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

Q.N.	HINTS/SOLUTION	Marks
1	$3x^2 - 7x - 6 = 0$ $\Rightarrow 3x^2 - 9x + 2x - 6 = 0$ $\Rightarrow 3x(x - 3) + 2(x - 3) = 0$ $\Rightarrow (x - 3)(3x + 2) = 0$ $\because x = 3, -\dfrac{2}{3}$ **OR** 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 $l^3 = 64 \ cm^3 \therefore l = 4 \ cm$ Total surface area of cuboid is $2[LB + BH + HL]$, Where L=12, B=4 and H=4 $= 2(12 \times 4 + 4 \times 4 + 4 \times 12) \ cm^2 = 224 cm^2$	1/2 1/2 1
3	<table><tr><td>Runs scored</td><td>Frequency</td><td>Cumulative Frequency</td></tr><tr><td>0-20</td><td>4</td><td>4</td></tr><tr><td>20-40</td><td>6</td><td>10</td></tr><tr><td>40-60</td><td>5</td><td>15</td></tr><tr><td>60-80</td><td>3</td><td>18</td></tr><tr><td>80-100</td><td>4</td><td>22</td></tr></table> Total frequency (N) = 22 $\frac{N}{2}$ = 11; So 40-60 is the median class. Median = $l + \dfrac{\left(\frac{N}{2}\right) - cf}{f} \times h$ $= 40 + \dfrac{11 - 10}{5} \times 20$ $= 44$ runs	1/2 1/2 1/2 1/2
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… =6,11,16….	1 1
5	$\because$ Mode = 38. $\therefore$ The modal class is 30-40. Mode = $l + \dfrac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$	1/2 1/2

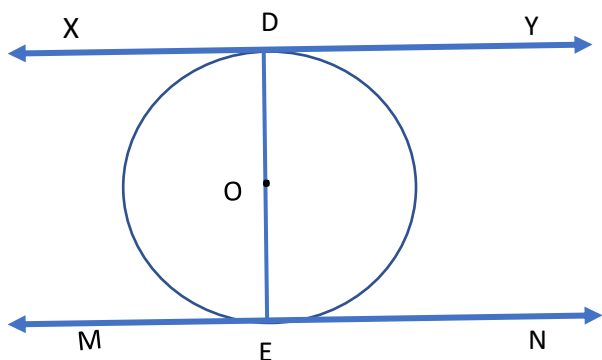$$=30 + \frac{16-12}{32-12-x} \times 10 = 38$$

1/2

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

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

$$20-x = 5$$

$$X = 15$$

1/2

6

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

∴ OD $\perp$ XY $\Rightarrow \angle$ ODX $= 90^0 \Rightarrow \angle$ EDX $= 90^0$
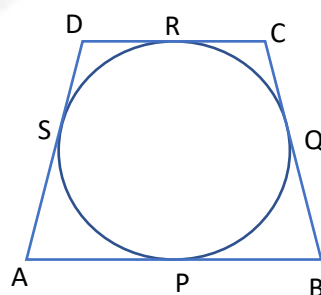
Also, MN is the tangent to the circle at E

∴ OE $\perp$ MN $\Rightarrow \angle$ OEN $= 90^0 \Rightarrow \angle$ DEN $= 90^0$

$\Rightarrow \angle$ EDX $= \angle$ DEN (*each* 90^0).

which are alternate interior angles.

∴ XY $\parallel$ MN

1/2

1/2

1

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

1

$\Rightarrow$ AB+DC = BC+AD
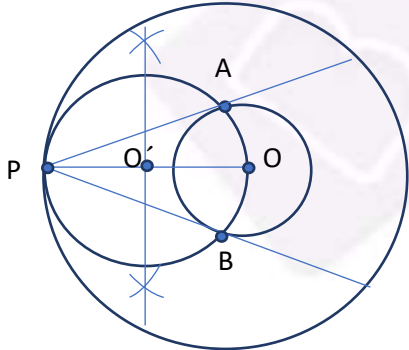
∴ AD= 10-7= 3 cm

1

Section-B

7	First Term of the AP(a) = 5 Common difference (d) = 8-5=3 Last term = a_{40} = a+(40-1) d $\qquad = 5 + 39 \times 3 = 122$ Also $a_{31} = a + 30d = 5 + 30 \times 3 = 95$ Sum of last 10 terms = $\frac{n}{2}(a_{31} + a_{40})$ $\qquad = \frac{10}{2}(95 + 122)$ $\qquad = 5 \times 217 = 1085$	 1 1 1
8	Let, AB be the tree broken at C, Also let $AC = x$ In Δ CAD, $\sin30^0 = \frac{AC}{DC}$ $\Rightarrow \frac{1}{2} = \frac{x}{8}$ $\Rightarrow x = 4\ m$ $\Rightarrow$the length of the tree is = 8+4 =12m	1 1/2 1/2 1(correct Fig.)

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, $tan60^o = \frac{h}{x} \Rightarrow h = x\sqrt{3}$ .....(1)

In ΔCDP, $tan\ 30^o = \frac{h}{80-x} \Rightarrow h = \frac{80-x}{\sqrt{3}}$ .....(2)
$x\sqrt{3} = \frac{80-x}{\sqrt{3}}$ $[\because LHS(1) = LHS(2), so\ equating\ RHS]$
$\Rightarrow 3x = 80 - x \Rightarrow 4x = 80 \Rightarrow x = 20m$
So, $80 - x = 80 - 20 = 60m$
Hence the point is 20m from one pole and 60 meters from the other pole. |

1

1/2

1/2

1(correct Fig.) |

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

| 11 |

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 | 1
1
1
1 |
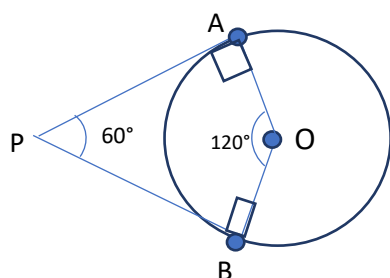
OR

Draw a circle of radius 6cm

Draw OA and Construct $\angle AOB = 120^0$

Draw $\angle OAP = \angle OBP = 90^0$

PA and PB are required tangents

Join OP and apply $\tan\angle APO = \tan 30° = \dfrac{6}{PA}$

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

2
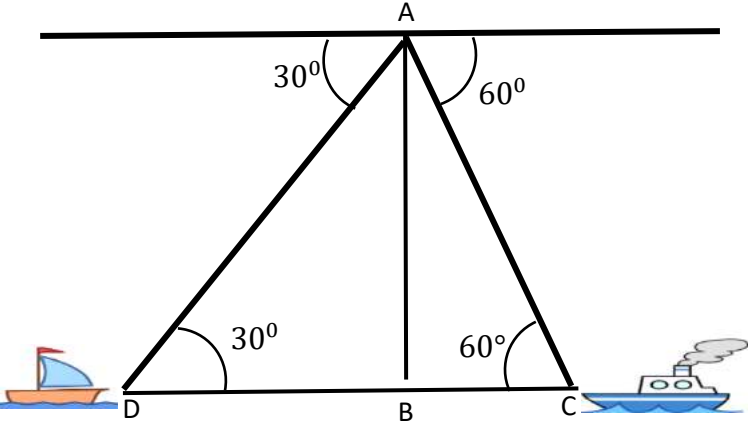
Mean age = $\bar{x} = \dfrac{\Sigma f_i x_i}{\Sigma f_i} = \dfrac{12600}{300}$

1

$\bar{x} = 42$

1

13 (i)	The ship is nearer to the lighthouse as its angle of depression is greater.	
	In Δ ACB, tan $60^0 = \frac{AB}{BC}$	1
	$\Rightarrow \sqrt{3} = \frac{40}{BC}$	
	$\therefore$ BC $= \frac{40}{\sqrt{3}} = \frac{40\sqrt{3}}{3}m$	1

(ii)	In Δ ADB, tan $30^0 = \frac{AB}{BD}$	
	$\Rightarrow \frac{1}{\sqrt{3}} = \frac{40}{DB}$	
	$\therefore$ DB $= 40\sqrt{3}m$	1
	Time taken to cover this distance = $(\frac{60}{2000} \times 40\sqrt{3})$ minutes	
	$\quad\quad\quad\quad\quad\quad\quad\quad\quad = \frac{60\sqrt{3}}{100} = 2.076$ minutes	1

14 (i)	Let r_1 and r_2 be respectively the radii of apples and oranges	
	$\because 2r_1 : 2r_2 = 2:3 \Rightarrow r_1 : r_2 = 2:3$	1/2
	$4\pi r_1^2 : 4\pi r_2^2 = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{2}{3}\right)^2 = 4:9$	$1\frac{1}{2}$
(ii)	Let the height of the drum be h.	
	Volume of the drum = volume of the cylinder + volume of the sphere	
	$\quad\quad \pi 3^2 h = (\pi 3^2 \times 8 + \frac{4}{3}\pi 3^3)\ cm^3$	1
	$\quad\quad\quad \Rightarrow h = (8+4)cm$	
	$\quad\quad\quad \Rightarrow h = 12cm$	1