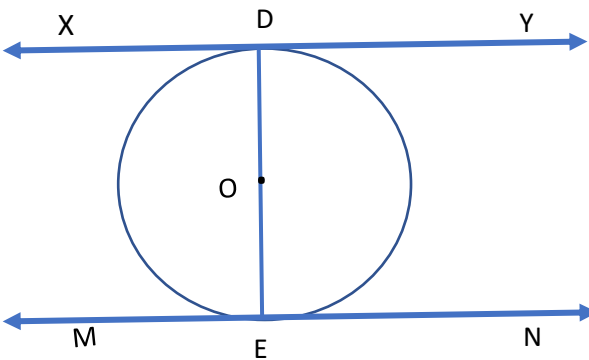
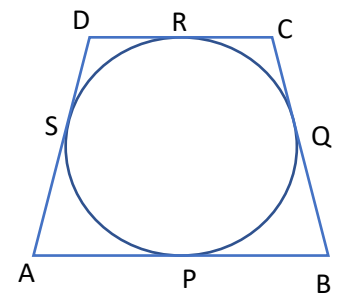
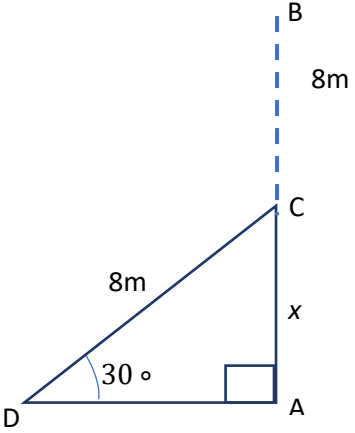
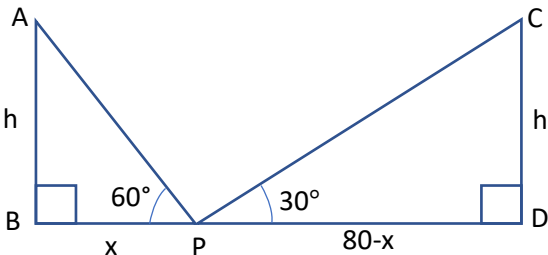


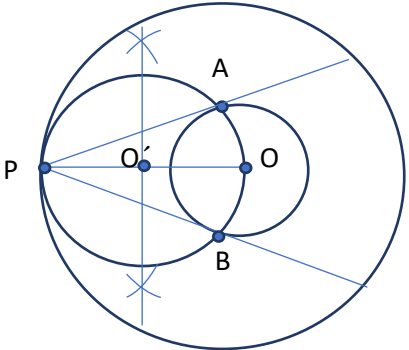
**Marking Scheme**  
**Mathematics –Basic(241)**  
**Class- X Session- 2021-22**  
**TERM II**

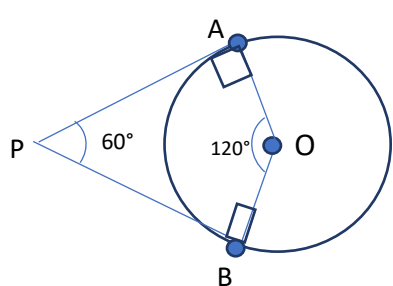
Q.N.	HINTS/SOLUTION	Marks																		
1	$3x^2 - 7x - 6 = 0$ $\Rightarrow 3x^2 - 9x + 2x - 6 = 0$ $\Rightarrow 3x(x - 3) + 2(x - 3) = 0$ $\Rightarrow (x - 3)(3x + 2) = 0$ $\therefore x = 3, -\frac{2}{3}$  <p style="text-align: center;"><b>OR</b></p> Since the roots are real and equal, $\therefore D = b^2 - 4ac = 0$ $\Rightarrow k^2 - 4 \times 3 \times 3 = 0$ ( $\because a = 3, b = k, c = 3$ ) $\Rightarrow k^2 = 36$ $\Rightarrow k = 6 \text{ or } -6$	1/2   1/2  1   1  1/2 + 1/2																		
2	Let $l$ be the side of the cube and L, B, H be the dimensions of the cuboid Since $l^3 = 64 \text{ cm}^3 \therefore l = 4 \text{ cm}$ Total surface area of cuboid is $2[LB + BH + HL]$ , Where L=12, B=4 and H=4 $= 2(12 \times 4 + 4 \times 4 + 4 \times 12) \text{ cm}^2 = 224 \text{ cm}^2$	1/2   1/2 1																		
3	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 30%;">Runs scored</th> <th style="width: 30%;">Frequency</th> <th style="width: 40%;">Cumulative Frequency</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-20</td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">20-40</td> <td style="text-align: center;">6</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">40-60</td> <td style="text-align: center;">5</td> <td style="text-align: center;">15</td> </tr> <tr> <td style="text-align: center;">60-80</td> <td style="text-align: center;">3</td> <td style="text-align: center;">18</td> </tr> <tr> <td style="text-align: center;">80-100</td> <td style="text-align: center;">4</td> <td style="text-align: center;">22</td> </tr> </tbody> </table> <p style="text-align: center;">Total frequency (N) = 22  <math>\frac{N}{2} = 11</math>; So 40-60 is the median class.</p> <p style="text-align: center;">Median = <math>l + \frac{(\frac{N}{2}) - cf}{f} \times h</math>  <math>= 40 + \frac{11 - 10}{5} \times 20</math>  <math>= 44 \text{ runs}</math></p>	Runs scored	Frequency	Cumulative Frequency	0-20	4	4	20-40	6	10	40-60	5	15	60-80	3	18	80-100	4	22	1/2      1/2   1/2  1/2
Runs scored	Frequency	Cumulative Frequency																		
0-20	4	4																		
20-40	6	10																		
40-60	5	15																		
60-80	3	18																		
80-100	4	22																		
4	The common difference is $9 - 4 = 5$ If the first term is 6 and common difference is 5, then new AP is, $6, 6+5, 6+10 \dots$ $= 6, 11, 16, \dots$	1   1																		
5	$\therefore$ Mode = 38. $\therefore$ The modal class is 30-40.  Mode = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$	1/2   1/2																		

	$= 30 + \frac{16-12}{32-12-x} \times 10 = 38$ $\frac{4}{20-x} \times 10 = 8$ $8(20-x) = 40$ $20-x = 5$ $x = 15$	<p>1/2</p> <p>1/2</p>
<p>6</p>	 <p>∴ XY is the tangent to the circle at the point D          ∴ <math>OD \perp XY \Rightarrow \angle ODX = 90^\circ \Rightarrow \angle EDX = 90^\circ</math>          Also, MN is the tangent to the circle at E          ∴ <math>OE \perp MN \Rightarrow \angle OEN = 90^\circ \Rightarrow \angle DEN = 90^\circ</math>  <math>\Rightarrow \angle EDX = \angle DEN</math> (each <math>90^\circ</math>).          which are alternate interior angles.          ∴ <math>XY \parallel MN</math></p> <p style="text-align: center;"><b>OR</b></p> <p>∴ Tangent segments drawn from an external point to a circle are equal          ∴ <math>BP = BQ</math>  <math>CR = CQ</math>  <math>DR = DS</math>  <math>AP = AS</math></p>  <p><math>\Rightarrow BP + CR + DR + AP = BQ + CQ + DS + AS</math>  <math>\Rightarrow AB + DC = BC + AD</math>          ∴ <math>AD = 10 - 7 = 3</math> cm</p>	<p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p> <p>1</p>
<b>Section-B</b>		

<p>7</p>	<p>First Term of the AP(<math>a</math>) = 5 Common difference (<math>d</math>) = <math>8-5=3</math></p> <p>Last term = <math>a_{40} = a+(40-1) d</math> <math>= 5 + 39 \times 3 = 122</math></p> <p>Also <math>a_{31} = a + 30d = 5 + 30 \times 3 = 95</math></p> <p>Sum of last 10 terms = <math>\frac{n}{2}(a_{31} + a_{40})</math> <math>= \frac{10}{2}(95 + 122)</math> <math>= 5 \times 217 = 1085</math></p>	<p>1</p> <p>1</p> <p>1</p>
<p>8</p>	<p>Let, AB be the tree broken at C, Also let <math>AC = x</math></p> <p>In <math>\Delta CAD</math>, <math>\sin 30^\circ = \frac{AC}{DC}</math> <math>\Rightarrow \frac{1}{2} = \frac{x}{8}</math> <math>\Rightarrow x = 4 \text{ m}</math> <math>\Rightarrow</math> the length of the tree is = <math>8+4 = 12\text{m}</math></p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>OR</b></p> <p>Let AB and CD be two poles of height <math>h</math> meters also let P be a point between them on the road which is <math>x</math> meters away from foot of first pole AB, <math>PD = (80-x)</math> meters.</p> <p>In <math>\Delta ABP</math>, <math>\tan 60^\circ = \frac{h}{x} \Rightarrow h = x\sqrt{3}</math> ....(1)</p> <p>In <math>\Delta CDP</math>, <math>\tan 30^\circ = \frac{h}{80-x} \Rightarrow h = \frac{80-x}{\sqrt{3}}</math> ....(2)</p> <p><math>x\sqrt{3} = \frac{80-x}{\sqrt{3}}</math> [<math>\because</math> LHS(1) = LHS(2), so equating RHS] <math>\Rightarrow 3x = 80 - x \Rightarrow 4x = 80 \Rightarrow x = 20\text{m}</math> So, <math>80 - x = 80 - 20 = 60\text{m}</math> Hence the point is 20m from one pole and 60 meters from the other pole.</p> <div style="text-align: center;">  </div>	<p>1</p> <p>1/2</p> <p>1/2</p> <p>1(correct Fig.)</p> <p>1</p> <p>1/2</p> <p>1/2</p> <p>1(correct Fig.)</p>

9	<p>PA = PB (Tangent segments drawn to a circle from an external point are equal)</p> <p><math>\therefore</math> In <math>\triangle APB</math>, <math>\angle PAB = \angle PBA</math>          Also, <math>\angle APB = 60^\circ</math>          In <math>\triangle APB</math>, sum of three angles is <math>180^\circ</math>.</p> <p>Therefore, <math>\angle PAB + \angle PBA = 180^\circ - \angle APB = 180^\circ - 60^\circ = 120^\circ</math>.  <math>\therefore \angle PAB = \angle PBA = 60^\circ</math> (<math>\because \angle PAB = \angle PBA</math>)  <math>\therefore \triangle APB</math> is an equilateral triangle.          So, <math>AB = 6\text{cm}</math></p>	<p>1</p> <p>1</p> <p>1</p>
10	<p>Let the three consecutive multiples of 5 be <math>5x</math>, <math>5x+5</math>, <math>5x+10</math>.          Their squares are <math>(5x)^2</math>, <math>(5x + 5)^2</math> and <math>(5x + 10)^2</math>.  <math display="block">(5x)^2 + (5x + 5)^2 + (5x + 10)^2 = 725</math> <math display="block">\Rightarrow 25x^2 + 25x^2 + 50x + 25 + 25x^2 + 100x + 100 = 725</math> <math display="block">\Rightarrow 75x^2 + 150x - 600 = 0</math> <math display="block">\Rightarrow x^2 + 2x - 8 = 0</math> <math display="block">\Rightarrow (x + 4)(x - 2) = 0</math> <math display="block">\Rightarrow x = -4, 2</math> <math display="block">\Rightarrow x = 2 \text{ (ignoring -ve value)}</math>         So the numbers are 10, 15 and 20</p>	<p>1</p> <p>1</p> <p>1</p>
<b>Section-C</b>		

11	 <p>Draw two concentric circles with center O and radii 3cm and 7cm respectively.          Join OP and bisect it at <math>O'</math>, so <math>PO' = O'O</math>          Construct circle with center <math>O'</math> and radius <math>O'O</math>          Join PA and PB</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
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OR

Draw a circle of radius 6cm

Draw OA and Construct  $\angle AOB = 120^\circ$

Draw  $\angle OAP = \angle OBP = 90^\circ$

PA and PB are required tangents

Join OP and apply  $\tan \angle APO = \tan 30^\circ = \frac{6}{PA}$

$\Rightarrow$  Length of tangent =  $6\sqrt{3}$  cm

1  
1  
1  
1

12

Converting the cumulative frequency table into exclusive classes, we get:

Age	No of passengers( $f_i$ )	$x_i$	$f_i x_i$
0-10	14	5	70
10-20	30	15	450
20-30	38	25	950
30-40	52	35	1820
40-50	50	45	2250
50-60	61	55	3355
60-70	42	65	2730
70-80	13	75	975
	$\Sigma f_i = 300$		$\Sigma f_i x_i = 12600$

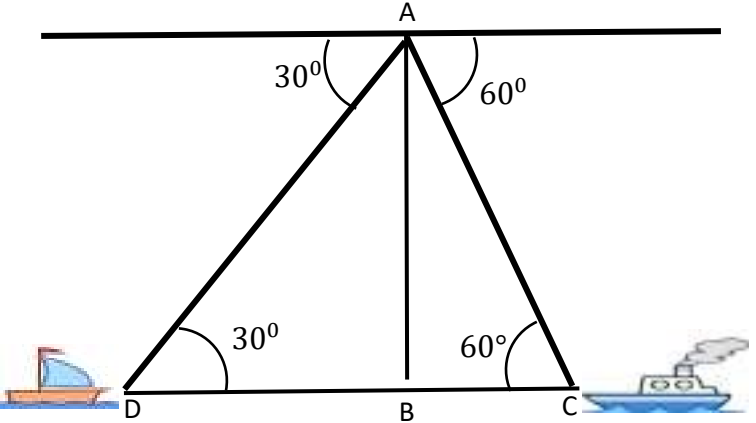
$$\text{Mean age} = \bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{12600}{300}$$

$$\bar{x} = 42$$

2

1

1

<p>13 (i)</p>	<p>The ship is nearer to the lighthouse as its angle of depression is greater.</p> <p>In <math>\Delta ACB</math>, <math>\tan 60^\circ = \frac{AB}{BC}</math></p> $\Rightarrow \sqrt{3} = \frac{40}{BC}$ $\therefore BC = \frac{40}{\sqrt{3}} = \frac{40\sqrt{3}}{3} m$ 	<p>1</p> <p>1</p>
<p>(ii)</p>	<p>In <math>\Delta ADB</math>, <math>\tan 30^\circ = \frac{AB}{BD}</math></p> $\Rightarrow \frac{1}{\sqrt{3}} = \frac{40}{DB}$ $\therefore DB = 40\sqrt{3}m$ <p>Time taken to cover this distance = <math>\left(\frac{60}{2000} \times 40\sqrt{3}\right)</math> minutes</p> $= \frac{60\sqrt{3}}{100} = 2.076 \text{ minutes}$	<p>1</p> <p>1</p>
<p>14 (i)</p>	<p>Let <math>r_1</math> and <math>r_2</math> be respectively the radii of apples and oranges</p> $\therefore 2r_1 : 2r_2 = 2 : 3 \Rightarrow r_1 : r_2 = 2 : 3$ $4\pi r_1^2 : 4\pi r_2^2 = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{2}{3}\right)^2 = 4 : 9$	<p>1/2</p> <p><math>1\frac{1}{2}</math></p>
<p>(ii)</p>	<p>Let the height of the drum be h.</p> <p>Volume of the drum = volume of the cylinder + volume of the sphere</p> $\pi 3^2 h = (\pi 3^2 \times 8 + \frac{4}{3} \pi 3^3) \text{ cm}^3$ $\Rightarrow h = (8 + 4) \text{ cm}$ $\Rightarrow h = 12 \text{ cm}$	<p>1</p> <p>1</p>