MARKING SCHEME

Mathematics (Basic) • Class X • Sample Paper 02 • Q.P. Code MC/X/B/02

(Value points with step-wise marks, as per the CBSE marking scheme pattern)

Q. No.	VALUE POINTS / EXPECTED ANSWERS	Marks
	SECTION – A	
1.	(A) 150	**1**
2.	(B) $x^2 + x - 12$	**1**
3.	(A) a unique solution	**1**
4.	(A) 10 years	**1**
5.	(A) $\pm 2\sqrt{6}$	**1**
6.	(C) -1	**1**
7.	(B) 13	**1**
8.	(A) $(1, 3)$	**1**
9.	(B) $\frac{2}{11}$	**1**
10.	(B) 60	**1**
11.	(A) 12 cm	**1**
12.	(B) 16	**1**
13.	(A) 30°	**1**
14.	(A) $\frac{3}{5}$	**1**
15.	(A) 24 cm	**1**
16.	(C) $\angle B = \angle D$	**1**
17.	(B) 120°	**1**
18.	(A) 220 cm^2	**1**
19.	(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).	**1**
20.	(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	**1**
	SECTION – B	
21 (a).	$336 = 2^4 \times 3 \times 7,\ 54 = 2 \times 3^3;$ HCF $= 6$, LCM $= 2^4 \times 3^3 \times 7 = 3024$	**1**
	HCF $\times$ LCM $= 6 \times 3024 = 18144 = 336 \times 54$. Verified.	**1**
	OR	
21 (b).	Required number $=$ HCF$(245 - 5,\ 1029 - 5)$ $=$ HCF$(240, 1024)$	**1**
	$240 = 2^4 \times 3 \times 5,\ 1024 = 2^{10};$ HCF $= 2^4 = 16$	**1**
22.	$A - B = 30^\circ,\ A + B = 60^\circ$	**1**
	$A = 45^\circ,\ B = 15^\circ$	**1**
23.	Let the zeroes be α and $\frac{1}{\alpha}$; product $= \alpha \times \frac{1}{\alpha} = 1$	**1**
	Product $= \frac{k}{3} = 1 \Rightarrow k = 3$	**1**

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24.	The chord AB touches the smaller circle at P; $OP \perp AB$ and P is the mid-point of AB.	**1**
	$AP = \sqrt{5^2 - 3^2} = 4$ cm; $AB = 8$ cm	**1**
25 (a).	$x = \dfrac{3\times 8 + 1\times 4}{4} = 7$	**1**
	$y = \dfrac{3\times 5 + 1\times(-3)}{4} = 3$; point $(7, 3)$	**1**
	OR	
25 (b).	Sides: $\sqrt{0+16} = 4$, $\sqrt{9+0} = 3$, $\sqrt{9+16} = 5$	**1**
	Perimeter $= 4+3+5 = 12$ units	**1**
	SECTION – C	
26.	Let $7 - 2\sqrt{2} = r$, a rational number.	**½**
	Then $\sqrt{2} = \dfrac{7-r}{2}$	**1**
	$\dfrac{7-r}{2}$ is rational, so $\sqrt{2}$ would be rational.	**1**
	This contradicts that $\sqrt{2}$ is irrational. Hence $7 - 2\sqrt{2}$ is irrational.	**½**
27 (a).	Let $AD = AF = x$, $BD = BE = y$, $CE = CF = z$ (tangents from an external point)	**1**
	$x + y = 10$, $y + z = 8$, $z + x = 12 \Rightarrow x + y + z = 15$	**1**
	$AD = x = 7$ cm, $BE = y = 3$ cm, $CF = z = 5$ cm	**1**
	OR	
27 (b).	Let OP meet AB at C. $\triangle OAP \cong \triangle OBP$ (RHS) $\Rightarrow \angle APC = \angle BPC$	**1**
	$\triangle PAC \cong \triangle PBC$ (SAS: $PA = PB$, $\angle APC = \angle BPC$, PC common) $\Rightarrow AC = BC$	**1**
	$\angle PCA = \angle PCB$ and together 180°, so each $= 90^\circ$. Hence OP is the perpendicular bisector of AB.	**1**
28.	Let P and Q divide AB in the ratios $1:2$ and $2:1$.	**1**
	$P = \left(\dfrac{-7+4}{3}, \dfrac{4-4}{3}\right) = (-1, 0)$	**1**
	$Q = \left(\dfrac{-14+2}{3}, \dfrac{8-2}{3}\right) = (-4, 2)$	**1**
29.	LHS $= \left(\dfrac{1}{\sin\theta} - \dfrac{\cos\theta}{\sin\theta}\right)^2 = \dfrac{(1-\cos\theta)^2}{\sin^2\theta}$	**1**
	$= \dfrac{(1-\cos\theta)^2}{1-\cos^2\theta} = \dfrac{(1-\cos\theta)^2}{(1-\cos\theta)(1+\cos\theta)}$	**1**
	$= \dfrac{1-\cos\theta}{1+\cos\theta} =$ RHS	**1**
30 (a).	x_i: 110, 130, 150, 170, 190; $f_i x_i$: 1320, 1820, 1200, 1020, 1900	**1**
	$\Sigma f_i = 50$, $\Sigma f_i x_i = 7260$	**1**
	Mean $= \dfrac{7260}{50} = ₹\,145.20$	**1**
	OR	
30 (b).	Modal class 30–40; $l = 30$, $f_1 = 16$, $f_0 = 10$, $f_2 = 12$, $h = 10$	**1**
	Mode $= 30 + \dfrac{16-10}{32-10-12} \times 10$	**1**
	$= 30 + 6 = 36$	**1**
31.	Let the fraction be $\dfrac{x}{y}$: $11(x+2) = 9(y+2) \Rightarrow 11x - 9y = -4$	**1**
	$6(x+3) = 5(y+3) \Rightarrow 6x - 5y = -3$	**1**

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	Solving, $x = 7$, $y = 9$; fraction $= \frac{7}{9}$	1
	SECTION – D	
32.	Statement, Given, To prove, figure and construction	1½
	Correct proof	1½
	$\frac{4x-3}{3x-1} = \frac{8x-7}{5x-3} \Rightarrow 20x^2 - 27x + 9 = 24x^2 - 29x + 7 \Rightarrow 2x^2 - x - 1 = 0$	1
	$(2x+1)(x-1) = 0 \Rightarrow x = 1$ ($x = -\frac{1}{2}$ gives negative lengths)	1
33 (a).	Let present age be x years: $\frac{1}{x-3} + \frac{1}{x+5} = \frac{1}{3}$	1
	$3(2x+2) = (x-3)(x+5)$	1
	$x^2 - 4x - 21 = 0 \Rightarrow (x-7)(x+3) = 0$	1
	$x = 7$ or $x = -3$	1
	Age cannot be negative; present age $= 7$ years	1
	OR	
33 (b).	Let the smaller tap take x h; larger takes $(x-10)$ h: $\frac{1}{x} + \frac{1}{x-10} = \frac{8}{75}$	1
	$75(2x-10) = 8x(x-10) \Rightarrow 8x^2 - 230x + 750 = 0$	1
	$4x^2 - 115x + 375 = 0 \Rightarrow (x-25)(4x-15) = 0$	1
	$x = 25$ or $x = \frac{15}{4}$ (rejected, as then $x - 10 < 0$)	1
	Smaller tap: 25 hours; larger tap: 15 hours	1
34.	TSA = CSA of cylinder + 2× CSA of hemisphere $= 2\pi rh + 4\pi r^2$	1
	$= 2 \times \frac{22}{7} \times 3.5 \times 10 + 4 \times \frac{22}{7} \times 3.5^2$	1
	$= 220 + 154 = 374$ cm^2	1
	Volume of wood $= \pi r^2 h - 2 \times \frac{2}{3}\pi r^3 = 385 - 179.67$	1
	$= 205.33$ cm^3 (approx.)	1
35 (a).	Figure. Let building $AB = h$, tower $CD = 50$ m, distance $BD = x$ m	1
	$\tan 60^\circ = \frac{50}{x} \Rightarrow x = \frac{50}{\sqrt{3}}$ m	1
	$\tan 30^\circ = \frac{h}{x}$	1
	$h = \frac{x}{\sqrt{3}} = \frac{50}{3}$	1
	Height of building $= 16\frac{2}{3}$ m	1
	OR	
35 (b).	Figure. Building $AB = 10$ m, flagstaff $BD = h$ m, $PA = d$ m	1
	$\tan 30^\circ = \frac{10}{d} \Rightarrow d = 10\sqrt{3}$ m	1
	$\tan 45^\circ = \frac{10+h}{d} \Rightarrow 10 + h = 10\sqrt{3}$	1
	$h = 10(\sqrt{3} - 1) = 7.32$ m	1
	Distance of building from $P = 10\sqrt{3} = 17.32$ m	1
	SECTION – E	
36.	(i) Angle $= \frac{360^\circ}{8} = 45^\circ$	1
	(ii) Area $= \frac{45}{360} \times \frac{22}{7} \times 14^2 = 77$ cm^2	1

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	(iii) (a) Arc length $= \frac{45}{360} \times 2 \times \frac{22}{7} \times 14 = 11$ cm	**1**
	Perimeter $= 11 + 14 + 14 = 39$ cm	**1**
	OR	
	(iii) (b) Remaining slices $= 5$	**1**
	Area $= 5 \times 77 = 385$ cm^2	**1**
37.	(i) $a_{10} = 24 + 9 \times 2 = 42$	**1**
	(ii) $a_{20} = 24 + 19 \times 2 = 62$	**1**
	(iii) (a) $S_{20} = \frac{20}{2}(24 + 62)$	**1**
	$= 860$ seats	**1**
	OR	
	(iii) (b) $\frac{n}{2}[48 + (n-1)2] = 330 \Rightarrow n^2 + 23n - 330 = 0$	**1**
	$(n+33)(n-10) = 0 \Rightarrow n = 10$ rows	**1**
38.	(i) Total outcomes $= 36$; sum 7: 6 outcomes; P $= \frac{6}{36} = \frac{1}{6}$	**1**
	(ii) Sum 11: $(5,6),(6,5)$; P $= \frac{2}{36} = \frac{1}{18}$	**1**
	(iii) (a) Sum ≥ 10: $(4,6),(5,5),(6,4),(5,6),(6,5),(6,6)$ — 6 outcomes	**1**
	P $= \frac{6}{36} = \frac{1}{6}$	**1**
	OR	
	(iii) (b) Product odd only when both are odd: $3 \times 3 = 9$ outcomes	**1**
	P(even product) $= 1 - \frac{9}{36} = \frac{3}{4}$	**1**

• • • End of Marking Scheme • • •

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