

Marking Scheme

SUMMATIVE ASSESSMENT – II (2014-15)

Mathematics (Class – X)

General Instructions:

1. The Marking Scheme provides general guidelines to reduce subjectivity and maintain uniformity. The answers given in the marking scheme are the best suggested answers.
2. Marking be done as per the instructions provided in the marking scheme. (It should not be done according to one's own interpretation or any other consideration).
3. Alternative methods be accepted. Proportional marks be awarded.
4. If a question is attempted twice and the candidate has not crossed any answer, only first attempt be evaluated and 'EXTRA' be written with the second attempt.
5. In case where no answers are given or answers are found wrong in this Marking Scheme, correct answers may be found and used for valuation purpose.

1 * 4 अ / SECTION-A

प्रश्न संख्या 1 से 4 में प्रत्येक का 1 अंक है।

Question numbers 1 to 4 carry **one** mark each.

1	1	1
2	12 m	1
3	0	1
4	Mid point $\left(\frac{5}{2}, 4\right)$	1

1 * ~~Q~~ब / SECTION-B

प्रश्न संख्या 5 से 10 में प्रत्येक के 2 अंक हैं।

Question numbers 5 to 10 carry **two** marks each.

5	<p>Let 1st term be a and common diff be d</p> $a_2 = a + d$ $a + d = 8 \quad (1)$ $a_5 = a + 4d$ $a + 4d = 17 \quad (2)$ <p>From (1) and (2)</p> $a = 5, \quad d = 3,$ $a_{19} = a + 18d$ $= 5 + 54 = 59$	2
6	<p>Given, $2x^2 - 5x + 3 = 0$</p> <p>Then, $2x^2 - 5x + 3 = 0$</p> $\Rightarrow (x - 1)(2x - 3) = 0$ $x = 1, x = \frac{3}{2}$	2
7	PQ = 6cm, OP = OQ = 6cm	2

$$\therefore PQ = OP = OQ$$

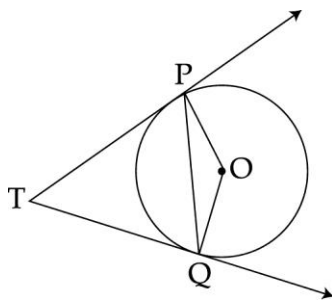
$$\therefore \angle POQ = 60^\circ \text{ (each angle of equilateral } \Delta.)$$

$$\angle P = \angle Q = 90^\circ \text{ (rad. } \perp \text{ tangent)}$$

$$\therefore \angle T + 90^\circ + 90^\circ + 60^\circ = 360^\circ \text{ (ASP)}$$

$$\angle T = 120^\circ$$

$$\angle PTQ = 120^\circ.$$

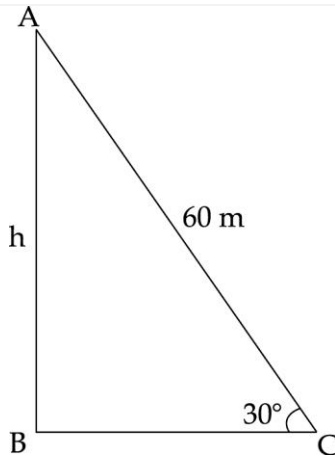


	$\therefore PQ = OP = OQ$ $\therefore \angle POQ = 60^\circ \text{ (each angle of equilateral } \Delta.)$ $\angle P = \angle Q = 90^\circ \text{ (rad. } \perp \text{ tangent)}$ $\therefore \angle T + 90^\circ + 90^\circ + 60^\circ = 360^\circ \text{ (ASP)}$ $\angle T = 120^\circ$ $\angle PTQ = 120^\circ.$	
8	Correct Construction and labelling	2
9	Correct Construction and labelling	2
10	$\text{Difference} = 2\pi r - 2r = 30$ $2r\left(\frac{22}{7} - 1\right) = 30$ $r = 7 \text{ cm}$	2
1 * / SECTION-C		

	<p>प्रश्न संख्या 11 से 20 में प्रत्येक के 3 अंक हैं। Question numbers 11 to 20 carry 3 marks each.</p>	
11	$22.50 = 15 + 2.50 (n - 1)$ <p>Or, $2.5 (n - 1) = 7.5$</p> <p>Or, $n - 1 = 3$ Or, $n = 4$</p>	3
12	<p>Let the present age of mother = x yrs</p> <p>Let the present age of daughter = $(50 - x)$ yrs</p> <p>5 years ago mother = $(x - 5)$</p> <p>daughter = $50 - x - 5 = (45 - x)$</p> <p>According to question</p> $(x - 5) (45 - x) = 175$ $-x^2 + 50x - 225 = 175$ $x^2 - 50x + 400 = 0$ $x^2 - 40x - 10x + 400 = 0$ $(x - 10) (x - 40) = 0$ <p>$\therefore x = 10, x = 40$</p> <p>$x = 10$ rejected because mother's age can not be 10</p> <p>\therefore mother age 40 years</p>	3
13		3

$$\begin{aligned} \angle OBP &= 90^\circ \quad (\text{Tgt is } \perp \text{ to the radius}) \\ OB^2 + BP^2 &= OP^2 \\ 5^2 + (10\sqrt{2})^2 &= OP^2 \\ \Rightarrow OP &= 15 \text{ cm} \\ \angle OAP &= 90^\circ \quad (\text{Tgt is } \perp \text{ to the radius}) \\ OA^2 + AP^2 &= OP^2 \Rightarrow 9^2 + AP^2 = 15^2 \Rightarrow AP = 12 \text{ cm} \end{aligned}$$

14



Let AB be a tree of height h

$$\begin{aligned} \text{Speed} &= 300 \text{ m/min} \\ &= \frac{300}{60} \text{ m/sec} \\ &= 5 \text{ m/sec} \end{aligned}$$

Distance covered in 1 sec = 5 m

$$\begin{aligned} \therefore \text{Distance covered in 12 sec} &= 5 \times 12 \\ &\Rightarrow AC = 60 \text{ m} \end{aligned}$$

$$\text{In } \triangle ACB, \frac{AB}{AC} = \sin 30^\circ$$

$$\Rightarrow \frac{h}{60} = \frac{1}{2}$$

$$\Rightarrow h = 30 \text{ m}$$

\therefore height of the tree is 30 m.

3

15

$$\begin{aligned} P(\text{not red}) \\ \text{No. of pens which are not red} &= 80 \\ P(\text{Not red}) &= \frac{80}{100} = \frac{4}{5} \end{aligned}$$

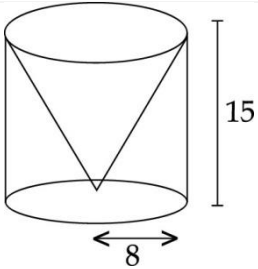
3

	<p>No. of green pens = 35</p> $P(\text{green}) = \frac{35}{100} = \frac{7}{20}$	
16	<p>Point P(x, y) is equidistant from A(a - b, a + b) and B(- a - b, a + b)</p> $\Rightarrow PA = PB$ $\Rightarrow PA^2 = PB^2$ $\Rightarrow [(x - (a - b))^2 + [y - (a + b)]^2 = [x - (- a - b)]^2 + [y - (a + b)]^2$ $\Rightarrow x^2 + (a - b)^2 - 2x(a - b) + y^2 + \cancel{(a + b)^2} - 2y(a + b)$ $= x^2 + \cancel{(a + b)^2} - 2x(a + b) + y^2 + (a + b)^2 - 2y(a + b)$ $\Rightarrow \cancel{x^2} + \cancel{y^2} - 2ab - \cancel{2ax} + 2bx - \cancel{2ay} - 2by$ $= -\cancel{2ax} - 2bx + \cancel{x^2} + \cancel{y^2} + 2ab - \cancel{2ay} - \cancel{2by}$ $\Rightarrow -2ab + 2bx = -2bx + 2ab$ $\Rightarrow \cancel{4bx} = \cancel{4ab}$ $\Rightarrow x - a = 0$	3
17	<p>Given points are A(4, 2), B(7, 5) and C(9, 7)</p> $AB = \sqrt{(7 - 4)^2 + (5 - 2)^2}$ $= \sqrt{(3)^2 + (3)^2}$ $= 3\sqrt{2} \text{ units}$ $BC = \sqrt{(9 - 7)^2 + (7 - 5)^2}$ $= \sqrt{(2)^2 + (2)^2}$ $= 2\sqrt{2} \text{ units}$ $AC = \sqrt{(9 - 4)^2 + (7 - 2)^2}$ $= \sqrt{(5)^2 + (5)^2}$ $= 5\sqrt{2} \text{ units}$ <p>Since $AB + BC = 3\sqrt{2} + 2\sqrt{2}$</p> $= 5\sqrt{2}$	3

$$= AC$$

As Sum of two sides is equal to the third side, so
points A, B and C do not form a triangle.

18



3

$$\text{Slant-Height of cone} = \sqrt{(8)^2 + (15)^2}$$

$$= 17 \text{ cm}$$

$$\text{Curved surface area of cylinder} = 2\pi rh$$

$$= 2 \times \pi \times 8 \times 15$$

$$= 240\pi \text{ cm}^2$$

$$\text{Curved surface area of cone} = \pi rl$$

$$= \pi \times 8 \times 17$$

$$= 136\pi \text{ cm}^2$$

$$\text{Base Area of cylinder} = \pi(8)^2$$

$$= 64\pi \text{ cm}^2$$

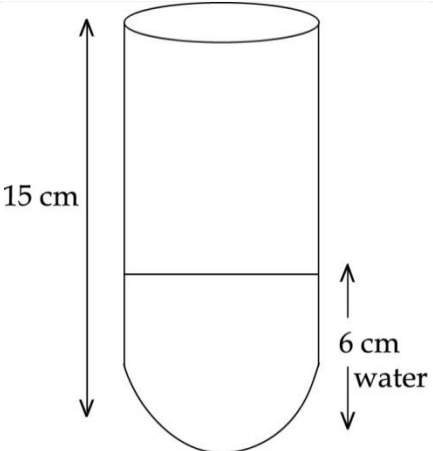
$$\therefore \text{Total Surface Area} = 240\pi + 136\pi + 64\pi$$

$$= 440\pi$$

$$= 440 \times 3.14$$

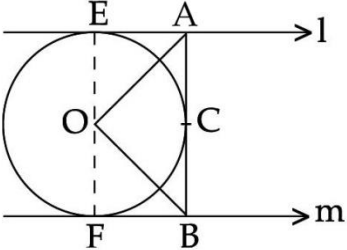
$$= 1381.6 \text{ cm}^2 (\approx).$$

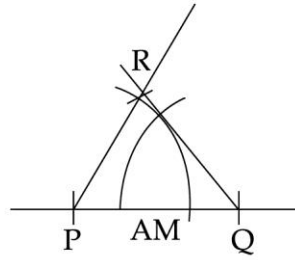
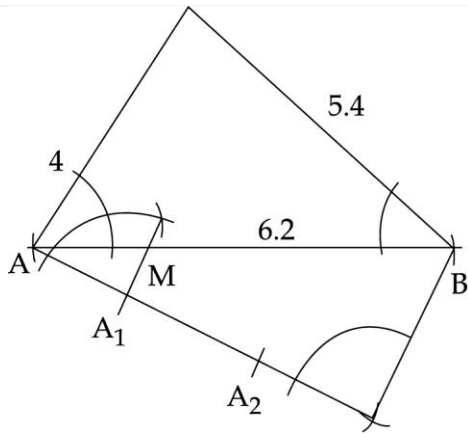
19	<p>Since side of square = 10 m \therefore Area of square = 100 m^2 Area left out is area of four quadrants of radius 5 m each \therefore Left out area = $4 \times \frac{90}{360} \times \frac{22}{7} \times 5 \times 5$ Since area of a quadrant = $\left[\frac{\theta}{360} \times \pi r^2, \theta = 90^\circ \right]$ $= 78.57 \text{ m}^2 (\approx)$ \therefore Area of flower bed = $100 - 78.57$ $= 21.43 \text{ m}^2$</p>	3
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20	 <p>Volume of 1 spherical drop of oil $\frac{4}{3} \times \frac{22}{7} \times 0.9 \times 0.9 \times 0.9 \text{ mm}^3$ Volume of 20 drops = Vol. of cylinder of height h $20 \times \frac{4}{3} \times \frac{22}{7} \times 0.9 \times 0.9 \times 0.9 = \frac{22}{7} \times 1.8 \times 1.8 \times h$ $h = 6$ The length of test tube that remains empty = $15 - (6 + 6) = 3 \text{ cm}$.</p>	3
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प्रश्न संख्या 21 से 31 में प्रत्येक के 4 अंक हैं।
Question numbers 21 to 31 carry 4 marks each.

21	<p>Let 1st term be a and common diff be d</p> $S_p = q \Rightarrow \frac{p}{2} [2a + (p-1)d] = q \quad (1)$ $S_q = p \Rightarrow \frac{q}{2} [2a + (q-1)d] = p \quad (2)$ $(1)-(2) \quad a(p-q) + \frac{1}{2} d [(p+q)(p-q) - (p-q)] = q - p$ $\cancel{(p-q)} \left[a + \frac{1}{2} d(p+q-1) \right] = - \cancel{(p-q)}$ $2a + (p+q-1)d = -2$ $S_{p+q} = \frac{p+q}{2} [2a + (p+q-1)d]$ $= \frac{p+q}{2} \times -2$ $= - (p+q) \text{ proved}$	4
22	$(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ <p>For real and equal roots, $D=0$</p> $B^2 - 4AC = 0$ $\Rightarrow [-2(ac + bd)]^2 - 4(a^2 + b^2)(c^2 + d^2) = 0$ $\Rightarrow 8abcd - 4a^2d^2 - 4b^2c^2 = 0$ $\Rightarrow -4(a^2d^2 + b^2c^2 - 2abcd) = 0$ $\Rightarrow (ad - bc)^2 = 0$ $\Rightarrow \frac{a}{b} = \frac{c}{d}$	4

23	$a_3 = 7, a_7 = 3a_3 + 2$ $= 3 \times 7 + 2 = 23$ $a + 2d = 7 \text{ and } a + 6d = 23$ <p>solving we get, $a = -1, d = 4$</p> $S_{25} = \frac{25}{2} [2 \times -1 + 24 \times 4]$ $= \frac{25}{2} \times 94 = 1175$	4
24	 <p>From exterior points A and B pair of tgts are drawn \therefore OA and OB bisect the angle at A and B respectively Also $\angle EAC + \angle CBF = 180^\circ$ (Co. int supplementary angles as $l \parallel m$) ----- (1) $\therefore \angle AOB = 180^\circ - (\angle OAB + \angle OBC)$ (angle sum) $= 180^\circ - \frac{1}{2} (\angle EAC + \angle CBF)$ (using (1)) $= 180^\circ - \frac{1}{2} \times 180^\circ$ $= 180^\circ - 90^\circ$ $= 90^\circ$</p>	4
25	<p>Scale factor $\frac{1}{3}$ means</p> $\frac{PQ}{AB} = \frac{PR}{AC} = \frac{QR}{BC} = \frac{1}{3}$	4



Drawing $\triangle ABC$

Marking M on AB so that

$$\frac{AM}{BC} = \frac{1}{3}$$

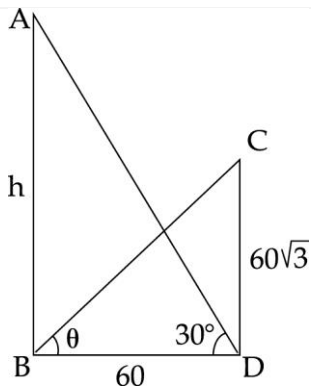
Drawing $\triangle PQR$ on $PQ = AM$

$$\angle P = \angle A, \angle Q = \angle B$$

$$\angle P = \angle A, \angle R = \angle B \text{ and } PR = AM$$

$$\therefore \triangle PQR \sim \triangle ABC$$

26



Let AB be the first tree of height h and CD be the second tree.
Let $\angle CBD = \theta$

4

$$\begin{aligned} \text{In } \triangle ABD, \frac{AB}{BD} &= \tan 30^\circ \\ \Rightarrow \frac{h}{60} &= \frac{1}{\sqrt{3}} \\ \Rightarrow h &= \frac{60}{\sqrt{3}} = 20\sqrt{3} \text{ m} \\ \text{In } \triangle CBD, \frac{CD}{BD} &= \tan \theta \\ \Rightarrow \frac{60\sqrt{3}}{60} &= \tan \theta \\ \Rightarrow \sqrt{3} &= \tan \theta \\ \therefore \theta &= 60^\circ \end{aligned}$$

- 27
- (i) $\frac{3}{4}$
 - (ii) $\frac{3}{4}$
 - (iii) $\frac{1}{4}$
- 4

28

A (-5, 7)

B (3, 2) C (4, 5)

Now, using distance formula,


$$AB = \sqrt{(-5 - 3)^2 + (7 - 2)^2} = \sqrt{64 + 25} = \sqrt{89}$$

$$BC = \sqrt{(3 - 4)^2 + (2 - 5)^2} = \sqrt{1 + 9} = \sqrt{10}$$

$$AC = \sqrt{(-5 - 4)^2 + (7 - 5)^2} = \sqrt{81 + 4} = \sqrt{85}$$

Now, $AB \neq BC \neq AC$
 $\Rightarrow \triangle ABC$ is scalene.
 Also, Area of $\triangle ABC$

4

	$= \frac{1}{2} [(-5)(2-5) + (3)(5-7) + 4(7-2)]$ $= \frac{1}{2} [15 - 6 + 20]$ $= 14.5 \text{ sq. units}$ <p>\therefore Area of $\triangle ABC = 14.5 \text{ sq. units}$</p>	
29	<p>Total volume of the cuboidal wood = $L \times B \times H = 20 \times 15 \times 10 = 3000 \text{ cm}^3$</p> <p>Volume of wood removed while making 4 conical depressions</p> $= 4 \times \frac{1}{3} \times \frac{22}{7} \times (0.5)^2 \times 2.1 \text{ cm}^3$ $= 2.2 \text{ cm}^3$ <p>Volume of wood removed for keeping pins and paper</p> $= (9)^3 = 729 \text{ cm}^3$ <p>Volume of wood in the stand after the depressions are made = $3000 - 2.2 - 729$</p> $= 2268.8 \text{ cm}^3$	4
30	<p>Side of triangle = $49 \times 4 = 14 \text{ cm}$</p> <p>radius = 7 cm</p> <p>area of sectors = $3 \times \frac{60}{360} \times \frac{22}{7} \times 49$</p> <p>area of 3 sectors = 77 sq. cm</p> <p>Remaining area = $84.77 - 77 = 7.77 \text{ sq. cm}$</p>	4
31		4

$$R = 24\text{cm}, h = 6\text{cm}$$

$$r = 16\text{cm}$$

$$l = \sqrt{h^2 + (R - r)^2}$$

$$= \sqrt{6^2 + (24 - 16)^2}$$

$$= \sqrt{36 + 64}$$

$$= 10\text{ cm}$$

$$\text{C.S.A} = \pi(r_1 + r_2)l$$

$$= \frac{22}{7} \times 10 \times 40$$

$$= 1257.14\text{cm}^2$$

Values of Aditya depicted here are : He believes in conserving the electricity. Aditya has understanding for the wastage and tries to conserve the electricity and saving money also.

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