X | H.W-17 (for $5^{th}$ October)

SECTION-A

1) If $p^2 = \frac{32}{50}$, then $p$ is a/an

(a) whole number (b) integer (c) rational number (d) irrational number.

2) If $\tan\theta = \frac{x}{y}$, then $\cos\theta =$

(a) $\frac{x}{\sqrt{x^2+y^2}}$ (b) $\frac{y}{\sqrt{x^2+y^2}}$ (c) $\frac{x}{\sqrt{x^2-y^2}}$ (d) $\frac{y}{\sqrt{x^2-y^2}}$

3) The no. of quadratic polynomials having zeroes $-5$ and $-3$ is (a) 1 (b) 2 (c) 3 (d) more than 3

4) The coordinates of the point where the line $2y = 4x+5$ crosses the $x$-axis is

(a) $(0,-5/4)$ (b) $(0,5/2)$ (c) $(-5/4,0)$ (d) $(-5/2,0)$

5) $(\cos^4A - \sin^4A)$ on simplification gives

(a) $2\sin^2A-1$ (b) $2\sin^2A+1$ (c) $2\cos^2A+1$ (d) $2\cos^2A-1$

6) The graph of a quadratic polynomial $p(x)$ passes through the points $(-6,0)$, $(0,-30)$, $(4,-20)$ and $(6,0)$. The zeroes of the polynomial are

(a) $(-6,0)$ (b) $(4,6)$ (c) $(-30,-20)$ (d) $(-6,6)$

7) A quadratic polynomial having zeroes $-\sqrt{\frac{5}{2}}$ and $\sqrt{\frac{5}{2}}$ is

(a) $x^2-5\sqrt{2}x+1$ (b) $8x^2-20$ (c) $15x^2-6$

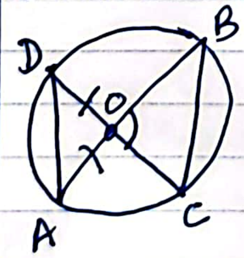
(d) $x^2-2\sqrt{5}x-1$

8) Consider the frequency distribution of 45 observations

| Class interval | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
|---|---|---|---|---|---|
| Frequency | 5 | 9 | 15 | 10 | 6 |

The upper limit of median class is

(a) 20 (b) 10 (c) 30 (d) 40

9) 


O is the point of intersection of two chords AB and CD of a circle. If $\angle BOC = 80^\circ$ and $OA = OD$, then $\triangle ODA$ and $\triangle OBC$ are

(a) equilateral and similar (b) isosceles and similar

(c) isosceles but not similar (d) not similar

10) The roots of the quadratic equation $x^2+x-1=0$ are
(a) irrational and distinct (b) not real
(c) rational and distinct (d) real and equal.

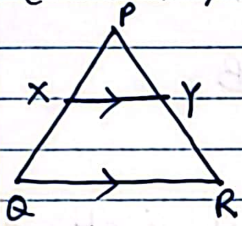
11) If $p$ is a root of the quadratic equation $x^2-(p+q)x+k=0$ then the value of $k$ is
(a) $p$ (b) $q$ (c) $p+q$ (d) $pq$

12) Which of the following gives the middle most observation of the data?
(a) median (b) mean (c) range (d) mode

13) If $\theta = 30°$, then $3\tan\theta =$ __
(a) 1 (b) $1/\sqrt{3}$ (c) $3/\sqrt{3}$ (d) not defined

14) The point on x-axis nearest to the point $(-4,-5)$ is
(a) $(0,0)$ (b) $(-4,0)$ (c) $(-5,0)$ (d) $(\sqrt{41},0)$

15) A point on the x-axis divides the line segment joining the points $A(2,-3)$ and $B(5,6)$ in the ratio $1:2$. The point is
(a) $(4,0)$ (b) $\left(\frac{7}{2},\frac{3}{2}\right)$ (c) $(3,0)$ (d) $(0,3)$

16)



$\frac{PX}{XQ} = \frac{PY}{YR} = \frac{1}{2}$, then
(a) $XY = QR$ (b) $XY = \frac{1}{3}QR$ (c) $XY^2 = QR^2$ (d) $XY = \frac{1}{2}$

17) For the following distribution:

| Marks obtained | No. of Students |
|---|---|
| more than or equal to 0 | 63 |
| more than or equal to 10 | 58 |
| more than or equal to 20 | 55 |
| more than or equal to 30 | 51 |
| more than or equal to 40 | 48 |
| more than or equal to 50 | 42 |

The frequency of the class 20-30 is
(a) 35 (b) 4 (c) 48 (d) 51

18) If $4\tan\beta = 3$, then $\frac{4\sin\beta - 3\cos\beta}{4\sin\beta + 3\cos\beta}$ is __
(a) 0 (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{3}{4}$

19) Assertion (A): HCF of any two consecutive even natural numbers is alway 2.
Reason (R): Even natural numbers are divisible by 2
(a) (b) (c) (d)

20) Assertion :- $x^2+4x+5$ has two zeroes
Reason : a quadratic polynomial can have at the most two zeroes.
(a) (b) (c) (d)

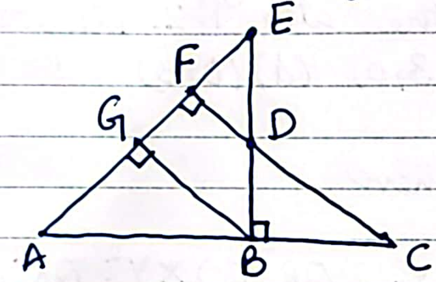
## SECTION-B

21) The HCF of 85 and 238 is expressible in the form $85m - 238$. Find the value of m. 3

22) Prove that $x^2+y^2=1$, if $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$

23) The length, breadth and height of a room are 8m 50cm, 6m 25cm and 4m 75cm respectively. Find the length of the longest rod that can measure the dimensions of the room exactly. 25cm

24)




$EB \perp AC$, $BG \perp AE$, $CF \perp AE$
Prove that
(i) $\Delta ABG \sim \Delta DCB$
(ii) $\dfrac{BC}{BD} = \dfrac{BE}{BA}$

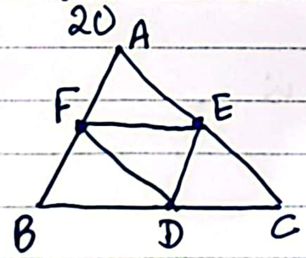
25) Find the point(s) on the x-axis which is at a distance of $\sqrt{41}$ units from the point $(8,-5)$ (4,0),(12,0)

## SECTION-C

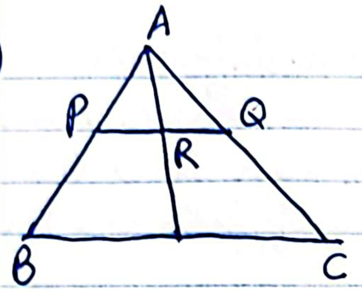
26) Prove that $(1+\cot A+\tan A)(\sin A-\cos A) = \dfrac{\sec^3 A - \operatorname{cosec}^3 A}{\sec^2 A \cdot \operatorname{cosec}^2 A}$

27) The numerator of a fraction is 3 less than its denominator. If 2 is added to both the numerator and the denominator, then the sum of the new fraction and original fraction is $\frac{29}{20}$. Find the original fraction. 7/10

28)




In $\Delta ABC$, D, E and F are mid-points of BC, CA and AB respectively.
Prove that (i) $\Delta FBD \sim \Delta DEF$
(ii) $\Delta DEF \sim \Delta ABC$

29) 

In $\Delta ABC$, P and Q are points on AB and AC respectively such that $PQ \parallel BC$. Prove that median AD drawn from A on BC bisects PQ

30) If $\cos\theta + \sin\theta = 1$, Prove that $\cos\theta - \sin\theta = \pm 1$

31) The average score of boys in the examination of a school is 71 and that of the girls is 73. The average score of the school in the examination is 71.8. Find the ratio of number of boys to the number of girls who appeared in the examination. 3:2

## SECTION-D

32) Solve graphically : $x+2y=3$ ; $2x-3y+8=0$

33) Find mean and median [use step-deviation method] of the following data :

| Class | 85-90 | 90-95 | 95-100 | 100-105 | 105-110 | 110-115 |
|---|---|---|---|---|---|---|
| frequency | 15 | 22 | 20 | 18 | 20 | 25 |

100.875
100.83

34) Ramkali required ₹2500 after 12 weeks to send her daughter to school. She saved ₹100 in the first week and increased her weekly saving by ₹20 every week. Find whether she will be able to send her daughter to School after 12 weeks. Rs 2520

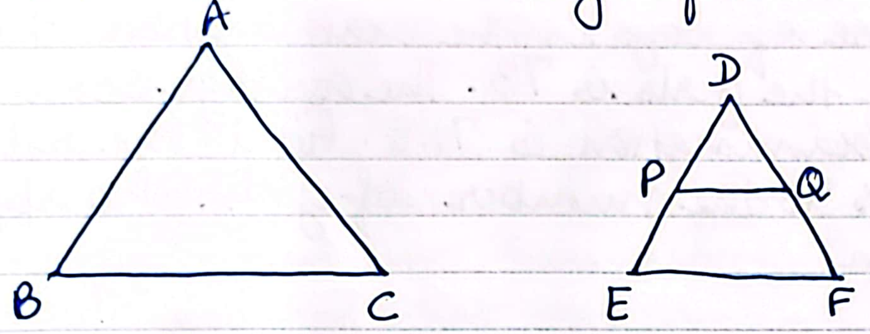
35) The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of depression from the top of tower to the foot of hill is 30°. If tower is 50m high, find the height of the hill. 150m

## SECTION-E

36) In a store, glass jars are arranged in a specific pattern. On the top layer, there are 3 jars. In the next layer, there are 6 jars, In the 3rd layer from the top, there are 9 jars and so on till the 8th layer.

(i) Write an A.P. Also, find the common difference.
(ii) Is it possible to arrange 34 jars in a layer? Justify.
(iii) If there are 'n' no. of jars in a layer then find the expression for finding the total no. of jars in terms of n. Hence, find $S_8$
(iv) The shopkeeper added 3 jars in each layer. How many jars are there in the $5^{th}$ layer from the top?

37)




PQ is parallel to EF
(i) Show that $\triangle DPQ \sim \triangle DEF$
(ii) If DP = 50cm, PE = 70cm, then find $\frac{PQ}{EF}$
(iii) If 2AB = 5DE and $\triangle ABC \sim \triangle DEF$, then show that $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF}$ is a constant.
(iv) If AM and DN are medians of $\triangle ABC$ and $\triangle DEF$ respectively, then prove that $\triangle ABM \sim \triangle DEN$

38) A taxi charges a base fare plus a certain amount for each kilometre. The rates are shown below

| Distance (in km) | 1 | 2 | 3 | 4 |
| --- | --- | --- | --- | --- |
| Fare (in rupees) | 45 | 60 | 75 | 90 |

Based on the above information, answer the following

(i) What is the base fare?

(ii) What is the fare per km?

(iii) What is the fare to travel 16 km?

X H.W-17 (answers)

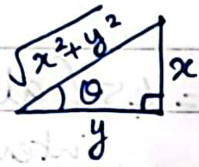
SECTION-A

1) $p^2 = \frac{\cancel{32}\,16}{\cancel{50}\,25}$

$p = \pm \frac{4}{5}$

(c) rational number

2)




$\cos\theta = \frac{y}{\sqrt{x^2+y^2}}$ (b)

3) more than 3 (d)

4) when $y=0$; $2y = 4x+5$

$0 = 4x+5$

$4x = -5$

$x = -\frac{5}{4}$

$\therefore$ The point is $\left(-\frac{5}{4}, 0\right)$ (c)

5) $a^2-b^2 = (a+b)(a-b)$

$\cos^4 A - \sin^4 A = (\cos^2 A)^2 - (\sin^2 A)^2$

$= (\cos^2 A + \sin^2 A)(\cos^2 A - \sin^2 A)$

$= 1 \times (\cos^2 A - \sin^2 A)$ $[\because \sin^2 A + \cos^2 A = 1]$

$= \cos^2 A - (1-\cos^2 A)$

$= \cos^2 A - 1 + \cos^2 A$

$= 2\cos^2 A - 1$ (d)

6) $(-6, 6)$ (d)

7) Let $\alpha = -\sqrt{\frac{5}{2}}$ and $\beta = \sqrt{\frac{5}{2}}$

$\alpha+\beta = -\sqrt{\frac{5}{2}} + \sqrt{\frac{5}{2}} = 0$

$\alpha\beta = -\sqrt{\frac{5}{2}} \times \sqrt{\frac{5}{2}} = -\frac{5}{2}$

$\therefore$ The required polynomial is $(x^2 - (\alpha+\beta)x + \alpha\beta)k$

$= \left(x^2 - 0x - \frac{5}{2}\right)k$

$= k(2x^2-5)$

$= 4(2x^2-5)$

$= 8x^2 - 20$; where $k=4$

(b)

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8) 

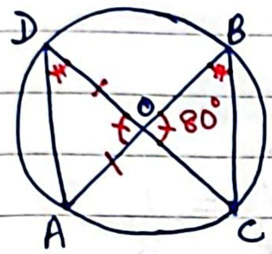
| C.I | f | C.f |
|---|---|---|
| 0-10 | 5 | 5 |
| 10-20 | 9 | 14 |
| $\boxed{20-30}$ | 15 | 29 |
| 30-40 | 10 | 39 |
| 40-50 | 6 | 45 |

$\frac{n}{2} = \frac{45}{2} = 22.5$

median class is 20-30

upper limit is 30 (c)

9)




$\angle BOC = \angle DOA = 80^\circ$ (VOA)

$\angle OBC = \angle ODA$ (angles in the same segment)

$\therefore \triangle OBC \sim \triangle ODA$ (AA similarity)

Thus $\frac{\cancel{OD}'}{OB} = \frac{\cancel{OA}'}{OC}$

$\therefore OB = OC$

$\triangle ODA$ and $\triangle OBC$ are isosceles and similar (b)

10) $a = 1, b = 1, C = -1$

$D = b^2 - 4ac = 1 + 4 = 5 > 0$

roots are irrational and distinct (a)

11) $x^2 - (p+q)x + k = 0$

$\Rightarrow p^2 - (p+q)p + k = 0$

$\Rightarrow \cancel{p^2} - \cancel{p^2} - pq + k = 0$

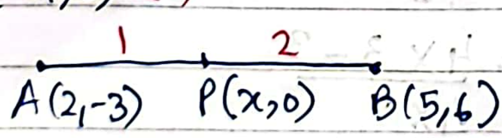
$k = pq$ (d)

12) median (a)

13) $3\tan 30^\circ = 3 \times \frac{1}{\sqrt{3}} = \frac{3}{\sqrt{3}}$ (c)

14) $(-4, 0)$ (b)

15)




$(x, 0) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$

$(x, 0) = \left(\frac{5+4}{3}, \frac{6-6}{3}\right)$

$(x, 0) = (3, 0)$

$\therefore$ the point is $(3, 0)$ (c)

16) $\frac{PX}{XQ} = \frac{1}{2}$

$\Rightarrow \frac{XQ}{PX} = \frac{2}{1}$

$\Rightarrow \frac{XQ}{PX} + 1 = \frac{2}{1} + 1$

$\Rightarrow \frac{PQ}{PX} = \frac{3}{1}$

$\Rightarrow \frac{PX}{PQ} = \frac{1}{3}$

$\Delta PXY \sim \Delta PQR$

Thus, $\frac{PX}{PQ} = \frac{XY}{QR} = \frac{1}{3}$

$\Rightarrow XY = \frac{1}{3} QR$ (b)

17)

| C.I | C.f | f |
|---|---|---|
| 0-10 | 63 | 5 |
| 10-20 | 58 | 3 |
| $\boxed{20-30}$ | 55 | 4 |
| 30-40 | 51 | 3 |
| 40-50 | 48 | 6 |
| 50-60 | 42 | 42 |

(b)

18) $\div \cos\beta \Rightarrow \frac{4\tan\beta - 3}{4\tan\beta + 3}$

$= \frac{3-3}{3+3} = \frac{0}{6} = 0$ (a)

19) (b)

20) $a = 1, b = 4, c = 5$

$b^2 - 4ac = 16 - 20 = -4 < 0$, no zeroes

assertion is false and reason is true (d)

SECTION-B

21) $85 = 17 \times 5$

$238 = 17 \times 7 \times 2$

$HCF = 17$

$85m - 238 = 17$

$85m = 255$

$\underline{m = 3}$

22) $x\sin\theta = y\cos\theta \rightarrow (1)$

$x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$

$\Rightarrow x\sin\theta \cdot \sin^2\theta + y\cos^3\theta = \sin\theta\cos\theta$

$\Rightarrow y\cos\theta \cdot \sin^2\theta + y\cos^3\theta = \sin\theta\cos\theta$

$\Rightarrow y\cancel{\cos\theta}(\sin^2\theta + \cos^2\theta) = \sin\theta\cancel{\cos\theta}$

$y = \sin\theta \rightarrow (2)$ $[\because \sin^2\theta + \cos^2\theta = 1]$

From eq: (1), $x\cancel{\sin\theta} = \cancel{\sin\theta}\cos\theta$

$x = \cos\theta \rightarrow (3)$

$\therefore x^2 + y^2 = \cos^2\theta + \sin^2\theta = \underline{1}$

23) $l = 850cm = 17 \times 5^2 \times 2$

$b = 625cm = 5^4$

$h = 475cm = 5^2 \times 19$

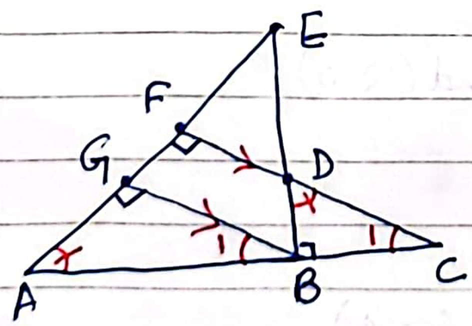
$HCF = 5^2 = 25cm$

$17 \,|\, 850$, $5 \,|\, 50$, $5 \,|\, 10$, $2$

$5 \,|\, 625$, $5 \,|\, 125$, $5 \,|\, 25$, $5$

$5 \,|\, 475$, $5 \,|\, 95$, $19$

$\therefore$ The length of the longest rod to measure the dimensions $= \underline{25cm}$.

24) 


Given:- $EB \perp AC$, $BG \perp AE$, $CF \perp AE$

To prove:- (i) $\triangle ABG \sim \triangle DCB$

(ii) $\frac{BC}{BD} = \frac{BE}{BA}$

Proof:- Since $BG \perp AE$ and $CF \perp AE$, $GB \parallel FC$.

In $\Delta ABG$ and $\Delta DCB$, $\angle BGA = \angle DBC$ (each $90^\circ$)

$\angle ABG = \angle BCD$ (corresponding angles)

$\therefore \Delta ABG \sim \Delta DCB$ (AA similarity)

Thus, $\angle BDC = \angle GAB$ (corresponding angles of similar $\Delta$s are equal) $\rightarrow (1)$

In $\Delta ABE$ and $\Delta DBC$,

$\angle ABE = \angle DBC$ (each $90^\circ$)

$\angle BAE = \angle BDC$ (from eq: (1))

$\therefore \Delta ABE \sim \Delta DBC$ (AA Similarity)

Thus, $\frac{BE}{BC} = \frac{AB}{DB}$ ($\because$ corresponding sides of similar $\Delta$s are in proportion)

$\Rightarrow \frac{BC}{BD} = \frac{BE}{BA}$. Hence Proved

25) A $(8,-5)$ —— $\sqrt{41}$ —— B $(x,0)$

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

$\Rightarrow \sqrt{41} = \sqrt{(x-8)^2 + (0+5)^2}$

$\Rightarrow 41 = x^2 + 64 - 16x + 25$

$\Rightarrow x^2 - 16x + 48 = 0$

$\Rightarrow (x-12)(x-4) = 0$

$\therefore x = 12, 4$

S P

$-16$ $48$

$-12, -4$

Hence, the required points on $x$-axis are $(4,0)$ and $(12,0)$

## SECTION - C

26) LHS, $(1 + \cot A + \tan A)(\sin A - \cos A)$

$$= \left(1 + \frac{\cos A}{\sin A} + \frac{\sin A}{\cos A}\right)(\sin A - \cos A)$$

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

$$= \frac{\sin^3 A - \cos^3 A}{\sin A \cos A} \qquad [\because (a-b)(a^2+b^2+ab) = (a^3 - b^3)]$$

$$\div \sin^3 A \cdot \cos^3 A \Rightarrow \frac{\dfrac{\cancel{\sin^3 A}}{\sin^3 A \cdot \cos^3 A} - \dfrac{\cancel{\cos^3 A}}{\sin^3 A \cdot \cancel{\cos^3 A}}}{\dfrac{\cancel{\sin A \cos A}}{\sin^{\cancel{3}2} A \cdot \cos^{\cancel{3}2} A}}$$

$$= \frac{\dfrac{1}{\cos^3 A} - \dfrac{1}{\sin^3 A}}{\dfrac{1}{\sin^2 A \cdot \cos^2 A}} = \frac{\sec^3 A - \operatorname{cosec}^3 A}{\sec^2 A \cdot \operatorname{cosec}^2 A}, \text{ RHS}$$

$\therefore$

27) Let the denominator of the fraction be $y$.

Then the numerator is $y-3$

Thus, the fraction is $\frac{y-3}{y}$

New fraction is $\frac{y-3+2}{y+2} = \frac{y-1}{y+2}$

ATQ; $\frac{y-1}{y+2} + \frac{y-3}{y} = \frac{29}{20}$

$$\Rightarrow \frac{y(y-1) + (y-3)(y+2)}{y(y+2)} = \frac{29}{20}$$

$$\Rightarrow \frac{y^2 - y + y^2 - y - 6}{y^2 + 2y} = \frac{29}{20}$$

$$\Rightarrow (2y^2 - 2y - 6)\,20 = 29(y^2 + 2y)$$

$$\Rightarrow 40y^2 - 40y - 120 = 29y^2 + 58y$$

$$\Rightarrow 11y^2 - 98y - 120 = 0$$

| S | P |
|---|---|
| $-98$ | $-1320$ |
| | $-110, 12$ |

$5 \mid 1320$
$3 \mid 264$
$11 \mid 88$
$2 \mid 8$
$4$

$11y^2 - 110y + 12y - 120 = 0$

$11y(y-10) + 12(y-10) = 0$

$(11y+12)(y-10) = 0$

$\therefore y = \frac{-12}{11}, +10$

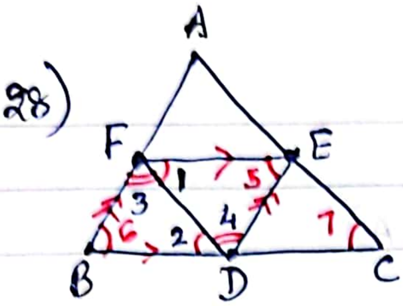
When $y = \frac{-12}{11}$, then the fraction is

$\frac{\frac{-11}{11} - 3}{\frac{-12}{11}} = \frac{44}{12}$ which does not satisfy the given condition.

$\therefore$ Required value of

Hence, the original fraction is $7/10$

28)




Given :- in $\triangle ABC$, E, F and D are the mid-points of AC, AB and BC respectively.

To prove :- (i) $\triangle FBD \sim \triangle DEF$

(ii) $\triangle DEF \sim \triangle ABC$

Proof :- Since F and E are the mid-pts of sides AB and AC respectively, using mid-point theorem,

$EF \parallel BC \Rightarrow EF \parallel BD$.

Similarly, since E and D are the mid-points of AC and BC respectively,

$ED \parallel AB \Rightarrow ED \parallel FB$

Thus EFBD is a parallelogram with both pairs of opposite sides parallel.

(i) In $\triangle FBD$ and $\triangle DEF$, $\angle 2 = \angle 1$ (alternate interior angles)

$\angle 3 = \angle 4$ (alternate interior angles)

$\therefore \triangle FBD \sim \triangle DEF$ (AA similarity)

(ii) Similarly, we can prove EFDC is also a parallelogram.

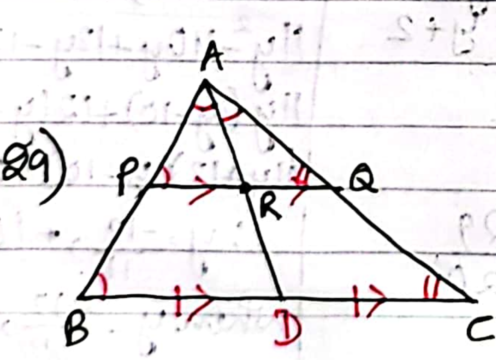
In $\triangle DEF$ and $\triangle ABC$, $\angle 5 = \angle 6$ (opposite angles of ||gm EFBD)

$\angle 1 = \angle 7$ (opposite angles of ||gm EFDC)

$\therefore \triangle DEF \sim \triangle ABC$ (AA similarity)

Hence Proved.

29)




Given :- in $\triangle ABC$,

$PQ \parallel BC$

median AD bisects BC

To prove :- $PR = RQ$

Proof :- Since AD bisects BC, $BD = DC \longrightarrow (1)$

In $\triangle APR$ and $\triangle ABD$, $\angle PAR = \angle BAD$ (common angle)

$\angle APR = \angle ABD$ (corresponding angles)

$\therefore \triangle APR \sim \triangle ABD$ (AA Simi

Thus, $\frac{AP}{AB} = \frac{PR}{BD} = \frac{AR}{AD} \rightarrow (2)$ [∵ corresponding sides of similar △s are in proportion]

In $\triangle ARQ$ and $\triangle ADC$, $\angle RAQ = \angle DAC$ (common angle)

$\angle AQR = ACD$ (corresponding angles)

∴ $\triangle ARQ \sim \triangle ADC$ (AA similarity)

Thus, $\frac{AQ}{AC} = \frac{RQ}{DC} = \frac{AR}{AD} \longrightarrow (3)$

From eq: (2) and (3), $\frac{PR}{\cancel{BD}_1} = \frac{RQ}{\cancel{DC}_1}$

∴ $PR = RQ$

⇒ median AD bisects PQ as well.

Hence proved.

30) $\cos\theta + \sin\theta = 1$

Squaring on both sides, $(\cos\theta + \sin\theta)^2 = (1)^2$

$\Rightarrow (\cos^2\theta + \sin^2\theta) + 2\sin\theta\cos\theta = 1$

$\Rightarrow 1 + 2\sin\theta\cos\theta = 1$ [∵ $\sin^2\theta + \cos^2\theta = 1$]

∴ $2\sin\theta\cos\theta = 0 \rightarrow (1)$

Then, $(\cos\theta - \sin\theta)^2 = (\cos^2\theta + \sin^2\theta) - 2\sin\theta\cos\theta$

$= 1 - 0$

$= 1$

∴ $\cos\theta - \sin\theta = \pm 1$

31) Let the no. of boys be $x$ and that of girls be $y$.

∴ $\frac{\text{Total score}}{x} = 71$ | $\frac{\text{Total score}}{y} = 73$

⇒ Total score of boys $= 71x$ | ⇒ Total score of girls $= 73y$

$\frac{\text{Total score of girls and boys}}{x+y} = 71.8$

$\Rightarrow \frac{71x + 73y}{x+y} = 71.8$

$\Rightarrow 71x + 73y = 71.8x + 71.8y$

$\Rightarrow 1.2y = 0.8x$

$\Rightarrow 12y = 8x$

$\frac{x}{y} = \frac{\cancel{12}\,3}{\cancel{8}\,2} = \frac{3}{2}$ ∴ The required s

$\boxed{\text{SECTION-D}}$

32) $x + 2y = 3$

$2y = 3 - x$

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

| $x$ | 3 | -1 | 1 |
|---|---|---|---|
| $y$ | 0 | 2 | 1 |

$2x - 3y + 8 = 0$

$-3y = -8 - 2x$

$3y = 2x + 8$

$y = \frac{2x+8}{3}$

| $x$ | -1 | -4 | 2 |
|---|---|---|---|
| $y$ | 2 | 0 | 4 |

(graph)

From the graph, $\boxed{x = -1,\ y = 2}$

33)

| C.I | f | $x_i$ | $u_i = \frac{x_i - a}{h}$ | $f_i u_i$ | c.f |
|---|---|---|---|---|---|
| 85-90 | 15 | 87.5 | -3 | -45 | 15 |
| 90-95 | 22 | 92.5 | -2 | -44 | 37 |
| 95-100 | 20 | 97.5 | -1 | -20 | 57 c.f |
| l $\boxed{100-105}$ | 18 f | a 102.5 | 0 | 0 | 75 |
| 105-110 | 20 | 107.5 | 1 | 20 | 95 |
| 110-115 | 25 | 112.5 | 2 | 50 | 120 |
| | $\Sigma f_i = 120$ | | | $\Sigma f_i u_i = -39$ | |

$h = 5$

$a = 102.5,\ \Sigma f_i = 120,\ \Sigma f_i u_i = -39$

mean $= a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

$= 102.5 - \frac{\cancel{39}^{13}}{\cancel{120}\ \cancel{24}\ 8} \times \cancel{5}^{1}$

$= 102.5 - 1.625 = \underline{\underline{100.875}}$

$n = 120$

$\frac{n}{2} = 60$

$$\text{median} = l + \frac{\frac{n}{2} - c.f}{f} \times h$$

$$= 100 + \frac{60 - 57}{18} \times 5$$

$$= 100 + \frac{\cancel{3}^{1}}{\cancel{18}\,6} \times 5$$

$$= 100 + 0.833$$

$$= \underline{\underline{100.833}}$$

34) $n = 12$

Money required = ₹2500

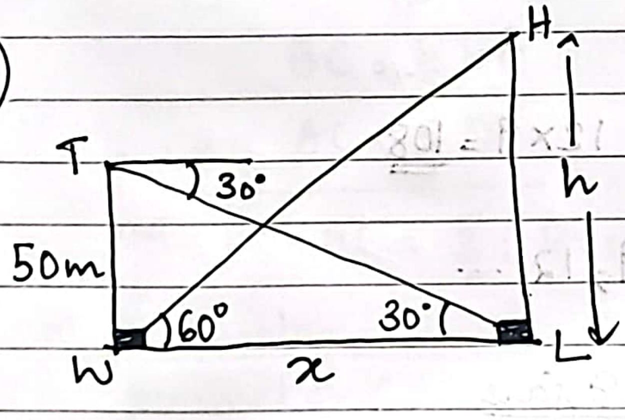
$a = 100$

$d = 20$

$S_{12} = \frac{n}{2}[2a + (n-1)d] = \frac{12}{2}[200 + 11 \times 20] = 6 \times 420$ ₹2520, the amount saved.

Since Ramkali required only ₹2500 after 12 weeks, he will be able to send her deughter to school.

35)




Let HL be the height of the hill.

To find : HL

In rt. $\Delta TWL$, $\tan 30° = \frac{50}{x}$

$$\frac{1}{\sqrt{3}} = \frac{50}{x}$$

$$\boxed{x = 50\sqrt{3}\,m}$$

In rt. $\Delta HLW$, $\tan 60° = \frac{HL}{WL}$

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

$\Rightarrow x\sqrt{3} = h$

$\Rightarrow h = 50\sqrt{3} \times \sqrt{3}$

$\therefore h = 150m$

Hence, height of the hill is

SECTION-E

36) $a = 3$

$d = 6 - 3 = 3$

$n = 8$

(i) 3, 6, 9, ... form an A.P with $a = 3, d = 3$

(ii) $a_n = 34$

$a + (n-1)d = 34$

$3 + (n-1)3 = 34$

$(n-1)3 = 31$

$3n - 3 = 31$

$3n = 34$

$n = \frac{34}{3} = 11.3$ which is not a positive integer.

$\therefore$ It is not possible to arrange 34 jars in a layer.

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

$= \frac{n}{2}[6 + 3n - 3]$

$= \frac{n}{2}[3 + 3n]$

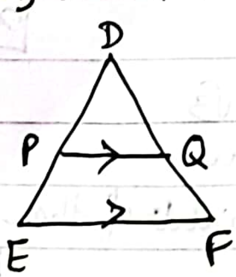
$\therefore S_n = \frac{3n}{2}(1+n)$

Thus $S_8 = \frac{3 \times 8 \times 9}{2} = 12 \times 9 = \underline{108}$

(iv) New A.P will be 6, 9, 12, ...

$a = 6, d = 3$

$a_5 = a + 4d = 6 + 12 = \underline{18 \text{ jars}}$

37) 


(i) In $\triangle DPQ$ and $\triangle DEF$,

$\angle PDQ = \angle EDF$ (common angle)

$\angle DPQ = \angle DEF$ (corresponding angles)

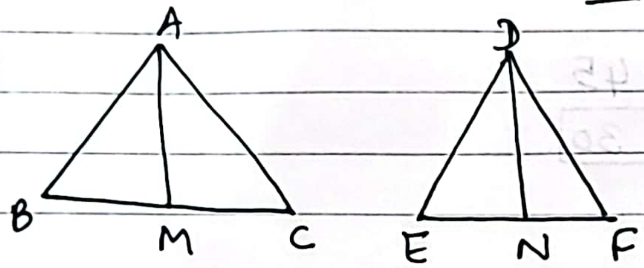
$\therefore \triangle DPQ \sim \triangle DEF$ (AA Similar...

(ii) Since ~~since~~ corresponding sides of similar Δs are in proportion, $\frac{DP}{DE} = \frac{PQ}{EF}$

$$\frac{50}{50+70} = \frac{PQ}{EF}$$

$$\therefore \frac{PQ}{EF} = \frac{50}{120} = \frac{5}{12}$$

(iv)




Since $\Delta ABC \sim \Delta DEF$,

$$\frac{AB}{DE} = \frac{\frac{1}{2}BC}{\frac{1}{2}EF}$$

$$\Rightarrow \frac{AB}{DE} = \frac{BM}{EN}$$

Also, $\angle B = \angle E$

$$\Rightarrow \angle ABM = \angle DEN$$

$\therefore \Delta ABM \sim \Delta DEN$ (SAS similarity)

(iii) $2AB = 5DE$

$$\frac{AB}{DE} = \frac{5}{2}$$

Since $\Delta ABC \sim \Delta DEF$, $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{5}{2}$

$$\therefore AB = \frac{5}{2}DE$$

$$BC = \frac{5}{2}EF$$

$$AC = \frac{5}{2}DF$$

$$AB + BC + AC = \frac{5}{2}(DE + EF + DF)$$

$\Rightarrow \frac{\text{Perimeter}(\Delta ABC)}{\text{perimeter}(\Delta DEF)} = \frac{5}{2}$, a constant

38) Let the base fare be ₹$x$ and amount for each Kilometre be ₹$y$.

$$x + 1y = 45 \longrightarrow (1)$$
$$x + 2y = 60 \longrightarrow (2)$$

(1) − (2), $-y = -15$

$$\boxed{y = 15}$$

From eq: (1), $x + 15 = 45$

$$\boxed{x = 30}$$

(i) Base fare = ₹30

(ii) Fare per km = ₹15

(iii) To travel 16 km, total fare $= x + 16y$

$= 30 + 16 \times 15$

$= 30 + 240$

$=$ ₹270