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Answer Key Practice Paper 1 -X Mathematics
Mind Curves -Mid Term (By Deepika Bhati)

Sec - A

Q1 = (b) 2

Q2 = (a) 0

Q3 = $p = x^5 y^2$
$q = x^3 y^3$

HCF $= x^3 y^2$

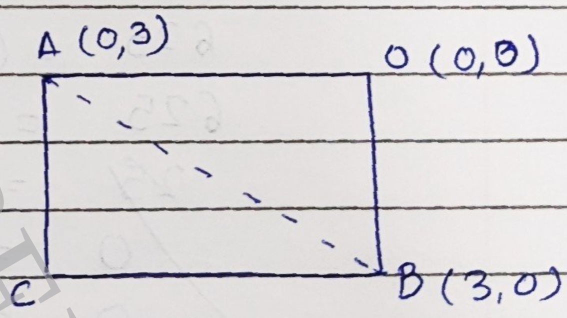
(c) $x^3 y^2$

Q4 = (d) not defined

Q5 = (b) $r = 21$, $s = 84$

Q6 = $AB = \sqrt{(3-0)^2 + (0-3)^2}$
$= \sqrt{9+9}$
$= \sqrt{18}$

$AB = 3\sqrt{2}$ unit



NOTE

Correct answer is $3\sqrt{2}$ unit

INFINITY THINK BEYOND

Q7 = $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\frac{K}{3} \neq \frac{2}{1}$

$K \neq 6$

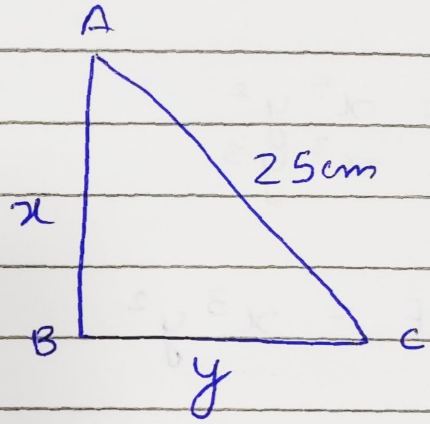
(b) $K \neq 6$

Q8 = (c) 11

Q9 = (a) is increased by 2

Q10 = Let the larger side $= x$

Let third side $= y$



ATQ $\longrightarrow$

$x = y + 5$

By pythagoreous Theorem

$\therefore (AC)^2 = (AB)^2 + (BC)^2$

$625 = (x)^2 + (y)^2$

$625 = (y+5)^2 + y^2$

$625 = y^2 + 25 + 10y + y^2$

INFINITY THINK BEYOND

$$625 = 2y^2 + 10y + 25$$
$$y^2 + 5y - 300 = 0$$
$$y^2 + 20y - 15y - 300$$
$$y = 15 \quad \text{option (b}$$

Q11= c) obtuse angled triangle

Q12= $\sin\theta = x$ $\quad\quad$ $\sec\theta = y$

$$\cos\theta = \frac{1}{y}$$

$$\cot\theta = \frac{\cos\theta}{\sin\theta} = \frac{1/y}{x} = \frac{1}{y} \times \frac{1}{x}$$
$$= \frac{1}{yx}$$

(d) $1/xy$

Q13= (a) parellel to x-axis

Q14= $x(x+1) + 8 = (x+2)(x-2)$
$$\cancel{x^2} + x + 8 = \cancel{x^2} - 4$$
$$x + 8 = -4$$

(a) linear equation

INFINITY THINK BEYOND

Q16 = (b) $\frac{\sqrt{3}}{2}$

Q17 = (b) $x^2 + x^3 + 2 = 0$

Q18 = $d = 1.26m$ $\quad r = \frac{126}{200} = \frac{63}{200}$

Distance $= 500 \times 2 \times \frac{22}{7} \times \frac{63}{100}$

$= 1980\ m$

(c) 1980m

Q19 = c) Assertion A is ~~tror~~ true but Reason R is false.

Q20 = a) Both assertion & reason are true and Reason R is the correct explanation of assertion A.

Sec-B

Q21 = $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

$= \sqrt{2}x^2 + 2x + 5x + 5\sqrt{2} = 0$

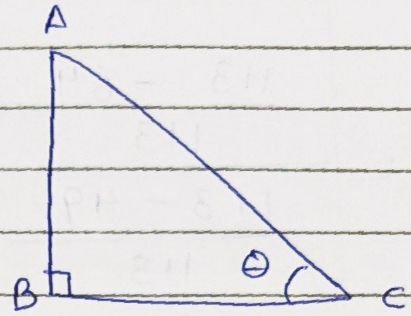
$= \sqrt{2}x^2 + (\sqrt{2x} \times \sqrt{2x}) + 5x + 5\sqrt{2} = 0$

$= \sqrt{2}x(x + \sqrt{2}) + 5(x + \sqrt{2}) = 0$

$= (x + \sqrt{2})(\sqrt{2}x + 5) = 0$

INFINITY THINK BEYOND

Q22 = $\cot\theta = \frac{7}{8}$



Let a ΔABC, right angled at B.

$$\cot\theta = \frac{7}{8} = \frac{B}{P} = \frac{BC}{AB}$$

Let $BC = 7K$, $AB = 8K$

By Pythagoreous Theorem

$$(AC)^2 = (7)^2 + (8)^2$$
$$= (49K^2) + 64K^2$$
$$AC = \sqrt{113K^2}$$
$$AC = \sqrt{113}\,K$$

$\sin\theta = \frac{P}{H} = \frac{8}{\sqrt{113}}$ $\cos\theta = \frac{B}{H} = \frac{7}{\sqrt{113}}$

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

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

$$= \frac{1 - \left(\frac{8}{\sqrt{113}}\right)^2}{1 - \left(\frac{7}{\sqrt{113}}\right)^2}$$

$$= \frac{1 - \frac{64}{113}}{1 - \frac{49}{113}}$$

INFINITY THINK BEYOND

$$= \frac{\frac{113-64}{113}}{\frac{113-49}{113}}$$

$$= \frac{\frac{49}{113}}{\frac{64}{113}}$$

$$= \frac{49}{\cancel{113}} \times \frac{\cancel{113}}{64}$$

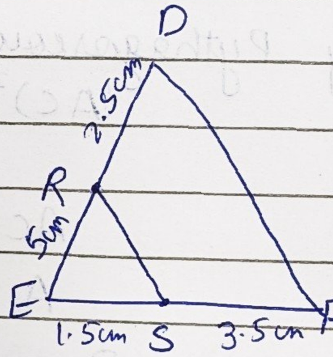
$$= \boxed{\frac{49}{64}}$$

Q23 = Given = (1) ΔDEF

(2) R & S points on sides DE & EF respectively

(3) ER = 5 cm RD = 2.5 cm

SE = 1.5 cm FS = 3.5 cm



To ~~prove~~ find = RS ∥ DF

Proof

$$\frac{ER}{RD} = \frac{5}{2.5} = \frac{\cancel{50}^{10\,2}}{\cancel{25}_{\cancel{5}\,1}} = \frac{2}{1}$$

$$\frac{SE}{FS} = \frac{1.5}{3.5} = \frac{\cancel{150}^{3}}{\cancel{350}_{7}} = \frac{3}{7}$$

$$\frac{ER}{RD} \neq \frac{SE}{FS}$$

As the ratio of sides ~~are~~ is not equal then by converse of Basic Proportionality theorem, RS ∦ DF.

INFINITY THINK BEYOND

Q24: Total outcomes 36

(i) Even sum: (1,1) (1,3) (1,5) (2,2) (2,4) (2,6)
(3,1) (3,3) (3,5) (4,2) (4,4) (4,6)
(5,1) (5,3) (5,5) (6,2) (6,4) (6,6)

$P(\text{Even Sum}) = \frac{18}{36} = \frac{1}{2}$

(ii) $P(\text{Even product}) = \frac{27}{36} = \frac{9}{12} = \frac{3}{4}.$

Q25: area $= 30.1.84\ cm^2$

area $= 2\pi r^2$

$301.84 = 2 \times \frac{22}{7} \times r^2$

$\frac{301.84 \times 7}{2 \times 22} = r^2$

$\frac{\cancel{30184}^{\cancel{15142}\ 7571} \times 7}{\cancel{2}_1 \times \cancel{22}_{11} \times 100} = r^2$

$\frac{7571 \times 7}{11 \times 100} = r^2$

$\sqrt{48.17} = r$

$6.9cm = r$

Circumfrence $= 2\pi r$

$= 2 \times \frac{22}{7} \times \frac{69}{10}$

$= 40.92$ cm

INFINITY THINK BEYOND

Sec-C

Q27 = $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\ \text{cosec}\,\theta$

Taking LHS

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

$$\cancel{\frac{\tan\theta}{1-\frac{1}{\tan\theta}} + \cot}$$

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

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

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

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

$$\cancel{\frac{}{\sin\theta\cos\theta\,(\cos\theta-\sin}}$$

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

INFINITY THINK BEYOND

$a^3 - b^3$
$= (a-b)(a^2$

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

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

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

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

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

$= \sec\theta\ \text{cosec}\,\theta + 1$

or

$1 + \sec\theta\ \text{cosec}\,\theta$

Hence, proved

Q28 = zeroes will be 2α, 2β

$2\alpha + 2\beta \qquad = 2\alpha \times 2\beta$

$= 2(\alpha + \beta) \qquad = \cancel{2}\ 4\alpha\beta$

$2x^2 - 5x - 3$

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

$= 2(\alpha + \beta) \qquad 4(\alpha\beta)$

$= \cancel{2}\left(\frac{5}{\cancel{2}}\right) \qquad 2\,\cancel{4}\left(\frac{-3}{\cancel{2}}\right)$

$= 5 \qquad = -6$

INFINITY THINK BEYOND

Value of $p = 5$ and $q = -6$

Q29= Let us assume 3^n ends with zero for some n.

So, 3^n must have zeroes 2 & 5 as its prime factors

But $= 3^n = (3\times1)^n$

$= 3^n \times 1^n$

3^n have no 2 & 5 as its prime factors.

This contradicts that 3^n ~~ends~~ must have 2 & 5 as its factors.

So, our assumption is wrong & 3^n doesn't end with zero.

Q30= $\sqrt{\dfrac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

taking LHS

$\sqrt{\dfrac{1+\sin A}{1-\sin A}}$

$\sqrt{\dfrac{1+\sin A}{1-\sin A} \times \dfrac{1+\sin A}{1+\sin A}}$

$\sqrt{\dfrac{(1+\sin A)^2}{1-\sin^2 A}}$

$\sqrt{\dfrac{(1+\sin A)^2}{\cos^2 A}}$

$= \dfrac{1+\sin A}{\cos A}$

$= \dfrac{1}{\cos A} + \dfrac{\sin A}{\cos A}$

$= \sec A + \tan A$

LHS = RHS

Hence proved.

INFINITY THINK BEYOND

Q 31 = let length $= x$

breadth $= y$

ATQ $\longrightarrow$

$xy - (x+5)(y-4) = 160$

$xy - xy - 4x + 5y - 20 = 160$

$4x + 5y = 180$ — ①

$xy - (x-10)(y+2) = 100$

$xy - xy + 2x - 10y + 20 = 100$

$2x - 10y = 80$ — ②

$2x - 10y = 80$

$4x + 5y = 180 \quad \times 2$

$2x - 10y = 80$

$8x + 10y = 360$

$10x = 440$

$x = 44$

$4(44) + 5y = 180$

$176 + 5y = 180$

$5y = 4$

$y = 0.8$

OR

let fixed charged $= x$

remaining $= y$

ATQ

$\cancel{x} + 20y = 3000$

$\cancel{x} + 25y = 3500$

$- \quad - \quad -$

$\cancel{-}5y = \cancel{-}500$

$y = 100$

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$$x + 20(100) = 3000$$
$$x + 2000 = 3000$$
$$x = 1000$$

$= 100 + 12(100)$

$= 100 + 1200$

$= \cancel{2200} \quad 1300$

Sec - D

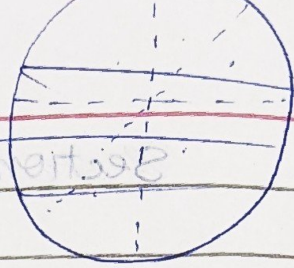
Q32 =

$a = 1 + m^2 \quad , \quad b = 2mc \qquad c = c^2 - a^2 = 0$

To prove = $c^2 = a^2(1 + m^2)$

$$b^2 - 4ac = 0$$
$$(2mc)^2 - 4(1+m)^2 \times (c^2 - a)) = 0$$
$$4m^2c^2 - 4(c^2 - a^2 + c^2m^2 - a^2m^2) = 0$$
$$4(\cancel{m^2}c^2 - c^2 + a^2 - c^2\cancel{m^2} + a^2m^2) = 0$$
$$4(a^2 - c^2 + a^2m^2) = 0$$
$$a^2 - c^2 + a^2m^2 = 0$$
$$a^2 + a^2m^2 = c^2$$
$$a^2(1 + m^2) = c^2$$

INFINITY THINK



Q33= $\theta = \frac{360}{6} = 60^\circ$

Area of one design = area of sector − area of ΔAOB

$= \frac{\theta}{360^\circ} \pi r^2 - \frac{\sqrt{3}}{4} r^2$

$= r^2 \left(\frac{\cancel{60}^{1}}{\cancel{360}_{6}} \times \frac{22}{7} - \frac{1.7}{4} \right)$

$= r^2 \left(\frac{22}{42} - \frac{1.7}{4} \right)$

$= (28)^2 \left(\frac{44 - 35.7}{84} \right)$

$= 783 \left(\frac{8.3}{84} \right)$

$= 9.3 \, (8.3)$

$= 77.19 \text{ cm}^2$

area of 6 design $= 77.19 \times 6$

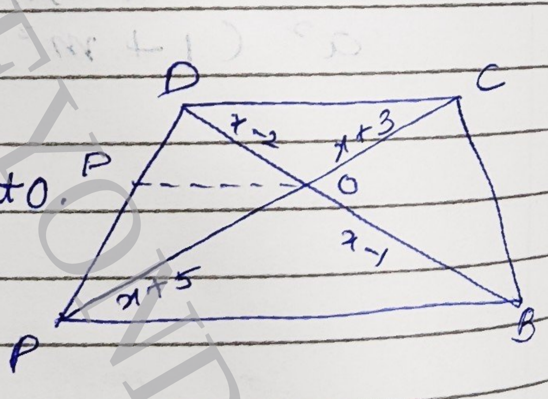
~~Cost~~ $= 463.14 \text{ cm}^2$

Cost $= 463.14 \times 0.35$

$= ₹162,099$

Q34= Given :- ABCD is a trapezium

• Diagnols AC & BD intersect at O.



To prove = $\frac{OA}{OB} = \frac{OC}{OD}$

Construction = A point P on AD is joined to O −

INFINITY THINK BEYOND

In $\triangle ADB$

$PO \parallel AB$ (By Construction)

$\therefore \frac{DP}{PA} = \frac{DO}{OB}$ (By Basic Proportionality Theorem) —— ①

Similarly in $\triangle ADC$

$PO \parallel DC$

$\frac{AD}{DP} = \frac{AO}{OC}$

$\frac{DP}{PA} = \frac{OC}{AO}$ —— ②

from 1 & 2

$\frac{DO}{OB} = \frac{OC}{AO}$

$\frac{AO}{OB} = \frac{OC}{OD}$

Hence, proved

$$\frac{x+5}{x-1} = \frac{x+3}{x-2}$$

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

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

$\cancel{x^2} - 2x + 5x - 10 = \cancel{x^2} - x + 3x - 3$

$3x - 10 = 2x - 3$

$3x - 2x = -3 + 10$

$x = 7$

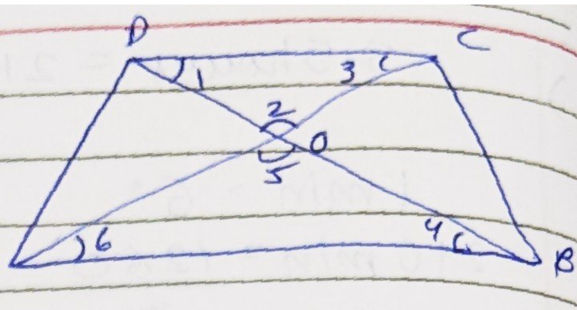
INFINITY THINK BEYOND

Q 34 = Given

ABCD is a trapezium

AB ∥ CD

Diagnol AC & BD intersect at O.



To prove - $\frac{OA}{OC} = \frac{OB}{OD}$

In $\triangle AOB$ & $\triangle DOC$

$\angle 2 = \angle 5$ (Vertically opp. angle)

$\angle 1 = \angle 4$ (Alternate Interior Angle)

$\triangle OAB \sim \triangle OCD$ (By AA similarity)

$\therefore$ corresponding sides are equal.

$$\frac{OA}{OC} = \frac{OB}{OD} = \frac{AB}{CD}$$

$$= \frac{OA}{OC} = \frac{OB}{OD}$$

$$\frac{x+5}{x-1} = \frac{x+3}{x-2}$$

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

$$x^2 - 2x + 5x - 10 = x^2 - x + 3x - 3$$

$$3x - 10 = 2x - 3$$

$$3x - 2x = -3 + 10$$

$$x = 7$$

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$$\text{Median} = l + \frac{\frac{n}{2} - cf_p}{fm} \times h$$

$$32.5 = 30 + \frac{20 - (x+14)}{12} \times 10$$

$$32.5 \times 12 = 30 + 20 - x - 14 \times 10$$

$$\frac{3.\cancel{0}}{1\cancel{0}} = 30 + 20 - 14 - x$$

$$33 = 36 - x$$

$$\cancel{0} =$$

$$3 = x$$

$$x + y + 31 = 40$$

$$3 + 31 + y = 40$$

$$y = 40 - 34$$

$$y = 6$$

INFINITY THINK

~~Q 34~~ Q35 =

CI	fi	Cf
30-35	14	14
35-40	16	30
40-45	18	48
45-50	23	71
50-55	18	89
55-60	8	97
60-65	3	100
	100	

45-50 — Median Class

$\frac{n}{2} = \frac{100}{2} = 50$

$$\text{Median} = l + \frac{\frac{n}{2} - Cf_P}{fm} \times h$$

$$= 45 + \frac{50-48}{23} \times 5$$

$$= 45 + \frac{2}{23} \times 5$$

$$= 45 + \frac{10}{23}$$

$$= 45 + 0.43$$

$$\text{Median} = 45.43$$

or

x	f	Cf
0-10	x	x
10-20	5	$x+5$
20-30	9	$x+14$
30-40	12	$x+26$
40-50	y	$x+y+26$
50-60	3	$x+y+29$
60-70	2	$x+y+31$
	40	

30-40 — median class

$\frac{n}{2} = \frac{40}{2} = 20$

INFINITY THINK BEYOND

Sec E

Q36 = i) O (2, −3) , M (9, 8)

ii) $OM = \sqrt{(9-2)^2 + (8-(-3))^2}$

$= \sqrt{(9-2)^2 + (8+3)^2}$

$= \sqrt{(7)^2 + (11)^2}$

$= \sqrt{49 + 121}$

$OM = \sqrt{170}$ unit

iii) ∵ P(−9, 8) , S(−6, −7) is divided by ~~Q~~ A

Let A(x, 0) divides P & S in ratio k:1

$x = \frac{k(-6)+1(-9)}{k+1}$, $0 = \frac{k(-7)+1(8)}{k+1}$

$\frac{8}{7} = k$

∴ Ratio is 8:7

or

Let B (x, y) equidistant from M(9, 8) & L(2, 8)

∴ BM = BL

$\sqrt{(9-x)^2 + (8-y)^2} = \sqrt{(2-\ \ )^2 + (8-y)^2}$

squaring both sides

$\left(\sqrt{(9-x)^2 + (8-y)^2}\right)^2 = \left(\sqrt{(2-\ \ )^2 + (8-y)^2}\right)^2$

INFINITY THINK BEYOND

$(9-x)^2 + (8-y)^2 = (2-x)^2 + (8-y)^2$

$81 + \cancel{x^2} - 18x + \cancel{64} + \cancel{y^2} - \cancel{16y} = 4 + \cancel{x^2} - 4x + \cancel{64} + \cancel{y^2} - \cancel{16y}$

$81 - 18x = 4 - 4x$

$81 - 4 = -4x + 18x$

$77 = 14x$

$\frac{\cancel{77}^{11}}{\cancel{14}_{2}} = x$

$5.5 = x$

Q37- i) quadratic polynomial - $x^2 + (a+1)x + b$

let zeroes $\alpha = 2$ and $\beta = -3$

$= \alpha + \beta$ $\qquad$ $\alpha\beta$

$= 2 + (-3)$ $\qquad$ $= 2(-3)$

$= -1$ $\qquad$ $= -6$

sum of Root $= \frac{-\text{coeff of } x}{\text{coeff of } x^2}$

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

$\cancel{-}1 = \cancel{-}(a+1)$

$1 = \frac{a+1}{1}$

$1 = a + 1$

$a = 0$

INFINITY THINK BEYOND

Product of root $= \dfrac{\text{constant}}{\text{coeff of } x^2}$

$$\alpha\beta = \frac{b}{1}$$

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

$$-6 = b$$

ii) $p(x) = x^2 - 2x - (7p+3) = 0$

$p(-4) = (-4)^2 - 2(-4) - (7p+3) = 0$

$= 16 + 8 - 7p - 3 = 0$

$= -7p + 21 = 0$

$= \cancel{-}7p = \cancel{-}21$

$= 7p = 21$

$= p = 3$

iii) $p(x) = x^2 + 4x + 5$

Sum of root $(u+v) = -4$

Product of root $(u \times v) = 5$

Let zeros of another polynomial ~~p & q~~

$p = 3u^2$ & $q = 3v^2$

INFINITY THINK BEYOND

$= p + q$
$= 3u^2 + 3v^2$
$= 3(u^2 + v^2)$
$= 3[(u+v)^2 - (2uv)]$

$= 3[(-4)^2 - (2 \times 5)]$

$= 3[16 - 10]$
$= 3(6)$
$= 18$

$p \times q$
$= 3u^2 \cancel{+} \times 3v^2$
$= 9(uv)^2$
$= 9(5)^2$
$= 9(25)$
$= 225$

$= K(x^2 - (p+q)x + (pq))$, $K \neq 0$
$= K[x^2 - (18)x + (225)]$, $k \neq 0$
$= k[x^2 - 18x + 225)$, $k \neq 0$

OR

$p(x) = x^2 + 4x + 5k$

$u + v = 3(uv)$
$-4 = 3(5k$
$\frac{-4}{15} = k$

INFINITY THINK BEYOND

Q 38 = i) 1 minutes = 6°

14 minutes = 6×14

= ~~92°~~ 84°

~~$\theta = 92^\circ$~~ $\theta = 84^\circ$

Radius = 14cm

Area = $\frac{\theta}{360^\circ} \times \pi r^2 = \frac{84^\circ}{360} \times \cancel{2} \times \frac{22}{\cancel{7}_1} \times \cancel{14}^{2} \times 14$

= 1006.13 cm^2

INFINITY THINK

ii) 1 minutes = 6°

10 minutes = $6 \times 10^\circ = 60^\circ$

iii) 3.5 hours = 210 minutes

$1 \text{ min} = 6°$

$210 \text{ min} = \frac{1260'}{3}$

$\theta = \frac{1260'}{360'} = 3.5°$

$\text{Area} = \frac{\theta}{360'} \times \pi r^2 = \frac{3.5}{\cancel{360}_{\cancel{60}\,10}} \times \frac{22}{7} \times \cancel{6}^{1} \times \cancel{6}$

$= \frac{\cancel{35}^{5}}{100} \times \frac{22}{\cancel{7}_{1}} = 0.110 \text{ cm}^2$

or

$15 \text{ min} = 90°$

area of arc of 15 min $= \frac{\theta}{360'} \times 2\pi r$

$= \frac{\cancel{90}^{1}}{\cancel{360}} \times 2 \times \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \cancel{14}^{2\,1}$

$\cancel{12}\ \cancel{4}\ \cancel{2}\ 1$

$= 22 \text{ cm}^2$

$30 \text{ min} = 180'$

are of arc ~~is~~ of 15 min $= \frac{\cancel{180}}{\cancel{360}} \times 2 \times \frac{22}{\cancel{7}_{1}} \times \cancel{14}^{2\,1}$

$\cancel{8}\ \cancel{2}^{1}$

$= 44 \text{ cm}^2$

Ratio will be 22 : 44 or 1 : 2

INFINITY THINK BEYOND