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Mid Curve Mid term Half yearly 2025-2026
Test 06

Q1) a) $\frac{9}{2}, \frac{3}{2}$

Q2) c) 1

Q3) c) $\frac{15}{4}$

Q4) c) $\frac{x^2-1}{2x}$

Q5) d) $\sqrt{3}, \sqrt{12}$

Q6) ~~d) None of these~~ c) Overlapping

Q7) $\frac{DP}{DC} = \frac{BL}{PL}$

Q8) a) 1

Q9) c) 2

Q10) b) 3 cm

Q11) d) 2520

Q12) c) 2

Q13) d) 36

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Q14) d) $a^2 b^2$

Q15) a) 3

Q16) c) -5

Q17) c) ± 7

Q18) b) 15

Q19) C) A is true, reason is false

Q20) a) Both A and R are true and R is the correct explanation for A

Section B

Q21) $\tan^2\theta + \cot^2\theta + 2 = \sec^2\theta \cdot \csc^2\theta$

LHS

$\tan^2\theta + \cot^2\theta + 2$

$\tan^2\theta = \sec^2\theta - 1$
$\cot^2\theta = \csc^2\theta - 1$

$(\sec^2\theta - 1) + (\csc^2\theta - 1) + 2$

$\sec^2\theta + \csc^2\theta - 2 + 2$

$\sec^2\theta + \csc^2\theta$

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$$\sec^2\theta = \frac{1}{\cos^2\theta}$$

$$\operatorname{cosec}^2\theta = \frac{1}{\sin^2\theta}$$

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

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

$$= \frac{1}{\cos^2\theta \cdot \sin^2\theta}$$

$$= \sec^2\theta \cdot \operatorname{cosec}^2\theta$$

LHS = RHS

Q(2)) $a = 2$ $\qquad$ $2, 5, 8 \ldots\ldots 59$

~~n = 20~~

$a_{20} = 59$

$a + 19d = 59$

$2 + 19d = 59$

$19d = 57$

$d = \frac{57}{19}$ 3

Reverse the AP

$59, 56, 53, 50 \ldots\ldots 2$

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$a = 59$
$d = -3$
$a_{22} = 2$
$a_6 = ?$

$= a + 5d$

$= 59 + (-15)$

$a_6 = 44$

(Q22) (b) $d = 7$
$a_{22} = 149$
$n = 22$

$a_{22} = a + 21d$
$149 = a + 147$
$149 - 147 = a$
$2 = a$

$S_n = \frac{n}{2}(a + a_n)$

$S_{22} = \frac{\cancel{22}^{11}}{\cancel{2}_{1}}(2 + 149)$

$= 11(151)$
$= 1661$

Q23) $x^2 - 3x - k$

$\alpha - \beta = 1$

$a = 1,\quad b = -3,\quad c = -k$

Sum of Zeros $\frac{-b}{a}$ Product of Zeros $\frac{c}{a}$

$\frac{-(-3)}{1} = 3$ $\frac{-k}{1}$

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

$2\alpha = 4$

$\alpha = \frac{4}{2} = 2$

Put in (1)

~~αβ~~ $2 + \beta = 3$

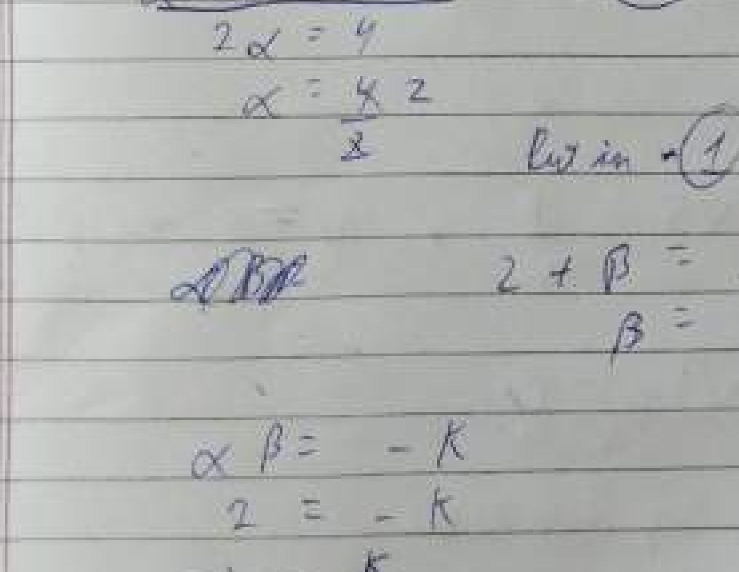
$\beta = 1$

$\alpha\beta = -k$

$2 = -k$

$-2 = k$

Q24) To find : D Coordinates



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Mid pt. of AC = $\frac{-2+8}{2}, \frac{3+3}{2} = \frac{6}{2}, \frac{6}{2} = (3,3)$

Mid pt. of diagonal BD is calculated as:

$$= \frac{6+x}{2}, \frac{7+y}{2}$$

$$= \frac{6+x}{2} = 3 \quad , \quad \frac{7+y}{2} = 3$$

$$= 6+x = 6 \quad , \quad 7+y = 6$$
$$x = 0 \quad , \quad y = -1$$

$$D = (0, -1)$$

Q35/ let us assume $\sqrt{5}$ is rational

$\sqrt{5} = \frac{p}{q}$, $q \neq 0$ and p & q are co-prime

$$\sqrt{5}q = p$$

Sq. both sides

$$5q^2 = p^2 \quad — (1)$$
$$q^2 = \frac{p^2}{5}$$

5 divides p^2
5 divides then p also

Then, $\frac{p}{5} = k$

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$p = 5k$

Sq. both sides

$p^2 = 25k^2$

from ①

$5q^2 = 25k^2$

$\frac{q^2}{5} = k^2$

5 divide q^2

5 also divides q

$\Rightarrow$ This contradicts our assumption as 5 divides both p & q and thus is a factor of p & q.

$= \sqrt{5}$ is irrational

Let us assume $17 + 3\sqrt{5}$ rational

$17 + 3\sqrt{5} = \frac{p}{q}$, $q \neq 0$ p & q are co-prime

$3\sqrt{5} = \frac{p}{q} - 17$

$3\sqrt{5} = \frac{p - 17q}{q}$

$\sqrt{5} = \frac{p - 17q}{3q}$

$\therefore$ Our assumption is wrong

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Q25) B) $(\sqrt{2}+\sqrt{3})^2$

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

$= 2 + 3 + 2(\sqrt{6})$

$= 5 + 2\sqrt{6}$

Let us assume $5 + 2\sqrt{6}$ is rational

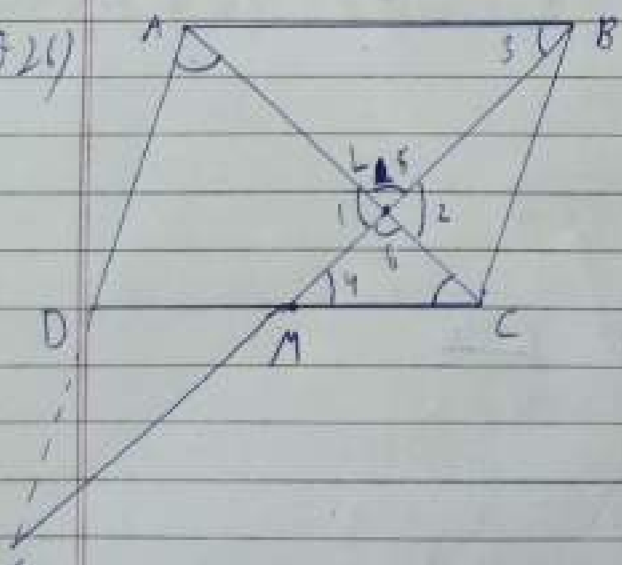
$5 + 2\sqrt{6} = \frac{p}{q}$, $q \neq 0$ p & q are co-prime

$2\sqrt{6} = \frac{p - 5q}{q}$

$\sqrt{6} = \frac{p - 5q}{2q}$

$\therefore$ Our assumption is wrong

Q26)



To prove : EL : 2BL

Given : AB || DC
M mid pt. of DC

In $\triangle MLC$ & $\triangle ALB$

$\angle 5 = \angle 6$ (Vertically opp.)
$\angle 3 = \angle 4$ (Alternate int.)

By AA $\triangle MLC \sim \triangle ALB$

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So we can conclude $\frac{LC}{LA} = \frac{MC}{AB}$

$MC = \frac{1}{2} CD$ (M is mid pt of CD)

$CD = AB$ (parallelogram property)

$\frac{MC}{AB} = \frac{1}{2}$. thus, $\frac{LC}{LA} = \frac{1}{2}$ — (1)

In ΔBLC & ΔELA

$\angle 1 = \angle 2$ (vertically opp.)
$\angle A = \angle C$ (alt. int.)

By A A Similarity $\Delta BLC \sim \Delta ELA$

So we can conclude $\frac{BL}{EL} = \frac{LC}{LA}$

from (1)

$\frac{BL}{EL} = \frac{1}{2}$

$2BL = EL$

Hence, proved

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Q) 7) $2x - 3y = 7$
$(a+b)x - (a+b - 3y) = 4a + b$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{2}{a+b} = \frac{-3}{-(a+b-3y)} = \frac{7}{4a+b}$$

$$\frac{2}{a+b} = \frac{3}{a+b-3} = \frac{7}{4a+b}$$

$$\frac{2}{a+b} = \frac{3}{a+b-3}$$

$$2a + 2b - 6 = 3a + 3b$$

$$a + b = -6 \quad - (1)$$

$$\frac{2}{a+b} = \frac{7}{4a+b}$$

$$8a + 2b = 7a + 7b$$

$$a = 5b \quad - (2)$$

Now substitute $a = 5b$ into (1)

$$5b + b = -6$$

$$6b = -6$$

$$b = \frac{-6}{6} = -1$$

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Put in (1)

$a + (-1) = -6$

$a = -5$

(iv) $2\left(\frac{2x+3}{x-3}\right) - 25\left(\frac{x-3}{2x+3}\right) = 5$

Let $y = \frac{2x+3}{x-3}$ The eq. becomes

$2y - 25\left(\frac{1}{y}\right) = 5$ or $2y - \frac{25}{y} = 5$

$2y^2 - 25 = 5y$

$2y^2 - 5y - 25 = 0$

$2y^2 - 10y + 5y - 25 = 0$

$2y(y - 5) + 5(y - 5) = 0$

$(2y + 5)(y - 5) = 0$

$2y + 5 = 0 \implies y = -\frac{5}{2}$

$y - 5 = 0 \implies y = 5$

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Case I $\frac{2x+3}{x-3} = 5$

$2x+3 = 5x-15$

$18 = 3x$

$\frac{\cancel{18}^{6}}{\cancel{3}_{1}} = x$

Case II

$\frac{2x+3}{x-3} = -\frac{5}{2}$

$4x+6 = -5x+15$

$9x = 9$

$x = 1$

$x = 1, 6$

8 18(a) $x+y = 29$ — (1)

$x^2+y^2 = 425$ — (2)

~~y~~ from (1)

$y = 29 - x$

Put in (2)

$x^2 + (29-x)^2 = 425$

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$x^2 + 841 - 58x + x^2 = 425$

$2x^2 - 58x + 416 = 0$

Divide it by 2

$x^2 - 29x + 208 = 0$

$x = \frac{-b \pm \sqrt{D}}{2a}$ $a = 1, b = -29,$ $c = 208$

$x = \frac{29 \pm \sqrt{(-29)^2 - 4(1)(208)}}{2(1)}$

$x = \frac{29 \pm \sqrt{841 - 832}}{2}$

$x = \frac{29 \pm \sqrt{9}}{2}$

$x = \frac{29 \pm 3}{2}$

$x = 16, y = 13$

Q29) $398 - 7 = 391$
$436 - 11 = 425$
$540 - 13 = 527$

$17 \mid 391$, $23 \mid 23$, 1

$5 \mid 425$, $5 \mid 85$, $17 \mid 17$, 1

$17 \mid 527$, $31 \mid 31$, 1

HCF = 17

Q3a) A (1, -3) and B (4, 5)

It is divided by the line $x + 2y = 5$ — ①

the ratio of division is 1 : 2 , coordinates of intersection point are (2, 3)

Assume the ratio Let the point P (x, y) divide the line segment AB in the ratio K : 1

$$P(x,y) = \frac{Kx_2 + x_1}{K+1} , \frac{Ky_2 + y_1}{K+1}$$

$$P(x,y) = \frac{4k + 1}{k+1} , \frac{5k - 3}{k+1}$$

Substitute in ①

$$\frac{4k + 1}{k+1} + 2\left(\frac{5k-3}{k+1}\right) = 5$$

Solve for k

$$\frac{4k + 1 + 2(5k - 3)}{k+1} = 5$$

$$4k + 1 + 10k - 6 = 5k + 5$$

$$4K = 10$$

$$k = \frac{10}{4}$$

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The ratio K : 1 which is $\frac{10}{9} : 1$

10 : 9

$$x = \frac{\frac{40+9}{9}}{\frac{10+9}{9}} = \frac{\frac{49}{9}}{\frac{19}{9}} = \frac{49}{19}$$

$$y = \frac{\frac{50-27}{9}}{\frac{10+9}{9}} = \frac{\frac{23}{9}}{\frac{19}{9}} = \frac{23}{19}$$

$$P\left(\frac{49}{19}, \frac{23}{19}\right)$$

Q31) A) $f(x) = 25x^2 - 15x + 2$

$$\alpha + \beta = -\left(\frac{-15}{25}\right) = \frac{\cancel{15}\,3}{\cancel{25}\,5}$$

$$\alpha\beta = \frac{2}{25}$$

$$\frac{1}{2\alpha} + \frac{1}{2\beta} = \frac{\beta + \alpha}{2\alpha\beta}$$

$$\frac{\frac{3}{5}}{2\left(\frac{2}{25}\right)} = \frac{\frac{3}{5}}{\frac{4}{25}} = \frac{3}{\cancel{5}} \times \frac{\overset{5}{\cancel{25}}}{4} = \frac{15}{4}$$

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$$\frac{1}{2\alpha} \times \frac{1}{2\beta} = \frac{1}{4\alpha\beta}$$

$$\frac{1}{4\left(\frac{2}{25}\right)} = \frac{1}{\frac{8}{25}} = \frac{25}{8}$$

$$p(x) = k\left(x^2 - \frac{15}{4} + \frac{25}{8}\right)$$

~~04) B) $p(x) = 2x^2 - 7x - 15$~~

Q3) B) $p(x) = 2x^2 - 7x - 15$

$$2x^2 - 10x + 3x - 15 = 0$$

$$2x(x-5) + 3(x-5) = 0$$

$$(2x+3)(x-5) = 0$$

$$x = 5, \ \frac{-3}{2}$$

$$\alpha = 5, \ \beta = \frac{-3}{2}$$

$$\frac{1}{\alpha} = \frac{1}{5}, \ \frac{1}{\beta} = \frac{-2}{3}$$

Sum of Zeros

$$\frac{1}{5} + \left(-\frac{2}{3}\right) = \frac{3-10}{15} = \frac{-7}{15}$$

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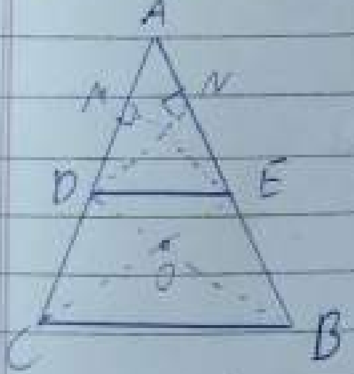
$\alpha\beta$

$$\frac{1}{5} \times \frac{-2}{3} = \frac{-2}{15}$$

$$P(x) = K\left(x^2 - \left(-\frac{7}{15}\right)x + \left(\frac{-2}{15}\right)\right)$$

$$P(x) = Kx^2 + \frac{7}{15}x - \frac{2}{15}$$

(32) (A) Thales theorem states that if a line is drawn parallel to one side of a triangle intersecting the other two sides of a triangle it divides those two sides in the same ratio.



Given: $DE \parallel CB$

Const: BD, DB, DN, EM

To prove: $\frac{AD}{DC} = \frac{AE}{EB}$

$$Ar(\Delta ADE) = \frac{1}{2} \times DN \times AE$$

$$Ar(\Delta ADE) = \frac{1}{2} \times EM \times AD$$

$$Ar(\Delta DEB) = \frac{1}{2} \times DN \times EB$$

$$Ar(\Delta DEC) = \frac{1}{2} \times EM \times DC$$

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We know that when two triangles lie on the same base and b/w parallel lines their area will be same

$$Ar\,\Delta(DEB) = Ar\,\Delta(DEC)$$

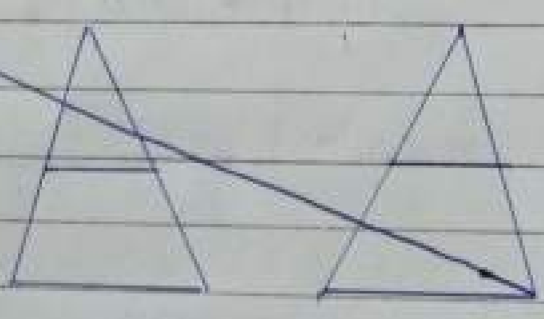
$$\frac{Ar(\Delta ADE)}{Ar(\Delta DEB)} = \frac{Ar\,\Delta ADE}{Ar\,(\Delta DEC)}$$

$$\frac{\frac{1}{2} \times DN \times AE}{\frac{1}{2} \times DN \times EB} = \frac{\frac{1}{2} \times EM \times AD}{\frac{1}{2} \times EM \times DC}$$

$$\frac{AE}{EB} = \frac{AD}{DC}$$

Hence, proved

Q32(B)



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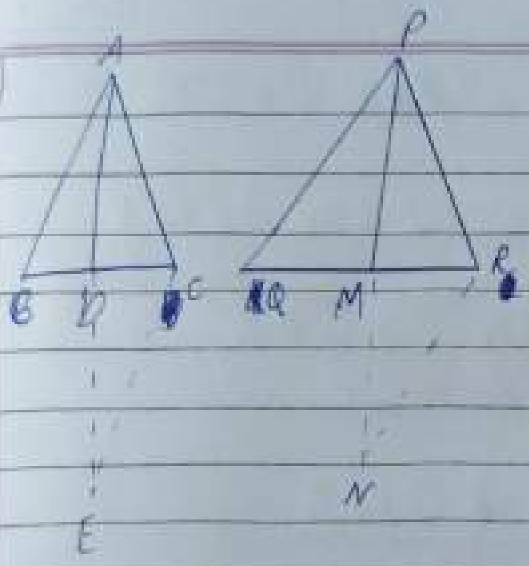
Q32(B)



Const: Extend AD to AE so $AD = DE$
similarly the with $PM = MN$

In ΔABD & ΔECD

$AD = DE$
$BD = DC$
$\angle ADB = \angle CDE$

By SAS $\Delta ABD \cong \Delta ECD$

Similarly $\Delta PQM \cong \Delta NRM$

This gives $AB = CE$ and $PQ = RN$ (by CPCT)

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

$AB = CE$ and $PQ = RN$

$$\frac{CE}{RN} = \frac{AC}{PR} = \frac{AD}{PM}$$

$$\frac{CE}{RN} = \frac{AC}{PR} = \frac{2AD}{2PM} = \frac{AE}{PN}$$

By SSS $\Delta ACE \sim \Delta PRN$

$\angle CAE = \angle RPN$ (By CPCT)

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$\angle BAE = \angle QPN$

$\angle CAE + \angle BAE = \angle RPN + \angle QPN$

$\angle BAC = \angle QPR$

$\angle A = \angle P$

In ΔABC & ΔPQR

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

$\angle A = P$

$\Delta ABC \sim \Delta PQR$

Hence, Proved

Q33) Let the speed of the stream be x Km/hr

The speed of boat in still water is 11 Km/hr

Time taken : 2 hr 45 min

$$2 + \frac{45}{60} = 2 + \frac{3}{4} = \frac{11}{4}$$

Speed upstream $= (11 - x)$ Km/hr
Speed downstream $= (11 + x)$ Km/hr

Distance travelled upstream and downstream = 12 Km

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Time taken upstream = $\frac{12}{11-x}$ hours

Time taken downstream = $\frac{12}{11+x}$ hours

$\frac{12}{11-x} + \frac{12}{11+x} = \frac{11}{4}$

$\frac{132 + 12x + 132 - 12x}{121 - x^2} = \frac{11}{4}$

$264 \times 4 = 1331 - 11x^2$

$1056 = 1331 - 11x^2$

$11x^2 = 1331 - 1056$

$11x^2 = \frac{275}{11}$ 25

$x = \sqrt{25}$

$x = 5$ Km/hr

Q34 (A) $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta \cdot \operatorname{cosec}\theta$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$, $\cot\theta = \frac{\cos\theta}{\sin\theta}$

LHS

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

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

$$= \frac{\sin^2\theta}{\cos\theta(\sin\theta - \cos\theta)} - \frac{\cos^2\theta}{\sin\theta(\sin\theta - \cos\theta)}$$ $\left(\cos\theta - \sin\theta = -(\sin\theta - \cos\theta)\right)$

$$= \frac{\sin^3\theta - \cos^3\theta}{\sin\theta\cos\theta(\sin\theta - \cos\theta)}$$

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

$\left(a^3 - b^3 = (a-b)(a^2 + ab + b^2)\right)$

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

$= \operatorname{cosec}\theta\sec\theta + 1$

LHS = RHS

Q14(B) $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$

~~divide~~ LHS

divide LHS by $\cos\theta$

Now $\dfrac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta}$

$= \dfrac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1}$

$= \dfrac{\tan\theta + \sec\theta - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1}$

$= \dfrac{\tan\theta + \sec\theta - (\sec\theta - \tan\theta)(\sec\theta + \tan\theta)}{\tan\theta - \sec\theta + 1}$

$= \dfrac{(\tan\theta + \sec\theta)(1 - (\sec\theta - \tan\theta))}{\tan\theta - \sec\theta + 1}$

$= \dfrac{(\tan\theta + \sec\theta)\cancel{(1 - \sec\theta + \tan\theta)}}{\cancel{(\tan\theta - \sec\theta + 1)}}$

$= \tan\theta + \sec\theta$

$= (\tan\theta + \sec\theta) \times \left(\dfrac{\sec\theta - \tan\theta}{\sec\theta - \tan\theta}\right) = \dfrac{\sec^2\theta - \tan^2\theta}{\sec\theta - \tan\theta}$

$= \dfrac{1}{\sec\theta - \tan\theta}$

LHS = RHS

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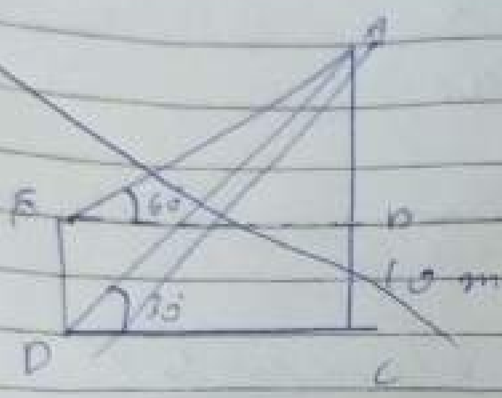
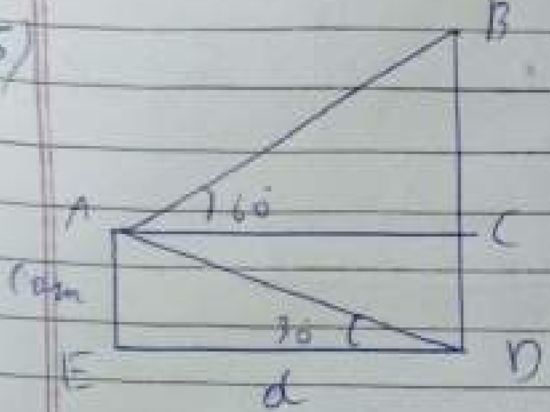


Q35)



Let ED be d

$\tan 30° = \frac{1}{\sqrt{3}} = \frac{10}{d}$

$d = 10\sqrt{3}$

$\tan 60° = \sqrt{3} = \frac{BC}{10\sqrt{3}}$

$30\ m = BC$

$h = CE + DE = 30 + 10 = 40\ m$

Q36) i) $a = 10,000$

$d = 1000$

$a_n = 11,80,000$

$a_{30} = ?$

$a_{30} = a + 29d$

$= 10000 + 29000$

$= 39,000$

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ii) ~~$S_{30} = \frac{32}{2} \times 1000 + (1,88,000)$~~

ii) a) $S_{30} = \frac{30}{2}(10,000 + 39,000)$

$S_{30} = 15(49,000)$
$= 235,000$

b) $a_{25} = a + 24d$
$a_{25} = 10,000 + 24,000$

$a_{25} = 34,000$

$a_{15} = a + 14d$
$a_{15} = 10,000 + 14,000$
$= 24,000$

$= a_{25} - a_{15}$

$= 34000 - 24000$
$= 10,000$

iii) $a : a_{40}$

$a_{40} = a + 39d$
$= 10,000 + 39,000$
$= 49000$

$10000 : 49000$
$10 : 49$

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Q.i) Let poor child monthly fee be = x
Let rich child monthly fee be = y

$20x + 5y = 9000$ — (1)
$5x + 25y = 26000$ — (2)

Divide Both eq by 5

$4x + y = 1800$ — (1)
$x + 5y = 5200$ — (2)

from (1)

$y = 1800 - 4x$

$x + 5(1800 - 4x) = 5200$

$x + 9000 - 20x = 5200$

~~$7200 - 5200 = 16x - x$~~
~~$2000 = 15x$~~

$-19x = -3800$

$x = \frac{3800}{19} = 200$

ii) b) $x = 200$
$y = 1800 - 4x$

$y = 1800 - 800$
$y = 1000$

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$= y - x$

$= 1000 - 200$

$= 800$

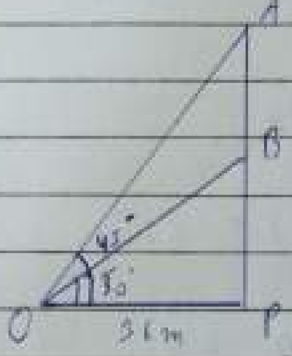
iii) $10x + 20y$

$= 10(200) + 20(1000)$

$= 2000 + 20{,}000$

$= 22{,}000$

Q38) i)



ii) $\tan 30° = \frac{1}{\sqrt{3}} = \frac{BP}{36m}$

$\frac{36\ m}{\sqrt{3}} = BP$

$\frac{36}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = BP$

$\frac{\overset{12}{\cancel{36}}\sqrt{3}}{\cancel{3}_1} = BP$

$12\sqrt{3} = BP$

iii) a) $\cos 45° = \frac{1}{\sqrt{2}} = \frac{36m}{AO}$

$AO = 36\sqrt{2}\ m$

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~~Tan 30° = $\frac{1}{\sqrt{3}}$ =~~

(iii) b) $\cos 30° = \frac{\sqrt{3}}{2} = \frac{36}{OB}$

$OB = \frac{72}{\sqrt{3}}$ m

$OB = \frac{\cancel{72}^{24}\sqrt{3}}{\cancel{3}_{1}}$

$$\boxed{OB = 24\sqrt{3}}$$