

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;">OR</p> Since the roots are real and equal, $\therefore D = b^2 - 4ac = 0$ $\Rightarrow k^2 - 4 \times 3 \times 3 = 0$ ($\because a = 3, b = k, c = 3$) $\Rightarrow k^2 = 36$ $\Rightarrow k = 6$ 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;"> <thead> <tr> <th style="text-align: center;">Runs scored</th> <th style="text-align: center;">Frequency</th> <th style="text-align: center;">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 $\frac{N}{2} = 11$; So 40-60 is the median class.</p> $\text{Median} = l + \frac{\left(\frac{N}{2}\right) - cf}{f} \times h$ $= 40 + \frac{11 - 10}{5} \times 20$ $= 44 \text{ runs}$	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. $\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$	1/2 1/2																		

$$= 30 + \frac{16-12}{32-12-x} \times 10 = 38$$

$$\frac{4}{20-x} \times 10 = 8$$

$$8(20-x) = 40$$

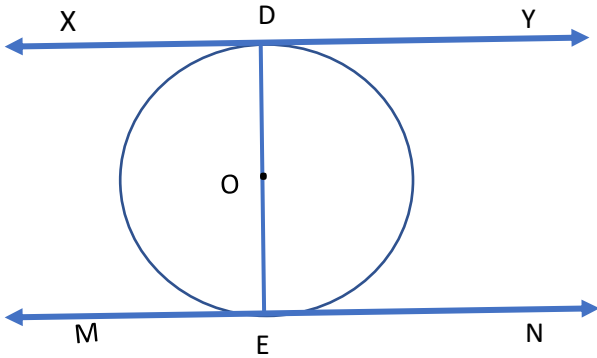
$$20-x = 5$$

$$x = 15$$

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6



∴ XY is the tangent to the circle at the point D

∴ $OD \perp XY \Rightarrow \angle ODX = 90^\circ \Rightarrow \angle EDX = 90^\circ$

Also, MN is the tangent to the circle at E

∴ $OE \perp MN \Rightarrow \angle OEN = 90^\circ \Rightarrow \angle DEN = 90^\circ$

$\Rightarrow \angle EDX = \angle DEN$ (each 90°).

which are alternate interior angles.

∴ $XY \parallel MN$

OR

∴ Tangent segments drawn from an external point to a circle are equal

∴ $BP = BQ$

$CR = CQ$

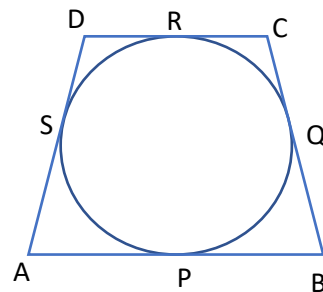
$DR = DS$

$AP = AS$

$\Rightarrow BP + CR + DR + AP = BQ + CQ + DS + AS$

$\Rightarrow AB + DC = BC + AD$

∴ $AD = 10 - 7 = 3$ cm



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Section-B

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First Term of the AP(a) = 5
Common difference (d) = 8-5=3

Last term = $a_{40} = a+(40-1) d$
 $= 5 + 39 \times 3 = 122$

Also $a_{31} = a + 30d = 5 + 30 \times 3 = 95$

Sum of last 10 terms = $\frac{n}{2}(a_{31} + a_{40})$
 $= \frac{10}{2}(95 + 122)$
 $= 5 \times 217 = 1085$

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Let, AB be the tree broken at C,

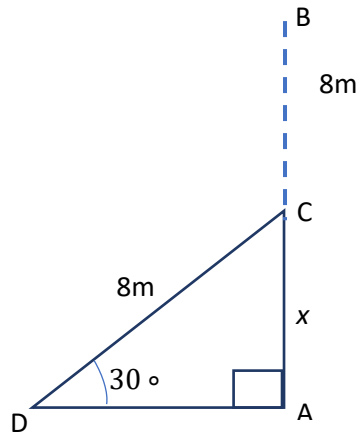
Also let $AC = x$

In ΔCAD , $\sin 30^\circ = \frac{AC}{DC}$

$\Rightarrow \frac{1}{2} = \frac{x}{8}$

$\Rightarrow x = 4 \text{ m}$

\Rightarrow the length of the tree is = $8+4 = 12\text{m}$



OR

Let AB and CD be two poles of height h meters also let P be a point between them on the road which is x meters away from foot of first pole AB, PD= (80-x) meters.

In ΔABP , $\tan 60^\circ = \frac{h}{x} \Rightarrow h = x\sqrt{3}$ (1)

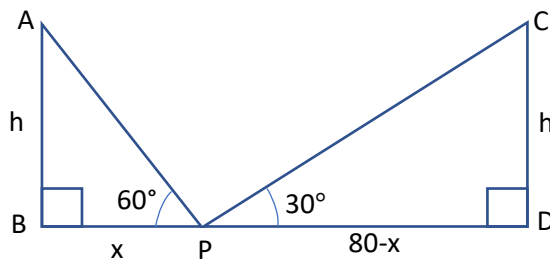
In ΔCDP , $\tan 30^\circ = \frac{h}{80-x} \Rightarrow h = \frac{80-x}{\sqrt{3}}$ (2)

$x\sqrt{3} = \frac{80-x}{\sqrt{3}}$ [\because LHS(1) = LHS(2), so equating RHS]

$\Rightarrow 3x = 80 - x \Rightarrow 4x = 80 \Rightarrow x = 20\text{m}$

So, $80 - x = 80 - 20 = 60\text{m}$

Hence the point is 20m from one pole and 60 meters from the other pole.



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1(correct Fig.)

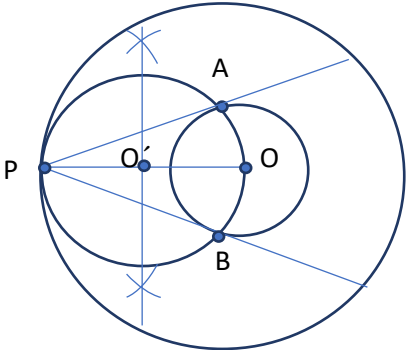
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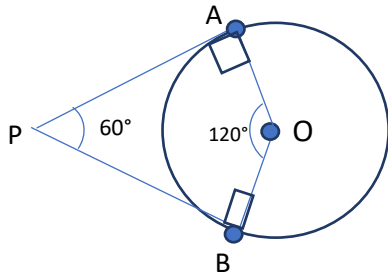
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1(correct Fig.)

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

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

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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
	$\Sigma f_i = 300$		$\Sigma f_i x_i = 12600$

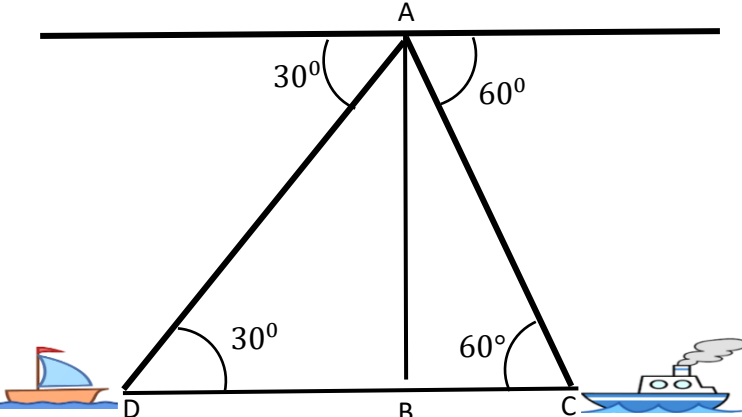
Mean age = $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{12600}{300}$

$\bar{x} = 42$

2

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<p>13 (i)</p>	<p>The ship is nearer to the island than the angle of depression is greater</p> <p>In ΔACB, $\tan 60^\circ = \frac{AB}{BC}$</p> <p>$\Rightarrow \sqrt{3} = \frac{40}{BC}$</p> <p>$\therefore BC = \frac{40}{\sqrt{3}} = \frac{40\sqrt{3}}{3}m$</p> 	<p>1</p> <p>1</p>
<p>(ii)</p>	<p>In ΔADB, $\tan 30^\circ = \frac{AB}{BD}$</p> <p>$\Rightarrow \frac{1}{\sqrt{3}} = \frac{40}{DB}$</p> <p>$\therefore DB = 40\sqrt{3}m$</p> <p>Time taken to cover this distance = $(\frac{60}{2000} \times 40\sqrt{3})$ minutes</p> <p>$= \frac{60\sqrt{3}}{100} = 2.076$ minutes</p>	<p>1</p> <p>1</p>
<p>14 (i)</p>	<p>Let r_1 and r_2 be respectively the radii of apples and oranges</p> <p>$\therefore 2r_1:2r_2 = 2:3 \Rightarrow r_1:r_2 = 2:3$</p> <p>$4\pi r_1^2:4\pi r_2^2 = (\frac{r_1}{r_2})^2 = (\frac{2}{3})^2 = 4:9$</p>	<p>1/2</p> <p>$1\frac{1}{2}$</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> <p>$\pi 3^2 h = (\pi 3^2 \times 8 + \frac{4}{3} \pi 3^3) cm^3$</p> <p>$\Rightarrow h = (8 + 4)cm$</p> <p>$\Rightarrow h = 12cm$</p>	<p>1</p> <p>1</p>

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