PTA Maths 5th Model.

1. d. Quadratic.
2. a. 0, 1, 8
3. c. 31m.
4. a. $\frac{94}{7}$
5. c. Real and unequal roots
6. a. 2×3
7. d. 15 cm.
8. c. 9
9. b. 7
10. b. $b^2 - a^2$
11. d. 3:1:2
12. a. T.S.A of solid sphere.
13. c. 33.25
14. b. $0 \leq P(A) \leq 1$.

(15) $A = \{1, 2, 3, 4\}$; $B = N = \{1, 2, 3, 4, \ldots\}$

$f(x) = x^2$

$\therefore f(1) = 1^2 = 1$; $f(3) = 3^2 = 9$

$f(2) = 2^2 = 4$; $f(4) = 4^2 = 16$.

$\therefore f = \{(1,1), (2,4), (3,9), (4,16)\}$

(i) Range of $f = \{1, 4, 9, 16\}$

(ii) $\because$ Every element in A has different element in B, it is an one-one function.

(16) If a, b, c are in an A.P.

Then $a + c = 2b$.

$\therefore 3 + K + 5K + 1 = 2(18 - K)$

$6K + 4 = 36 - 2K$

$6K - 2K = 36 - 4$

$4K = 32$

$K = \frac{32}{4} = 8$.

(17) $a = -7$, $r = 6$.

$GP = a, ar, ar^2, \ldots$

$= -7, (-7)6, (-7)6^2, \ldots$

$= -7, -42, -252, \ldots$

(18). $\sqrt{\frac{144a^8b^{12}c^{16}}{81f^{12}g^4h^4}} = \sqrt{\frac{12^2(a^4)^2(b^6)^2(c^8)^2}{9^2(f^6)^2(g^2)^2(h^7)^2}}$

$= \sqrt{\frac{(12a^4b^6c^8)^2}{(9f^6g^2h^7)^2}}$

$= \frac{12}{9}\left|\frac{a^4b^6c^8}{f^6g^2h^7}\right|$

(19). AP : 21, 18, 15, ...

$a = 21$, $d = 18-21 = -3$; $l = -81$

$\therefore n = \frac{l-a}{d} + 1$

$= -\frac{81-21}{-3} + 1 = \frac{-102}{-3} + 1$

$= 34 + 1 = 35$.

$\therefore -81$ is the 35^{th} of the term.

$t_n = a + (n-1)d = 0$

$21 + (n-1)(-3) = 0$

$21 - 3n + 3 = 0$

$3n = 24$

$n = 8$

Since $n = 8$ is a natural number, it's one term becomes 0.

(20) $R = \{(x,y) \mid y = x+3, x \in \{0,1,2,3,4,5\}\}$

$x = 0, y = 0+3 = 3$ | $x = 3, y = 3+3 = 6$

$x = 1, y = 1+3 = 4$ | $x = 4, y = 4+3 = 7$

$x = 2, y = 2+3 = 5$ | $x = 5\ y = 5+3 = 8$

$\therefore R = \{(0,3), (1,4), (2,5), (3,6), (4,7), (5,8)\}$

Domain of R = {0, 1, 2, 3, 4, 5}
(All 1st Elements)

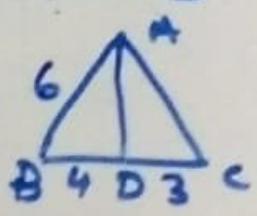
Range of R = {3, 4, 5, 6, 7, 8}
(All 2nd Elements)

(21) $A = \begin{bmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{bmatrix}$; $\therefore 3A = \begin{bmatrix} 0 & 12 & 27 \\ 24 & 9 & 21 \end{bmatrix}$

$B = \begin{bmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{bmatrix}$; $9B = \begin{bmatrix} 63 & 27 & 72 \\ 9 & 36 & 81 \end{bmatrix}$

$\therefore 3A - 9B = \begin{bmatrix} -63 & -15 & -45 \\ 15 & -27 & -61 \end{bmatrix}$

(22) Here AD is the bisector.
According to bisector theorem,



$\frac{BD}{CD} = \frac{AB}{AC}$

$\frac{4}{3} = \frac{6}{AC}$

$\therefore AC = \frac{6 \times 3}{4} = \frac{9}{2} = \underline{\underline{4.5 \text{ cm}}}$.

(23) Line ①: $x - 2y + 3 = 0$

It's slope $m_1 = \frac{-a}{b} = \frac{-1}{-2} = \frac{1}{2}$

Line ②: $6x + 3y + 8 = 0$.

It's slope $m_2 = \frac{-a}{b} = \frac{-6}{3} = -2$

$m_1 \times m_2 = \frac{1}{2} \times (-2) = -1$.

Since $m_1 \times m_2 = -1$, the given two lines are perpendicular to each other.

(24) $\sqrt{\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta}} = \sqrt{\frac{(\sec\theta - \tan\theta)(\sec\theta - \tan\theta)}{(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)}}$

$= \sqrt{\frac{(\sec\theta - \tan\theta)^2}{\sec^2\theta - \tan^2\theta}}$

$= \sqrt{\frac{(\sec\theta - \tan\theta)^2}{1}}$

$= \sec\theta - \tan\theta$

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

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

LHS = RHS (Hence Proved)

(28) $px^2 + (\sqrt{3} - \sqrt{2})x - 1 = 0$ — (1)

It's one root $x = \frac{1}{\sqrt{3}}$

∴ Placing $x = \frac{1}{\sqrt{3}}$ in eqn (1)

$$p\left(\frac{1}{\sqrt{3}}\right)^2 + (\sqrt{3} - \sqrt{2})\frac{1}{\sqrt{3}} - 1 = 0$$

$$p \times \frac{1}{3} + \frac{\sqrt{3}}{\sqrt{3}} - \frac{\sqrt{2}}{\sqrt{3}} - 1 = 0$$

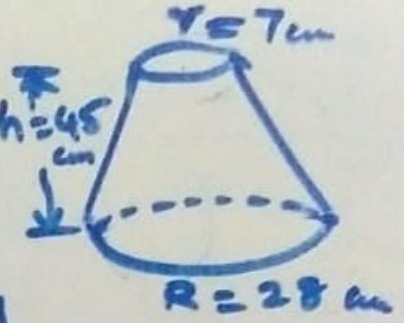
$$\frac{p}{3} + 1 - \frac{\sqrt{2}}{\sqrt{3}} - 1 = 0$$

$$\frac{p}{3} = \frac{\sqrt{2}}{\sqrt{3}}$$

$$\therefore p = \frac{\sqrt{2} \times 3}{\sqrt{3}} = \frac{\sqrt{2} \times \sqrt{3} \times \sqrt{3}}{\sqrt{3}}$$

$$p = \sqrt{2} \times \sqrt{3} = \sqrt{6}$$

(25) Volume $= \frac{\pi h}{3}[R^2 + r^2 + Rr]$



$= \frac{22 \times 45}{7 \times 3}[28^2 + 7^2 + 28 \times 7]$

$= \frac{22 \times 15}{7}[784 + 49 + 196]$

$= \frac{22 \times 15}{7} \times 1029$

$= 48510 \text{ cm}^3.$

Volume of frustum $= 48510 \text{ cm}^3.$

(26) From the Table

Largest value L = Upper class of last frequency

$= 28$

Smallest value S = Lower class Ist frequency which $\neq 0$

$= 18$

Range $= 28 - 18 = 10$ years.

(27) Three coins are tossed together.

Its Sample space $S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

$n(S) = 8$

(i) atleast tail

$A = \{HHT, HTH, HTT, THH, THT, TTH, TTT\}$

$n(A) = 7$

$P(A) = \frac{n(A)}{n(S)} = \frac{7}{8}$

(ii) Atmost one head

$B = \{HTT, THT, TTH, TTT\}$

$n(B) = 4$

$P(B) = \frac{n(B)}{n(S)} = \frac{4}{8} = \frac{1}{2}.$