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Answer Key Practice Paper 2 -X Mathematics
Mind Curves -Mid Term(By Deepika Bhati)

DT.

Section - A

1. Smallest composite no: 4
Smallest prime no: 2
HCF $\rightarrow 4 = 2^2 \times 1$
$2 = 2 \times 1$
HCF = 2
$\Rightarrow$ b)

2. b) zero of $p(x)$

3. a is oodd no and not divisible by 2 = 2a
b isn't divisible by 3.
HCF of a & b is P
LCM of 3a & 2b = $3a \times 2b = 3 \times a \times 2 \times b$
$= 6(a \times b) = 6P$
$\Rightarrow$ c)

4. $p(x) = ax^2 + bx + c$
$\frac{c}{a}$ = product of zeros
$\Rightarrow$ d)

5. $3^3 \times 5 = 135$
$3^2 \times 5^2 = 225$
HCF $- 3^2 \times 5 = 9 \times 5 = 45$
$\Rightarrow$ a)

6. $\sqrt{3x^2+6} = 9$

Squaring both sides

$$\left(\sqrt{3x^2+6}\right)^2 = (9)^2$$

$$3x^2 + 6 = 81$$

$$3x^2 = 75$$

$$x^2 = \frac{75}{3}$$

$$x = \sqrt{25} = \pm 5$$

$\Rightarrow$ c) 5

7. $x+y-4=0$; $x+y=4$

$2x+ky-3=0$; $2x+ky=3$

For no solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$$\frac{1}{2} = \frac{1}{k} \neq \frac{4}{3}$$

$$k = 2$$

$\Rightarrow$ d)

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

$P(-6, 8)$
x_1, y_1

Distance $= \sqrt{(0-[-6])^2 + (0-8)^2}$

Distance $= \sqrt{36+64}$

Distance $= \sqrt{100} = 10$ units

$\Rightarrow$ c)

9. b) centred at the classmarks of class.

10. $(5, -2)$ & $(-3, 2)$
$\quad x_1 \quad y_1 \qquad x_2 \quad y_2$

Let the vertex be (x, y)

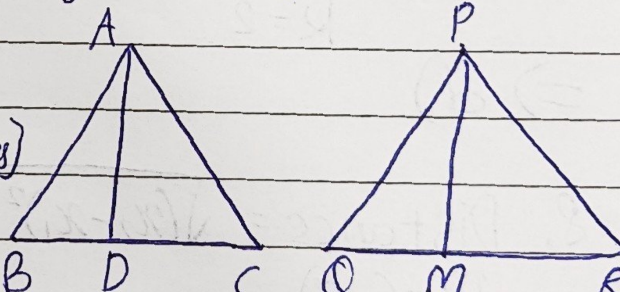
$$\sqrt{(x-5)^2+(y+2)^2} = \sqrt{[x-(-3)]^2+[y-(-2)]^2}$$

As the point is on x-axis then, $y=0$

$$(x-5)^2+(0+2)^2 = (x+3)^2+(0+2)^2$$
$$\cancel{x^2}-10x+25+\cancel{4} = \cancel{x^2}+6x+9+\cancel{4}$$
$$-10x-6x = 9-25$$
$$\cancel{-}16x = \cancel{-}16$$
$$x = 1$$
$$(-1, 0) = (x, y)$$
$\Rightarrow$ b)

11. As $\Delta ABC \sim \Delta PQR$

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP} \text{ [Corresponding side of similar triangles]}$$



$\angle A = \angle P$, $\angle B = \angle Q$ & $\angle C = \angle R$
[$\because$ Corresponding angles of similar triangles]

In ΔABD & In ΔPQM

$$\frac{AB}{PQ} = \frac{BC}{QR} \text{ [given]}$$

$$\frac{AB}{PQ} = \frac{\frac{1}{2}BC}{\frac{1}{2}QR}$$

$$\frac{AB}{PQ} = \frac{BD}{QM}$$

$\angle B = \angle Q$ [proved]

DT.

$\triangle ABD \sim \triangle PQM$ [By SAS]

$\frac{AB}{PQ} = \frac{AD}{PM}$ [Corresponding side of similar triangle]

$\Rightarrow$ b)

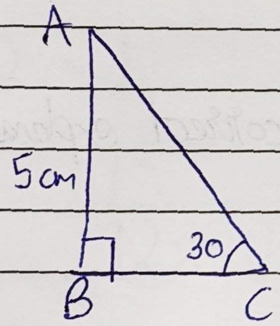
12. 5, 10, 15, 20, 25, 30, 35, 40

$P(E) = \frac{\text{no. of outcome}}{\text{Total No. of outcome}} = \frac{8}{40} = \frac{1}{5}$

$\Rightarrow$ b)

13. c) intersecting or coincident

14.



$\tan 30 = \frac{AB}{BC} = \frac{P}{B}$

$\frac{1}{\sqrt{3}} = \frac{5}{BC}$

$5\sqrt{3} = BC$

By Pyth. Theorem

$P^2 + B^2 = H^2$

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

$25 + 75 = AC^2$

$\sqrt{100} = AC$

$AC = 10$ cm

$\Rightarrow$ c)

15. $9(-1)^2 + (-1)(24) + 16 = 0$

$9 - 24 + 16 = 0$

$-16 + 16 = 0$

$0 = 0$

$\Rightarrow$ d)

16. $9(\sec^2 A - \tan^2 A) = 9(1) = 9 \Rightarrow$ b)

DT.

17. a) $(x+2)^2 = 2(x+3)$
$x^2+4x+4 = 2x+3$
$x^2+2x-2=0$

c) $(x+2)(x-1) = x^2-2x-3$
$\cancel{x^2}-x-2 = \cancel{x^2}-2x-3$
$x-1=0$

b) $x(x-1)+8 = (x-2)(x-2)$
$\cancel{x^2}-x+8 = \cancel{x^2}-4x+4$
$3x-4=0$

d)

$\Rightarrow$ Both b) & c) are answers

18. $P(E) = \frac{\text{Favourable outcomes}}{\text{Total No. of outcomes}} = \frac{\cancel{20}\ 10}{\cancel{144}\ 72} = \frac{5}{36}$
$\Rightarrow$ a)

19. b) A & R are correct, but R isn't correct explanation of A

20. $\frac{\theta}{360} \times \pi r^2 = $ Sector of circle

$\frac{\cancel{60}}{\cancel{360}\,6} \times \frac{22}{7} \times 6 \times \cancel{6} = \frac{132}{7}$

$\Rightarrow$ b) A & R are correct, but R isn't correct explaination of A

Section B

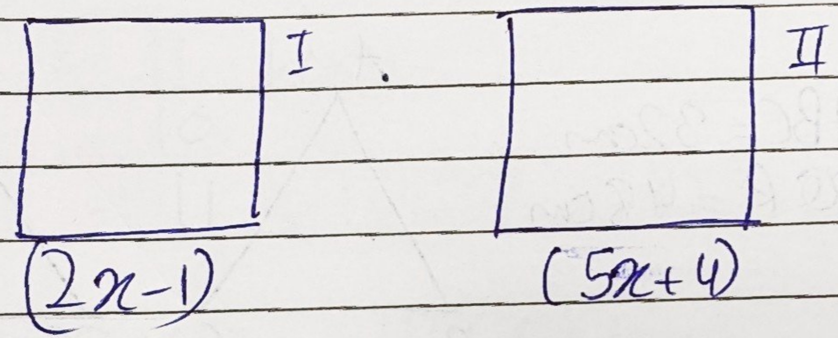
1. $ad \neq bc$; $(a^2+b^2)x^2 + 2(ac+bd)x + (c^2+d^2) = 0$
has no real roots
$D < 0$; $b^2-4ac < 0$

$[2(ac+bd)]^2 - 4(a^2+b^2)(c^2+d^2) = 0$
$4(a^2c^2+b^2d^2+2acbd) - 4(a^2c^2+a^2d^2+b^2c^2+b^2d^2) = 0$
$4(\cancel{a^2c^2}+\cancel{b^2d^2}+2abcd-\cancel{a^2c^2}-a^2d^2-b^2c^2-\cancel{b^2d^2}) = 0$
$-4(a^2d^2+b^2c^2-2abcd) = 0$
$-4(ad-bc)^2 < 0$

That's why it has no real root.

Spiral

21. ii)



Area of I plot = Area of II plot

$$9(2x-1)^2 = (5x+4)^2$$

Take root both sides

$$\sqrt{9(2x-1)^2} = \sqrt{(5x+4)^2}$$

$$3(2x-1) = (5x+4)$$

$$6x-3 = 5x+4$$

$$x = 7$$

$$5x+4 = 5(7)+4 = 35+4 = 39\text{m}$$

22. $\tan\theta + \cot\theta = 5$

Sq. both sides

$$(\tan\theta + \cot\theta)^2 = (5)^2$$

$$\tan^2\theta + \cot^2\theta + 2\left(\frac{1}{\cancel{\tan\theta}}\right)(\cancel{\tan\theta}) = 25$$

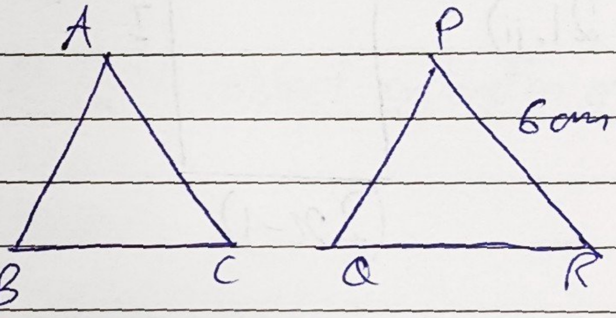
$$\tan^2\theta + \cot^2\theta = 25 - 2 = 23$$

$\sin(A-B) = \frac{1}{2}$; $\sin(A-B) = 30^\circ$

$\cos(A+B) = \frac{1}{2}$; $\cos(A+B) = 60$

$$A - B = 30$$
$$A + B = 60$$
$$(-) \quad (+) \quad (-)$$
$$2B = 30$$
$$B = 15^\circ$$
$$A - B = 30$$
$$A - 15 = 30$$
$$A = 45^\circ$$

23. Perimeter of $\Delta ABC = 32cm$
Perimeter of $\Delta PQR = 48cm$
$PR = 6cm$



$$\frac{P \text{ of } \Delta ABC}{P \text{ of } \Delta PQR} = \frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP}$$

$$\frac{P \text{ of } \Delta ABC}{P \text{ of } \Delta PQR} = \frac{AC}{PR}$$

$$\frac{\cancel{32}\,\cancel{8}\,2}{\cancel{48}\,\cancel{12}\,3} = \frac{AC}{6}$$
$$12 = 3AC$$
$$AC = 4cm$$

24. Let the total no. of balls $= x$
No. of blue balls $= \frac{x}{3}$

No. of red balls $= \frac{x}{4}$

No. of orange balls = 10

$$x = \frac{x}{3} + \frac{x}{4} + 10$$

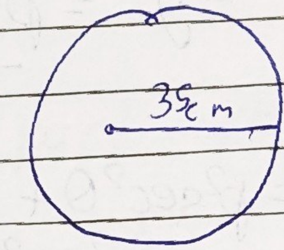
$$x = \frac{4x + 3x + 120}{12}$$

$$12x = 7x + 120$$

$$5x = 120$$

$$x = 24$$

25. Revoultions in 1hr = 66 km



Revolution in 1 min = $\frac{66}{60}$ km

$= \frac{11}{10}$ km

$= \frac{11}{1\cancel{0}} \times 100\cancel{0} = 1100$ m

$1100 \times 100 = 110000$ cm

In one revolution $= 2\pi r$

$= 2 \times \frac{22}{\cancel{7}} \times \cancel{35}\,5 = 220$ cm

No. of revolution per min $= \frac{\cancel{110000}^{\,500}}{\cancel{220}}$

$= 5000$

Section C

26. Let the hostel fixed charge be ₹ x = ₹1000

Cost of food in No. of days be y = ₹100

$\cancel{x} + 20y = ₹3000$, $x + 20(100) = 3000$

$\cancel{x} + 25y = ₹3500$ $\quad x = 3000 - 2000 = 1000$

$(-)\ (-)\ (-)$ $\quad \boxed{y = 100}$, $\boxed{x = 1000}$

$5y = 500$

27. $(x = p\sec\theta + q\tan\theta)^2$

$$x^2 = p^2\sec^2\theta + q^2\tan^2\theta + pq(\sec\theta \times \tan\theta) \quad - (1)$$

$(y = p\tan\theta + q\sec\theta)^2$

$$y^2 = p^2\tan^2\theta + q^2\sec^2\theta + pq(\tan\theta \times \sec\theta) \quad - (2)$$

Subtract (2) from (1)

$$x^2 - y^2 = p^2\sec^2\theta + q^2\tan^2\theta + pq(\sec\theta \times \tan\theta) - [p^2(\tan^2\theta) + q^2(\sec^2\theta) + pq(\tan\theta \times \sec\theta)$$

$$x^2 - y^2 = p^2\sec^2\theta + q^2\tan^2\theta + \cancel{pq(\sec\theta \times \tan\theta)} - p^2\tan^2\theta - q^2\sec^2\theta - \cancel{pq(\sec\theta \times \tan\theta)}$$

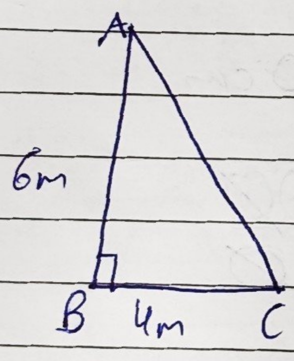
$$x^2 - y^2 = p^2(\sec^2\theta - \tan^2\theta) + q^2(\tan^2\theta - \sec^2\theta)$$

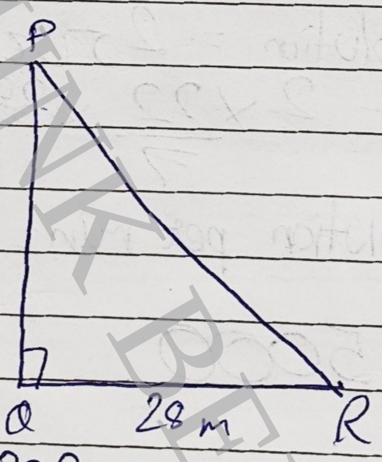
$$x^2 - y^2 = p^2(1) + q^2(-1)$$

$$x^2 - y^2 = p^2 - q^2$$

Hence proved

28.





In ΔABC & In ΔPQR

$\angle Q = \angle B = 90$ (angle b/w ground & vertical objet)

$\angle R = \angle C$ [Sun's elevation]

$\Delta ABC \sim \Delta PQR$ [By AA]

As $\Delta ABC \sim \Delta PQR$,

DT.

$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP}$ (Corresponding sides of similar Δ)

$\frac{AB}{PQ} = \frac{BC}{QR}$

$\frac{6}{PQ} = \frac{4}{\cancel{28}\ 7}$

$PQ = 42\,m$

29. No. of colour pencil in each pack = 24

$24 = 2^3 \times 3$

No. of crayons in each pack = 32

$32 = 2^5$

$LCM(24, 32) = 2^3 \times 3$

$2^5 \times 1$

$= 2^5 \times 3 = 32 \times 3 = 96$

No. of colour pencil packs = $96 \div 24 = 4$

No. of crayon packs = $96 \div 32 = 3$

30. $\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} = 1 - \sin\theta \times \cos\theta$ $\qquad \sin^2\theta + \cos^2\theta = 1$

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

Hence proved

31. $a = 1$, $b = -(k+6)$, $c = 2(2k-1)$

Sum of zeros = $\frac{1}{2}$ product of zeros

$-\frac{b}{a} = \frac{1}{2} \times \frac{c}{a}$

Spiral

$-\frac{(-(k+6))}{1} = \frac{1}{2} \times \frac{2(2k-1)}{1}$

$k+6 = 2k-1$

$k = 7$

Product of zeros $= \frac{c}{a}$

$= \frac{2(2\times 7-1)}{1} = 2(13) = 26$

$\frac{1}{\alpha^2} + \frac{1}{\beta^2} = \frac{\alpha^2+\beta^2}{\alpha^2\beta^2} = \frac{(\alpha+\beta)^2 - 2(\alpha\beta)}{(\alpha\beta)^2}$

$= \frac{(13)^2 - 2(26)}{(26)^2} = \frac{169-52}{676}$

$= \frac{\cancel{117}\,9}{\cancel{676}\,52} = \frac{9}{52}$

Sum of zeros

$= \frac{-b}{a} = \frac{-[-(7+6)]}{1} = 13$

ii) Sum of zeros $= \frac{-b}{a} = \frac{-5}{1}$

Product of zeros $= \frac{c}{a} = \frac{k}{1}$

$\alpha^3 + \beta^3 = 11$

$(\alpha+\beta)^3 - 3(\alpha\beta)(\alpha+\beta) = 11$

$(-5)^3 - 3(-5)(k) = 11$

$-125 + 15k = 11$

$15k = 136$

$k = \frac{136}{15}$

Section D

32. Let us assume $\sqrt{7}$ is ~~ir~~rational.

$\sqrt{7} = \frac{a}{b}$ (a & b are co-prime)

Sq. both sides

$7 = \frac{a^2}{b^2}$

$$7b^2 = a^2 \quad - (1)$$

a^2 is a multiple of 7

a is also multiple of $\sqrt{7}$

$$a = 7p,\ p \text{ is integer}$$

Put (1)

$$7b^2 = (7p)^2$$

$$7b^2 = 49p^2$$

$$b^2 = 7p^2$$

b^2 is a multiple of 7

b is also multiple of 7.

a & b both are multiples of 7

$\because$ This contriducts that a & b are co-prime

Our assumption is wrong.

$\sqrt{7}$ is irrational.

$$\frac{1}{\sqrt{7}-2} \times \frac{\sqrt{7}+2}{\sqrt{7}+2} = \frac{\sqrt{7}+2}{3}$$

$\frac{\sqrt{7}+2}{3}$ is rational, let us assume

$$\frac{\sqrt{7}+2}{3} = \frac{a}{b} \quad [a \,\&\, b \text{ are integers}]$$

$$b(\sqrt{7}+2) = 3a$$

$$\sqrt{7}+2 = \frac{3a}{b}$$

$$\sqrt{7} = \frac{3a-2b}{b}$$

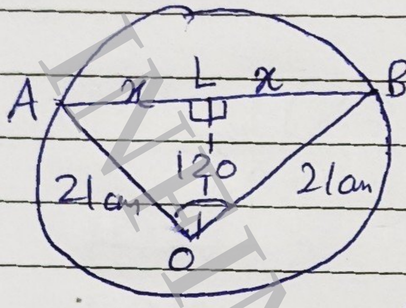
$\sqrt{7}$ is in $\frac{p}{q}$ form, which mean it's rational

This contriducts that $\sqrt{7}$ is irrational.

$\because$ So, our assumption is wrong.

So, $\frac{1}{\sqrt{7}-2}$ is irrational.

33.



Const: $OL \perp AB$

We know that,

$\Delta OLA \cong \Delta OLB$ (By ~~RHS~~ RHS)

By CPCT, $AL = BL = x$

$OL = y$

In ΔAOL, right angled at L

$$\sin 60° = \frac{P}{H}$$

$$\frac{\sqrt{3}}{2} = \frac{x}{21}$$

$$\frac{21\sqrt{3}}{2} = x$$

$$\cos 60 = \frac{B}{H}$$

$$\frac{1}{2} = \frac{y}{21}$$

$$\frac{21}{2} = y$$

Area of $\Delta AOB = \frac{1}{2} \times 2x \times y$

$$= \frac{21\sqrt{3}}{2} \times \frac{21}{2} = \frac{441\sqrt{3}}{4}$$

DT.

Area of segment $= \frac{\theta}{360} \times \pi r^2 -$ Area of Δ

Area of segment AOB $= \frac{120}{360} \times \pi(21)^2 -$ Area of ΔAOB

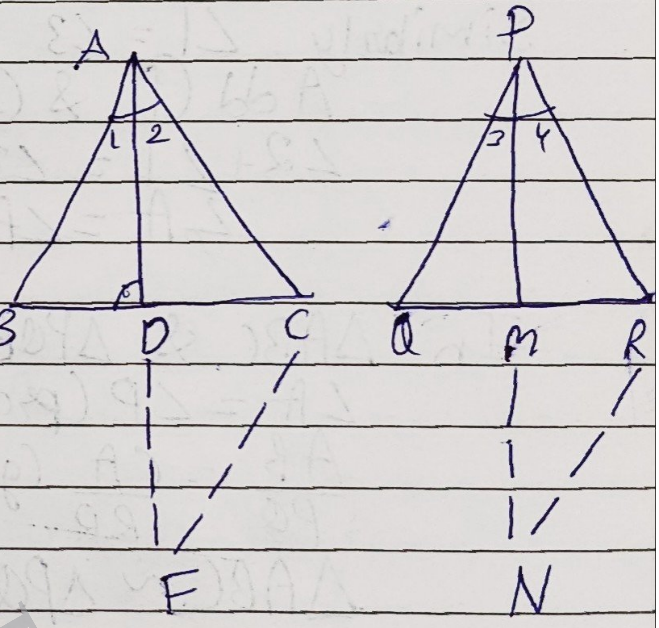
$= \frac{1}{3} \times \frac{22}{7} \times \cancel{441} - \frac{441\sqrt{3}}{4}$

$= 462 - \frac{441\sqrt{3}}{4}$

$= \frac{1848 - 441(1.73)}{4} = \frac{1848 - 762.93}{4}$

$= \frac{1085.07}{4} = 271.26\ m$

34. Given: $\frac{AB}{PQ} = \frac{AC}{PR} = \frac{AD}{PM}$



To show: $\Delta ABC \sim \Delta PQR$

Const: ① In ΔABC, Join AD to F such that, $AD = FD$

② In ΔPQR, Join PM to N such that $PM = MN$

Proof: In ΔABD & ΔDFC

$\angle ADB = \angle CDF$ [Vertically opp. angle]

$AD = DF$ (By const)

$BD = CD$ [D is median]

By SAS congruency, $\Delta ABD \cong \Delta DFC$

By CPCT, $AB = CF$ — ①

Similarly, $PQ = RN$ — ②

$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{AD}{PM}$

DT.

Proof: As $\Delta ABC \sim \Delta FEG$

$\frac{AB}{FE} = \frac{BC}{EG} = \frac{CA}{GF}$ [Corresponding sides of similar Δ]

$\angle A = \angle F$, $\angle B = \angle E$, $\angle C = \angle G$ [Corresponding angles of similar Δ]

In ΔDCB & ΔHGE

$\angle C = \angle G$ (proved)

$\frac{\angle C}{2} = \frac{\angle G}{2}$

$\angle 2 = \angle 4$

$\angle B = \angle E$ (given)

$\Delta DCB \sim \Delta HGE$ (By AA)

In ΔDCA & ΔHGF

$\angle A = \angle F$ (given)

$\frac{\angle C}{2} = \frac{\angle G}{2}$ (given)

$\angle 1 = \angle 3$

$\Delta DCA \sim \Delta HGF$ (By AA)

$\frac{DC}{HG} = \frac{CA}{GF} = \frac{AD}{FH}$ [Corresponding sides of similar Δ]

$\frac{DC}{HG} = \frac{AC}{FG}$

35. Mean = 18

$\frac{\Sigma x_i f_i}{\Sigma f_i} = 18$

$\frac{704 + 20x}{40 + x} = 18$

$704 + 20x = 720 + 18x$

CI	f_i	x_i	$x_i f_i$
11-13	3	12	36
13-15	6	14	84
15-17	9	16	144
17-19	13	18	234
19-21	f	20	$20x$
21-23	5	22	110
23-25	4	24	96
Total	$40+x$		$704+20x$

$$\frac{CF}{RN} = \frac{AC}{PR} = \frac{2AD}{2PM}$$

$$\frac{CF}{RN} = \frac{AC}{PR} = \frac{AF}{PN}$$

In ΔACF & ΔPRN

$\frac{CF}{RN} = \frac{AC}{PR} = \frac{AF}{FN}$ (proved)

$\Delta ACF \sim \Delta PRN$ [By SSS]

$\angle 2 = \angle 4$ [Corresponding angle of similar Δ] — ①

Similarly, $\angle 1 = \angle 3$ — ②

Add ① & ②

$\angle 2 + \angle 1 = \angle 3 + \angle 4$

$\angle A = \angle P$

In ΔABC & ΔPQR

$\angle A = \angle P$ (proved)

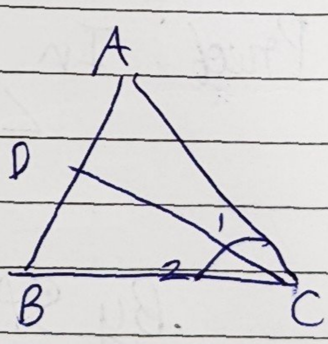
$\frac{AB}{PQ} = \frac{CA}{RP}$ (given)

$\Delta ABC \sim \Delta PQR$ (By SAS)

ii) Given: ① CD is bisector of $\angle ACB$, such that D lies on AB of ΔABC

② GH is bisector of $\angle EGF$, such that H lies on FE of ΔEFG

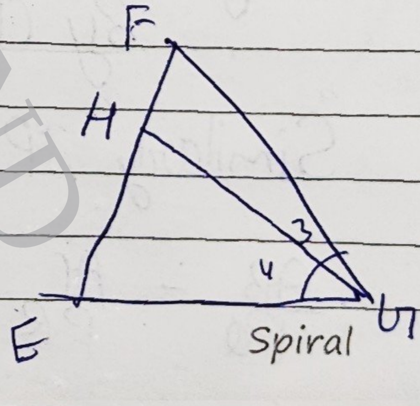
③ $\Delta ABC \sim \Delta FEG$



To prove: ① $\frac{CD}{GH} = \frac{AC}{FG}$

② $\Delta DCB \sim \Delta HGE$

③ $\Delta DCA \sim \Delta HGF$



Spiral

$720 - 704 = 20f - 18f$

$16 = 2f$

$f = 18$

ii)

CI	f
Below 10	8
" 20	17
" 30	32
" 40	62
" 50	80
" 60	95
" 70	100
	394

CI	f
0–10	8
10–20	9
20–30	15
30–40	30.
40–50	18
50–60	15
60–70	5

$\Rightarrow$ 30–40 is Modal class

As modal class have highest frequency

Section E

36. i) A – (3, 4) & B(6, 7)

ii) C (9, 4) & D (6, 1)

iii) a) distance formula $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$x_1 = 3,\ y_1 = 4$ & $x_2 = 9,\ y_2 = 4$

$\sqrt{(9-3)^2 + (4-4)^2} = \sqrt{(6)^2 + (0)^2} = \sqrt{36} = 6$ units

b) $x_1 = 3,\ y_1 = 4$ & $x_2 = 6,\ y_2 = 7$

$\sqrt{(6-3)^2 + (7-4)^2} = \sqrt{(3)^2 + (3)^2} = \sqrt{9+9} = 3+3 = 6$ units

37. i) Parabola

ii) $\alpha + \frac{1}{\alpha}$ = Sum of root = 10 = SOR

Let the zeros of quad poly be α & $\frac{1}{\alpha}$

Product of zero $= \cancel{\alpha} \times \frac{1}{\cancel{\alpha}} = 1$ = POR

$k(x^2 - SOR\,x + POR),\ k \neq 0$

$k(x^2 - 10x + 1),\ k \neq 0$

iii) a) $\alpha = 2,\ \beta = -1$ & $\gamma = 3$

$SOR = \alpha + \beta + \gamma = 2 + (-1) + 3 = 4$

$POR = \alpha\beta\gamma = (2)(-1)(3) = -6$

$SOPOR = \alpha\beta + \beta\gamma + \gamma\alpha = (2)(-1) + (-1)(3) + (3)(2)$

$= -2 - 3 + 6 = 1$

$x^3 - SOR\,x^2 + SOPOR\,x - POR$

$\Rightarrow\ x^3 - 4x^2 + x + 6$

b) Let the zeros be α & β

$\alpha = (2, 0)$ & $\beta = (-5, 0)$

$\alpha = 2,\ \beta = -5$

$SOR = \alpha + \beta = 2 + (-5) = -3$

$POR = \alpha\beta = (2)(-5) = -10$

$k(x^2 - SOR\,x + POR),\ k \neq 0$

$k(x^2 - (-3)x + (-10)),\ k \neq 0$

$k(x^2 + 3x - 10),\ k \neq 0$

38. i) For ₹30, then length of fencing = 1m

For ₹6000, then length of fencing $= \frac{1}{\cancel{30}} \times \cancel{6000}^{200} = 200m$

Spiral

$2\pi r = 200$

$2 \times \frac{22}{7} \times r = 200$

ii) $r = \frac{\cancel{200}^{50} \times 7}{\cancel{44}_{11}} = \frac{350}{11} = 31.81\text{m}$

iii) a) $\theta = 60$

P of sector = length of arc + 2 radius

$L = \frac{60}{360} \times 2\pi r$

$= \frac{1}{\cancel{6}_3} \times \cancel{2} \times \frac{22}{7} \times 31.81 = \frac{699.82}{21}$

$= 33.32\text{m}$

P of sector $= l + 2r$

$= 33.32 + 2(31.81)$

$= 33.32 + 63.62$

$= 96.94\text{m}$

b) $\frac{\theta}{360} \times \pi r^2$ $[\theta = 90$

$\frac{\cancel{90}}{\cancel{360}_{4\,2}} \times \frac{\cancel{22}^{11}}{7} \times 31.81 \times 31.81$

$= \frac{11 \times 1011.87}{14} = \frac{11130.63}{14} = 795.04\text{m}$