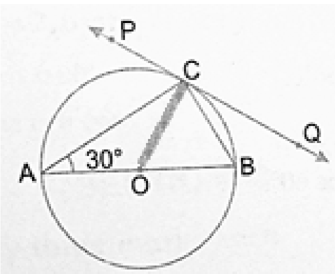
Marking Scheme

Class X, Session - 2021-22

TERM II

SET 2

Subject – Mathematics (Standard)

SECTION A		
Q No		**Marks**
1	a = 17 d = -5 $a_n = a + (n-1)\,d$ $-150 = 17 + (n-1)(-5)$ Solving and getting $n = 34\frac{2}{5}$ n is not a positive integer. ∴ -150 is not a term of an A.P OR a + 8d = 0 a = -8d $a_{29} = a + 28d$ $= 20d$ $a_{19} = a + 18d$ $= 10d$ ∴ $a_{29} = 2\,a_{19}$	½ ½ ½ ½ ½ ½ ½ ½
2	 Join OC In Δ OCA, we have OC = OA (Radii of a circle) ⇒ ∠OAC = ∠OCA (Angles opposite to equal sides of a Δ are equal) ⇒ ∠OAC = 30° ⇒ ∠OCA = 30° Now, OC ⊥ PQ ∠OCA + ∠PCA = 90° ⇒ ∠PCA = 60°	 1 1

<table>
<tr><td>3</td><td>Modal Class is 20 – 25, l = 20, h = 5, f_1 =20, f_0 = 7, f_2 = 8
Mode = $20 + \left[\frac{20-7}{40-7-8}\right] \times 5$
$= 20 + \frac{13}{25} \times 5$
= 22.6</td><td>½
½

1</td></tr>
<tr><td>4</td><td>$x^2 + k(2x + k - 1) = 0$
$x^2 + 2kx + k^2 - k = 0$
Since the roots are real and equal,
∴ $D = b^2 - 4ac = 0$
$(2k)^2 - 4(k^2 - k) = 0$
⇒ k = 0</td><td>1

1</td></tr>
<tr><td>5</td><td>Let a cm be the side of the cube.
Volume of cuboid = Volume of new cube
$100 \times 80 \times 64 = a^3$
a = 80 cm
Hence,
Surface area of the cube $= 6a^2$
$= 6 \times (80)^2$
$= 38400 \text{ cm}^2$</td><td>1
½

½</td></tr>
<tr><td>6</td><td>$x^2 - 2ax - (4b^2 - a^2) = 0$
$a = 1, b = -2a, c = -(4b^2 - a^2)$
$D = b^2 - 4ac$
$= 4a^2 + 4(4b^2 - a^2)$
$=16b^2 > 0$
$x = \frac{2a \pm \sqrt{16b^2}}{2}$
= a ± 2b
OR
Let Meena's actual marks be x.
$9(x + 10) = x^2$
⇒ $x^2 - 9x - 90 = 0$
⇒ $x^2 - 15x + 6x - 90 = 0$
⇒ $x(x - 15) + 6(x - 15) = 0$
⇒ x =15 or x = -6
Hence, her actual marks in Maths = 15 (rejecting x = -6)</td><td>½

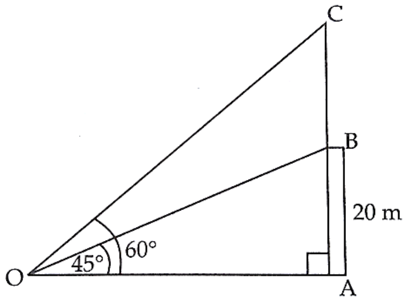
½

1

1

½
½</td></tr>
<tr><td colspan="3">SECTION B</td></tr>
<tr><td>Q No</td><td></td><td>Marks</td></tr>
<tr><td>7</td><td><table>
<tr><td>Class</td><td>x_i</td><td>Frequency</td><td>f_ix_i</td></tr>
<tr><td>0 – 20</td><td>10</td><td>17</td><td>170</td></tr>
<tr><td>20 – 40</td><td>30</td><td>p</td><td>30p</td></tr>
<tr><td>40 – 60</td><td>50</td><td>32</td><td>1600</td></tr>
<tr><td>60 – 80</td><td>70</td><td>24</td><td>1680</td></tr>
<tr><td>80 – 100</td><td>90</td><td>19</td><td>1710</td></tr>
<tr><td></td><td></td><td>92 + p</td><td>5160 + 30p</td></tr>
</table>
Mean $= \frac{\sum fixi}{\sum fi}$
$50 = \frac{5160+30p}{92+p}$
4600 + 50p = 5160 + 30p</td><td>$1\frac{1}{2}$

½</td></tr>
</table>

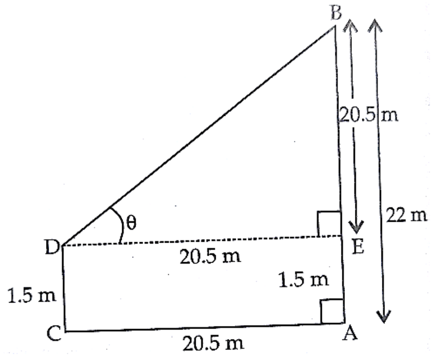
<table>
<tr><td></td><td>20p = 560
$p = \frac{560}{20}$
p = 28</td><td>1</td></tr>
<tr><td>8</td><td>
Let AB be the building and BC be the transmission tower and O be a point on the ground,
$\angle COA = 60°$ and $\angle BOA = 45°$

In right ΔOAB, $\frac{AB}{OA} = \tan 45°$
$\Rightarrow OA = AB = 20m$

In right ΔOAC, $\frac{AC}{OA} = \tan 60°$
$= \sqrt{3}$
$AC = 20\sqrt{3}m$

Height of the tower $= (20\sqrt{3} - 20)m$
$= 14.64$ m

OR


Let AB = 22m be the tower and CD = 1.5m be the observer
$\Rightarrow BE = BA - EA = BA - DC = 20.5m$
Also, $AC = ED = 20.5m$
In right ΔBED,
$\tan\theta = \frac{BE}{ED} = \frac{20.5}{20.5} = 1$
Or $\theta = 45°$
Hence, the angle of elevation is 45°.</td><td>1

1

½

½

1

1

½

½</td></tr>
</table>

9

1.Draw a circle of radius 4 cm — ½

2.Draw OA and construct

$\angle AOB = 120°$ — 1

3. Draw $\angle OAP = \angle OBP = 90°$

PA and PB are required tangents — 1

4. Measure of OP = 8 cm — ½

10

% Marks obtained	Number of students	Cumulative frequency (c.f.)
30 – 35	14	14
35 – 40	16	30
40 – 45	18	48
45 – 50	23	71
50 – 55	18	89
55 – 60	8	97
60 – 65	3	100

— 1

Median class is 45 – 50.

Here, $\frac{n}{2} = 50$, l = 45, f = 23, c.f. = 48, h = 5 — ½

Median = $l + \frac{\frac{n}{2} - c.f.}{f} \times h$

$= 45 + \frac{50-48}{23} \times 5$ — 1

$= 45.43$

Median = 45. 43 % Marks — ½

SECTION C

Q No		Marks

11

Let a and d be the first term and common difference of the AP a, a+d, a + 2d, …

$S_4 = 40 = 2(2a + 3d)$ — 1

$\Rightarrow 20 = 2a + 3d$

$S_{14} = 280 = 7(2a + 13d)$

$\Rightarrow 40 = 2a + 13d$ — 1

Solving we get

d = 2 — ½

a = 7 — ½

$S_n = \frac{n}{2}(14 + (n-1)2)$

$= n(n + 6)$ — 1

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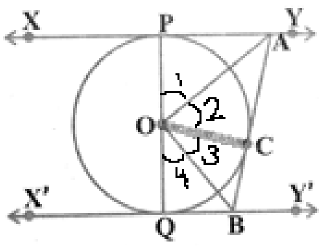
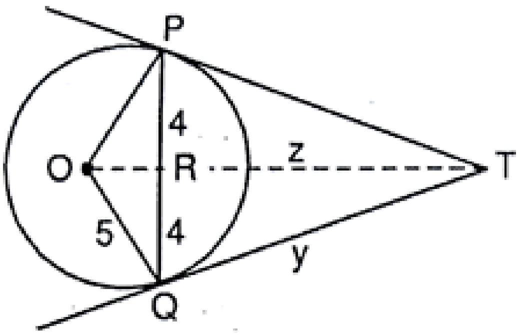
Construction : Join OC — ½

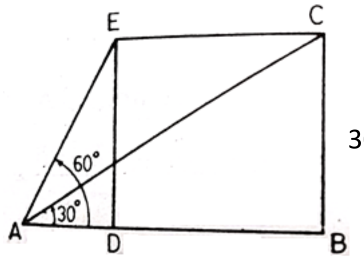


Proof : In fig, AP and AC are tangents to the circle from A

∴ AP = AC

OP = OC (Radii of the same circle)

	OA = OA (Common)	
	$\Rightarrow \Delta\, OPA \cong \Delta OCA$ (SSS cong. rule)	1
	$\therefore \angle 1 = \angle 2$	
	Similarly, $\angle 4 = \angle 3$	1
	But, $\angle 1 + \angle 2 + \angle 3 + \angle 4 = 180°$	½
	$\Rightarrow 2\angle 2 + 2\angle 3 = 180°$	
	$\Rightarrow \quad \angle 2 + \angle 3 = 90°$	
	Hence, $\angle AOB = 90°$	1
	OR	
		1
	Since tangent TP = TQ	
	$\therefore \Delta PTQ$ is isosceles and TO is the angle bisector of ∠PTQ	
	$\therefore$ OT ⊥ PQ	
	$\therefore$ OT bisects PQ i.e. PR = QR = 4cm.	
	Let PT = QT = y and OT = z OR = $\sqrt{25 - 16}$ = 3cm Δ PRT ≅ Δ QRT ∠PRT = ∠QRT = 90°	½
	Hence, $y^2 = (3 + z)^2 - 25$………(1) And $y^2 = 16 + z^2$ ……………(2)	1 ½
	Using equations (1) and (2) $(3 + z)^2 - 25 = 16 + z^2$ $\Rightarrow z = \frac{16}{3}$ And $y = \frac{20}{3}$ Or length of tangent = $\frac{20}{3}\ cm$	1

13	(i)  $3000\sqrt{3}m$ In right Δ ADE, $\frac{DE}{AD} = \tan 60°$ $\Rightarrow \frac{3000\sqrt{3}}{AD} = \sqrt{3}$ ⇒ AD = 3000 m In right Δ ABC, $\frac{BC}{AB} = \tan 30°$ $\Rightarrow \frac{3000\sqrt{3}}{AB} = \frac{1}{\sqrt{3}}$ ⇒ AB = 9000 m $\therefore$ Distance travelled by a plane in 30 sec = 6000 m (ii) Speed $= \frac{Distance}{Time}$ $= \frac{6000}{30}$ $= 200$ m/sec $= \frac{200 \times 60 \times 60}{1000}$ $= 720$ km/hr	1 ½ ½ 1 1
14	(i) The volume of cylindrical cup = $\pi r^2 h$ $= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 10.5$ = 404.25 cm^3 The volume of hemispherical cup = $\frac{2}{3} \pi r^3$ $= \frac{2}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{7}{2}$ = 89.83 cm^3 Cylindrical container has more juice. (ii) Actual area used to make conical tent = 551 – 1 = 550 m^2	½ 1 ½ ½

	$\pi rl = 550$ $l = \frac{550}{\pi r}$ $= \frac{550 \times 7}{22 \times 7}$ $= 25$ m $h^2 = l^2 - r^2$ $= (25)^2 - (7)^2$ $h = \sqrt{625 - 49}$ $= \sqrt{576}$ $= 24$m Height of the conical tent = 24m.	1 ½