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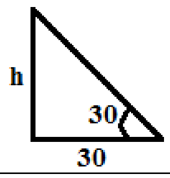
CBSE Class 10 Maths (Standard) Question Paper Solution 2020 Set 1

CLASS: X

MATHEMATICS STANDARD SOLVED

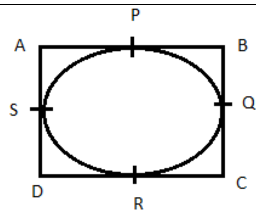
SET 1 (CODE: 30/5/1) SERIES: JBB/5

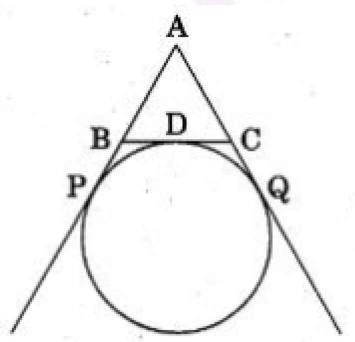
Q. NO	SOLUTION	MARKS
	SECTION – A	
1.	(B) $x^3 - 4x + 3$	1
2.	(A) $AB^2 = 2AC^2$	1
3.	(D) (3, 0) OR (C) $\left(0, \frac{7}{2}\right)$	1
4.	(B) ± 4	1
5.	(C) $\frac{4}{3}, \frac{7}{3}, \frac{9}{3}, \frac{12}{3}$.....,	1
6.	(B) InConstistent	1
7.	(A) 50°	1
8.	(C) $3^{2/3}$	1
9.	(C) $2\sqrt{m^2 + n^2}$	1
10.	(B) 4cm	1
11.	1	1

12.	$\tan^2 A$	1
13.	5 units	1
14.	$u_i = \frac{x_i - a}{h}$, x_i – class mark a – Assumed mean h – Class size	1
15.	Similar	1
16.	$S_n = \frac{n(n+1)}{2}$ $S_{100} = \frac{100\times 101}{2} = 5050$	½ ½
17.	$\tan 30 = \frac{1}{\sqrt{3}} = \frac{h}{30}$ $h = \frac{30}{\sqrt{3}} = \frac{30\times\sqrt{3}}{3} = 10\sqrt{3}m$  	½ ½
18.	LCM × HCF = Product 182 × 13 = 2 6 × x $x = \frac{182\times\cancel{13}}{\cancel{26}\,2}$	½

	x = 91 Other number = 91	½
19.	K[x^2 + 3x + 2]	1
	(OR) **No.** $x^2 - 1$ can't be the remainder because degree of the remainder should be less than the degree of the divisor.	1
20.	$\frac{2\tan 45^\circ \times \cos 60^\circ}{\sin 30^\circ} = 2$ tan 45=1, cos 60 = ½ , sin 30= ½ . For correct values, ½ mark will be given	½ + ½
SECTION – B		
21.	Given DE || AC $BPT \Rightarrow \frac{BE}{EC} = \frac{BD}{AD}$ ......1 $and, DF \parallel AC$ $By\ BPT \Rightarrow \frac{BF}{FE} = \frac{BD}{AD}$ ......2 $From\ 1\ and\ 2$ $\frac{BE}{EC} = \frac{BF}{FE}$	½ ½ 1

	Hence proved.	
22.	Let $5+2\sqrt{7}$ be rational. So $5+2\sqrt{7}=\frac{a}{b}$, *where 'a' and 'b' are integers and* $b \neq 0$ $2\sqrt{7}=\frac{a}{b}-5$ $2\sqrt{7}=\frac{a-5b}{5}$ $\sqrt{7}=\frac{a-5b}{2b}$ Since 'a' and 'b' are integers a – 5b is also an integer. $\frac{a-5b}{2b}$ is rational. So RHS is rational. LHS should be rational. but it is given that $\sqrt{7}$ is irrational .Our assumption is wrong. So $5+2\sqrt{7}$ is an irrational number. **OR** $12^n = (2 \times 2 \times 3)^n$ If a number has to and with digit 0. It should have prime factors 2 and 5. By fundamental theorem of arithmetic, $12^n = (2 \times 2 \times 3)^n$	½ ½ 1 1

	It doesn't have 5 as prime factor. So 12^n cannot end with digit 0.	1
23.	Given A, B and C are interior angles of ΔABC, A + B + C = 180° (Angle sum property of triangle) B + C = 180 – A $\frac{B+C}{2}=\frac{180-A}{2}=90-A/2$ $\cos\left(\frac{B+C}{2}\right)=\cos\left(90-A/2\right)$ $\cos\left(\frac{B+C}{2}\right)=\sin A/2$	1 1
24.	Let P, Q, R and S be point of contact.  $\left.\begin{array}{l} AP=AS \\ BP=BQ \\ CQ=CR \\ DS=DR \end{array}\right]$ Tangents drawn from external point of circle AB + CD = AP + BP + CR + RD	½ ½

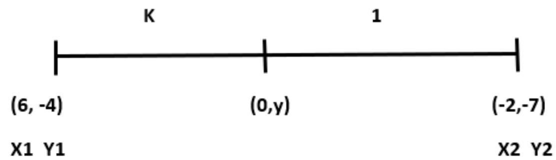
	= AS + BQ + CQ + DS = AS + DS + BQ + CQ = AD + BC Hence proved.	1
	(OR)	
	 *Figure-7*	
	Perimeter of ΔABC = AB + BC + AC	½
	= AB + BD + CD + AC = AB + BP + CQ + AC [Since BD = BP and CD = CQ]	½
	= AP + AQ = 2AP [AP = AQ, Tangents drawn from external point]	½
	= 2 × 12	

	= 24 cm.	½
25.	Modal class : 30 – 40 $\ell = 30,\ \ f_1 = 12,\ \ f_0 = 7,\ \ f_2 = 5,\ \ h = 10$ $mod\ e = \ell + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ $= 30 + \left[\frac{12-7}{24-7-5} \times 10\right]$ $= 30 + \left[\frac{5}{12} \times 10\right]$ $= 30 + \frac{50}{12} = 30 + 4.16\ldots = 34.17$	½ ½ 1
26.	Volume of cube = 125 cm^3 Let ‘a’ be edge of cube So $a^3 = 125$ a = 5 Cuboid : Length $\ell = 10\,cm$ b = 5 cm h = 5 cm surface area = $2(\ell b + bh + h\ell)$ = 2 (50 + 25 + 50)	½ ½

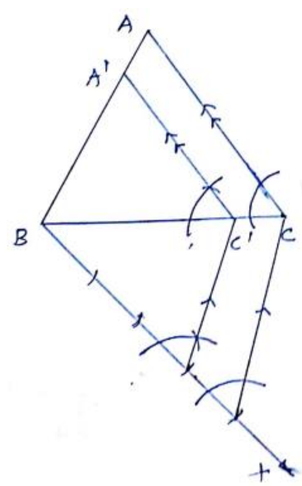
	$= 250\text{ cm}^2$	1
SECTION – C		
27.	Let the fraction be $\frac{x}{y}$ as per the question, $\frac{x-1}{y}=\frac{1}{3}$ 3x – 3 = y 3x – y = 3 ……………. 1 and, $\frac{x}{y+8}=\frac{1}{4}$ 4x = 8 + y 4x – y = 8 …………… 2 By elimination, $\Theta \begin{array}{l} 3x-y=3 \\ \underline{4x-y=8} \\ \quad -x=-5 \\ \quad\ x=5 \end{array}$ $Put\ x=5 in 1$ $15-y=3$ $y=12$ $\therefore The\ required\ fraction\ is\ \frac{5}{12}$ **OR**	1 1 ½ 1 + ½

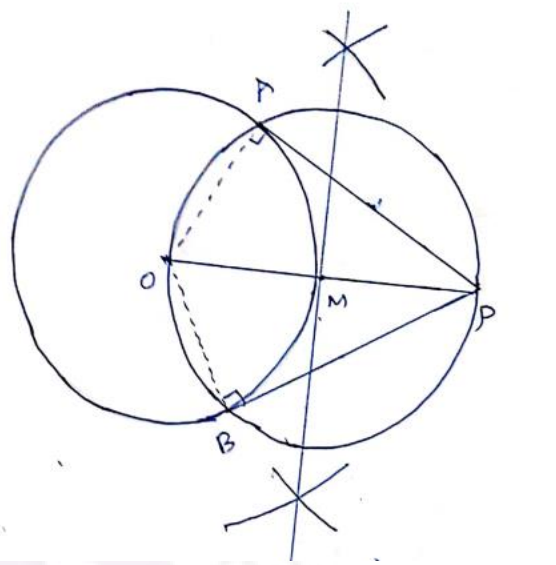
	Let the present age of son be ‘x’ years <table><tr><td></td><td>Father</td><td>Son</td></tr><tr><td>Present age</td><td>3x + 3</td><td>X</td></tr><tr><td>Three years hence</td><td>3x + 6</td><td>x + 3</td></tr></table> As per question, $3x + 6 = 10 + 2(x + 3)$ $3x + 6 = 10 + 2x + 6$ $x = 10$ Father’s present age = $3x + 3$ $= 3 \times 10 + 3 = 33$ $\therefore$ Present age of son = 10 years Present age of father = 33 years	1 1 1
28.	Let ‘a’ be any positive integer and b = 3, if a is divided by b by EDL, $a = 3m + r$, m is any positive integer and $0 \leq r < 3$	1

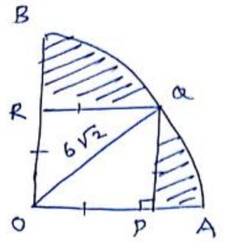
	If $r = 0$, $a = 3m$ $a^2 = (3m)^2 = 3 \times 3m^2$ $a^2 = 3q$, where $3m^2 = q$ $r = 1$, $a = 3m + 1$ $a^2 = (3m + 1)^2 = 9m^2 + 6m + 1$ $= 3(3m^2 + 2m) + 1$ $a^2 = 3q + 1$ where $q = 3m^2 + 2m$ $r = 2$, $a = 3m + 2$ $a^2 = (3m + 2)^2 = 9m^2 + 12m + 4$ $= 9m^2 + 12m + 3 + 1$ $= 3(3m^2 + 4m + 1) + 1$ $a^2 = 3q + 1$, where $q = 3m^2 + 4m + 1$ $\therefore$ The square of any positive integer is of the form 3q or 3q + 1 for some integer q.	1 + ½ ½
29.	Given, Y axis divides the line segment . Any point on y – axis is of the form (0, y) As per the question	½

	 As per section formula, $P(x,y) = \left(\frac{kx_2+x_1}{k+1}, \frac{ky_2+y_1}{k+1}\right)$ $= \left(\frac{-2k+6}{k+1}, \frac{-7k-4}{k+1}\right)$ $\frac{-2k+6}{k+1} = 0$ $-2k+6=0$ $2k = 6$ $k = 3$ $\therefore Ratio 3:1$ $y = \frac{-7k-4}{k+1} = \frac{-21-4}{4} = \frac{-25}{4}$ $\therefore Point\ of\ intersection \left(0, \frac{-25}{4}\right)$ **OR** Let A (7, 10) B(-2, 5) C(3, -4) be the vertices of triangle.	½ 1 1

	Distance between two points (x_1, y_1) (x_2, y_2) $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $AB = \sqrt{9^2 + 5^2} = \sqrt{81 + 25} = \sqrt{106}$ $BC = \sqrt{5^2 + 9^2} = \sqrt{25 + 81} = \sqrt{106}$ $CA = \sqrt{4^2 + 14^2} = \sqrt{16 + 196} = \sqrt{212}$ (by pythagoras theorem) $AB^2 + BC^2 = AC^2$ $\left(\sqrt{106}\right)^2 + \left(\sqrt{106}\right)^2 = \left(\sqrt{212}\right)^2$ 106 + 106 = 212 $\therefore$ ABC is an isosceles right angled Δ.	½ 1+ ½ 1
30.	LHS: $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sqrt{\frac{1+\sin A}{1-\sin A} \times \frac{1+\sin A}{1+\sin A}}$ $= \sqrt{\frac{(1+\sin A)^2}{1-\sin^2 A}} = \sqrt{\frac{(1+\sin A)^2}{\cos^2 A}}$ $= \frac{1+\sin A}{\cos A} = \frac{1}{\cos A} + \frac{\sin A}{\cos A}$ $= \sec A + \tan A = RHS$ Hence proved	1 1 1
31.	Given, for an AP a = 5, d = 3, $a_n = 50$ n = ? S_n = ?	

	$a_n = a+(n-1)d = 50$ $5 + (n-1)3 = 50$ $(n-1)\, 3 = 45$ $n - 1 = 15$ $n = 16$ $s_n = \frac{n}{2}[a+a_n]$ $s_{16} = \frac{16}{2}[a+a_{16}]$ $= 8[5+50] = 8\times 55$ $s_{16} = 440$ $n = 16$	½ 1 1+ ½
32.	For correct construction of Δ ABC AB = 5 cm, BC= 6 cm , $\angle B = 60°$ A'B C' is required similar Δ. A' B C' is similar to ABC $\frac{A'B}{AB} = \frac{BC'}{BC} = \frac{A'C'}{AC} = \frac{3}{4}$  	1

	For correct construction of similar triangle with scale factor ¾ OR  For correct construction of given circle OP = 7cm , OA = OB = 3.5 cm. PA and PB are required tangents to the circle with centre O. For correct construction of tangents	2 1 2

33.	(i) P(to pick a marble from the bag) = P(spinner stops an even number) A = {2, 4, 6, 8, 10} n (A) = 5 n (S) = 6 $\Rightarrow P(A)=\frac{n(A)}{n(S)}=\frac{5}{6}$ (ii) P(getting a prize) = P(bag contains 20 balls out of which 6 are black) $=\frac{6}{20}=\frac{3}{10}$	½ 1 ½ 1
34.	Given,  Radius of circle r = $6\sqrt{2}$ OA = OB = OQ = $6\sqrt{2}$ cm In Δ OPQ, $(OP)^2 + (PQ)^2 = (OQ)^2$ $2(OP)^2 = \left(6\sqrt{2}\right)^2$	

	a = op = 6 cm Area of the shaded region = ar (quadrant, with r = $6\sqrt{2}$) – ar (square with side 6 cm) $= [\frac{1}{4}\pi \times r^2] - a^2$ $= [\frac{1}{4} \times 3.14 \times (6\sqrt{2})^2] - 6^2$ $= [18\ x\ 3.14] - 36 = 56.52 - 36$ $= 20.52cm^2(app)$	1 1 1
SECTION – D		
35.	$p(x) = 2x^4 - x^3 - 11x^2 + 5x + 5$ Two zeros are $\sqrt{5}$ *and* $-\sqrt{5}$ $\therefore x = \sqrt{5} \quad x = -\sqrt{5}$ $(x-\sqrt{5})(x+\sqrt{5}) = x^2 - 5$ is a factor of p(*x*) To find other zeroes	 1

$$
\begin{array}{r|l}
 & 2x^2 - x - 1 \\ \hline
x^2 - 5 & 2x^4 - x^3 - 11x^2 + 5x + 5 \\
 & \underline{\overset{-}{2x^4} \quad \overset{+}{-10x^2}} \\
 & -x^3 - x^2 + 5x \\
 & \underline{\overset{+}{-x^3} \quad \overset{-}{+5x}} \\
 & -x^2 + 5 \\
 & \underline{-x^2 + 5} \\
 & 0
\end{array}
$$

$\therefore 2x^2 - x - 1 \, is \, a \; factor$ 2

$2x^2 - 2x + x - 1 = 0$

$2x(x - 1) + 1(x - 1) = 0$

$(2x + 1) \qquad (x - 1) = 0$

$x = -1/2 \qquad x = 1$

$\therefore$ Other zeroes are $-1/2, \; 1$ 1

(OR)

$$
\begin{array}{r|l}
 & 2x + 5 \\ \hline
x^2 - 4x + 8 & 2x^3 - 3x^2 + 6x + 7 \\
 & \underline{\overset{-}{2x^3} \overset{+}{- 8x^2} \overset{-}{+ 16x}} \\
 & 5x^2 - 10x + 7 \\
 & \underline{\overset{-}{5x^2} \overset{+}{- 20x} \overset{-}{+ 40}} \\
 & 10x - 33
\end{array}
$$

3

	So, $-10x + 33$ has to be added	1
36.	For correct Given, to prove, Construction and figure For Correct proof Refer NCERT Text book Pg no 142	½ x 4=2 2
37.	Let the sides of the two squares be x and y $(x > Y)$ Difference in perimeter is = 32 $4x - 4y = 32$ $x - y = 8 \Rightarrow y = x - 8$ Sum of area of two squares = 544 $x^2 + y^2 = 544$ $x^2 + (x - 8)^2 = 544$ $x^2 + x^2 + 64 - 16x = 544$ $2x^2 - 16x = 480$ $\div 2,\ x^2 - 8x = 240$ $x^2 - 8x - 240 = 0$	1 2

	$(x - 20)(x + 12) = 0$ $X = 20, -12$ Side can't be negative. So $x = 20$ $y = x - 8 = 20 - 8 = 12$ $\therefore$ Sides of squares are 20 cm, 12cm **(OR)** Speed of boat = 18 km/h Let speed of the stream be $= x$ km/h Speed of upstream $= (18 - x)\,km/hr$ Speed of downstream $= (18 + x)\,km/hr$ Distance = 24 km Time $= \frac{\text{Distance}}{\text{Speed}}$ As per question, $\frac{24}{18-x} - \frac{24}{18+x} = 1$	1 1 1

<table>
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$$24\left[\frac{1}{18-x}-\frac{1}{18+x}\right]=1$$

$$\frac{18+x-18+x}{(18-x)(18+x)}=\frac{1}{24}$$

$$\frac{2x}{324-x^2}=\frac{1}{24}$$

$$324-x^2=48x$$

$$x^2+48x-324=0$$

$$(x+54)(x-6)=0$$

$$x=6,\ -54$$

$\therefore$ $x=6\ km/hr$

Speed of stream $=6\ km/hr$

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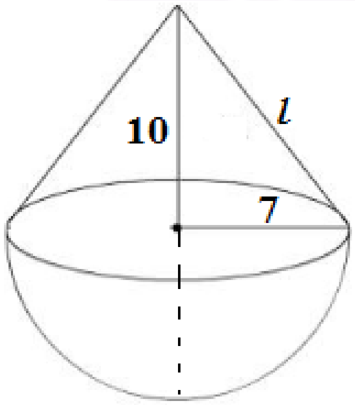
1</td></tr>
<tr><td>38.</td><td>

Volume of the toy = Volume of cone + Volume of hemisphere



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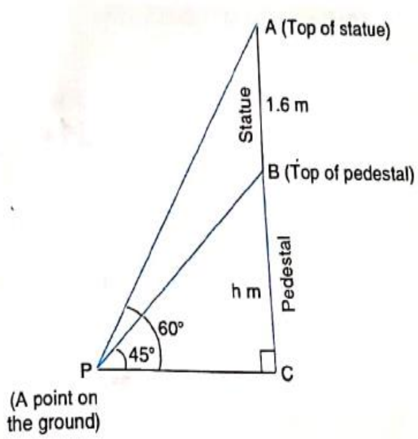
	Cone: r = 7 cm h = 10 cm Hemisphere: r = 7 cm Volume of toy $=\frac{1}{3}\pi r^2 h+\frac{2}{3}\pi r^3$ $=\frac{1}{3}\pi r^2[h+2r]$ $=\frac{1}{3}\times\frac{22}{7}\times 7\times 7[10+14]$ $=\frac{1}{3}\times 22\times 7\times 24$ Volume of toy $=1232\,cm^3$ Area of coloured sheet required to cover the toy = CSA of cone + CSA of hemisphere $=\pi rl+2\pi r^2$ $=\pi r[l+2r]$ $=\frac{22}{7}\times 7[12.2+14]$ $l^2=10^2+7^2$ $l^2=100+49$ $l=\sqrt{149}$	1 1 ½

	$l = 12.2$ $= 22 \times 26.2$ $= 576.4\,cm^2$	½ 1
39.	As per figure, BC = h m  In right triangle ACP, $\tan 60^\circ = \frac{AC}{PC}$ $\Rightarrow \quad \sqrt{3} = \frac{AB+BC}{PC}$ $\Rightarrow \quad \sqrt{3} = \frac{1.6+h}{PC} \quad \ldots (1)$ In right triangle BCP, $\tan 45^\circ = \frac{BC}{PC}$ $\Rightarrow \quad 1 = \frac{h}{PC} \quad \ldots (2)$ Dividing (1) by (2), we get $\frac{\sqrt{3}}{1} = \frac{1.6+h}{h}$ $\Rightarrow \quad h\sqrt{3} = 1.6 + h$ $\Rightarrow \quad h\left(\sqrt{3}-1\right) = 1.6$	1 1

	$\Rightarrow \quad h = \dfrac{1.6}{\sqrt{3}-1}$ $\Rightarrow \quad h = \dfrac{1.6\left(\sqrt{3}+1\right)}{\left(\sqrt{3}-1\right)\left(\sqrt{3}+1\right)}$ $\Rightarrow \quad h = \dfrac{1.6\left(\sqrt{3}+1\right)}{3-1}$ $\Rightarrow \quad h = \dfrac{1.6\left(\sqrt{3}+1\right)}{2}$ $\Rightarrow \quad h = 0.8\left(\sqrt{3}+1\right)$ h=0.8(1.73+1)=0.8 x 2.73 =2.184m Hence, the height of the pedestal is 2.184 m	1+ ½ ½
40.	Less than frequency distribution	

Age	No. of persons	Class	CF
0 – 10	5	Less than 10	5
10 – 20	15	Less than 20	20
20 – 30	20	Less than 30	40
30 – 40	25	Less than 40	65
40 – 50	15	Less than 50	80

50 – 60	11	Less than 60	91
60 – 70	9	Less than 70	100

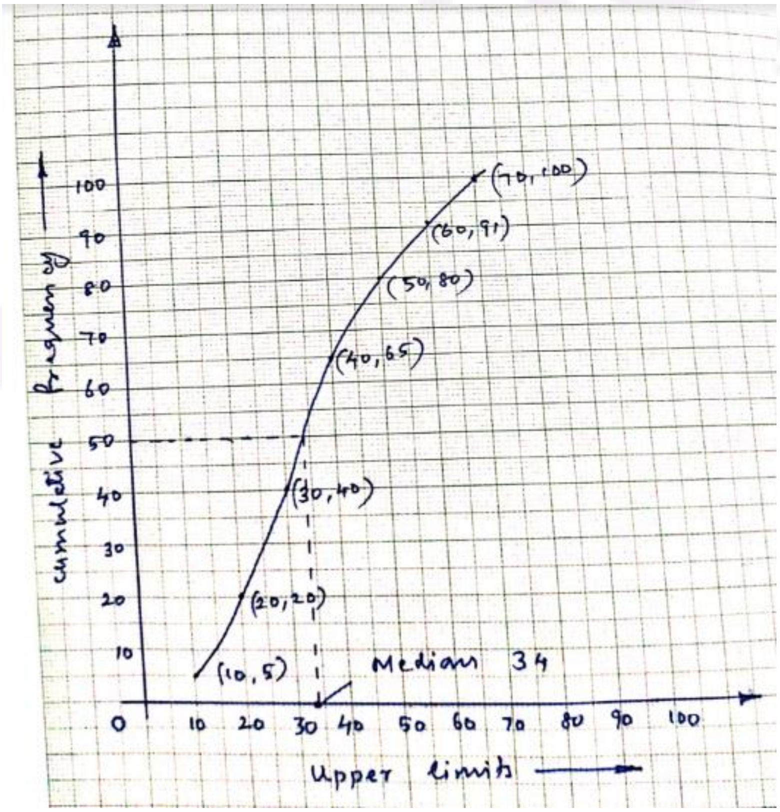
Coordinates to plot less than ogive:

(10, 5) (20, 20) (30, 40) (40, 65) (50, 80)

(60, 91) (70, 100)

2

N = 100 , N/2 = 50 Median = 34



2

(OR)

To find mean

Number of wickets	**Number of bowlers (f)**	**Xi**	$u_i = \frac{x_i - a}{h}$	**$u_i\, f_i$**
20 – 60	7	40	-3	-21
60 – 100	5	80	-2	-10
100 – 140	16	120	-1	-16
140 – 180	12	160	0	0
180 – 220	2	200	1	2
220 – 260	3	240	2	6
	45			**-39**

1

Assumed mean a = 160

Class size h = 40

$$Mean\ \bar{x} = a + \left(\frac{\sum f_i u_i}{\sum f_i} \times h\right)$$

$$= 160 + \left(\frac{\cancel{-39}\ -13}{\cancel{45}\ \cancel{9}\ 3} \times \cancel{40}\right)$$

$$= 160 + \left(\frac{-104}{3}\right)$$

$$= 160 - 34.66 \ldots$$

$$= 160 - 34.67$$

$$\bar{x} = 125.33$$

1

To find median,

Number of workers CI	**No. of bowlers (f)**	**CF**

	20 – 60	7	7		
	60 – 100	5	12		
	100 – 140	16	28		
	140 – 180	12	40		
	180 – 220	2	42		
	220 – 260	3	<u>45</u>		

N = 45, > N/2 ➔ > 22.5 1

Median class: 100 – 140

F = 16 h = 40

CF = 12 l = 100

$$Median = \ell + \left(\frac{{}^{N}\!/_{2} - CF}{f} \times h \right)$$

$$= 100 + \left(\frac{\frac{45}{2} - 12}{\cancel{16}\,4} \times \cancel{40}\,10 \right)$$

1

$$= 100 + \frac{105}{4} = 100 + 26.25$$

$$= 126.25$$
