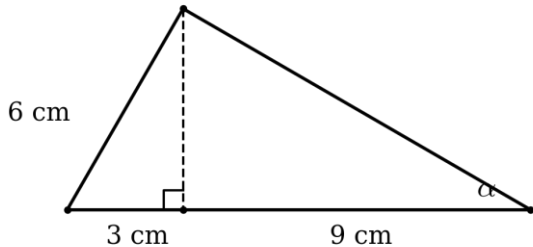
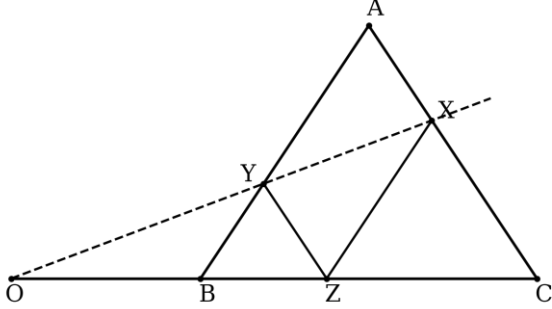


Q.No	Step-by-Step Solution	Marks per Step
SECTION – A (Q1–20, 1 mark each)		
1	Q1  Let the foot of the altitude from the apex divide the base into 3 cm and 9 cm; the slant side to the 3 cm end is 6 cm. Altitude h: $h^2 + 3^2 = 6^2 \Rightarrow h^2 = 36 - 9 = 27 \Rightarrow h = 3\sqrt{3}$ cm. Hypotenuse to the α vertex: $\sqrt{h^2 + 9^2} = \sqrt{27 + 81} = \sqrt{108} = 6\sqrt{3}$ cm. $\sin \alpha = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{3\sqrt{3}}{6\sqrt{3}} = \frac{1}{2}$ Answer: (c) $\frac{1}{2}$	1 mark for the correct option.
2	Q2 Since S lies on PR, ray $RS =$ ray RP; since T lies on QR, ray $RT =$ ray RQ, so $\angle PRQ = \angle TRS$ (common angle). Given $\angle P = \angle RTS$, i.e. the angle at P equals the angle at T. By AA similarity (common angle at R, given angle equality): $\triangle RPQ \sim \triangle RTS$. Answer: (a) $\angle RPQ \sim \angle RTS$	1 mark for the correct option.
3	Q3 $10 = 2 \times 5$, $24 = 2^3 \times 3$, $72 = 2^3 \times 3^2$ HCF = product of smallest powers of common primes = $2^1 = 2$ LCM = product of greatest powers of all primes = $2^3 \times 3^2 \times 5 = 360$ Answer: (c) 2, 360	1 mark for the correct option.
4	Q4 August 2018 has 31 days, so there are 31 equally likely possible birth dates. $P(\text{same date of birth}) = \frac{1}{31}$ Answer: (d) $\frac{1}{31}$	1 mark for the correct option.
5	Q5 Distance of a point from the x-axis = $y\text{-coordinate}$; this must equal 3. Checking each option: $(-3, 3) \rightarrow 3 = 3$; $(3, -3) \rightarrow -3 = 3$; $(3, -1) \rightarrow -1 = 1 \neq 3$; $(1, 3) \rightarrow 3 = 3$.	1 mark for the correct option.

Q.No	Step-by-Step Solution	Marks per Step
	Answer: (c) $(3, -1)$	
6	Q6 $\cot 45^\circ = 1, \sin 30^\circ = \frac{1}{2}, \cos 60^\circ = \frac{1}{2}$ $\text{Numerator} = \cot 45^\circ - \sin 30^\circ = 1 - \frac{1}{2} = \frac{1}{2}$ $\text{Denominator} = 2 \sin 30^\circ + \cos 60^\circ = 1 + \frac{1}{2} = \frac{3}{2}$ $\text{Value} = \frac{1/2}{3/2} = \frac{1}{3}$ Answer: (d) $\frac{1}{3}$	1 mark for the correct option.
7	Q7 $(\sqrt{5})^2 - (1 - \sqrt{3})^2 = 5 - (1 - 2\sqrt{3} + 3) = 5 - (4 - 2\sqrt{3})$ $= 5 - 4 + 2\sqrt{3} = 1 + 2\sqrt{3}$ Answer: (d) $2\sqrt{3} + 1$	1 mark for the correct option.
8	Q8 Days from 12th May to 20th May inclusive = $20 - 12 + 1 = 9$ days. Pages added = $9 \times 5 = 45$ Total pages completed = $100 + 45 = 145$ Answer: (b) 145 pages	1 mark for the correct option.
9	Q9 For infinitely many solutions: $\frac{a-b}{12} = \frac{b}{8} = \frac{4}{16} = \frac{1}{4}$ $\frac{b}{8} = \frac{1}{4} \Rightarrow b = 2; \frac{a-b}{12} = \frac{1}{4} \Rightarrow a - b = 3 \Rightarrow a = 5$ Check: $a + b = 5 + 2 = 7$ Answer: (a) $a + b = 7$	1 mark for the correct option.
10	Q10 $\cot \theta = \tan \theta$ is false in general; $\sin^2 \theta = 1 + \cos^2 \theta$ is false ($\sin^2 \theta + \cos^2 \theta = 1$); $\tan^2 \theta - \cot^2 \theta = 1$ is false in general. $\sec^2 \theta = 1 + \tan^2 \theta$ is a standard trigonometric identity — always true. Answer: (d) $\sec^2 \theta = 1 + \tan^2 \theta$	1 mark for the correct option.
11	Q11 Right angle at Q means $\vec{QP} \perp \vec{QR}$. $\vec{QP} = (3 - k, 4), \vec{QR} = (6 - k, 0)$ $\vec{QP} \cdot \vec{QR} = 0 \Rightarrow (3 - k)(6 - k) = 0 \Rightarrow k = 3 \text{ or } k = 6$ $k = 6$ makes Q coincide with R (rejected), so $k = 3$. Answer: (d) 3	1 mark for the correct option.
12	Q12 Consider natural numbers 1 to 80 (multiples of 2 and 3, i.e. multiples of 6, up to 80).	1 mark for the correct option.

Q.No	Step-by-Step Solution	Marks per Step
	Multiples of 6 from 1 to 80: $6, 12, \dots, 78 \Rightarrow \left\lfloor \frac{80}{6} \right\rfloor = 13$ numbers. Of these, multiples of 5 as well (i.e. multiples of 30): $30, 60 \Rightarrow 2$ numbers — excluded. Favourable outcomes $= 13 - 2 = 11$; Total outcomes $= 80$ $P(\text{multiple of 2 and 3 but not 5}) = \frac{11}{80}$ Answer: (c) $\frac{11}{80}$	
13	Q13 $2x + 3y = 12$ (i); $5x - 3y = 9$ (ii) Adding (i) and (ii): $7x = 21 \Rightarrow x = 3$ From (i): $6 + 3y = 12 \Rightarrow y = 2$ Answer: (b) $x = 3, y = 2$	1 mark for the correct option.
14	Q14 $p = x^2y^3, \quad q = xy^4$ $\text{LCM} = x^{\max(2,1)}y^{\max(3,4)} = x^2y^4$ Answer: (b) x^2y^4	1 mark for the correct option.
15	Q15 Total outcomes when two dice are thrown $= 36$. Pairs with difference = 1: $(1, 2), (2, 1), (2, 3), (3, 2), (3, 4), (4, 3), (4, 5), (5, 4), (5, 6)$, 10 outcomes. $P = \frac{10}{36} = \frac{5}{18}$ Answer: (d) $\frac{5}{18}$	1 mark for the correct option.
16	Q16 $\cot \theta = \frac{3}{4}$: take adjacent $= 3k$, opposite $= 4k$; then hypotenuse $= \sqrt{9k^2 + 16k^2} = 5k$ $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{4k}{5k} = \frac{4}{5}$ Answer: (c) $\frac{4}{5}$	1 mark for the correct option.
17	Q17 $3x - 15y = 7$ and $2x - 10y = \frac{14}{3}$ $\frac{a_1}{a_2} = \frac{3}{2}, \quad \frac{b_1}{b_2} = \frac{-15}{-10} = \frac{3}{2}, \quad \frac{c_1}{c_2} = \frac{7}{14/3} = \frac{21}{14} = \frac{3}{2}$ All three ratios are equal $\left(\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}\right)$, so the lines are coincident. Answer: (b) coincident	1 mark for the correct option.
18	Q18 $\sqrt{27} = 3\sqrt{3}, \quad \sqrt{75} = 5\sqrt{3}, \quad \sqrt{147} = 7\sqrt{3}$ Common difference $= 5\sqrt{3} - 3\sqrt{3} = 2\sqrt{3}$	1 mark for the correct option.

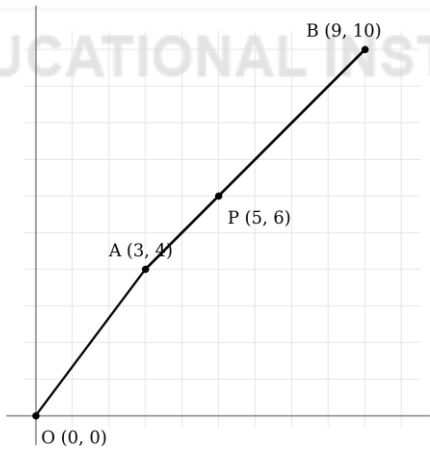
Q.No	Step-by-Step Solution	Marks per Step
	Answer: (a) $2\sqrt{3}$	
19	Q19 $A(a, a), B(-a, -a), C(-a, a)$: $AB = \sqrt{(2a)^2 + (2a)^2} = 2\sqrt{2} a$ $BC = \sqrt{0 + (2a)^2} = 2 a$, $AC = \sqrt{(2a)^2 + 0} = 2 a$ Since $AB \neq BC$ (unless $a = 0$), the triangle is isosceles, not equilateral $\Rightarrow$ Assertion (A) is FALSE. Reason (R) is a standard true property of collinear points $\Rightarrow$ Reason (R) is TRUE. Answer: (d) A is false but R is true	1 mark for the correct option.
20	Q20 $\tan 2A = 3 \tan A \Rightarrow \frac{2 \tan A}{1 - \tan^2 A} = 3 \tan A \Rightarrow 2 = 3(1 - \tan^2 A) \Rightarrow \tan^2 A = \frac{1}{3} \Rightarrow A = 30^\circ$, not 60°. Direct check at $A = 60^\circ$: $\tan 120^\circ = -\sqrt{3}$, but $3 \tan 60^\circ = 3\sqrt{3}$ — not equal $\Rightarrow$ Assertion (A) is FALSE. Reason (R): $\tan 30^\circ = \frac{1}{\sqrt{3}}$ is a standard true value $\Rightarrow$ Reason (R) is TRUE. Answer: (d) A is false but R is true	1 mark for the correct option.
SECTION – B (Q21–25, 2 marks each)		
21	Q21 (A) $7 \times 11 \times 13 + 13 = 13 \times (7 \times 11 + 1) = 13 \times 78$ Since it is expressible as a product of two factors, each greater than 1, it is composite. $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5 = 5 \times (7 \times 6 \times 4 \times 3 \times 2 \times 1 + 1)$ This is also a product of two factors, each greater than 1, so it is composite. (B) OR Time after which the bells toll together again = LCM(9, 12, 15) $9 = 3^2$, $12 = 2^2 \times 3$, $15 = 3 \times 5$ $\text{LCM} = 2^2 \times 3^2 \times 5 = 180$ Answer: the bells will next toll together after 180 minutes (3 hours).	1 mark for each number correctly shown composite.
22	Q22 Pole and tower cast shadows at the same time, so the sun's angle of elevation is the same $\Rightarrow$ triangles are similar. $\frac{\text{pole height}}{\text{pole shadow}} = \frac{\text{tower height}}{\text{tower shadow}} \Rightarrow \frac{6}{4} = \frac{H}{28}$ $H = \frac{6 \times 28}{4} = 42 \text{ m}$ Answer: height of the tower = 42 m	1 mark for setting up the ratio; 1 mark for the final answer.
23	Q23 (A) Since $ST \parallel QR$, by the Basic Proportionality Theorem: $\frac{PS}{SQ} = \frac{PT}{TR}$	(A) 1 mark for BPT ratio; 1 mark for x. (B) marks distributed across the similarity steps.

Q.No	Step-by-Step Solution	Marks per Step
	$\frac{4}{3x-4} = \frac{8}{x+2}$ $4(x+2) = 8(3x-4) \Rightarrow 4x+8 = 24x-32 \Rightarrow 20x = 40 \Rightarrow x = 2$ Answer: $x = 2$ <u>(B) OR</u>  Since $XZ \parallel AB$: line ZX is parallel to line BY (as Y lies on AB). With common vertex O: $\triangle OZX \sim \triangle OBY$ (AA) $\Rightarrow OZ \cdot OY = OB \cdot OX \dots$ (i) Since $YZ \parallel AC$: line ZY is parallel to line CX (as X lies on AC). With common vertex O: $\triangle OZY \sim \triangle OCX$ (AA) $\Rightarrow OZ \cdot OX = OC \cdot OY \dots$ (ii) Multiplying (i) and (ii): $OZ^2 \cdot OX \cdot OY = OB \cdot OC \cdot OX \cdot OY$ $\Rightarrow ZO^2 = OB \times OC$, as required.	
24	Q24 Let the height of the tower be h. $\tan 60^\circ = \frac{h}{15}$ $h = 15\sqrt{3} = 15 \times 1.732 = 25.98 \text{ m}$ Answer: height of the tower = 25.98 m	1 mark for the correct equation; 1 mark for the final value.
25	Q25 For two numbers: (Product of the numbers) = HCF $\times$ LCM Product = $13 \times 182 = 2366$ Other number = $\frac{2366}{26} = 91$ Answer: the other number is 91	1 mark for the relation; 1 mark for the final answer.
SECTION – C (Q26–31, 3 marks each)		
26	Q26 Assume, to the contrary, that $2 + 3\sqrt{5}$ is rational, say equal to r. Then $3\sqrt{5} = r - 2 \Rightarrow \sqrt{5} = \frac{r-2}{3}$ The right-hand side is rational (difference and quotient of rationals), so $\sqrt{5}$ would be rational. This contradicts the given fact that $\sqrt{5}$ is irrational. Hence, our assumption is wrong, and $2 + 3\sqrt{5}$ is irrational.	1 mark for the assumption; 1 mark for reaching $\sqrt{5} = \text{rational}$; 1 mark for the contradiction/conclusion.

Q.No	Step-by-Step Solution	Marks per Step
27	Q27 $141x + 93y = 189 \quad (i); \quad 93x + 141y = 45 \quad (ii)$ Adding (i) and (ii): $234x + 234y = 234 \Rightarrow x + y = 1 \quad (iii)$ Subtracting (ii) from (i): $48x - 48y = 144 \Rightarrow x - y = 3 \quad (iv)$ Adding (iii) and (iv): $2x = 4 \Rightarrow x = 2$; then $y = 1 - 2 = -1$ Answer: $x = 2, y = -1$	1 mark for adding the equations; 1 mark for subtracting; 1 mark for the final values.
28	Q28 (A) $a = -15, d = 2. \quad S_n = \frac{n}{2}[2a + (n-1)d] = -55$ $\frac{n}{2}[-30 + 2(n-1)] = -55 \Rightarrow n(2n-32) = -110 \Rightarrow n^2 - 16n + 55 = 0$ $(n-5)(n-11) = 0 \Rightarrow n = 5 \text{ or } n = 11$ Reason for the double answer: $a_6, \dots, a_{11} = -5, -3, -1, 1, 3, 5$, which sum to 0. So the sum of these six terms adds nothing to the total $\Rightarrow$ both $n = 5$ and $n = 11$ give sum -55. (B) OR $a_8 = 37 \Rightarrow a + 7d = 37 \quad (i)$ $a_{15} = a_{12} + 15 \Rightarrow (a + 14d) - (a + 11d) = 15 \Rightarrow 3d = 15 \Rightarrow d = 5$ From (i): $a = 37 - 35 = 2$ AP: 2, 7, 12, 17, ... $S_{15} = \frac{15}{2}[2a + 14d] = \frac{15}{2}[4 + 70] = 15 \times 37 = 555$ Answer: AP is 2, 7, 12, ...; $S_{15} = 555$	(main) 1 mark for the quadratic in n; 1 mark for both roots; 1 mark for the explanation. (OR) 1 mark for d; 1 mark for a; 1 mark for S_{15}.
29	Q29 (A) Let the y-axis divide the segment joining $(-4, -6)$ and $(10, 12)$ in ratio $k : 1$. x-coordinate on the y-axis is 0: $\frac{10k - 4}{k + 1} = 0 \Rightarrow k = \frac{2}{5}$, i.e. ratio 2 : 5 y-coordinate: $\frac{(2/5)(12) + (-6)}{2/5 + 1} = \frac{24/5 - 6}{7/5} = \frac{-6/5}{7/5} = -\frac{6}{7}$ Answer: ratio 2 : 5; point of division $\left(0, -\frac{6}{7}\right)$ (B) OR $A(-3, 2), B(-5, -5), C(2, -3), D(4, 4)$ $AB = \sqrt{(-5+3)^2 + (-5-2)^2} = \sqrt{4+49} = \sqrt{53}$ $BC = \sqrt{(2+5)^2 + (-3+5)^2} = \sqrt{49+4} = \sqrt{53}$ $CD = \sqrt{(4-2)^2 + (4+3)^2} = \sqrt{4+49} = \sqrt{53}, \quad DA = \sqrt{(-3-4)^2 + (2-4)^2} = \sqrt{49+4} = \sqrt{53}$ All four sides are equal ($\sqrt{53}$), so $ABCD$ is at least a rhombus. Checking the diagonals: $AC = \sqrt{5^2 + 5^2} = 5\sqrt{2}, \quad BD = \sqrt{9^2 + 9^2} = 9\sqrt{2}$ Diagonals are unequal, confirming $ABCD$ is a rhombus (not a square).	(main) 1 mark for the ratio; 1 mark for the point of division. (OR) 1 mark for the four side lengths; 1 mark for the diagonals; 1 mark for the conclusion.

Q.No	Step-by-Step Solution	Marks per Step
30	Q30 $\tan \alpha = \frac{1}{\sqrt{7}} \Rightarrow \tan^2 \alpha = \frac{1}{7} \Rightarrow \cot^2 \alpha = 7$ $\operatorname{cosec}^2 \alpha = 1 + \cot^2 \alpha = 8, \quad \sec^2 \alpha = 1 + \tan^2 \alpha = 1 + \frac{1}{7} = \frac{8}{7}$ $\frac{\operatorname{cosec}^2 \alpha + \sec^2 \alpha}{\operatorname{cosec}^2 \alpha - \sec^2 \alpha} = \frac{8 + 8/7}{8 - 8/7} = \frac{64/7}{48/7} = \frac{64}{48} = \frac{4}{3}$ Answer: $\frac{4}{3}$	1 mark for $\operatorname{cosec}^2 \alpha, \sec^2 \alpha$; 1 mark for substitution; 1 mark for the final value.
31	Q31 Cards numbered 11 to 60: total outcomes = $60 - 11 + 1 = 50$ (a) Odd numbers from 11 to 59: $11, 13, \dots, 59 \Rightarrow 25$ numbers. $P = \frac{25}{50} = \frac{1}{2}$ (b) Perfect squares from 11 to 60: $16, 25, 36, 49 \Rightarrow 4$ numbers. $P = \frac{4}{50} = \frac{2}{25}$ (c) Primes less than 23 (within 11–60): $11, 13, 17, 19 \Rightarrow 4$ numbers. $P = \frac{4}{50} = \frac{2}{25}$ Answer: (a) $\frac{1}{2}$ (b) $\frac{2}{25}$ (c) $\frac{2}{25}$	1 mark for part (a); 1 mark for part (b); 1 mark for part (c).
SECTION – D (Q32–35, 5 marks each)		
32	Q32 Given: $\triangle ABC$ with D on AB, E on AC, and $DE \parallel BC$. To prove: $\frac{AD}{DB} = \frac{AE}{EC}$ Construction: Join BE and CD. Draw $EN \perp AB$ and $DM \perp AC$. $\operatorname{ar}(ADE) = \frac{1}{2} \times AD \times EN, \quad \operatorname{ar}(BDE) = \frac{1}{2} \times DB \times EN$ $\Rightarrow \frac{\operatorname{ar}(ADE)}{\operatorname{ar}(BDE)} = \frac{AD}{DB} \quad \dots (i)$ $\operatorname{ar}(ADE) = \frac{1}{2} \times AE \times DM, \quad \operatorname{ar}(DEC) = \frac{1}{2} \times EC \times DM$ $\Rightarrow \frac{\operatorname{ar}(ADE)}{\operatorname{ar}(DEC)} = \frac{AE}{EC} \quad \dots (ii)$ $\triangle BDE$ and $\triangle DEC$ have the same base DE and lie between the same parallels DE and BC (since $DE \parallel BC$), so $\operatorname{ar}(BDE) = \operatorname{ar}(DEC) \quad \dots (iii)$ From (i), (ii) and (iii): $\frac{AD}{DB} = \frac{\operatorname{ar}(ADE)}{\operatorname{ar}(BDE)} = \frac{\operatorname{ar}(ADE)}{\operatorname{ar}(DEC)} = \frac{AE}{EC}$ Hence, $\frac{AD}{DB} = \frac{AE}{EC}$, proved.	1 mark for construction; 1 mark each for the two area ratios; 1 mark for the equal-area step; 1 mark for the conclusion.
33	Q33 (A) Let the fraction be $\frac{x}{y}$. $\frac{x+2}{y+2} = \frac{1}{3} \Rightarrow 3x+6 = y+2 \Rightarrow y = 3x+4 \quad (i)$ $\frac{x+3}{y+3} = \frac{2}{5} \Rightarrow 5x+15 = 2y+6 \Rightarrow 5x+9 = 2y \quad (ii)$ Substituting (i) in (ii): $5x+9 = 2(3x+4) = 6x+8 \Rightarrow x = 1$	(main) 1 mark for each equation; 1 mark for solving; 1 mark for the final fraction. (OR) marks for the table of points, correct graph, and reading off the y-intercepts.

Q.No	Step-by-Step Solution	Marks per Step
	From (i): $y = 3(1) + 4 = 7$ Answer: the fraction is $\frac{1}{7}$ (B) OR $x - 2y = 2$: when $x = 0$, $y = -1$; when $y = 0$, $x = 2$ — points $(0, -1)$ and $(2, 0)$ $3x + 5y = 17$: when $x = 0$, $y = \frac{17}{5} = 3.4$; when $y = 0$, $x = \frac{17}{3} \approx 5.67$ — points $(0, 3.4)$ and $(5.67, 0)$ Solving algebraically to locate the intersection: from $x - 2y = 2$, $x = 2 + 2y$; substituting, $3(2 + 2y) + 5y = 17 \Rightarrow 11y = 11 \Rightarrow y = 1$, $x = 4$ Plotting both lines: they intersect at $(4, 1)$. Answer: the lines meet the y-axis at $(0, -1)$ and $(0, 3.4)$; they intersect each other at $(4, 1)$.	
34	Q34 Let the horizontal distance between the feet of the tower and the building be d, and the building height be H. From the foot of the building, angle of elevation to the top of the (60 m) tower is 60°: $\tan 60^\circ = \frac{60}{d}$ $d = \frac{60}{\sqrt{3}} = 20\sqrt{3}$ m From the foot of the tower, angle of elevation to the top of the building is 30°: $\tan 30^\circ = \frac{H}{d}$ $H = d \times \tan 30^\circ = 20\sqrt{3} \times \frac{1}{\sqrt{3}} = 20$ m Answer: height of the building = 20 m	1 mark for the first equation; 1 mark for d; 1 mark for the second equation; 1 mark for H; 1 mark for the final answer.
35	Q35 (A) $x = a \cos \theta + b \sin \theta \Rightarrow x^2 = a^2 \cos^2 \theta + 2ab \sin \theta \cos \theta + b^2 \sin^2 \theta$ $y = b \cos \theta - a \sin \theta \Rightarrow y^2 = b^2 \cos^2 \theta - 2ab \sin \theta \cos \theta + a^2 \sin^2 \theta$ $x^2 + y^2 = a^2(\cos^2 \theta + \sin^2 \theta) + b^2(\sin^2 \theta + \cos^2 \theta)$ $= a^2(1) + b^2(1) = a^2 + b^2$ Hence, $x^2 + y^2 = a^2 + b^2$, proved. (B) OR $\sin(A + B) = 1 \Rightarrow A + B = 90^\circ$ $\tan(A - B) = \frac{1}{\sqrt{3}} \Rightarrow A - B = 30^\circ$ Solving: $2A = 120^\circ \Rightarrow A = 60^\circ$, $B = 30^\circ$ (i) $\tan A + \cot B = \tan 60^\circ + \cot 30^\circ = \sqrt{3} + \sqrt{3} = 2\sqrt{3}$ (ii) $\sec A - \operatorname{cosec} B = \sec 60^\circ - \operatorname{cosec} 30^\circ = 2 - 2 = 0$ Answer: (i) $2\sqrt{3}$ (ii) 0	(main) 1 mark for x^2; 1 mark for y^2; 1 mark for adding; 1 mark for using $\sin^2 \theta + \cos^2 \theta = 1$; 1 mark for the conclusion. (OR) 1 mark for $A + B = 90^\circ$; 1 mark for $A - B = 30^\circ$; 1 mark for A, B; 1 mark each for parts (i) and (ii).

Q.No	Step-by-Step Solution	Marks per Step
36	Q36 (i) Multiples of 11 from 1 to 50: 11, 22, 33, 44 $\Rightarrow$ 4 numbers. $P(\text{bumper prize on first draw}) = \frac{4}{50} = \frac{2}{25}$ (ii) Multiples of 5 from 1 to 50: 5, 10, ..., 50 $\Rightarrow$ 10 numbers. $P(\text{multiple of 5}) = \frac{10}{50} = \frac{1}{5}$ (iii) Primes from 1 to 50: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47 $\Rightarrow$ 15 numbers. Perfect squares from 1 to 50: 1, 4, 9, 16, 25, 36, 49 $\Rightarrow$ 7 numbers. (No number is both prime and a perfect square.) $P(\text{souvenir or sports kit}) = \frac{15 + 7}{50} = \frac{22}{50} = \frac{11}{25}$ (iii) OR Token 25 (a perfect square) is removed; tokens remaining = 49. Perfect squares remaining: 1, 4, 9, 16, 36, 49 $\Rightarrow$ 6 numbers (25 removed from the original 7). $P(\text{next token is a perfect square}) = \frac{6}{49}$	(i) 1 mark. (ii) 1 mark. (iii) 2 marks (main) / 2 marks (OR).
37	Q37  (i) A(3, 4), main gate O(0, 0): distance $OA = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$ Answer: 5 units (ii) Midpoint of AB, where A(3, 4), B(9, 10): $\left(\frac{3+9}{2}, \frac{4+10}{2}\right) = (6, 7)$ Answer: (6, 7) (iii)	(i) 1 mark. (ii) 1 mark. (iii) 2 marks (main) / 2 marks (OR).

Q.No	Step-by-Step Solution	Marks per Step
	P divides AB internally in ratio $1 : 2$ (from A to B): $P = \left(\frac{1(9) + 2(3)}{1 + 2}, \frac{1(10) + 2(4)}{1 + 2} \right) = \left(\frac{15}{3}, \frac{18}{3} \right) = (5, 6)$ Answer: $(5, 6)$ (iii) OR For (x, y) equidistant from $A(3, 4)$ and $B(9, 10)$: $(x - 3)^2 + (y - 4)^2 = (x - 9)^2 + (y - 10)^2$ $x^2 - 6x + 9 + y^2 - 8y + 16 = x^2 - 18x + 81 + y^2 - 20y + 100$ $-6x - 8y + 25 = -18x - 20y + 181 \Rightarrow 12x + 12y - 156 = 0$ Answer: $x + y = 13$	
38	Q38 (i) First month $a = 4$ floors; increase each month $d = 3$ floors. Answer: $a = 4, d = 3$ (ii) Standard nth term formula of an AP: $a_n = a + (n - 1)d$ (iii) $a_{10} = a + 9d = 4 + 9(3) = 4 + 27 = 31$ Answer: 31 floors (iii) OR $S_{12} = \frac{12}{2}[2a + (12 - 1)d] = 6[8 + 33] = 6 \times 41$ Answer: $S_{12} = 246$ floors	(i) 1 mark. (ii) 1 mark. (iii) 2 marks (main) / 2 marks (OR).

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