Basic Maths 18 (E)

## Section : A

| | | | |
|---|---|---|---|
| 1) | (B) | 13.5 [For Blind students] (C) 2 | (1) |
| 2) | (C) | 2 | (1) |
| (3) | (D) | 28 | (1) |
| (4) | (B) | 5 | (1) |
| (5) | (D) | 1 | (1) |
| (6) | (A) | 27 | (1) |
| (7) | | 0 | (1) |
| (8) | | 5 | (1) |
| (9) | | 6 | (1) |
| (10) | | $\frac{1}{2}$ | (1) |
| (11) | | 0 | (1) |
| (12) | | 3 | (1) |
| (13) | | ✓ | (1) |
| (14) | | ✗ | (1) |
| (15) | | ✓ | (1) |
| (16) | | ✓ | (1) |
| (17) | | Not A.P. | (1) |
| (18) | | infinite | (1) |
| (19) | | 0.35 | (1) |
| (20) | | 3 - 5 | (1) |
| (21) | (C) | $2\pi rh$ | (1) |
| (22) | (a) | $\frac{1}{3}\pi r^2 h$ | (1) |
| (23) | (b) | $2\pi r$ | (1) |
| (24) | (C) | $\frac{\pi r^2 \theta}{360}$ | (1) |

# Section - B

Answer the following questions with Calculation : (Any 9) [18]
(Questions : 25 to 37) [2 marks each]

25) $x^2 - x - 20 = 0$

$x^2 - 5x + 4x - 20 = 0$ ← (0.5)

$x(x-5) + 4(x-5) = 0$ ← (0.5)

$(x+4)\ (x-5) = 0$

$x + 4 = 0$ or $x - 5 = 0$

$\boxed{x = -4}$ ← (0.5m) or $\boxed{x = 5}$ ← (0.5)

∴ zeroes of $x^2 - x - 20$ are $-4$ & $5$

26) Sum of zeroes

$\alpha + \beta = -3$ ← (0.5)

Product of zeroes

$\alpha\beta = 2$ ← (0.5)

Quadratic polynomial

$p(x) = k(x^2 - (\alpha+\beta)x + \alpha\beta)$

$k \neq 0$

$= k(x^2 - (-3)x + 2)$

$= k(x^2 + 3x + 2)$

∴ The quadratic polynomial is $k(x^2 + 3x + 2)$ ← (1)

27) Quadratic Polynomial

$p(x) = 6x^2 + 37x - (P-2)$

Comparing with $ax^2+bx+c$

$a=6$

$b=37$

$c=-(P-2)$

One root is inverse of the other root

$\therefore \alpha = \frac{1}{\beta}$ ← (0.5)

$\alpha\beta = 1$

$\therefore c/a = 1$ ← (0.5)

$\therefore \frac{-(P-2)}{6} = 1$

$\therefore P+2 = 6$

$\therefore P = 6-2$

$\therefore \boxed{P = -4}$ ← (1)

$\therefore$ Value of $P$ is $-4$

28) A.P : 2, 7, 12, ....

$a = 2$

$d = a_2 - a_1$ ← (0.5)

$= 7-2 = 5$

$d = 5$

$a_n = a + (n-1)d$ ← (0.5)

$a_{20} = 2 + (20-1)5$

$= 2 + (19)(5)$

$= 2 + 95$ ← (0.5)

$a_{20} = 97$ $\leftarrow (0.5)$

$\therefore$ $20^{th}$ Term is 97

29) given integers : 51, 52, 53, .... 100

$a = 51$, $d = 52 - 51 = 1$

$\therefore a_n = 100$

$a_n = a + (n-1)d$ $\leftarrow (0.5)$

$100 = 51 + (n-1)1$

$100 - 51 = n - 1$

$49 = n - 1$

$\boxed{50 = n}$ $\leftarrow (0.5)$

$S_n = \frac{n}{2}(a + l)$ $\leftarrow (0.5)$

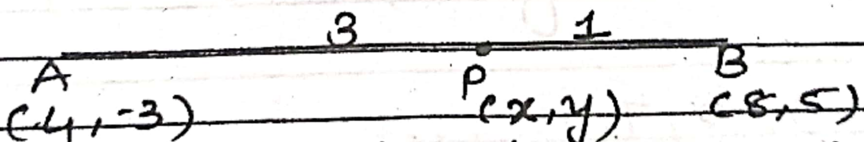
$= \frac{50}{2}(51 + 100)$

$= 25 \times 151$

$= 3775$ $\leftarrow (0.5)$

$\therefore$ Sum of all integers from 51 to 100 is 3775

30)




Point P(x,y) divides A(4,-3) and B(8,5) in the ratio 3:1 internally.

$(x, y) = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$ $\leftarrow (0.5)$

$= \left(\frac{3(8) + 1(4)}{3+1}, \frac{3(5) + 1(-3)}{3+1}\right)$ $\leftarrow (0.5)$

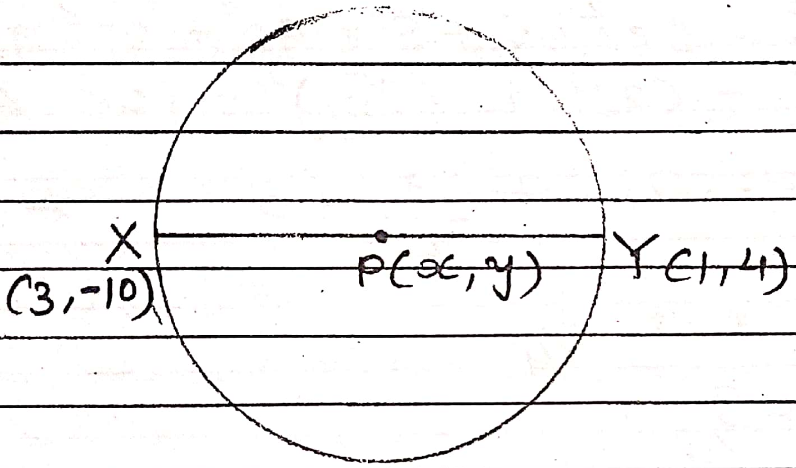
$$= \left(\frac{24+4}{4}, \frac{15-3}{4}\right)$$ ← (0.5)

$$= \left(\frac{28}{4}, \frac{12}{4}\right)$$

$$= (7, 3)$$ ← (0.5)

Coordinates of the point is (7,3)

(31)




If the coordinates of point P = (x,y)

$$(x,y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$ ← (0.5)

$$= \left(\frac{3+1}{2}, \frac{-10+4}{2}\right)$$ ← (0.5)

$$= \left(4/2, -6/2\right)$$ ← (0.5)

$$= (2, -3)$$ ← (0.5)

∴ Coordinates of P(x,y) = (2,-3)

(32) $\cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1$

$L.H.S. = \cos^2\theta - \sin^2\theta$

$= \cos^2\theta - (1-\cos^2\theta)$ ← (1)

$= \cos^2\theta - 1 + \cos^2\theta$ ← (0.5)

$= 2\cos^2\theta - 1$ ← (0.5)

$= R.H.S.$

$\therefore L.H.S. = R.H.S.$

(33) $4\cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + \cos^2 90^\circ$

$= 4(1)^2 - (2)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + (0)^2$ ← (1)

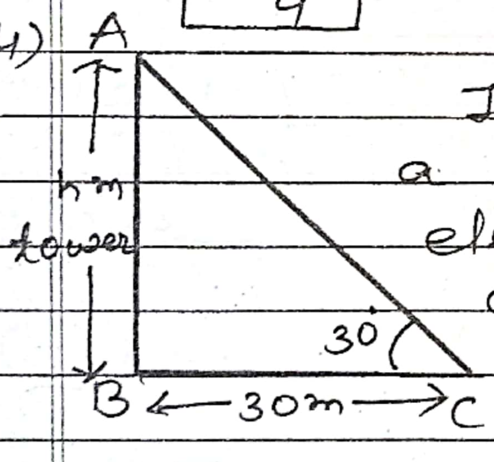
$= 4 \times 1 - 4 + \frac{3}{4} + 0$ ← (0.5)

$= 4 - 4 + 3/4$

$= 0 + 3/4$

$= \boxed{3/4}$ ← (0.5)

(34)




In the figure AB is a tower. Angle of elevation of the top of a tower from a point (C) on the ground is 30°. ← (0.5m)(fig)

$\angle ACB = 30^\circ \quad \therefore BC = 30\,m$

In $\triangle ABC$ $\therefore \tan 30^\circ = \frac{AB}{BC} = \frac{h}{30}$ ← (0.5)

$\frac{1}{\sqrt{3}} = \frac{h}{30} \quad \therefore h = \frac{30}{\sqrt{3}}$

$$h = \frac{30 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{30\sqrt{3}}{3} \leftarrow (0.5)$$

$$h = \boxed{10\sqrt{3}} \leftarrow (0.5)$$

$\therefore$ The height of the tower is $10\sqrt{3}$ m

[For Blind Students Only]

(34) Define the terms :-

(i) The angle of elevation :-
The angle between a horizontal line and a line of sight to an object above the line.
[ (1m)

(ii) The angle of depression:-
The angle between a horizontal line and a line of sight to an object below the line.
[ (1m)

(35) Edge (side) of a cube $(x)$ = 6 cm

$\therefore$ T.S.A. of a cube $= 6x^2 \leftarrow (0.5m)$

$= 6(6)^2 \leftarrow (0.5m)$

$= 6(36) \leftarrow (0.5m)$

$= 216 \text{ cm}^2 \leftarrow (0.5m)$

$\therefore$ Total Surface Area of a Cube is $\boxed{216}$ cm$^2$.

(36) The height of a cone (h) = 6 cm
Diameter of a base of it = 5 cm

$d = 2r$

$5 = 2r$

$\therefore r = 5/2 = 2.5$ cm

By pythagoras

$l^2 = h^2 + r^2$ ← (0.5m)

$= (6)^2 + (2.5)^2$ ← (0.5m)

$= 36 + 6.25$

$l^2 = 42.25$ ← (0.5m)

$\therefore l = \sqrt{42.25}$

$\boxed{l = 6.5 \text{ cm}}$ ← (0.5m)

∴ The Slant height of a cone is 6.5 cm

(37) For the frequency distribution
$l = 40$, $f_1 = 7$, $f_0 = 3$, $f_2 = 6$ and $h = 15$

$$\text{Mode } (Z) = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$ ← (0.5m)

$$= 40 + \left(\frac{7-3}{2\times7-3-6}\right) \times 15$$ ← (0.5m)

$$= 40 + \left(\frac{4}{14-9}\right) \times 15$$

$$= 40 + \frac{4}{5} \times \overset{3}{\cancel{15}}$$ ← (0.5m)

$= 40 + 12$

$= 52$

∴ The Mode is $\boxed{52}$ ← (0.5m)

## SECTION C

Answer any 6 from 38 to 46 [18]

38. Suppose Alok has $x$ pigeons and $y$ cows.

$\therefore$ Pigeons has $2x$ eyes and cows has $2y$ eyes

$$\therefore \quad 2x + 2y = 120$$
$$\therefore \quad 2(x+y) = 120$$
$$\therefore \quad x + y = 60 \quad \text{---- eq}^n (1) \quad \text{— } (0.5)$$

Now, Pigeons has $2x$ legs and cows has $4y$ legs

$$\therefore \quad 2x + 4y = 180$$
$$\therefore \quad 2(x + 2y) = 180$$
$$\therefore \quad x + 2y = 90 \quad \text{..... eq}^n (2) \quad \text{— } (0.5)$$

eq$^n$ (1) − eq$^n$ (2)

$$\therefore \quad \cancel{x} + y = 60$$
$$\underset{-}{\cancel{x}} \underset{-}{+} 2y = \underset{-}{90}$$

$$-y = -30$$

$\therefore \boxed{y = 30}$ (1)

Substitute $y = 30$ in eq$^n$ (1)

$$x + 30 = 60$$
$$\therefore x = 60 - 30$$
$$\therefore \boxed{x = 30}$$ (1)

$\therefore$ Alok has 30 pigeons and 30 cows

NOTE: Marks are to be given for substitution method also.

39. Eq$^n$ (1) $\rightarrow$ $x + y = 5$ by elimination method.
Eq$^n$ (2) $\rightarrow$ $2x - 3y = 4$

Eq$^n$ (1) $\times$ 2

$$2x + 2y = 10 \quad \text{--- eq}^n(3)$$ (1)

Eq$^n$ (3) $-$ Eq$^n$ (2)

$$\cancel{2x} + 2y = 10$$
$$\cancel{2x} - 3y = 4$$
$$- \quad + \quad -$$
$$5y = 6$$

$$\therefore \boxed{y = \frac{6}{5}}$$ (1)

Substitute $y = \frac{6}{5}$ in $eq^n$ (1)

$$x + \frac{6}{5} = 5$$

$$\therefore x = 5 - \frac{6}{5}$$

$$\therefore = \frac{25-6}{5}$$

$$\therefore \boxed{x = \frac{19}{5}}$$ (1)

40. $S_7 = \frac{n}{2}[2a + (n-1)d] = 49$ (0.5)

$$\therefore \frac{7}{2}[2a + 6d] = 49$$ (0.5)

$$\therefore \frac{1}{2} \times 2(a + 3d) = 7$$

$$\therefore a + 3d = 7 \quad \text{.....} \; eq^n (1)$$ (0.5)

$$S_{17} = \frac{n}{2}[2a + (n-1)d] = 289$$

$$\therefore \frac{17}{2}[2a + 16d] = 289$$

$$\therefore \frac{1}{2} \times 2(a + 8d) = 17$$

$$\therefore a + 8d = 17 \quad \text{......} \; eq^n (2)$$ (0.5)

$Eq^n (1) - Eq^n (2)$

$$\cancel{a} + 3d = 7$$
$$\cancel{a} + 8d = 17$$
$$- \quad - \quad -$$

$$-5d = -10$$
$$d = \frac{-10}{-5}$$
$$\therefore \boxed{d = 2}$$

Substitute $d = 2$ in $eq^n (1)$

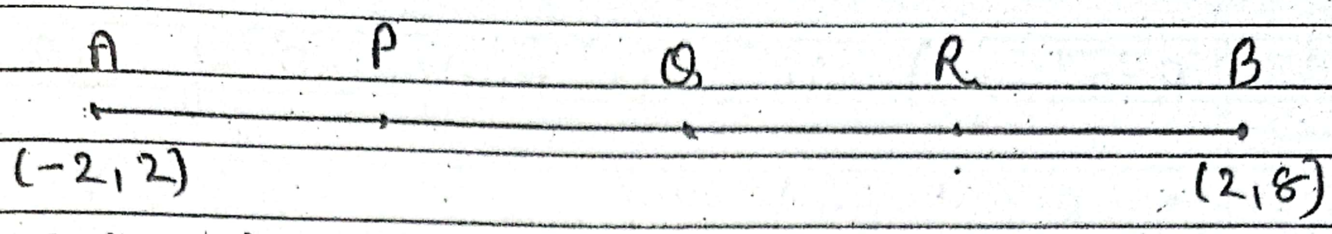
$$a + 3(2) = 7$$
$$\therefore a + 6 = 7$$
$$\therefore a = 7 - 6$$
$$\therefore \boxed{a = 1}$$

$$S_n = \frac{n}{2}[2a + (n-1)d] \quad \text{——— } (0.5)$$

$$\therefore S_{20} = \frac{20}{2}\left[2(1) + (19)(2)\right]$$
$$= 10[2 + 38]$$
$$= 10 \times 40$$

$$\therefore \boxed{S_{20} = 400} \quad \text{——— } (0.5)$$

41.




$Q(x, y)$ is the midpoint of AB

$$\therefore Q(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$= \left(\frac{-2 + 2}{2}, \frac{2 + 8}{2}\right)$$

$$= \left(\frac{0}{2}, \frac{10}{2}\right)$$

$$= (0, 5) \quad \text{---} \quad (1)$$

$P(x', y')$ is the midpoint of AB

$$\therefore P(x', y') = \left(\frac{-2 + 0}{2}, \frac{2 + 5}{2}\right)$$

$$= \left(\frac{-2}{2}, \frac{7}{2}\right)$$

$$= \left(-1, \frac{7}{2}\right) \quad \text{---} \quad (1)$$

$R(x'', y'')$ is the midpoint of QB

$\therefore R(x'', y'') = \left(\frac{0+2}{2}, \frac{5+8}{2}\right)$

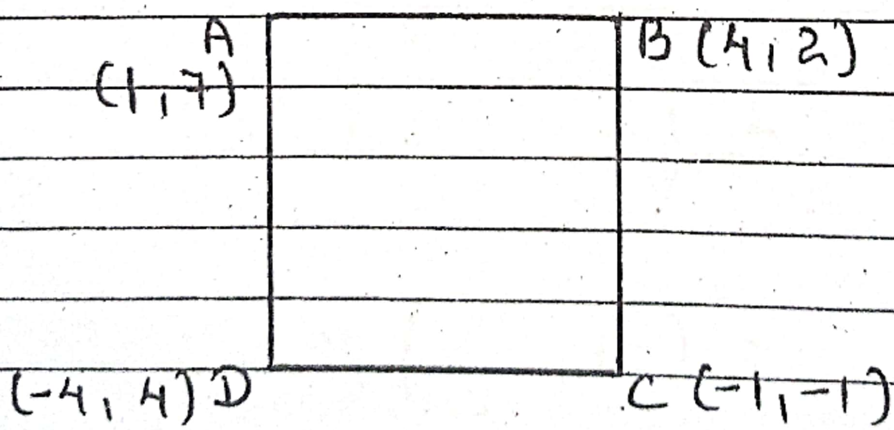
$= \left(\frac{2}{2}, \frac{13}{2}\right)$

$= \left(1, \frac{13}{2}\right)$ —— (1)

$\therefore$ The co-ordinates of the points are $\left(-1, \frac{7}{2}\right)$, $(0, 5)$ & $\left(1, \frac{13}{2}\right)$

NOTE: If the sum is done by any other appropriate method, then marks are to be given accordingly.

42.




$A(1,7)$, $B(4,2)$, $C(-1,-1)$ and $D(-4,4)$ are the vertices of square

By distance formula,

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

$\therefore AB = \sqrt{(4-1)^2 + (2-7)^2}$

$= \sqrt{(3)^2 + (-5)^2}$

$= \sqrt{9+25}$

$= \sqrt{34}$ (0.5)

$\therefore BC = \sqrt{(-1-4)^2 + (-1-2)^2}$

$= \sqrt{(-5)^2 + (-3)^2}$

$= \sqrt{25+9}$

$= \sqrt{34}$ (0.5)

$\therefore CD = \sqrt{(-4+1)^2 + (4+1)^2}$

$= \sqrt{(-3)^2 + (5)^2}$

$= \sqrt{9+25}$

$= \sqrt{34}$ (0.5)

$\therefore DA = \sqrt{(1+4)^2 + (7-4)^2}$

$= \sqrt{(5)^2 + (3)^2}$

$= \sqrt{25+9}$

$= \sqrt{34}$ ——— (0.5)

$\therefore AB = BC = CD = DA = \sqrt{34}$

$\therefore$ All 4 sides are equal

Now,

$AC = \sqrt{(-1-1)^2 + (-1-7)^2}$

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

$= \sqrt{4+64}$

$= \sqrt{68}$

& $BD = \sqrt{(-4-4)^2 + (4-2)^2}$

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

$= \sqrt{64+4}$

$= \sqrt{68}$

(0.5)

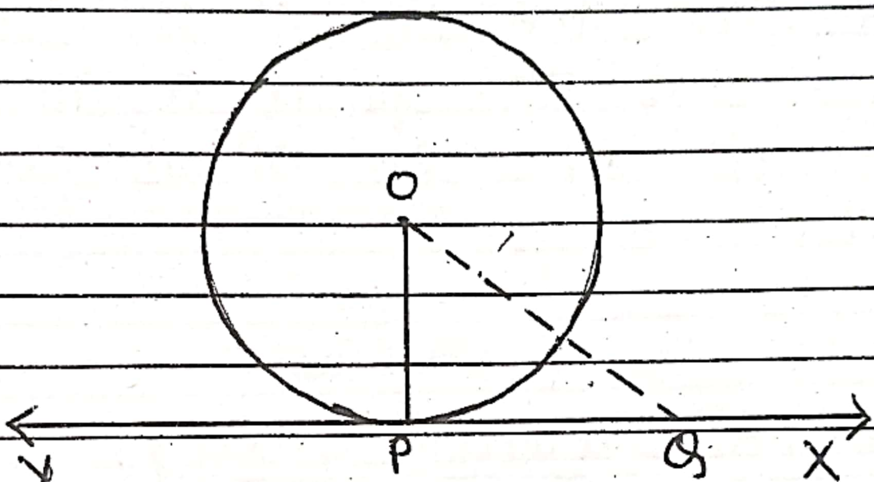
$\therefore$ $AC = BC = \sqrt{68}$

$\therefore$ Diagonals are equal.

As all 4 sides are equal and both diagonals are equal, it is a square.

— (0.5)

43. Theorem 10.1




— (0.5)

Proof : We are given a circle with centre O and a tangent XY to the circle at a point P. We need to prove that OP is perpendicular to XY.

— (0.5)

Take a point Q on XY other than P and join OQ (see figure)

The point Q must lie outside the circle. (Note that if Q lies inside the circle, XY will become a secant and not a tangent to the circle)

Therefore, OQ is longer than the radius OP of the circle. That is,

$$OQ > OP \quad \text{——— (1)}$$

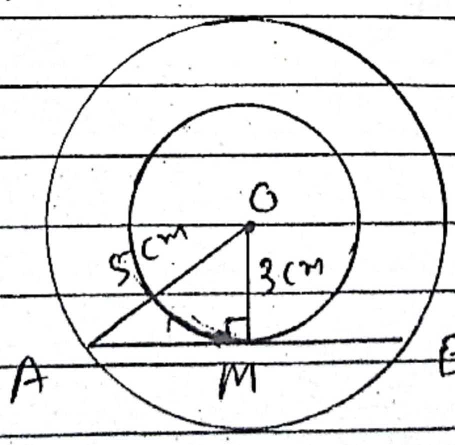
Since this happens for every point on the line XY except the point P, OP is the shortest of all the distances of the point O to the points of XY. So OP is perpendicular to XY.

——— (1)

43. [For blind students only]

(i) True ——— (1 m)
(ii) True ——— (1 m)
(iii) True ——— (1 m)

44.




——— (0.5)

Two concentric circles are of radii 5 cm and 3 cm with centre O.

Chord AB of ⊙(O, 5 cm) touches ⊙(O, 3 cm) at point M

In $\triangle AOM$, $\angle M = 90^\circ$
AO = 5 cm
OM = 3 cm — (0.5)

$AM^2 = AO^2 - OM^2$ — (0.5)
(by Pythagoras thm)
$= (5)^2 - (3)^2$
$= 25 - 9$
$\therefore AM^2 = 16$ — (0.5)

$\therefore \boxed{AM = 4 \text{ cm}}$ — (0.5)

$\therefore AB = 2AM$
$= 2 \times 4$

$\therefore \boxed{AB = 8 \text{ cm}}$ — (0.5)

44. [For blind students only]

(i) Tangent of a circle.

A line that intersects the circle at only one point is known as tangent of a circle —— (1)

(ii) Secant of a circle.

A line that intersects the circle at two points is known as secant of a circle —— (1)

(iii) Point of contact of a circle

The common point of the tangent and the circle is called the point of contact. —— (1)

45. Modal class : 60 - 80

$l = 60$

$f_1 = 61$

$f_0 = 52$

$f_2 = 38$

$h = 20$ ——— (1)

$$Z = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$ ——— (0.5)

$$= 60 + \left(\frac{61 - 52}{2(61) - 52 - 38}\right) \times 20$$ ——— (0.5)

$$= 60 + \frac{9}{122 - 90} \times 20$$

$$= 60 + \frac{9}{32} \times 20$$ ——— (0.5)

$$= 60 + 5.625$$

$$\boxed{Z = 65.625}$$ ——— (0.5)

46. Total outcomes $= (5 + 8 + 4)$ marbles

$= 17$

(i) $P_{(red)} = \dfrac{5}{17}$ — (1)

(ii) $P_{(white)} = \dfrac{8}{17}$ — (1)

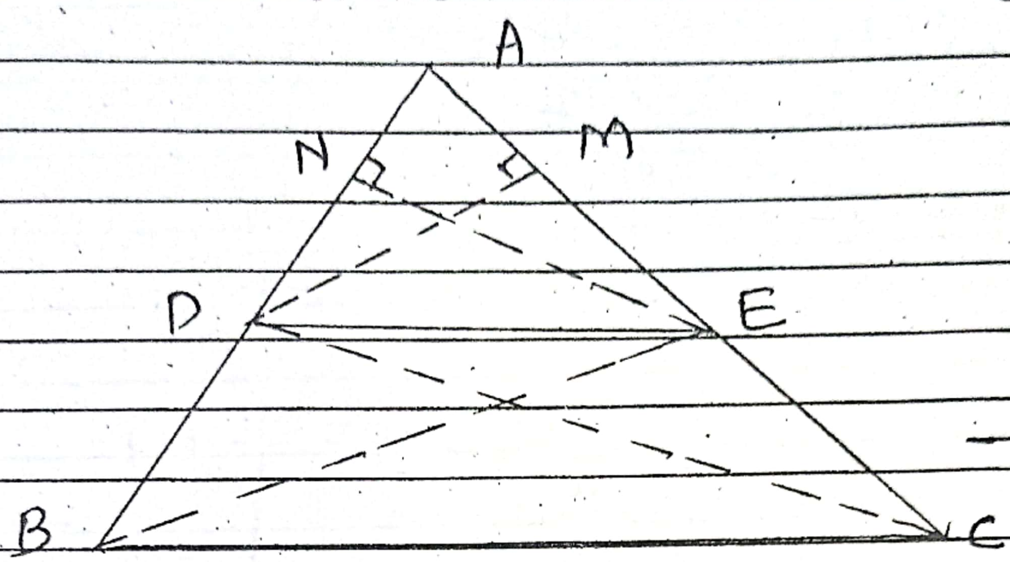
(iii) $P_{(not\ green)} = \dfrac{13}{17}$ — (1)

NOTE: If sum is done by any other appropriate method, then marks are to be given accordingly.

## SECTION D

Answer any 5 questions from Q. No 47 to 54 [20]

47.




— (0.5)

We are given a triangle ABC in which a line parallel to side BC intersects other two sides AB and AC at D and E respectively

We need to prove that $\frac{AD}{DB} = \frac{AE}{EC}$

Let us join BE and CD and then draw $DM \perp AC$ and $EN \perp AB$

Now, area of $\triangle ADE = \frac{1}{2} AD \times EN$

Similarly $ar(BDE) = \frac{1}{2} DB \times EN$

$ar(ADE) = \frac{1}{2} AE \times DM$

& $ar(DEC) = \frac{1}{2} EC \times DM$

$\therefore \frac{ar(ADE)}{ar(BDE)} = \frac{\frac{1}{2} AD \times EN}{\frac{1}{2} DB \times EN}$

$= \frac{AD}{DB}$ ------ (1)

(1)

and $\frac{ar(ADE)}{ar(DEC)} = \frac{\frac{1}{2} AE \times DM}{\frac{1}{2} EC \times DM}$

$= \frac{AE}{EC}$ ------ (2)

(1)

Note that $\Delta BDE$ and DEC are on the same base DE and between the same parallels BC and DE

So, $ar(BDE) = ar(DEC)$ ------ (3)

(1)

From (1), (2) & (3)

$\frac{AD}{DB} = \frac{AE}{EC}$

(0.5)

47 [For blind students only]

(i) AAA

If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar

(1)

(ii) AA

If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar

(1)

(iii) SSS

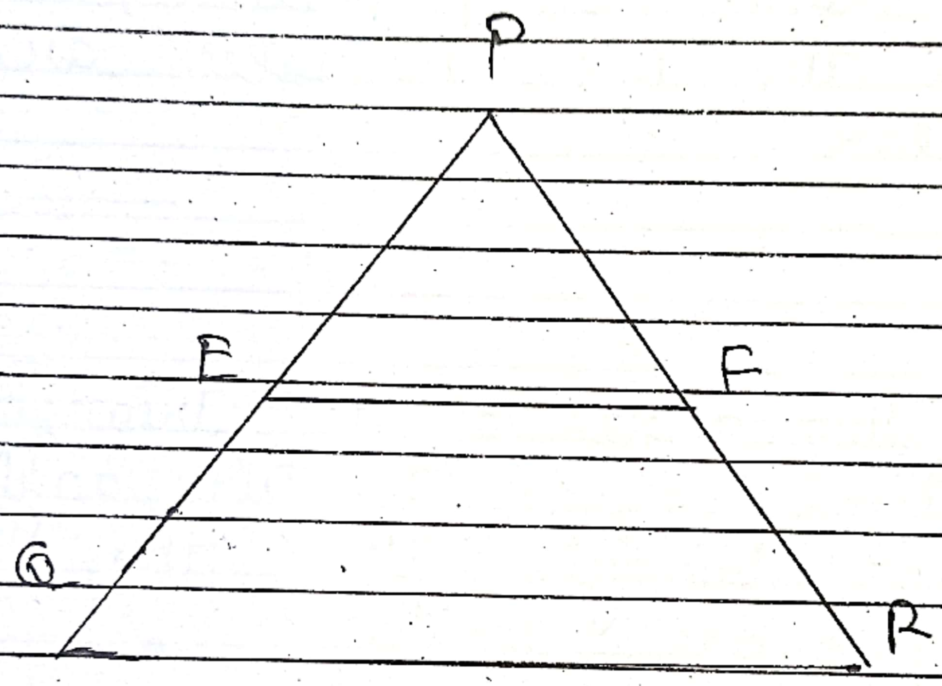
If in two triangles, sides of one triangle are proportional to (i.e. in the same ratio of) the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar

(1)

(iv) SAS

If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar

(1)

48. 

(i) $\frac{PE}{EQ} = \frac{3.9}{3} = 1.3$ —— (1)

(0.5)

$\frac{PF}{FR} = \frac{3.6}{2.4} = 1.5$ —— (2)

(0.5)

$\frac{PE}{EQ} \neq \frac{PF}{FR}$ (from (1) & (2))

$\therefore$ EF is not parallel to QR

(1)

(iii) $\frac{PE}{QE} = \frac{4}{4.5} = \frac{40}{45} = \frac{8}{9}$ —— (1)

—— (0.5)

$\frac{PF}{RF} = \frac{8}{9}$ —— (2)

—— (0.5)

$\frac{PE}{QE} = \frac{PF}{RF}$ (from (1) & (2))

$\therefore$ $EF \parallel QR$ —— (1)

48. [For blind students only]

(i) Similar —— (1)
(ii) Similar —— (1)
(iii) Equilateral —— (1)
(iv) Similar —— (1)

49. Suppose two consecutive positive integers are $x$ and $x+1$

$(x)^2 + (x+1)^2 = 365$ —— (0.5)

$\therefore x^2 + x^2 + 2x + 1 = 365$ —— (0.5)

$\therefore 2x^2 + 2x - 364 = 0$

$\therefore 2(x^2 + x - 182) = 0$

$\therefore x^2 + x - 182 = 0$ —— (0.5)

$\therefore x^2 + 14x - 13x - 182 = 0$

$\therefore x(x+14) - 13(x+14) = 0$

$\therefore (x+14)(x-13) = 0$

$\therefore x+14 = 0$ or $x - 13 = 0$

$\therefore \boxed{x = -14}$ or $\boxed{x = 13}$ —— (0.5)

Not possible — (0.5)

$\therefore x = 13$

$x + 1 = 13 + 1 = 14$

$\therefore$ Two consecutive positive integers are 13 & 14.

50. $a = 5$, $d = 1.75$

$\therefore$ AP is 5, 6.75, 8.50, ....

$a_n = 20.75$ —— (1)

$a_n = a + (n-1)d$ —— (0.5)

$\therefore 20.75 = 5 + (n-1)(1.75)$ —— (0.5)

$\therefore 20.75 - 5 = (n-1)(1.75)$ —— (0.5)

$\therefore 15.75 = (n-1)(1.75)$ —— (0.5)

$\therefore \frac{15.75}{1.75} = n - 1$ —— (0.5)

$\therefore 9 = n - 1$

$\therefore 9 + 1 = n$

$\therefore \boxed{n = 10}$ —— (0.5)

(51)

| Percentage of female Trs. | No. of States/U.T. ($f_i$) | $x_i$ | $u_i = \frac{x_i - a}{h}$ | $f_i u_i$ |
|---|---|---|---|---|
| 15-25 | 6 | 20 | -3 | -18 |
| 25-35 | 11 | 30 | -2 | -22 |
| 35-45 | 7 | 40 | -1 | -7 |
| 45-55 | 4 | $\boxed{50 = a}$ | 0 | 0 |
| 55-65 | 4 | 60 | 1 | 4 |
| 65-75 | 2 | 70 | 2 | 4 |
| 75-85 | 1 | 80 | 3 | 3 |
| | $\Sigma f_i = 35$ | | | $\Sigma f_i u_i = -36$ |

-47

11

(0.5m) (0.5m) (1)

Mean $\bar{x} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$ — (0.5)

$= 50 + \left(\frac{-36}{35}\right) \times 10$ — (0.5)

$= 50 + \left(\frac{-36}{7}\right) \times 2$

$= 50 - \frac{72}{7}$

$= 50 - 10.28$ — (0.5)

$\bar{x} = 39.72$ — (0.5)

∴ [Note:- Marks to be given for any suitable method]

(52) (i) No. of women in range of 68-77
$= 4+3+8 = \boxed{15}$ — (1)

(ii) $n = 30$, $\frac{n}{2} = 15^{th}$ observation
Median class $\boxed{74-77}$ — (1)

(iii) $l = 74$, $f_0 = 3$, $f_1 = 8$, $f_2 = 7$, $h = 3$

$$Z = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h \quad \text{— (0.5)}$$

$$= 74 + \left(\frac{8-3}{2(8)-3-7}\right) \times 3 \quad \text{— (0.5)}$$

$$= 74 + \left(\frac{5}{16-10}\right) \times 3$$

$$= 74 + \frac{15}{6} \quad \text{— (0.5)}$$

$$= 74 + 2.5$$

$$Z = 76.5 \quad \text{— (0.5)}$$

[Note :- Table is not required]

(52)

## (For Blind Students Only)

| Literacy rate (in %) | Number of cities ($f_i$) | $x_i$ | $u_i = \frac{x_i - a}{h}$ | $f_i u_i$ |
|---|---|---|---|---|
| 45-55 | 3 | 50 | −2 | −6 |
| 55-65 | 10 | 60 | −1 | −10 |
| 65-75 | 11 | 70 = a | 0 | 0 |
| 75-85 | 8 | 80 | 1 | 8 |
| 85-95 | 3 | 90 | 2 | 6 |
| | $\Sigma f_i = 35$ | | | $\Sigma f_i u_i = -2$ |

(0.5 m) (0.5 m) (1 m)

Mean $\bar{x} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$ —— (0.5)

$= 70 + \frac{-2}{35} \times 10$ —— (0.5)

$= 70 - \frac{20}{35}$

$= 70 - 0.57$ —— (0.5)

$\therefore \boxed{\bar{x} = 69.43}$ —— (0.5)

NOTE: If sum is done by any other appropriate method, then marks are to be given accordingly.

53. Total outcomes = 6

(i) Prime number : 2, 3, 5

$P_{(\text{prime no.})} = \frac{3}{6} = \boxed{\frac{1}{2}}$ — 1 m

(ii) Number lying between 2 & 6 : 3, 4, 5

$P_{(\text{no. bet}^n\ 2\ \&\ 6)} = \frac{3}{6} = \boxed{\frac{1}{2}}$ — 1 m

(iii) An odd number : 1, 3, 5

$P_{(\text{odd number})} = \frac{3}{6} = \boxed{\frac{1}{2}}$ — 1 m

(iv) $P_{(7)} = \frac{0}{6} = \boxed{0}$ — 1 m

54. Total outcomes = 52

(i) a king of red colour : 2

$P_{(\text{king of red colour})} = \frac{2}{52} = \boxed{\frac{1}{26}}$ — 1 m

(ii) the jack of hearts : 1

$P_{(\text{jack of hearts})} = \boxed{\frac{1}{52}}$ — 1 m

(iii) a spade : 13

$P_{(\text{spade})} = \frac{13}{52} = \boxed{\frac{1}{4}}$ — 1 m

(iv) a red face card : 6

$P_{(\text{red face card})} = \frac{6}{52} = \boxed{\frac{3}{26}}$ — 1 m