

$$1. \quad a^2 - 2k + 6 = 0$$

$$9 - 6k - 6 = 0$$

$$\Rightarrow \underline{\underline{k = \frac{1}{2}}}$$

$$2. \quad \begin{aligned} \text{prim} &= 2 \\ \text{Gyork} &= 4 \\ \text{HCF} &= 2. \end{aligned}$$

$$3. \quad \sqrt{x^2 + y^2}$$

$$4. \quad \begin{aligned} a_7 &= 4 \\ d &= -4 \end{aligned}$$

$$a_7 = a_1 + 6d$$

$$\Rightarrow a_1 = a_7 - 6d$$

$$= 4 + 24 = \underline{\underline{28 \text{ Am.}}}$$

$$5. \quad \cos^2 67 - \sin^2 23 = 0$$

$$6. \frac{\text{ar}(\triangle ABC)}{\text{ar}(\triangle BAC)} = \frac{1}{5}$$

$$7. \text{If } 5 + 3\sqrt{2} = \frac{p}{q},$$

$$3\sqrt{2} = \frac{p}{q} - 5$$

$$\Rightarrow \sqrt{2} = \frac{p}{3q} - \frac{5}{3}$$

$\Rightarrow \sqrt{2}$ is rational, Contradiction

$$8. \quad x - y = 14$$

$$x + y = 30$$

$$\Rightarrow x = 22$$

$$\underline{\underline{y = 8}}$$

$$9. \quad 3(1+2+ \dots + 1) = \frac{3 \times 1 \times 9}{2} = \underline{\underline{108 \text{ Ans.}}}$$

$$10. \quad p = \frac{kA+B}{k+1}$$

$$k = \frac{2k+6}{3}$$

$$\Rightarrow k+3 = 6 \text{ or } \underline{k=3}.$$

$$m = \frac{3k-3}{k+1} = \frac{3 \times 3}{4} = \underline{\underline{\frac{9}{4} \text{ Ans.}}}$$

$$11. \quad X_1, X_2 \in \{1, 2, 3, \dots, 6\}$$

$$\begin{aligned} \text{i) } P_x(X_1 = X_2) &= \sum P_x(X_1=i, X_2=i) \\ &= \frac{6}{36} = \underline{\underline{\frac{1}{6} \text{ Ans.}}} \end{aligned}$$

$$\text{ii) } P_x(X_1 + X_2 = 10)$$

Sample space.

$$\begin{cases} X_1 = 5, & X_2 = 5 \\ X_1 = 4, & X_2 = 6 \\ X_1 = 6, & X_2 = 4 \end{cases}$$

$$= \frac{1}{6} \times \frac{1}{6} + 2 \times \frac{1}{6} \times \frac{1}{6}$$

$$= \frac{3}{36} = \frac{1}{12} \text{ Ans.}$$

12. (i) $P_x(x \bmod 8 = 0)$

$$= \frac{12}{100} = \frac{3}{25}$$

(ii) $P_x(x \bmod 8 \neq 0)$

$$= 1 - \frac{3}{25} = \frac{22}{25}$$

13.
$$\begin{array}{r} 4 \\ 96 \overline{) 404} \\ \underline{384} \\ 20 \end{array}$$

$$\begin{array}{r} 4 \\ 20 \overline{) 96} \\ \underline{80} \\ 16 \\ 16 \overline{) 20} \\ \underline{16} \\ 4 \\ 4 \overline{) 16} \end{array}$$

H.C.F. = 4.

L.C.M. = $\frac{404 \times 96}{4}$

= 101×24

= 2424 Ans.

$$14. \quad (x-2-\sqrt{3})(x-2+\sqrt{3})$$

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

$$= x^2 - 4x + 1$$

$$\begin{array}{r} x^2 - 4x + 1 \overline{) 2x^4 - 5x^3 + 5x^2 + 3x - 1} \\ \underline{- 2x^4 + 8x^3 - 2x^2} \\ 13x^3 + 7x^2 + 3x - 1 \end{array}$$

$$ \underline{- x^3 + 3x^2 + 3x - 1}$$

$$ 4x^2 + 6x - 1$$

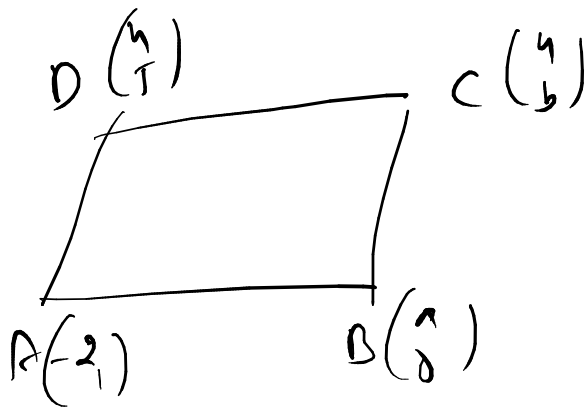
$$ \underline{- x^2 + 4x - 1}$$

$$2x^2 - x - 1 = 0$$

$$\Rightarrow x = \frac{1 \pm \sqrt{1+8}}{4}$$

$$= \frac{1 \pm 3}{4} = \underline{\underline{1}} \text{ or } \underline{\underline{-\frac{1}{2}} \text{ Ans.}}$$

15.



$$\begin{pmatrix} 6 \\ 4 \end{pmatrix} = k_1 \begin{pmatrix} 4-a \\ b \end{pmatrix}$$

$$\begin{pmatrix} 0 \\ 5-b \end{pmatrix} = k_2 \begin{pmatrix} -2-a \\ 1 \end{pmatrix}$$

$$a = -2,$$

$$b = 6 \quad k_1 = 2 \quad k_2 = 1$$

$$b = 4$$

$$AB = \left\| \begin{pmatrix} 0 \\ 1 \end{pmatrix} \right\|$$

$$AD = \left\| \begin{pmatrix} 6 \\ 4 \end{pmatrix} \right\|$$

$$= 1 \cdot AD$$

$$= 2 \sqrt{9+4}$$

$$= \underline{\underline{2\sqrt{13} \text{ cm}}}$$

b) area of quad.

$$\frac{1}{2} \begin{vmatrix} 1 & 1 & 1 \\ A & B & C \end{vmatrix} + \frac{1}{2} \begin{vmatrix} 1 & 1 & 1 \\ A & D & C \end{vmatrix}$$

$$= \frac{1}{2} \begin{vmatrix} 1 & 1 & 1 \\ -5 & -4 & -1 \\ 7 & -5 & -6 \end{vmatrix} + \frac{1}{2} \begin{vmatrix} 1 & 1 & 1 \\ -5 & 4 & -1 \\ 7 & 5 & -6 \end{vmatrix}$$

$$= \frac{1}{2} \begin{vmatrix} 1 & 0 & 0 \\ -5 & 1 & 4 \\ 7 & -12 & -13 \end{vmatrix} + \frac{1}{2} \begin{vmatrix} 1 & 0 & 0 \\ -5 & 9 & 4 \\ 7 & -2 & -13 \end{vmatrix}$$

$$= \frac{1}{2} \times 35 + \frac{1}{2} \times 125$$

$$= \frac{160}{2} = \underline{\underline{80}} \text{ Ans}$$

$$c. \quad x(t) = 1500$$

$$(x-100)(t-30) = 1500$$

$$(x-100) \left(\frac{1500}{x} - 30 \right) = 1500$$

$$\Rightarrow \cancel{1500} - 30x + \frac{\overset{5}{\cancel{150000}} - \overset{1}{\cancel{3000}}}{x} = \cancel{1500}$$

$$\Rightarrow \frac{5000}{x} - x - 100 = 0$$

$$\Rightarrow x - \frac{5000}{x} + 100 = 0$$

$$\Rightarrow x^2 + 100x - 5000 = 0$$

$$x = \frac{100 \pm \sqrt{10000 + 50000}}{2}$$

$$= \frac{100 + \sqrt{15000}}{2} = \frac{100 + 50\sqrt{6}}{2} = \underline{\underline{50 + 25\sqrt{6} \text{ km/hr.}}}$$

$$17. a) A_1 = \sqrt{3} a^2$$

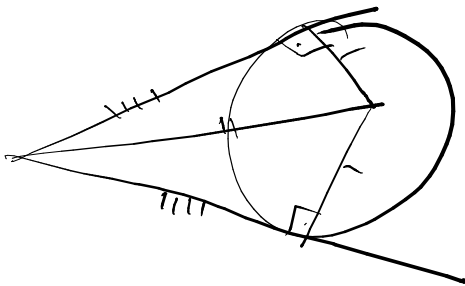
$$A_2 = \sqrt{3} (a\sqrt{2})^2$$

$$\frac{A_1}{A_2} = \frac{1}{2} A.$$

$$b) \frac{1}{2} b c \sin A = \frac{1}{2} k^2 b c \sin A$$

$$\Rightarrow \underline{k=1} \quad \text{S.S.S} \quad \text{congruence.}$$

18.



RTS Congruence

$$19. a) \cos \theta = \frac{3}{5} \quad X = \frac{\ln \sin \theta - \cos \theta}{\ln \sin \theta + \cos \theta - 1}$$

$$X = \frac{\ln \sin \theta - 1 + \sec \theta}{\ln \sin \theta + 1 - \sec \theta}$$

$$\sec \theta = \sqrt{10}.$$

$$\lambda = \frac{12 - 1 + \sqrt{10}}{12 + 1 - \sqrt{10}}$$

$$= \frac{11 + \sqrt{10}}{13 - \sqrt{10}} \text{ Ans.}$$

$$\begin{aligned} \text{b) } \ln 2A &= \cos(A - 18) \\ &= \ln\left(\frac{\pi}{2} + 18 - A\right) \end{aligned}$$

$$\Rightarrow 2A = \frac{\pi}{2} + 18 - A$$

$$\Rightarrow 3A = \frac{\pi}{2} + 18$$

$$\Rightarrow A = \frac{\pi}{6} + 6$$

$$= \underline{\underline{36^\circ}} \text{ Ans.}$$

$$20. \text{ Area} = 12^2 - \pi 6^2$$

$$= \underline{\underline{6^2 (4 - \pi)}} \text{ Ans.}$$

$$21. a) \text{ Surface area} = 2\pi rh + 4\pi r^2$$

$$= 2\pi r (h + 2r)$$

$$= 7\pi (7 + 10)$$

$$= \underline{\underline{119\pi}}.$$

$$b) \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \times 12^2 \times 2.5$$

$$= 12\pi \times 140$$

$$= \underline{\underline{1680\pi}}.$$

$$23. (18-x)t_1 = 24$$

$$(18+x)t_2 = 24$$

$$t_1 = t_2 + 1$$

$$\frac{24}{18-n} = \frac{24}{18+n} + 1$$

$$2) \frac{24 \times 24}{18^2 - n^2} = 1$$

$$\Rightarrow n^2 - 48n - 18^2 = 0$$

$$\Rightarrow n = \frac{48 \pm \sqrt{48^2 + 4 \cdot 18^2}}{2}$$

$$= \frac{48 + 2 \sqrt{24^2 + 18^2}}{2}$$

$$= \frac{24^2 + 18^2}{2} = 27 \text{ Ans.}$$

b)

$$v_1 = 63 \text{ km}$$

$$v_{1+6} = 72 \text{ km}$$

$$\frac{63}{v} + \frac{72}{v+6} = 3$$

$$2) \quad \frac{21}{v} + \frac{24}{v+6} = 1$$

$$2) \quad \frac{7(v+6) + 8v}{v(v+6)} = \frac{1}{3}$$

$$2) \quad \frac{15v + 42}{v(v+6)} = \frac{1}{3}$$

$$2) \quad v^2 + 6v - 45v - 126 = 0$$

$$2) \quad v^2 - 39v - 126 = 0.$$

$$v = \frac{39 + \sqrt{39^2 + 4 \times 126}}{2}$$

$$= \frac{39 + \sqrt{3^2 \times 13^2 + 2^2 \times 3^2 \times 14}}{2}$$

$$\begin{aligned}
 & \frac{39 + \sqrt{3^2 \times 13^2 + 2^2 \times 3^2 \times 14}}{2} \\
 &= \frac{39 + 3\sqrt{169 + 56}}{2} \\
 &= \frac{39 + 3 \times 25}{2} = \frac{39 + 75}{2} \\
 &= 19 + 38 \\
 &= \underline{\underline{57}} \text{ Ans.}
 \end{aligned}$$

24. $a_n + a_{n+d} + a_{n+2d} + a_{n+3d} = 32$

$$\frac{a_n (a_{n+3d})}{(a_{n+d})(a_{n+2d})} = \frac{7}{15}$$

$$4a + 6d = 2 \Rightarrow 2a + 3d = 1$$

$$\frac{a(a+3d)}{(a+d)(a+2d)} = \frac{7}{15}$$

$$\Rightarrow \frac{2a(2a+6d)}{(2a+2d)(2a+4d)} = \frac{7}{15}$$

$$\frac{(1-3d)(1+3d)}{(1-d)d} = \frac{7}{15}$$

$$\Rightarrow 15(1-9d^2) = 7d - 7d^2$$

$$\Rightarrow 15 - 135d^2 = 7d - 7d^2$$

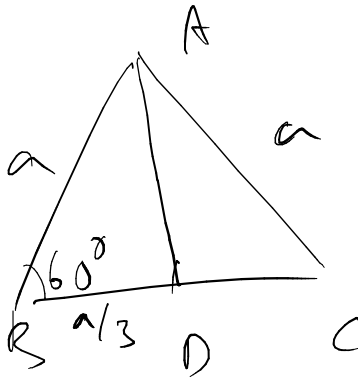
$$\Rightarrow 128d^2 + 7d - 15 = 0$$

$$\Rightarrow d = \frac{-7 \pm \sqrt{7^2 + 15 \cdot 128}}{2 \times 128}$$

$$\frac{128 \times 15}{1920 + 45 = 1969}$$

$$d = \frac{7 \pm \sqrt{1969}}{2 \times 128}$$

25.



$$AD^2 = a^2 + \left(\frac{a}{3}\right)^2 - 2(a) \cdot \frac{a}{3} \cdot \frac{1}{2}$$

$$= a^2 + \frac{a^2}{9} - \frac{a^2}{3}$$

$$= a^2 \left(1 + \frac{1}{9} - \frac{1}{3} \right)$$

$$= a^2 \left(\frac{2}{3} + \frac{1}{9} \right)$$

$$= a^2 \left(\frac{7}{9} \right)$$

$$\Rightarrow \underline{\underline{9AD^2 = 7a^2}}$$

27.

$$\frac{\sin A - 2 \cos^3 A}{2 \cos^3 A - \cos A}$$

$$= \frac{\sin A \cos 2A}{\cos A \cos 2A} = \underline{\underline{\tan A}}$$

28. $S.A = \pi r_1^2 + \pi r_2 l_2 - \pi r_1 l_1$

$$h = h_2 - h_1$$

$$r_1 = h_1 \tan \theta$$

$$r_2 = h_2 \tan \theta$$

$$(r_2 - r_1) = h \tan \theta$$

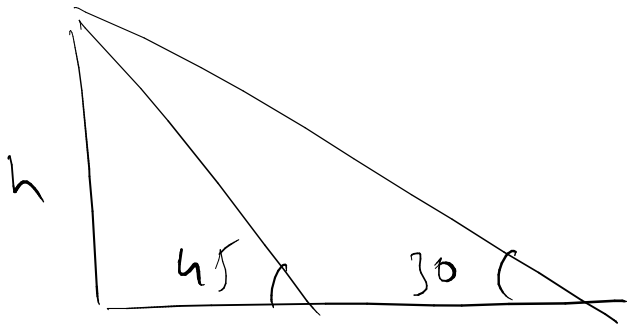
$$\Rightarrow \tan \theta = \frac{20}{24} = \frac{5}{6}$$

$$l_1 = r_1 \operatorname{cosec} \theta$$

$$l_2 = r_2 \operatorname{cosec} \theta$$

$$\begin{aligned} S.A. &= \pi r_1^2 + \pi (r_2^2 - r_1^2) \operatorname{cosec} \theta \\ &= \pi \left[10^2 + 800 \times \sqrt{1 + \frac{6}{5^2}} \right] \\ &= 100\pi \left[1 + \frac{8}{5} \sqrt{61} \right] \text{ cm}^2 \end{aligned}$$

25.



$$\begin{aligned} d &= h (\cot 30^\circ - \cot 45^\circ) \\ &= 100 (\sqrt{3} - 1) \text{ m.} \end{aligned}$$