**Set - A**

| A.P. SET CODE |
| --- |
| **A** |

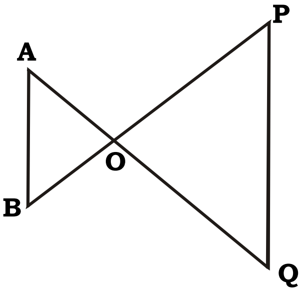
# MT

**2014 ___ ___ 1100-MT- GENERAL MATHEMATICS (71)GEOMETRY-PAPER A(E)**

**Time : 2 Hours** **Prelim - I Model Answer Paper** **Max. Marks : 40**

**A.1. Solve the following : (Any 5)**

(i) aOAB ~ aOQP [Given]




y ĎOAB ] ĎOQP [c.a.s.t.] ½

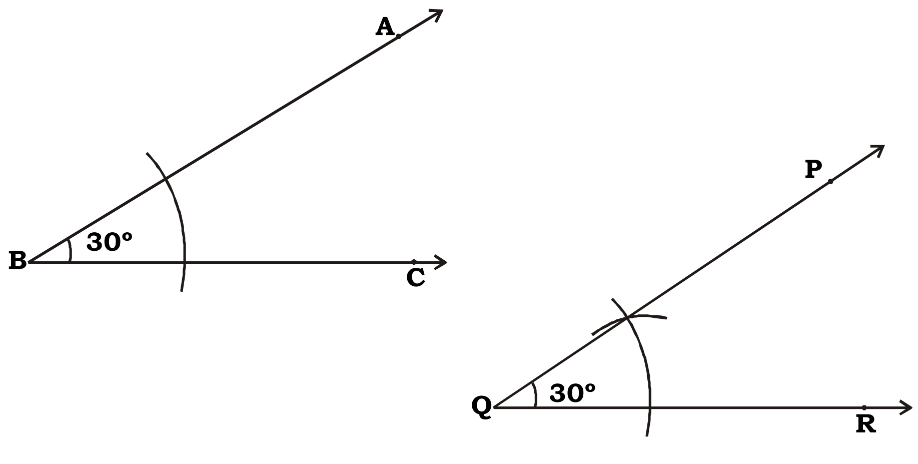
y ĎQAB ] ĎAQP [A - O - Q and B - O - P]

y seg AB || seg PQ [Alternate angles test] ½

(ii) $\tan\theta = \dfrac{\sin\theta}{\cos\theta} = \dfrac{1}{0}$ ½

y Value of tanθ is not defined. ½

(iii)




½

½

(iv) Side of cube ($l$) = 17 cm

Volume of cube = $l^3$ ½

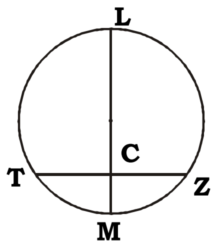
= $(17)^3$

= 17 × 17 × 17

= 4913cm$^3$

y | Volume of cube is 4913 cu.cm | ½

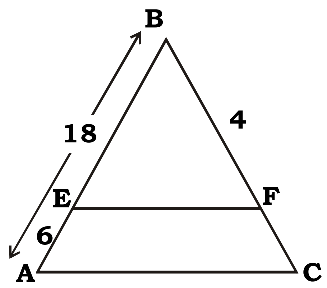
(v) (i) seg TZ ì chord
(ii) seg LM ì diameter ½
(iii) seg CL ì radius
(iv) seg CM ì radius ½



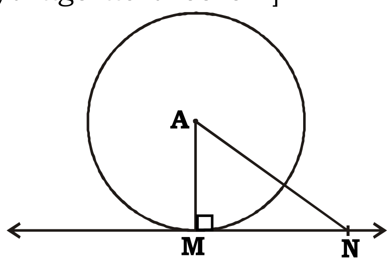

(vi) $\sin^2 90^\circ - \tan^2 45^\circ = (1)^2 - (1)^2$
$= 1 - 1$ ½
$= 0$
y $\boxed{\sin^2 90^\circ - \tan^2 45^\circ = 0}$ ½

**A.2. Solve the following : (Any 4)**

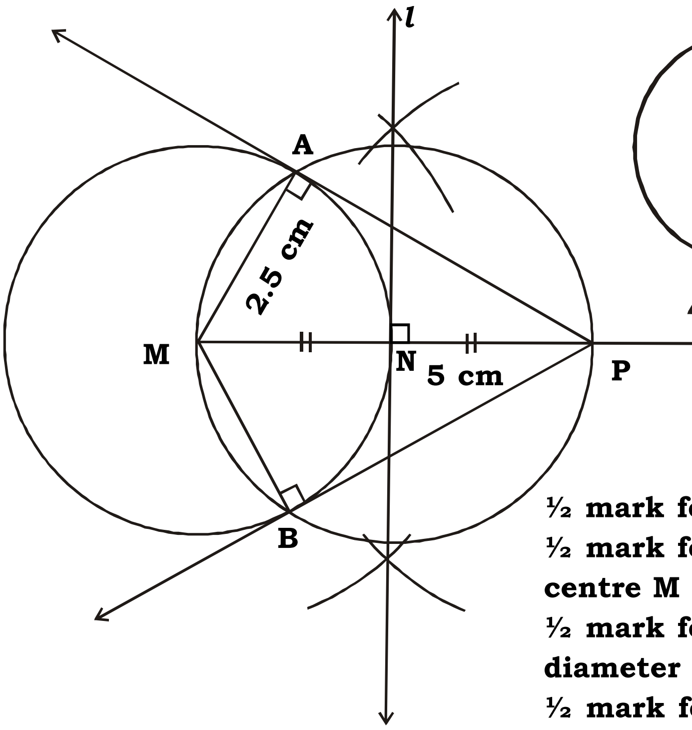
(i) AB = AE + BE [A - E - B]
∴ 18 = 6 + BE
∴ BE = 12 ½
In $\Delta$ABC,
seg EF || side AC [Given]
∴ $\frac{BE}{AE} = \frac{BF}{FC}$ [By B.P.T.] ½
∴ $\frac{12}{6} = \frac{4}{FC}$
∴ $FC = \frac{6 \times 4}{12}$
∴ FC = 2 ½
But, BC = BF + FC [B - F - C]
∴ BC = 4 + 2
∴ $\boxed{BC = 6 \text{ units}}$ ½

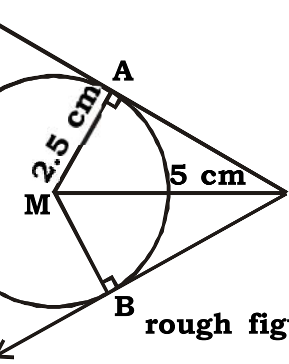



(ii) seg AM $\perp$ line MN
In right angled $\Delta$AMN,
$AN^2 = AM^2 + MN^2$ [By Pythagoras theorem] ½
∴ $(25)^2 = AM^2 + (24)^2$ ½
∴ $625 - 576 = AM^2$
∴ $49 = AM^2$ ½
∴ AM = 7
∴ Radius of the circle is 7 cm. ½



(iii)




**½ mark for rough figure**
**½ mark for drawing circle with centre M and plotting point P.**
**½ mark for drawing circle with diameter MP**
**½ mark for drawing tangents.**

(iv)

Radius of lead ball $= 1$ cm

Volume of each lead ball $= \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi \times (1)^3$

$= \frac{4}{3}\pi$ cm$^3$ ½

Radius of sphere $= 8$ cm

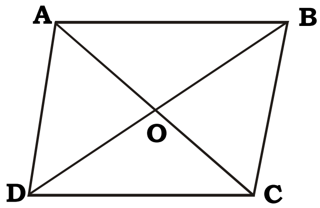
Volume of each sphere $= \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi \times (8)^3$

$= \frac{4}{3}\pi \times 512$ cm$^3$ ½

No. of balls $= \frac{\text{Volume of sphere}}{\text{Volume of each lead ball}}$ ½

| | | |
|---|---|---|
| | $= \dfrac{\frac{4}{3}\pi \times 512}{\frac{4}{3}\pi}$ | |
| | No. of balls = 512 | |
| | y 512 lead balls can be made. | ½ |
| (v) | Midpoint of class 21 - 25 | |
| | $\dfrac{21+25}{2} = 23$ | 1 |
| | Exclusive form continuous classes<br>10.5 - 15.5<br>15.5 - 20.5<br>20.5 - 25.5<br>25.5 - 30.5 | 1 |
| (vi) | 9A (ΔPQR) = 16A (ΔPMN) [Given] | |
| | $\therefore \dfrac{A\ (aPQR)}{A\ (aPMN)} = \dfrac{16}{9}$ ......(i) | ½ |
| | ΔPQR ~ ΔPMN | |
| | $\therefore \dfrac{A\ (aPQR)}{A\ (aPMN)} = \dfrac{QR^2}{MN^2}$ [By theorem on areas of similar triangles] | ½ |
| | $\therefore \dfrac{16}{9} = \dfrac{QR^2}{MN^2}$ [From (i)] | ½ |
| | y $\dfrac{QR}{MN} = \dfrac{4}{3}$ | ½ |
| **A.3.** | **Solve the following : (Any 3)** | |
| (i) | □ABCD is a parallelogram | |
| | $AB^2 + BC^2 = 130$ [Given] | |
| | AC = 14 units [Given] | |
| | y OC = $\frac{1}{2}$AC [Diagonals of a parallelogram bisect each other] | ½ |
| | y OC = $\frac{1}{2} \times 14$ | |

| | | |
|---|---|---|
| | y OC = 7 units | ½ |
| | In aABC, | |
| | seg BO is the median | |
| |  | |
| | y $AB^2 + BC^2 = 2BO^2 + 2OC^2$ | ½ |
| | y $130 = 2BO^2 + 2(7)^2$ | |
| | y $130 = 2BO^2 + 98$ | |
| | y $130 - 98 = 2BO^2$ | |
| | y $32 = 2BO^2$ | |
| | y $BO^2 = 16$ | |
| | y BO = 4 [Taking square roots] | ½ |
| | y BD = 2BO [∵ O is the midpoint of seg BD] | ½ |
| | y BD = 2 (4) | |
| | y **BD = 8 units** | ½ |
| (ii) | L.H.S. = $\sin^2 45° + \sin^2 30° + \sin^2 60°$ | |
| | L.H.S. = $\left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2$ | ½ |
| | $= \frac{1}{2} + \frac{1}{4} + \frac{3}{4}$ | |
| | $= \frac{1}{2} + \frac{4}{4}$ | ½ |
| | $= \frac{1}{2} + 1$ | |
| | $= \frac{1+2}{2}$ | ½ |
| | $= \frac{3}{2}$ | ½ |
| | R.H.S. = $\frac{3}{2}$ | |
| | ∴ L.H.S. = R.H.S. | ½ |
| | ∴ $\sin^2 45° + \sin^2 30° + \sin^2 60° = \frac{3}{2}$ | ½ |

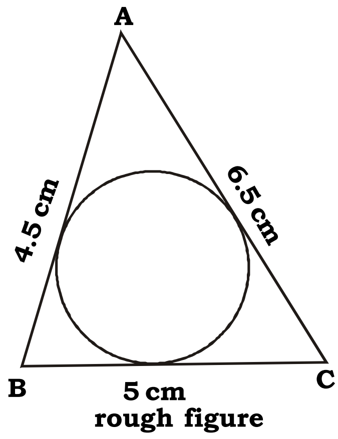
(iii) **½ mark for drawing rough figure**

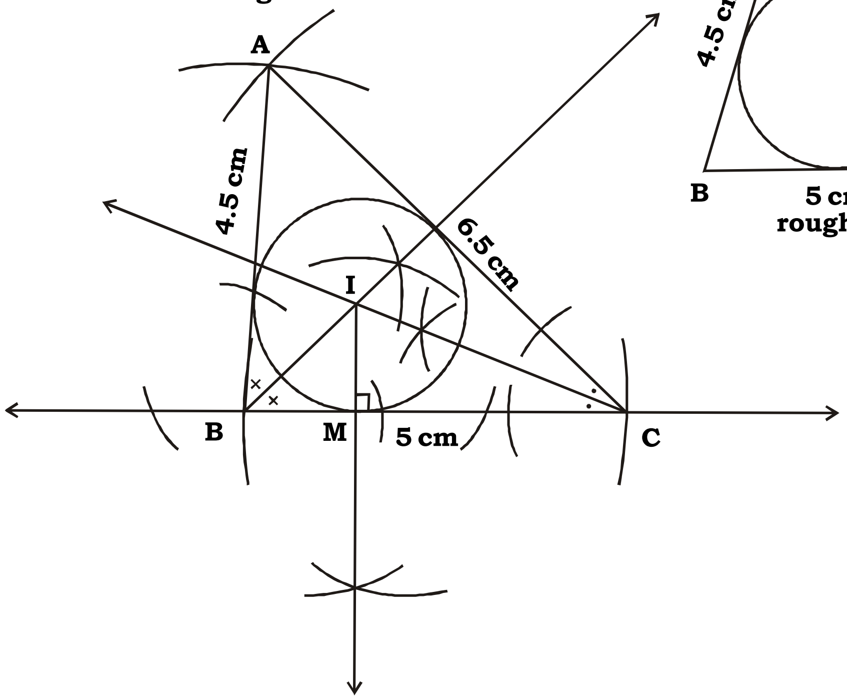
**1 mark for drawing a-ABC**

**½ mark for drawing two angle bisector**

**½ mark for drawing IM { BC**

**½ mark for drawing incircle.**




(iv) Curved Surface area of cylinder = $55 cm^2$

height (h) = 3.5cm

Curved surface area = 55

y $2\pi rh = 55$ ½

y $2 \times \frac{22}{7} \times r \times 3.5 = 55$

y $r = \frac{55 \times 7}{2 \times 22 \times 3.5}$ ½

y $r = \frac{35}{4 \times 3.5}$

y $r = \frac{350}{4 \times 35}$ ½

y $r = \frac{10}{4}$

y $r = 2.5$ cm

y Radius of cylinder is 2.5 cm ½

Volume of cylinder = $\pi r^2 h$ ½

$= \frac{22}{7} \times 2.5 \times 2.5 \times 3.5$

$= 22 \times 2.5 \times 2.5 \times 0.5$

$= 68.75 cm^3$

y **Volume of cylinder is 68.75 cu.cm** ½

(v) Class width (h) = 10

| Money (in Rs.) | Class Mark ($x_i$) | No. of students ($f_i$) | $f_i x_i$ |
|---|---|---|---|
| 0 - 10 | 5 | 5 | 25 |
| 10 - 20 | 15 | 7 | 105 |
| 20 - 30 | 25 | 5 | 125 |
| 30 - 40 | 35 | 2 | 70 |
| 40 - 50 | 45 | 6 | 270 |
| **Total** | | **25** | **595** |

**1**

Mean = $\frac{\text{p } f_i x_i}{\text{p } f_i}$

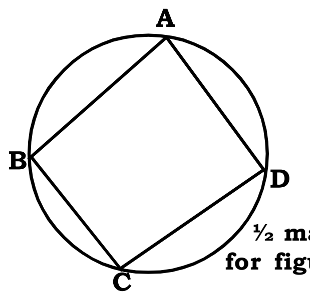
y Mean = $\frac{595}{25}$ **1**

y Mean = Rs. 23.8

y Mean of money collected is Rs. 23.8 **1**

**A.4. Solve the following : (Any 2)**

(ii) **Given :** □ABCD is a cyclic



**To Prove :** m ĎABC + m ĎADC = 180° ½

m ĎBAD + m ĎBCD = 180°

**Proof :**

½ mark for figure

m ĎABC = $\frac{1}{2}$ m (arc ADC) .....(i)

m ĎADC = $\frac{1}{2}$ m (arc ABC) .....(ii)

[Inscribed angle theorem] ½

Adding (i) and (ii), we get

m ĎABC + m ĎADC = $\frac{1}{2}$ m (arc ADC) + $\frac{1}{2}$ m (arc ABC) ½

y m ĎABC + m ĎADC = $\frac{1}{2}$ [m (arc ADC) + m (arc ABC)] y m ĎABC + m ĎADC = $\frac{1}{2} \times 360^\circ$ [∵ Measure of a circle is 360°] ½

y m ĎABC + m ĎADC = 180° ..........(iii) ½

In □ABCD,

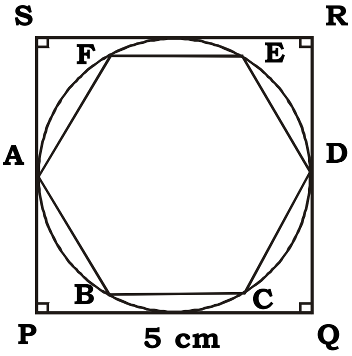
m ĎBAD + m ĎBCD + m ĎABC + m ĎADC = 360°

[∵ Sum of measure of angles of a quadrilateral is 360°] ½

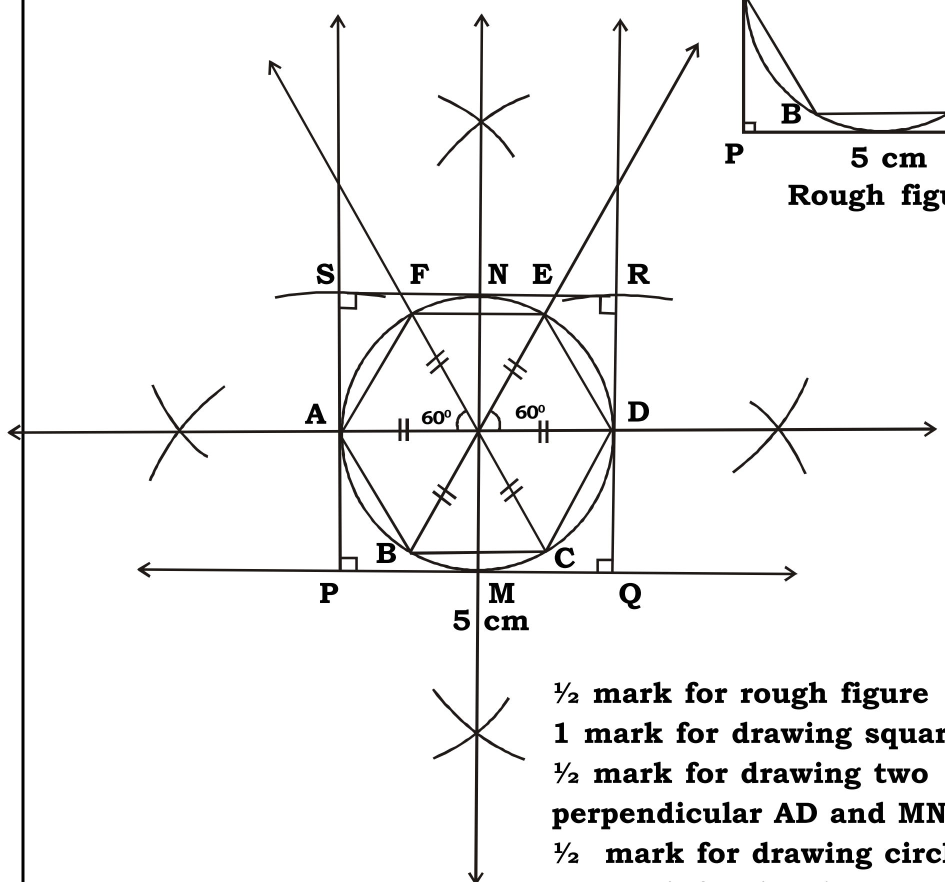
y m ĎBAD + m ĎBCD + 180° = 360° [From (iii)]

y m ĎBAD + m ĎBCD = 180° ½

(iii)




**Rough figure**




**½ mark for rough figure**
**1 mark for drawing square**
**½ mark for drawing two perpendicular AD and MN**
**½ mark for drawing circle**
**½ mark for drawing CF and BE**
**1 mark for drawing hexagon and indentical marks**

**(iii)**

Length of the paper ($l$) = 22 cm

its breadth (b) = 10 cm

Area of the paper = $l \times b$ ½

= $22 \times 10$

= $220\ cm^2$ ½

Paper completely covers curved surface area of the cylinder

y Curved surface area of cylinder = Area of paper ½

y Curved surface area of cylinder = $220 cm^2$

its diameter = 10 cm

its radius (r) = 5 cm

Curved surface area of cylinder = $2\pi rh$ ½

y 220 = $2 \times \frac{22}{7} \times 5 \times h$

y h = $\frac{220 \times 7}{2 \times 22 \times 5}$ ½

y h = 7 cm ½

Volume of the cylinder = $\pi r^2 h$ ½

= $\frac{22}{7} \times 5 \times 5 \times 7$

= $550 cm^3$ ½

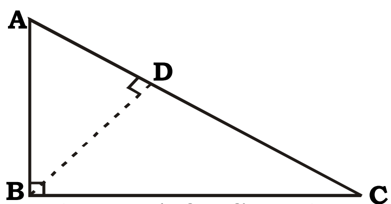
y **Volume of the cylinder is 550 cm³.**

**A.5. Solve the following : (Any 2)**

**(i)** **Given :** In aABC, m ĎABC = 90°

**To Prove :** $AC^2 = AB^2 + BC^2$ ½

**Construction :** Draw seg BD { side AC such that A - D - C. ½




**(½ mark for figure)**

**Proof :** In aABC,

m ĎABC = 90° [Given]

seg BD { hypotenuse AC [Construction]

y aABC ~ aADB ~ aBDC .....(i)

[Similarity in right angled triangles] ½

aABC ~ aADB [From (i)]

y $\frac{AB}{AD} = \frac{AC}{AB}$ [Corresponding sides of similar triangles] ½

y $AB^2 = AC \times AD$ ........(ii) ½

aABC ~ aBDC [From (i)]

y $\frac{BC}{DC} = \frac{AC}{BC}$ [Corresponding sides of similar triangles] ½

y $BC^2 = AC \times DC$ ........(iii) ½

Adding (ii) and (iii) we get,

$AB^2 + BC^2 = AC \times AD + AC \times DC$

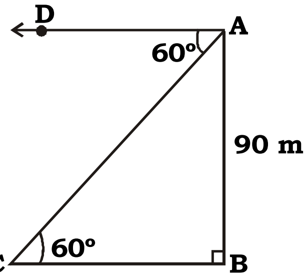
y $AB^2 + BC^2 = AC\,(AD + DC)$

y $AB^2 + BC^2 = AC \times AC$ [∵ A - D - C] ½

y $AB^2 + BC^2 = AC^2$

∴ $\mathbf{AC^2 = AB^2 + BC^2}$ ½

(ii) Seg AB represents the lighthouse




**(½ mark for figure)**

C represents the position of ship. ½

A represents the position of observer ½

∠DAC is the angle of depression

AB = 90m

m∠DAC = 60°

∠DAC ≅ ∠ACB [Converse of alternate angle test] ½

∴ m∠ACB = 60°

In right angled ΔABC ½

y $\tan 60^\circ = \frac{AB}{BC}$ [by definition] ½

y $\sqrt{3} = \frac{90}{BC}$ ½

y $BC = \frac{90}{\sqrt{3}}$

y $BC = \frac{90}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ ½

y $BC = \frac{90\sqrt{3}}{3}$ ½

y $BC = 30\sqrt{3}$ m

∴ The ship is $30\sqrt{3}$ m far from the light house. ½

(iii) Here the class given are discontinuous, so they have to be made continuous.
The difference between lower limit of a class and upper limit of previous class is 0.1

y $\frac{0.1}{2} = 0.05$

Hence we subtract 0.05 from lower limit of every class and add 0.05 to upper limit of every class.

| **Body weight (in gms)** | **Continuous class** | **No. of fish** |
|---|---|---|
| 15 - 15.9 | 14.95 - 15.95 | 2 |
| 16 - 16.9 | 15.95 - 16.95 | 4 ì $f_1$ |
| 17 - 17.9 | 16.95 - 17.95 | 8 ì $f_m$ |
| 18 - 18.9 | 17.95 - 18.95 | 6 ì $f_2$ |
| 19 - 19.9 | 18.95 - 19.95 | 6 |
| 20 - 20.9 | 19.95 - 20.95 | 4 |

**2**

Here the maximum frequency $f_m = 8$
The corresponding class 16.95 - 17.95 is the modal class.
$L = 16.95, f_m = 8, f_1 = 4, f_2 = 6, h = 1$ **1**

$$\text{Mode} = L + \left(\frac{f_m - f_1}{2f_m - f_1 - f_2}\right) \times h$$

$$= 16.95 + \left(\frac{8 - 4}{2(8) - 4 - 6}\right) \times 1$$ **1**

$$= 16.95 + \left(\frac{4}{6}\right)$$

$$= 16.95 + 0.67$$

$$= 17.62$$

y Mode of body weight is 17.62 gm. **1**

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