24, 30, 40.

No. of students: 3, 7, 15, 9, 4, 4

- j) How many students score below 20?
- k) Find median score.

11) Daily wages of labourers in a company are given in the table below

| Wages | No. of labourers |
|----------|------------------|
| 200- 300 | 7 |
| 300- 400 | 15 |
| 400-500 | 10 |
| 500-600 | 13 |
| 600-700 | 4 |
| 700-800 | 4 |

a) Which labourer have median wage?

- b) What is the median class?
- c) What is the assumed wage of 23rd labourer?
- d) What is the median wage?

12) Score of 8 students got in an examination are given

10, 12, 16, 18, 20, 22, 24

- a) Find the mean score.
- b) Find the median of score.

13) Daily wages and no of some workers in a factory is given

| Daily wages. | No of workers |
|--------------|---------------|
| 300-400. | 9 |
| 400-500. | 10 |
| 500-600. | 10 |
| 600-700. | 8 |
| 700-800. | 5 |
| 800-900. | 3 |

- a) If the workers are arranged according to their wages of the worker at what position is taken as the median.
- b) Which is the median class
- c) Find the median wage.