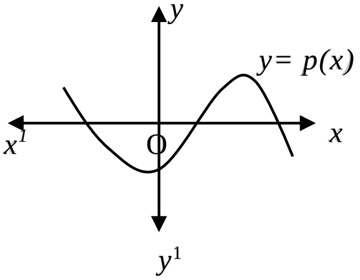
KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD,
6th CROSS, MALLESWARAM, BANGALORE – 560 003
STATE LEVEL SSLC PREPARATORY EXAMINATION,
FEBRUARY 2020
Subject: MATHEMATICS

[Date: 18.02.2020 **Code No. 81K**
Max. Marks: 80 **[Time: 9.30A.M. to 12.45P.M.**

I. In the following question four alternatives are given for each question choose and write the correct answer along with its alphabet. **1x8 = 8**

1. If 180 = $2^x \times 3^2 \times 5$ then the value of x is
(A) 1 (B) 2 (C) 3 (D) 4
Ans: (B) 2

2. In the figure a polynomial of $y = p(x)$ is represented through a graph , the number of zeroes of the polynomial is



(A) 4 (B) 2 (C) 3 (D) 1
Ans: (C) 3

3. The roots of the quadratic equation $x^2 + bx + c = 0$
(A) $x = \frac{-b\pm\sqrt{b^2-4c}}{2}$ (B) $x = \frac{-b\pm\sqrt{b^2+4c}}{2}$ (C) $x = \frac{-b+\sqrt{b^2+4c}}{2}$ (D) $x = \frac{b-\sqrt{b^2-4c}}{2}$
Ans: (A) $\boldsymbol{x = \frac{-b\pm\sqrt{b^2-4c}}{2}}$

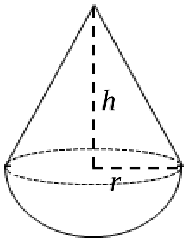
4. If $\sin\theta = \frac{3}{5}$ then the value of cosec θ is
(A) $\frac{5}{3}$ (B) $\frac{3}{5}$ (C) $\frac{3}{5}$ (D) $\frac{5}{4}$
Ans: (A) $\boldsymbol{\frac{5}{3}}$

5. The probability of certain event is
(A) 0 (B) 0.5 (C) 0.75 (D) 1
Ans: (D) 1

6. The corresponding sides of two similar triangles are in the ratio 1 : 4 then the ratio of their area is
(A) 1 : 2 (B) 1 : 16 (C) 1 : 4 (D) 16 : 1
Ans: (B) 1 : 16

7. The area of the sector which is $\frac{1}{4}$ th the area of circle of radius 'r' unit is
(A) $\frac{\pi r^2}{360}$ Sq.units (B) $\frac{\pi r^2}{90}$ Sq.units (C) $\frac{\pi r^2}{4}$ Sq.units (D) $\frac{\pi r^2}{2}$ Sq.units
Ans: (C) $\boldsymbol{\frac{\pi r^2}{4}}$ **Sq.units**

8. A cone is mounted on a hemisphere of radius 'r' cm and height 'h' cm then the volume of the solid is



(A) $\left(\frac{4}{3}\pi r^3 + \frac{1}{3}\pi r^2 h\right)$ cm^3 (B) $\left(\frac{1}{3}\pi r^3 + \pi r^2 h\right)$ cm^3

(C) $\left(\frac{3}{4}\pi r^3 + \frac{2}{3}\pi r^2 h\right)$ cm^3 (D) $\left(\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h\right)$ cm^3

Ans: (D) $\left(\boldsymbol{\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h}\right)$ cm^3

II. Answer the following questions: **1x8 =8**

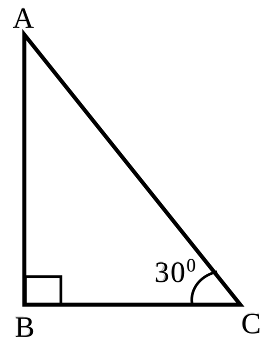
9. 4x + py + 8 = 0
4x + 4y + 2 = 0
are parallel to each other then find the value of p
If the lines are parallel then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
$\Rightarrow \frac{4}{4} = \frac{p}{4} \Rightarrow 4p = 16$
Ans: 4

10. In an A.P. $a_n = 3n + 2$ then find 12th term.
Ans: $a_n = 3n + 2$
$a_{12} = 3x12 + 2$
$a_{12} = 36 + 2$
$\boldsymbol{a_{12} = 38}$

11. Find the sum of the zeroes of the polynomial P(x) = 2x^2 – 9x + 10
Ans: Sum of the Zeores: $\alpha + \beta = \frac{-b}{a}$
$\alpha + \beta = \frac{-(-9)}{2} = \frac{9}{2}$

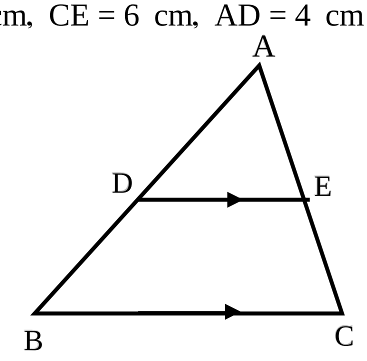
12. Find the value of $\frac{\sin 28^0}{\cos 62^0}$
Ans: $\frac{\sin 28^0}{\cos 62^0} = \frac{\sin 28^0}{\cos(90-28)^0}$
$= \frac{\sin 28^0}{\sin 28^0} = \mathbf{1}$

13. In ΔABC , AB$\perp$BC, $\angle$ABC = 30^0. AB = 15m, then find the length of BC.



Ans:
$\tan\theta = \frac{AB}{BC}$
$\tan 30^0 = \frac{AB}{BC}$
$\frac{1}{\sqrt{3}} = \frac{15}{BC} \Rightarrow BC = 15\sqrt{3}$ m

14. In figure DE$\parallel$BC, AE= 3cm, CE = 6 cm, AD = 4 cm , then find the length of AB



Ans: $\frac{AB}{AD} = \frac{AC}{AE}$
$\frac{AB}{4} = \frac{9}{3}$
$\frac{AB}{4} = \frac{4x9}{3} = \frac{36}{3} = 12$cm

15. Write the number of tangent that can be drawn to a circle at any point on it.
Ans: 1

16. Write the formula to find the total surface area of a frustum of a cone.
Ans: $\pi l(r_1 + r_2) + \pi r_1^2 + \pi r_2^2$

YK

III. Answer the following questions: **8x2 =16**

17. Solve the following pair of linear equations:

$3x + 2y = 11$

$5x - 2y = 13$

Ans:

$3x + 2y$	$= 11$	------------ (1)
$5x - 2y$	$= 13$	------------ (2)
$8x$	$= 24$	----(1) + (2)

$\Rightarrow$ $\boldsymbol{x = 3}$

Substitute $x = 3$ in Equation (1) we get,

$3\text{x}3 + 2y = 11$

$\Rightarrow 9 + 2y = 11$

$\Rightarrow 2y = 11 - 9$

$\Rightarrow 2y = 2$

$\Rightarrow \mathbf{y = 1}$

18. Find the sum of first 20 terms of A.P. 3, 7, 11, 15 . . . using the formula.

Ans: $S_n = \frac{n}{2}[2a + (n - 1)d]$

Here, n = 20, d = 4, a = 3

$S_{20} = \frac{20}{2}[2\text{x}3 + (20 - 1)4]$

$S_{20} = 10 [6 + (19) 4]$

$S_{20} = 10 [6 + 76]$

$S_{20} = 10 [82]$

$\mathbf{S_{20} = 820}$

19. Find the discriminant of the quadratic equation $2x^2 + x + 4 = 0$, and hence find the nature of its roots.

Ans: The discriminant $\Delta = b^2 - 4ac$

$\Delta = 1^2 - 4\text{x}2\text{x}4$

$\Delta = 1 - 32$

$\Delta = \mathbf{-32}$

Here, $\boldsymbol{\Delta < 0}$**,** Therefore roots are imaginary.

20. Find the distance between the points A(8, 3) and B (2, 11) by using distance formula

Ans:

x_1	y_1	x_2	y_2
8	3	2	11

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

$d = \sqrt{(2 - 8)^2 + (11 - 3)^2}$

$d = \sqrt{(-6)^2 + (8)^2}$

$d = \sqrt{36 + 64}$

$d = \sqrt{100} = 10$ Units

21. A box contains 28 bulbs of which 7 bulbs are defective, a bulb is drawn randomly from the box. Find the probability of picking a non – defective bulb.

Ans: S = { Total number of Bulbs in the box }; A = { Number of bulbs those are non-defective}

n(S) = 28; n(A) = 21

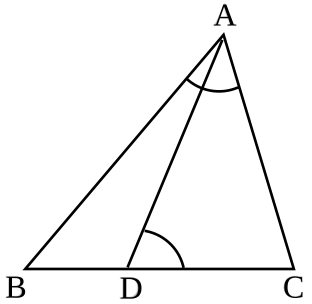
$P(A) = \frac{n(A)}{n(S)}$

$P(A) = \mathbf{\frac{21}{28}}$

YK

22. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB.CD$

Ans: In ΔABC and ΔADC,



$\angle BAC = \angle ADC$ (Given)

$\angle C = \angle C$ (Common)

$\therefore\ \Delta ABC \sim \Delta ADC$ (AA- Criteria)

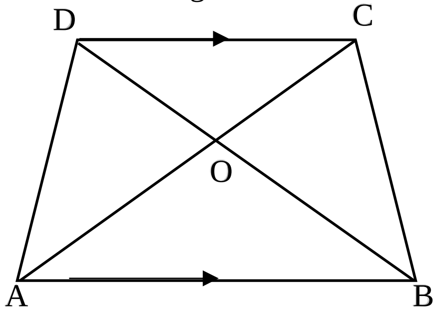
$\therefore\ \frac{CA}{CD} = \frac{CB}{CA}$

$\Rightarrow\ CA^2 = CB.\ CD$

OR

In a trapezium ABCD, AB||CD, AC and BD diagonals are intersecting at O. Prove that.

AO.OD = BO.OC



Ans: In ΔAOB and ΔCOD,

$\angle AOB = \angle COD$ (Vertically opposite angles)

$\angle ABO = \angle CDO$ (alternate angles)

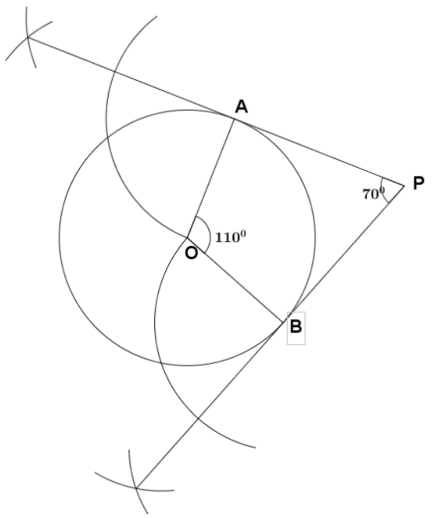
$\therefore\ \Delta AOB \sim \Delta COD$ (AA criteria)

$\therefore\ \frac{AO}{OC} = \frac{BO}{OD}$

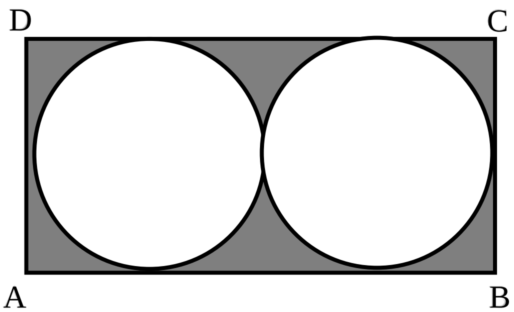
$\Rightarrow$ AO.OD = BO.OC

23. Draw a pair of tangents of a circle of radius 4 cm such that the angle between the tangents is 70^0

Ans:



24. In the figure two congruent circles touch each other externally and also touches the side of the rectangle ABCD. If AB = 28cm and BC = 14 cm, find the area of the shaded region.



Ans: The area of shaded region = Area of rectangle ABCD – Area of 2 circles

$= AB \times BC - 2\pi r^2$

$= 28 \times 14 - 2 \times \frac{22}{7}(7)^2$

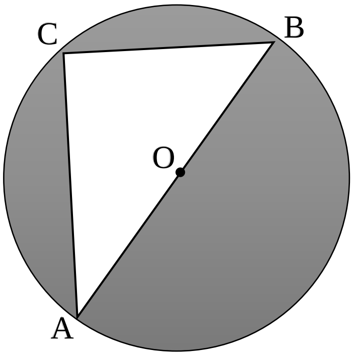
$= 392 - 308$

= **84 Sq.cm**

YK

OR

A right angled triangle of sides containing right angle are 6 cm and 8 cm is circumscribe in a circle with centre O of radius 5cm as shown in the figure. Find the area of the shaded region.



YK

Ans: Area of shaded region = Area of the circle – Area of right triangle

$= \pi r^2 - \frac{1}{2}$ x AC x BC

$= 3.14(5)^2 - \frac{1}{2}$ x 8 x 6

$= 3.14$ x $25 - 24$

$= 78.5 - 24$

$= \mathbf{54.5}$ **Sq.units**

IV. Answer the following questions: 3x9 =27

25. Prove that $\sqrt{3}$ is an irrational number.

Ans: Let us assume, to the contrary that $\sqrt{3}$ is a rational number

$\Rightarrow \sqrt{3} = \frac{p}{q}$ [p,q∈ Z, q ≠ 0 and (p,q)=1]

Here, p and q have no common factor other than 1

Now, $\sqrt{3} = \frac{p}{q} \Rightarrow \sqrt{3}q = p$

Squaring on both sides,

$(\sqrt{3}q)^2 = p^2$

$\Rightarrow 3q^2 = p^2$ ----------- (1)

$\Rightarrow$ 3 divides $p^2 \Rightarrow$ 3 divides p [by theorem]

$\therefore$ 3 is the factor of p

$\therefore$ Let p = 3m,

(1) $\Rightarrow 3q^2 = (3m)^2$

$\Rightarrow q^2 = 3m^2$

$\Rightarrow$3 divides $q^2 \Rightarrow$ 3 divides q [by theorem]

$\therefore$ 3 is the factor of q

$\therefore$ 3 is the common factor of both p and q

This is not possible.

$\therefore$ our assumption is wrong. $\therefore \sqrt{3}$ is an irrational number.

OR

Find the HCF of 135 and 75 by the prime factorisation,hence find the LCM of HCF(135,75) and 20

Ans:

135 = 3 x 3 x 3 x 5

75 = 3 x 5 x 5

$\therefore$ HCF of 135 and 75 = 3 x 5 = **15**

15 = 3 x 5

YK

$20 = 2 \times 2 \times 5$

$\therefore$ LCM of HCF $(135, 75)$ and $20 = 2 \times 2 \times 3 \times 5 = 60$

26. If two zeroes of the polynomial $p(x) = x^3 + 2x^2 - 9x - 18$ are 3 and -3, find other zero of the polynomial P(x).

Ans:

If 3 and -3 are the zeroes of $p(x) = x^3 + 2x^2 - 9x - 18$,

then $(x - 3), (x + 3)$ are the factors

$\therefore$ Dividing $p(x) = x^3 + 2x^2 - 9x - 18$ by $(x - 3)(x + 3) = x^2 - 9$, we get the third zero

$x^2 - 9$	$x^3 + 2x^2 - 9x - 18$ $x^3 \quad - 9x$	$x + 2$
	$0 + 2x^2 - 0 - 18$ $2x^2 \quad - 18$	
	0	

$\therefore$ $(x + 2)$ is the third factor

$\therefore$ The third zero of $p(x) = x^3 + 2x^2 - 9x - 18$ is **- 2**

OR

On dividing $p(x) = 3x^3 + x^2 + 2x + 5$ by polynomial $g(x)$, the quotient and remainder obtained are $(3x - 5)$ and $(9x + 10)$ respectively $g(x)$.

Ans: $p(x) = g(x).q(x) + r(x) \Rightarrow g(x) = \frac{p(x) - r(x)}{q(x)}$

$\Rightarrow g(x) = \frac{3x^3 + x^2 + 2x + 5 - (9x + 10)}{3x - 5}$

$\Rightarrow g(x) = \frac{3x^3 + x^2 + 2x + 5 - 9x - 10)}{3x - 5}$

$\Rightarrow g(x) = \frac{3x^3 + x^2 - 7x - 5}{3x - 5}$

$3x - 5$	$3x^3 + x^2 - 7x - 5$ $3x^3 - 5x^2$	$x^2 + 2x + 1$
	$+ 6x^2 - 7x$ $+ 6x^2 - 10x$	
	$+ 3x - 5$ $+ 3x - 5$	
	0	

$\Rightarrow g(x) = x^2 + 2x + 1$

27. Prove that $\frac{\cos\theta}{1 - \tan\theta} + \frac{\sin\theta}{1 - \cot\theta} = \sin\theta + \cos\theta$.

Ans:

$\frac{\cos\theta}{1 - \tan\theta} + \frac{\sin\theta}{1 - \cot\theta}$

$= \frac{\cos\theta}{1 - \frac{\sin\theta}{\cos\theta}} + \frac{\sin\theta}{1 - \frac{\cos\theta}{\sin\theta}}$

$= \frac{\cos\theta}{\frac{\cos\theta - \sin\theta}{\cos\theta}} + \frac{\sin\theta}{\frac{\sin\theta - \cos\theta}{\sin\theta}}$

$= \frac{\cos^2\theta}{\cos\theta - \sin\theta} + \frac{\sin^2\theta}{\sin\theta - \cos\theta}$

$= \frac{\cos^2\theta}{\cos\theta - \sin\theta} - \frac{\sin^2\theta}{\cos\theta - \sin\theta}$

$= \frac{(\cos\theta + \sin\theta)(\cos\theta - \sin\theta)}{\cos\theta - \sin\theta}$

$= \cos\theta + \sin\theta$ OR $\sin\theta + \cos\theta$

OR

$$\frac{1+\cos\theta}{\sin\theta} - \frac{\sin\theta}{1+\cos\theta} = 2\cot\theta$$

Ans:

$$\frac{1+\cos\theta}{\sin\theta} - \frac{\sin\theta}{1+\cos\theta} = \frac{(1+\cos\theta)(1+\cos\theta) - \sin^2\theta}{\sin\theta(1+\cos\theta)}$$

$$= \frac{1+\cos^2\theta + 2\cos\theta - \sin^2\theta}{\sin\theta(1+\cos\theta)}$$

$$= \frac{\cos^2\theta + 2\cos\theta + \cos^2\theta}{\sin\theta(1+\cos\theta)} \quad [\,1 - \sin^2\theta = +\cos^2\theta]$$

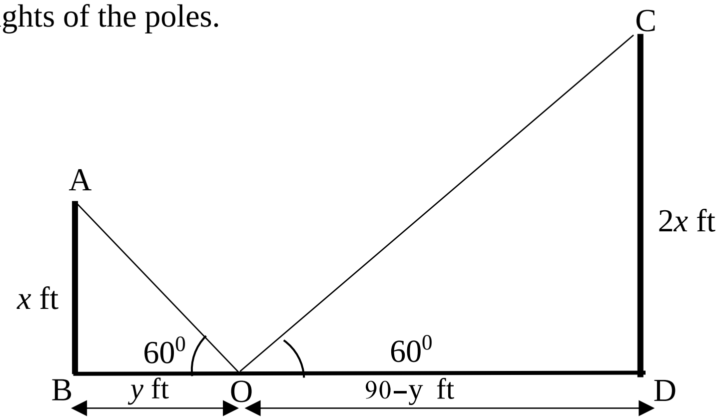
$$= \frac{2\cos^2\theta + 2\cos\theta}{\sin\theta(1+\cos\theta)}$$

$$= \frac{2\cos\theta(1+\cos\theta)}{\sin\theta(1+\cos\theta)}$$

$$= \frac{2\cos\theta}{\sin\theta}$$

$$= 2\cot\theta$$

28. A man observes two vertical poles which are fixed opposite to each other on either side of the road. If the width of the road is 90 feet and heights of the pole are in the ratio 1 : 2, also the angle of elevation of their tops from a point between the line joining the foot of the poles on the road is 60^0. Find the heights of the poles.



Ans:

In ΔAOB, $\tan 60 = \frac{AB}{OB}$

$\Rightarrow \sqrt{3} = \frac{x}{y}$

$\Rightarrow x = \sqrt{3}y$ ------- (1)

In ΔCOD, $\tan 60 = \frac{CD}{OD}$

$\Rightarrow \sqrt{3} = \frac{2x}{90-y}$

$\Rightarrow 2x = \sqrt{3}(90 - y)$

$\Rightarrow x = \frac{\sqrt{3}(90-y)}{2}$

$\Rightarrow \sqrt{3}\,y = \frac{\sqrt{3}(90-y)}{2}$

$\Rightarrow y = \frac{90-y}{2}$

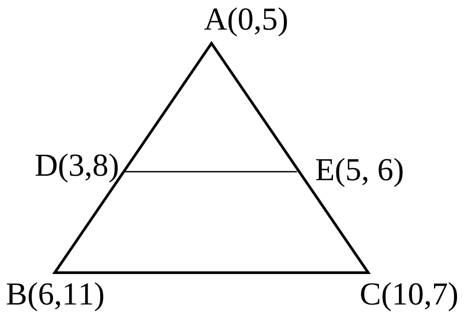
$\Rightarrow 2y = 90 - y$

$\Rightarrow 3y = 90 \Rightarrow y = 30$

$\therefore x = 30\sqrt{3}$ ft and $2x = 60\sqrt{3}$ ft

29. A (0, 5), B (6, 11), and C (10 , 7) are the vertices a ΔABC, D and E are the mid – points of AB and AC respectively. Then find the area of ΔADE

Ans:



Mid-Point Formula: P(x,y) = $\left(\frac{x_2+x_1}{2} + \frac{y_1+y_2}{2}\right)$

Coordinates of D: $\left(\frac{6+0}{2}, \frac{11+5}{2}\right) = (3, 8)$

Coordinates of E: $\left(\frac{10+0}{2}, \frac{7+5}{2}\right) = (5, 6)$

Area of the triangle A = $\frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

x_1	y_1	x_2	y_2	x_3	y_3
0	5	3	8	5	6

Areaof ΔADE = $\frac{1}{2}[0 + 3(6 - 5) + 5(5 - 8)]$

= $\frac{1}{2}[0 + 3(1) + 5(-3)]$ YK

= $\frac{1}{2}[0 + 3 - 15]$

= $\frac{1}{2}[-12]$

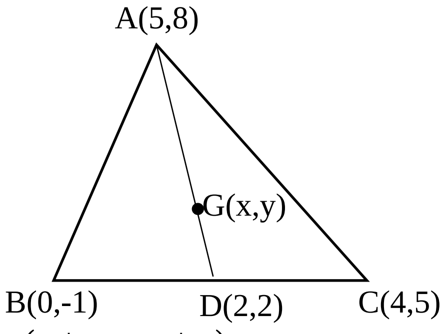
= -6

∴ **Area of triangle = 6 Sq units**

Or

A (5 , 8), B (0, -1) ಮತ್ತು C (4, 5) are the vertices of a ΔABC. AD is the median and 'G' is a point on AD such that AG : GD = 2 : 1 Find the co-ordinate of the point G.

Ans:



Mid-Point Formula: P(x,y) = $\left(\frac{x_2+x_1}{2} + \frac{y_1+y_2}{2}\right)$

Co ordinates of D: $\left(\frac{4+0}{2}, \frac{5-1}{2}\right)$ = (2, 2) [D is the mid point of BC]

G divides AD in the ratio 2 : 1, therefore using section formula,

G(x,y) = $\left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$

$m_1 = 2, m_2 = 1, x_1 = 5, x_2 = 2, y_1 = 8, y_2 = 2$

G(x,y) = $\left[\frac{2(2)+1(5)}{2+1}, \frac{2(2)+1(8)}{2+1}\right]$

G(x,y) = $\left[\frac{4 + 5}{3}, \frac{4 + 8}{3}\right]$

G(x,y) = $\left[\frac{9}{3}, \frac{12}{3}\right]$

G(x,y) = (3, 4)

YK

30. Find the median of the following data.

C.I.	50 - 60	60 – 70	70 - 80	80 - 90	90- 100
freequency	12	14	8	6	10

Ans:

C.I.	f	cf
50 - 60	12	12
60 – 70	14	26
70 - 80	8	34
80 - 90	6	40
90- 100	10	50

Now, $\frac{n}{2} = \frac{50}{2} = 25$ which is in the class interval 60 - 70

∴ $l = 60$, $cf = 12$, $f = 14$, h = 10

Median $= l + \frac{\left(\frac{n}{2} - cf\right)}{f}$ x h

$= 60 + \frac{(25 - 12)}{14}$ x 10

$= 60 + \frac{13}{14}$ x 10

$= 60 + \frac{130}{14} = 60 + 9.28$

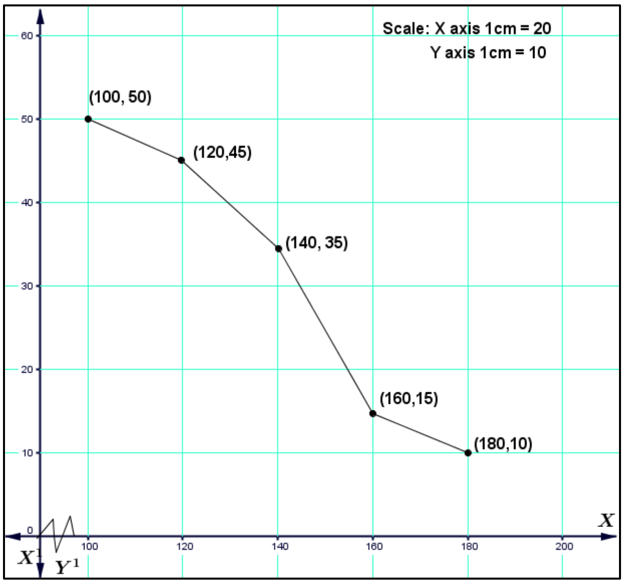
$\mathbf{= 69.28}$

31. The following distribution gives the daily income of 50 workers of . Draw its more than type ogive.

Daily income in rupees	120 - 140	140 - 160	160 - 180	180 - 200
Number of workers	10	20	5	10

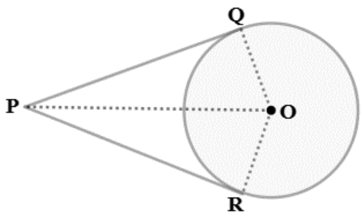
Ans:

C.I.	cf
More than 100	50
More than 120	45
More than 140	35
More than 160	15
More than 180	10



32. Prove that the tangents drawn to a circle from an external point are equal.

Data: PQ and PR are the tangents drawn from an external point to a circle of center O. Join OA,OB and OP



To Prove: PQ = PR

Proof : In right angle triangle OQP and ORP,

OQ = OR (Radius of the same circle)

OP = OP (Common)

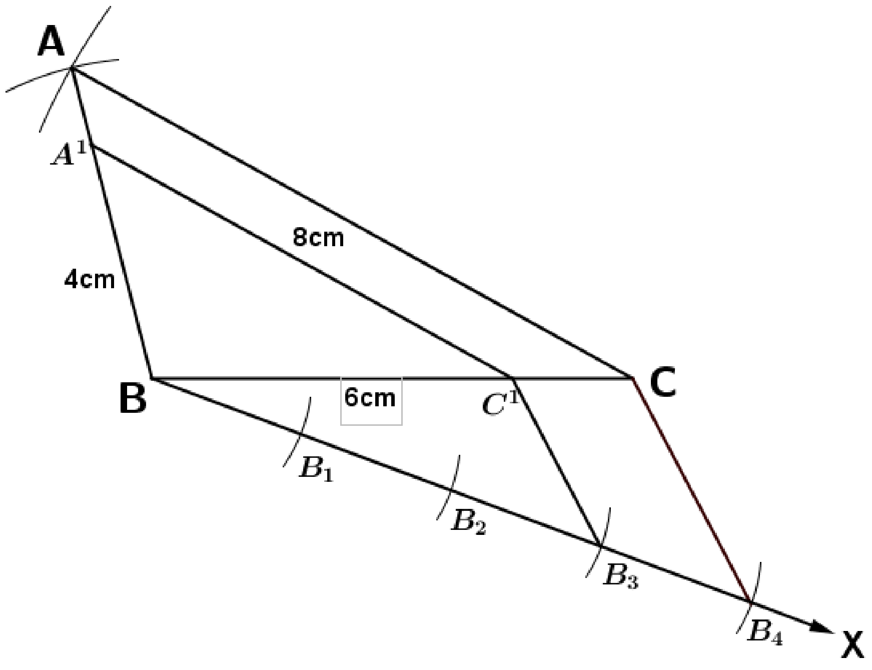
∴ ΔOQ P ≅Δ ORP (RHS)

∴ PQ = PR (CPST)

YK

33. Draw a triangle with sides 4 cm, 6 cm, and 8 cm and then construct an another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the first triangle.

Ans:



YK

V. Answer the following question: **4x4 =16**

34. The first term of two A.P.s are equal and the ratios of the common differences is 1 : 2 If the 7th term of first A.P. and 21st term of second are 23 and 125 respectively. Find two A.P.s .

Ans:

Let a, d are the first term and c.d. of First AP, A and D are the first term and c.d. of second AP

a = A; D = 2d; $a_7 = 23$, $A_{21} = 125$

$a_7 = 23$

$\Rightarrow a + 6d = 23$ ------- (1)

$A_{21} = 125$

$\Rightarrow A + 20D = 125$

$\Rightarrow a + 40d = 125$ ------ (2)

(1) – (2)

(1)	$\Rightarrow$ a + 6d	= 23
(2)	$\Rightarrow$ a + 40d	= 125
(1)-(2) $\Rightarrow$	- 34d	= -102

$\Rightarrow$ **d = 3**

substitute d = 3 in equation (1) we get,

$a + 6(3) = 23$

$\Rightarrow a = 23 - 18$

$\Rightarrow$ **a = 5** and **D = 2x 3 = 6**

$\therefore$ The required APs : 5, 8, 11 . . . and 5, 11, 17. . .

35. Sanvi purchased some books for Rs 120. If she purchased 3 more books for the same amount each book would have cost her Rs.2 less. Find the number of books purchased by Sanvi and the price of each book.

Ans: Let the number of books be 'x' ,

$\frac{120}{x} - \frac{120}{x+3} = 2$

$120(x + 3) - 120x = 2x(x + 3)$

$120x + 360 - 120x = 2x^2 + 6x$

$360 = 2x^2 + 6x$

$2x^2 + 6x - 360 = 0$
$x^2 + 3x - 180 = 0$
$x^2 + 15x - 12x - 180 = 0$
$x(x + 15) - 12(x + 15) = 0$
$(x + 15)(x - 12) = 0$; $(x + 15)$ is not possible
$\therefore$ $(x - 12) = 0 \Rightarrow x = 12$

The number of books $= 12$ and the cost of each book $= \frac{120}{12} = 10$ Rs

Or

A motor boat goes down the stream 30km and again returns to the starting point in a total time of 4 hours and 30 minutes. If the speed of the stream is 5km/hr, then find the speed of the motor boat in still water.

Ans:

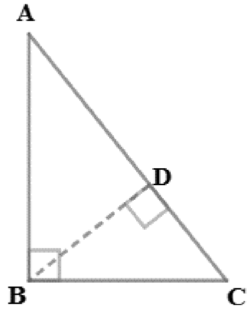
Let the speed of the motor boat in still water $= x$ km/h
The Spead of the boat downstream $= (x + 5)$km/h
The spead of the boat Upstream $= (x - 5)$km/h
The time taken by the boat Upstream $= \frac{30}{x-5}$ hour
The time taken by the boat downstream $= \frac{30}{x+5}$ hour

$\frac{30}{x-5} + \frac{30}{x+5} = \frac{9}{2}$.

$30(x + 5)2 + 30(x - 5)2 = 9(x + 5)(x - 5)$
$60x + 300 + 60x - 300 = 9x^2 - 225$
$120x = 9x^2 - 225$
$3x^2 - 40x - 75 = 0$
$3x^2 - 45x + 5x - 75 = 0$
$3x(x - 15) + 5(x - 15) = 0$
$(3x + 5)(x - 15) = 0$; $(3x + 5)$ is not possible
$\therefore$ $x - 15 = 0 \Rightarrow x = 15$
$\therefore$ Speed of the motor boat in still water $= 15$ km/h

36. Prove that"In a right angles triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides"

Ans:



Data: In $\triangle ABC$, $\angle B = 90^0$

To prove: $AC^2 = AB^2 + BC^2$

Construction: Draw $BD \perp AC$

Proof: $\Delta ADB \sim \Delta ABC$ ($\because$ Theorem 2.7)

$\therefore \frac{AD}{AB} = \frac{AB}{AC}$ ($\because$ the sides are in same ratio)

or $AD.AC = AB^2$ ----------(1)

but $\Delta BDC \sim \Delta ABC$ ($\because$ theorem 2.7)

$\therefore \frac{CD}{BC} = \frac{BC}{AC}$

or $CD.AC = BC^2$ ----------(2)

Adding (1) and (2) we get,

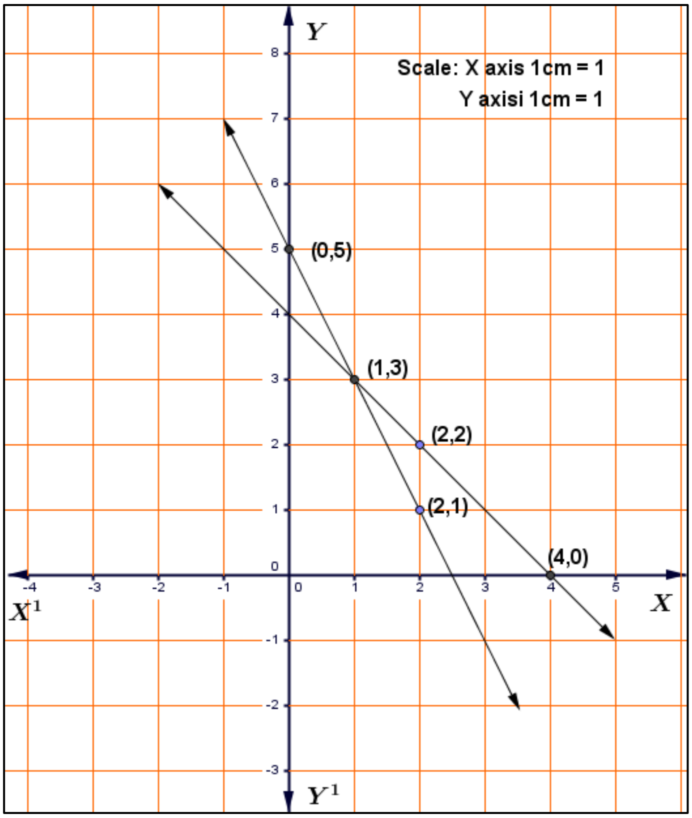
$AD.AC + CD.AC = AB^2 + BC^2$
or $AC(AD+CD) = AB^2 + BC^2$
or $AC \times AC = AB^2 + BC^2$
$\Rightarrow$ $AC2 = AB^2 + BC^2$

37. Solve the following pair of linear equations graphically.

Ans:

$2x + y = 5$

$x + y = 4$



$2x + y = 5$

x	1	2	0
y	3	1	5

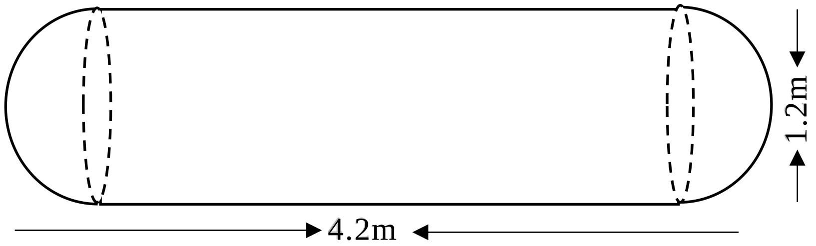
$x + y = 4$

x	0	2	1
y	4	2	3

solution: $x = 1$; $y = 3$

V. Answer the following questions: 1x5 =5

38. A social welfare association decides to supply drinking water for the flood affected people. The drinking water is filled in a water tanker which is in the shape of a cylinder with hemispherical end as shown in the figure. The whole length of the tanker is 4.2 metre and the diameter of base of the cylinder and two hemispheres are each 1.2m. If they distribute drinking water to 60 people in a container each is in the shape of a cylinder of radius 21cm and height 50cm. Find the quantity of water left in the tanker after distribution in liter. $\left(\pi = \frac{22}{7}\right)$



Ans:

Volume of the Tanker = Volume of the cylindee + Volume of 2 hemisphere

$= \pi r^2 h + \frac{4}{3}\pi r^3 = \pi r^2[h + \frac{4}{3}r]$

$= \frac{22}{7} \times 0.6 \times 0.6\ [3 + \frac{4}{3} \times 0.6] = \frac{22}{7} \times 0.36\ [3.8] = 4.299\ m^3$

Volume of 60 cylindrical vessels = $60\ \pi r^2 h$

$= 60 \times \frac{22}{7} \times 21 \times 21 \times 50 = 60 \times \frac{22}{7} \times 441 \times 50$

$= 415800\ cm^3 = 4.158\ m^3$

The quantity of water left in the tanker after distribution is

$= 4.299 - 4.158 = 0.141\ m^3$

$= 141$ Ltr

YK
