

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 अंका / SECTION-A

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

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

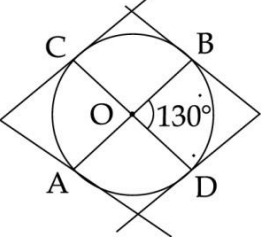
1	1	1
2	50 m	1
3	$\frac{1}{3}$	1
4	$\sqrt{13}$	1

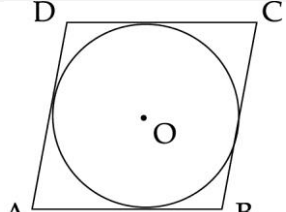
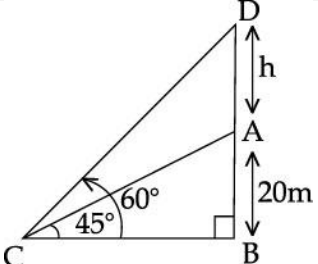
1 * Q.ब / SECTION-B

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

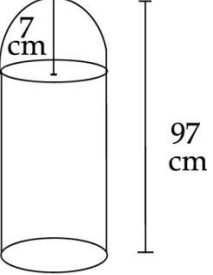
Question numbers 5 to 10 carry **two** marks each.

5	<p>Let 1st term be a and common diff be d</p> $a_{32} = 2a_{12}$ $a + 31d = 2(a + 11d)$ $a + 31d = 2a + 22d$ $a = 9d$ $a_{70} = a + 69d = 9d + 69d = 78d$ $a_{31} = a + 30d = 9d + 30d = 39d$ $\therefore a_{70} = 2a_{31} \text{ Proved}$	2
6	<p>$b^2 - 4ac = 0$ (Since roots are equal)</p> $\therefore 4k^2 - 24k = 0$ $4k(k - 6) = 0$ $\therefore k = 0, k = 6$ <p>But coefficient of x^2 can not be zero</p> $\therefore k = 6$	2

7	 <p>Tgts at end point of diameters are parallel. Hence tgt at C and D are parallel and tgts at A and B are parallel. So the figure formed is a parallelogram.</p>	2
8	<p>Correct construction (1½) Labelling(½)</p>	2
9	<p>Construction with proper labelling</p>	2
10	<p>$l^3 = (3x)^3 + (4x)^3 + (5x)^3$ Side of new cube = $6x$ Diagonal of cube = side $\sqrt{3}$ $12\sqrt{3} = 6x\sqrt{3}$ Edges of the three cubes are 6 cm, 8 cm and 10 cm</p>	2
	<p style="text-align: center;">1 * प्रश्न / SECTION-C</p> <p>प्रश्न संख्या 11 से 20 में प्रत्येक के 3 अंक हैं। Question numbers 11 to 20 carry 3 marks each.</p>	
11	<p>$(x^2 + x + 1) - (2x + 1) = (3x^2 - 3x + 3) - (x^2 + x + 1)$ $x^2 - x = 2x^2 - 4x + 2$ $x^2 - 3x + 2 = 0$ $x = 1, x = 2$ ans.</p>	3

12	<p>Put $x - 1 = y$ (1)</p> $y^2 - 5y - 6 = 0$ $(y + 1)(y - 6) = 0$ <p>or $y = -1$ or $y = 6$</p> <p>From (1) $x = 0$ when $y = -1$</p> <p>and $x = 7$ when $y = 6$</p>	3
13	 <p>$AB + DC = AD + BC$</p> $\Rightarrow 2AB = 2BC \text{ (Q Opposite sides of parallelogram are equal)}$ $\Rightarrow AB = BC$ <p>Hence ABCD is a rhombus.</p>	3
14	 <p>Let us assume height of the transmission tower be 'h' m</p> $\left. \begin{array}{l} AB = 20 \text{ m} \\ \angle ACB = 45^\circ \\ \angle DCB = 60^\circ \end{array} \right\} \text{ (given)}$ <p>Here, C is the point on the ground.</p> <p>In ΔABC, $\frac{AB}{BC} = \tan 45^\circ$</p>	3

	$\Rightarrow \frac{AB}{BC} = 1$ $\Rightarrow AB = BC = 20 \text{ m}$ <p>Now, In $\triangle DBC$, $\frac{BD}{BC} = \tan 60^\circ$</p> $\Rightarrow \frac{AB + AD}{20} = \sqrt{3}$ $\Rightarrow 20 + AD = 20\sqrt{3}$ $\Rightarrow AD(h) = 20\sqrt{3} - 20$ $\Rightarrow h = 20(\sqrt{3} - 1)$ <p>Hence, the required height of the tower is $20(\sqrt{3} - 1) \text{ m}$</p>	
15	<p>Total no. of outcomes = 6 Squares of the no. are. 9, 4, 1, 0, 1, 4 respectively. Favourite out comes = 5 \therefore probability = $\frac{5}{6}$</p>	3
16	<p>Point P(x, y) is equidistant from A(a - b, a + b) and B(-a - b, a + b)</p> $\Rightarrow PA = PB$ $\Rightarrow PA^2 = PB^2$ $\Rightarrow [(x - (a - b))^2 + [y - (a + b)]^2 = [x - (-a - b)]^2 + [y - (a + b)]^2$ $\Rightarrow x^2 + (a - b)^2 - 2x(a - b) + y^2 + (a + b)^2 - 2y(a + b)$ $= x^2 + (a + b)^2 - 2x(a + b) + y^2 + (a + b)^2 - 2y(a + b)$ $\Rightarrow a^2 + b^2 - 2ab - 2ax + 2bx - 2ay - 2by$ $= -2ax - 2bx + a^2 + b^2 + 2ab - 2ay - 2by$ $\Rightarrow -2ab + 2bx = -2bx + 2ab$ $\Rightarrow 4bx = 4ab$ $\Rightarrow x - a = 0$	3

17	<p>Point A(2, 5), B(+ 3, 4) and C(x, y) are collinear. \therefore Area = 0</p> $\Rightarrow \frac{1}{2} 2(4 - y) + 3(y - 5) + x(5 - 4) = 0$ $\Rightarrow 8 - 2y + 3y - 15 + 5x - 4x = 0$ $\Rightarrow y + x - 7 = 0$ $\Rightarrow x + y = 7$	3
18	 <p>Radius of hemispherical end any cylinder is 7 cm</p> $\therefore \text{Height of cylinder} = 97 - 7$ $= 90 \text{ cm}$ <p>Total Surface Area of the solid =</p> <p>curved Surface Area of cylinder + Curved Surface Area of hemisphere</p> $= 2\pi rh + 2\pi r^2$ $= 2\pi r(h + r)$ $= 2 \times \frac{22}{7} \times 7(90 + 7)$ $= 4268 \text{ cm}^2.$	3
19	<p>ABCD is a square with side 6 cm</p> $\text{Area of square} = (6)^2$ $= 36 \text{ cm}^2$	3

	<p>AC is diameter of circle</p> $AC = \sqrt{6^2 + 6^2}$ $= 6\sqrt{2} \text{ cm}$ <p>Area of circle = $\pi (3\sqrt{2})^2$</p> $= \frac{22}{7} \times 9 \times 2$ $= 56.57 \text{ cm}^2 (\approx)$ <p>Area of shaded region = $56.57 - 36$</p> $= 20.57 \text{ cm}^2 (\approx)$	
20	<p>Area of major sector = area of circle – area of sector</p> $= \pi r^2 \left(1 - \frac{\theta}{360}\right)$ $= \frac{22}{7} \times 28 \times 28 \left(1 - \frac{45}{360}\right)$ $= 22 \times 4 \times 28 \times \frac{7}{8} = 2156 \text{ cm}^2$ <p>OR</p> <p>area of circle = 2464 cm^2</p> <p>area of sector = 308 cm^2</p> <p>area of major sector = $2464 - 308 = 2156 \text{ cm}^2$</p>	3
	<p style="text-align: center;">1 * उत्तर / SECTION-D</p> <p>प्रश्न संख्या 21 से 31 में प्रत्येक के 4 अंक हैं।</p> <p>Question numbers 21 to 31 carry 4 marks each.</p>	
21	$a = 2, t_{20} = 59 = l$ $a + 19d = 59$ $d = 3$ $l_6 = l - (n - 1)d$ $= 59 - (6 - 1)(3)$ $= 44$ <p>\therefore 6th term from end = 44</p>	4

22	<p>Let ten's place digit be x</p> <p>Then unit's place digit is $\frac{16}{x}$</p> <p>\therefore Number = $10x + \frac{16}{x}$</p> <p>No. in the reverse order : $\frac{160}{x} + x$</p> <p>According to Question : $\left[10x + \frac{16}{x} \right] - 54 = \frac{160}{x} + x$</p> <p>$\Rightarrow 10x + \frac{16}{x} - \frac{160}{x} - x = 54$</p> <p>$\Rightarrow 9x - \frac{144}{x} - 54 = 0$</p> <p>$\Rightarrow 9x^2 - 54x - 144 = 0$</p> <p>$\Rightarrow x^2 - 6x - 16 = 0$</p> <p>$\Rightarrow x^2 - 8x + 2x - 16 = 0$</p> <p>$\Rightarrow x(x - 8) + 2(x - 8) = 0$</p> <p>$\Rightarrow (x + 2)(x - 8) = 0$</p> <p>$\Rightarrow x = -2, 8$</p> <p>[Rejected]</p> <p>$\therefore x = 8$</p> <p>\therefore The required number is : $10 \times 8 + \frac{16}{8} = 80 + 2$</p> <p style="text-align: center;">$= 82$</p>	4
23	$a_5 = a + (5 - 1) d = 22$	4

$$a + 4d = 22 \text{ _____ (1)}$$

$$a_{15} = a + (15 - 1)d = 62$$

$$a + 14d = 62 \text{ _____ (2)}$$

from (1) and (2)

$$a + 4d = 22$$

$$\frac{a + 14d = 62}{\cancel{10d} = \cancel{40}} \text{ or } d = 4$$

Substituting in equation (1)

$$a + 4 \times 4 = 22 \text{ or } a = 6$$

$$a_{100} = a + (100 - 1)d$$

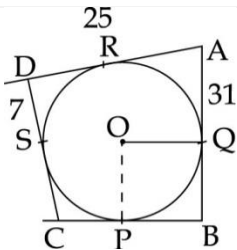
$$= 6 + 99 \times 4 = 402$$

$$S_{50} = \frac{50}{2} [12 + 49 \times 4]$$

$$= 25 \times 208$$

$$= 5200$$

24



Join OP and OQ

$OP \perp BC$ and $OQ \perp BQ$ (radius \perp tgt)

$$\angle B = 90^\circ$$

\therefore OPBQ is a square

Let radius be r

Then $BP = r$, $BQ = r$

Also $AQ = AR$, $DR = DS$ and $CS = CP$

(tgts from ext pt)

$$AR = AD - DR$$

$$= AD - DS$$

$$= 25 - 7 = 18$$

$$BQ = AB - AQ$$

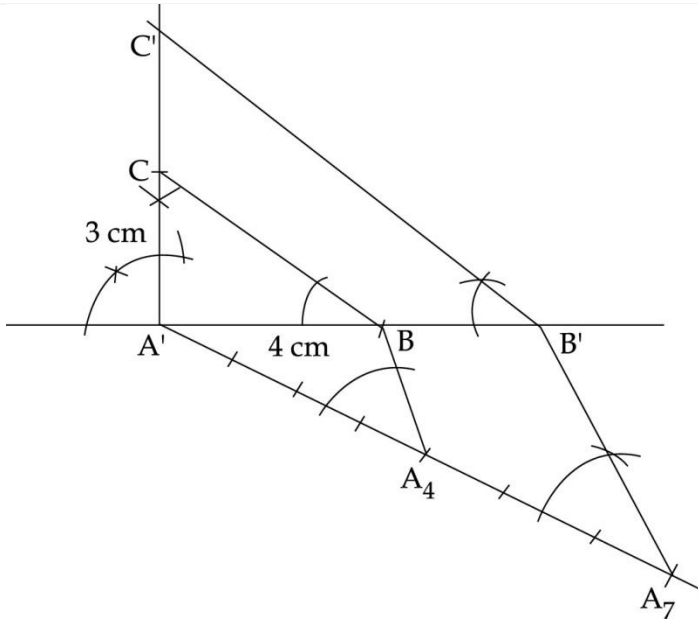
$$= AB - AR$$

$$= 31 - 18 = 13$$

4

∴ Radius = 13 cm

25



4

$1 \frac{3}{4}$ times = $\frac{7}{4}$ of correspond sides

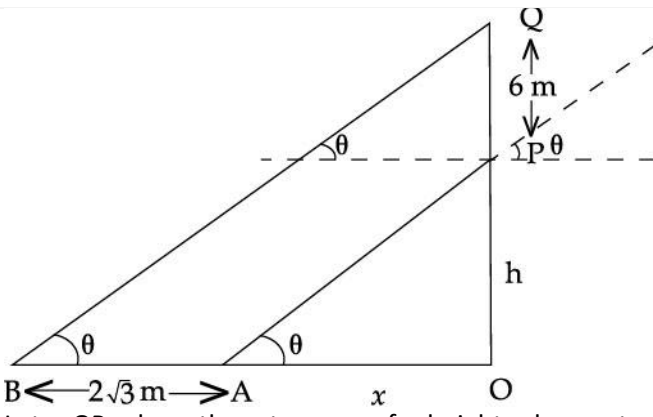
Marking B' on AB so that $\frac{AB'}{AB} = \frac{7}{4}$

Draw || line through B' to BC to get A'

Neatness

26

4



Let OP be the tower of height h metres and PQ be the flagstaff of height 6m.

Let the sun makes an angle θ with the ground. Let $OA = x$, and $AB = 2\sqrt{3}$ be the shadows of the tower and the flagstaff respectively.

In a $\triangle OAD$, $\frac{OP}{OA} = \tan\theta$
 $= \frac{h}{x} = \tan\theta$ ----- (i)

Also, In $\triangle OBQ$
 $\frac{OQ}{OB} = \tan\theta$
 $\Rightarrow \frac{h+6}{x+2\sqrt{3}} = \tan\theta$ ----- (ii)

From (i) and (ii)
 $\frac{h}{x} = \frac{h+6}{x+2\sqrt{3}}$
 $\Rightarrow hx + 2\sqrt{3}h = hx + 6x$
 $\Rightarrow 2\sqrt{3}h = 6x$
 $\Rightarrow \frac{h}{x} = \frac{6}{2\sqrt{3}} = \sqrt{3}$
 $\Rightarrow \tan\theta = \sqrt{3}$
 $\Rightarrow \theta = 60^\circ$

Hence, the angle that the sun makes with the ground is 60° .

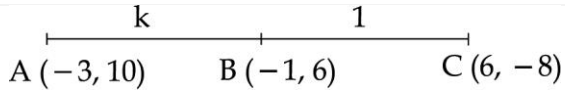
27

4

- (i) P (red ball or white ball)
 $= \frac{4}{15} + \frac{8}{15} = \frac{12}{15} = \frac{4}{5}$
- (ii) P (neither a red ball nor a white ball)
 $= 1 - P(\text{red ball or white})$

$$= 1 - \frac{4}{5} = \frac{1}{5}$$

28



Let the ratio $\frac{AB}{BC} = \frac{k}{1}$

then, using section formula, the x – coordinate of B given as,

$$-1 = \frac{6k - 3}{k + 1}$$

or, $6k - 3 = -k - 1$

or, $7k = 2$

or, $k = \frac{2}{7}$

Now, using distance formula,

$$AB = \sqrt{(-3+1)^2 + (10-6)^2} = \sqrt{4+16} = \sqrt{20} = 2\sqrt{5} \text{ ---- (1)}$$

$$BC = \sqrt{(-1-6)^2 + (6+8)^2} = \sqrt{49+196} = \sqrt{245} = 7\sqrt{5} \text{ ---- (2)}$$

$$AC = \sqrt{(-3-6)^2 + (10+8)^2} = \sqrt{81+324} = \sqrt{405} = 9\sqrt{5} \text{ ---- (3)}$$

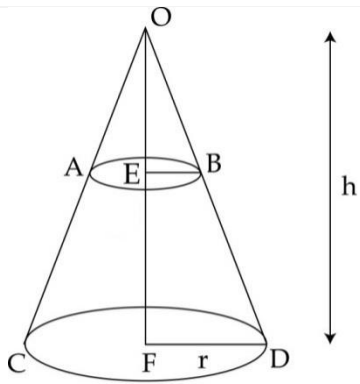
From (1), (2) and (3), we get

$$AB + BC = AC$$

and the ratio $AB:BC = 2:7$

4

29



Let r be the radius of the base and h be the height of the cone OCD

4

$$OE = \frac{h}{2}$$

$\triangle OEB \sim \triangle OFD$ by AA similarity

$$\therefore EB = \frac{r}{2}$$

$$\begin{aligned} \text{Volume of cone OAB} &= \frac{1}{3} \pi \left(\frac{r}{2}\right)^2 \frac{h}{2} \\ &= \frac{1}{24} \pi r^2 h \end{aligned}$$

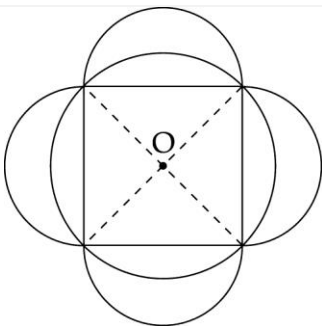
$$\text{Volume of cone OCD} = \frac{1}{3} \pi r^2 h$$

$$\begin{aligned} \text{Volume of frustum ABDC} &= \frac{1}{3} \pi r^2 h - \frac{1}{24} \pi r^2 h \\ &= \frac{7}{24} \pi r^2 h \end{aligned}$$

$$\frac{\text{Volume of cone OAB}}{\text{Volume of frustum ABDC}} = \frac{\frac{1}{24} \pi r^2 h}{\frac{7}{24} \pi r^2 h} = \frac{1}{7}$$

\therefore Volumes of two parts are in ratio 1 : 7

30



The diagonals of the square are diameters of the circle.

$$\begin{aligned} \text{The area of square} &= \frac{1}{2} \times (\text{length of the diagonal}) \\ &= \frac{1}{2} \times (10)^2 = 50\text{cm}^2 \end{aligned}$$

4

$$\text{Side of the square} = \sqrt{\text{Area}} = \sqrt{50} \text{ cm}$$

$$\text{Radius of the semicircle} = \frac{\sqrt{50}}{2} \text{ cm}$$

$$\begin{aligned} \text{Area of 4 semicircles} &= 4 \times \frac{1}{2} \times \pi \times r^2 \\ &= 4 \times \frac{1}{2} \times \frac{22}{7} \times \left(\frac{\sqrt{50}}{2}\right)^2 \\ &= 4 \times \frac{1}{2} \times \frac{22}{7} \times \frac{50}{4} \\ &= \frac{11 \times 50}{7} = 78.57 \text{ cm}^2 \end{aligned}$$

31

$$\begin{aligned} \text{Area of canvas} &= 2\pi rh + 2\pi r^2 = 2\pi r (r + h) \\ &= \frac{429}{7} = 61.25 \text{ m}^2 \end{aligned}$$

$$\text{Cost} = 350 \times \frac{429}{7} = 21450$$

Value : They Builed in them discipline, co-existance.
chapert 13 surface Areas and volumes

4

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