

POSSIBLE ANSWERS FOR:

FUNCTIONAL MATHS SET P2

QUESTION 1

1.1 A(-6;0) and B(4;4)
 $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ ✓
 $= \sqrt{(4 + 6)^2 + (4 - 0)^2}$ ✓
 $= \sqrt{100 + 16} = \sqrt{116}$ Units ✓ [3]

1.2 C(8;2) and D(-2;-2)
 $M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$
 $= M\left(\frac{8 + (-2)}{2}; \frac{2 + (-2)}{2}\right)$ ✓
 $= M(3; 0)$ ✓ [4]

1.3 A(-6;0), B(4;4), C(8;2), D(-2;-2)
 $m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$ ✓, $m_{CD} = \frac{y_2 - y_1}{x_2 - x_1}$
 $= \frac{4 - 0}{4 + 6}$ ✓, $= \frac{-2 - 2}{-2 - 8}$ ✓
 $= \frac{4}{10}$ ✓, $= \frac{-4}{-10}$ ✓
 $= \frac{2}{5}$ ✓, $= \frac{2}{5}$ ✓ [5]

✓ 1.4 AB || CD (Parallel lines have equal gradients) ✓ [2]
 (14)

QUESTION 2

$y - 3x + 2 = 0$

2.1 $y = 3x - 2$ ✓ [2]

2.2 3 ✓ [1]

2.3 $\tan \theta = 3$ ✓

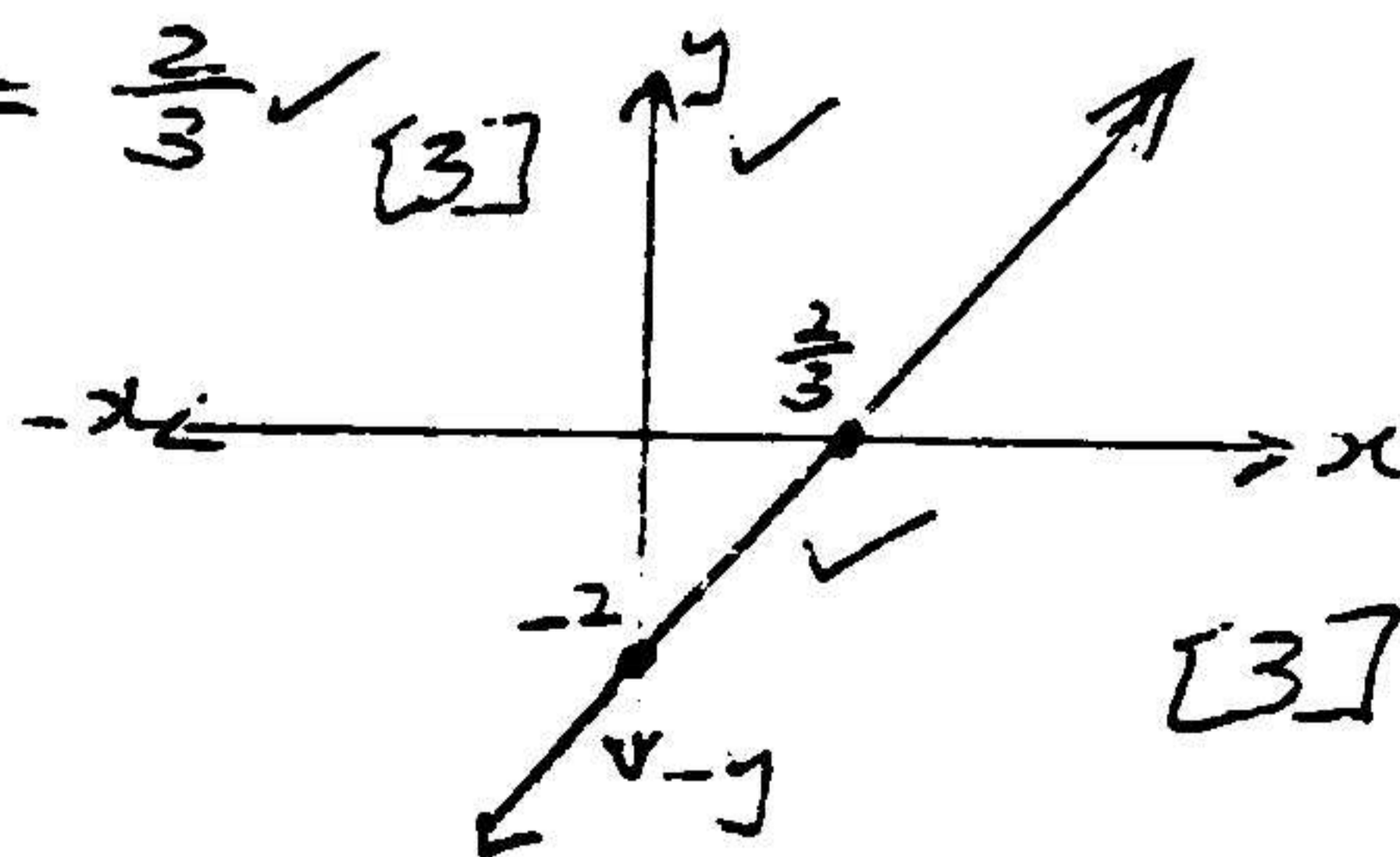
$\therefore \theta = 71,57^\circ$ ✓ [2]

2.4 -2 ✓ [1]

2.5 $3x - 2 = 0$ ✓

$\therefore x = \frac{2}{3}$ ✓ [3]

✓ 2.6



(PAPER B)

QUESTION 3

3.1) 3.1.1 $r^2 = x^2 + y^2$
 $= (-3)^2 + (2)^2$
 $= 9 + 4$
 $r^2 = 13$ ✓

$\therefore x^2 + y^2 = 13$ ✓ [2]

3.1.2 $r^2 = 13$

$\therefore r = \sqrt{13}$ units ($r > 0$) ✓ [1]

3.2 $y + 2x = 10$, $x^2 + y^2 = 25$

$\therefore y = -2x + 10$ ✓

$\therefore x^2 + (-2x + 10)^2 = 25$ ✓

$x^2 + 4x^2 - 40x + 100 = 25$

$5x^2 - 40x + 75 = 0$

$x^2 - 8x + 15 = 0$ ✓

$(x - 3)(x - 5) = 0$ ✓

$\therefore x = 3$ or $x = 5$ ✓

$y = -2(3) + 10$ or $y = -2(5) + 10$

$= 4$ or $y = 0$ ✓

\therefore Points of intersection are

✓ (3; 4) and (5; 0) ✓ [7]

SECTION B

QUESTION 4

4.1 $\sin C$ ✓ Sine Rule [2]

4.2 $\cos A$ ✓ Cosine rule [2]

✓ 4.3 $\sin B$ ✓ Area rule [2]

QUESTION 5

5.1 $\hat{C}_1 = 130^\circ$ (\angle 's on str. line suppl.) [2]

$\hat{A}_1 = 7^\circ$ (\angle 's on a Δ suppl.) [2]

5.2 $\frac{\sin 43^\circ}{AC} = \frac{\sin 7^\circ}{90m}$ ✓

$\therefore AC = \frac{\sin 43^\circ \times 90m}{\sin 7^\circ} = 503,7$ ✓ [4]

$$5.3 \frac{\sin 130^\circ}{AD} = \frac{\sin 7^\circ}{90 \text{ m}} \checkmark$$

$$AD = \frac{\sin 130^\circ \times 90 \text{ m}}{\sin 7^\circ} = 565,72 \text{ m} \checkmark [4]$$

$$5.4 \sin 50^\circ = \frac{AB}{503 \text{ m}} \checkmark$$

$$\therefore AB = 385,32 \text{ m} \checkmark [3]$$

$$5.5 A = \frac{1}{2} (DC)(AC) \sin C \checkmark$$

$$= \frac{1}{2} (90 \text{ m})(503 \text{ m}) \sin 130^\circ \checkmark$$

$$\therefore A = 17\,339,4 \text{ m}^2 \checkmark [4]$$

QUESTION 6

$$6.1 \angle EFD = 41^\circ \text{ (corr. } \angle\text{'s =)} [2]$$

$$6.2 \angle EFA = 139^\circ \text{ (}\angle\text{'s on a str. line suppl.)}$$

$$\therefore \angle AEF = 9^\circ \text{ (Int. } \angle\text{'s of a } \Delta \text{ suppl.)}$$

$$6.3 \frac{\sin 9^\circ}{500 \text{ m}} = \frac{\sin (90^\circ + 32^\circ)}{BE} \checkmark [3]$$

$$BE = \frac{500 \text{ m} \times \sin 122^\circ}{\sin 9^\circ} \checkmark$$

$$\therefore BE = 2\,710,6 \text{ m} \checkmark [4]$$

$$6.4 \frac{\sin 41^\circ}{EC} = \frac{\sin 120^\circ}{2700 \text{ m}} \checkmark$$

$$\therefore EC = \frac{\sin 41^\circ \times 2700 \text{ m}}{\sin 120^\circ} \checkmark$$

$$\therefore EC = 2\,045,39 \text{ m} \checkmark [4]$$

SECTION C

QUESTION 7

$$7.1 S.I = \frac{P \times r \times t}{100} = \frac{R50\,000 \times 12 \times 10}{100} \checkmark$$

$$= R60\,000 \checkmark [4]$$

$$7.2) 7.2.1 R70 \checkmark [1]$$

$$7.2.2 R350 \checkmark [2]$$

$$7.3) r = \frac{21}{2} = 10,5 \checkmark$$

$$n = 2n \checkmark$$

$$A = P \left(1 + \frac{r}{100}\right)^n \checkmark$$

$$A = R100\,000 \left(1 + \frac{10,5}{100}\right)^{2n} \checkmark$$

$$= R100\,000 (1 + 0,105)^{2n} \checkmark$$

$$= R100\,000 (1,105)^{2n} \rightarrow [4]$$

7.3D

n	2	3	4	5
A	R149 090	R182 043	R222 278	R271 408

7.3.3 Refer to graph. [5] [4]

7.3.4) 7.3.4.1 R300 000. [1] ✓

7.3.4.2 $2\frac{1}{2}$. [1] ✓

QUESTION 8

8.1 Taxable income

$$= R85\,000 - (R3\,000 + R3\,300 + R4\,200) \checkmark$$

$$= R73\,400 \checkmark [4]$$

$$8.2 \text{ Tax} = R1\,630 + 42\% \times R73\,400 \checkmark$$

$$= R1\,630 + R56\,280 \checkmark$$

$$= R21\,928 \checkmark [4]$$

$$8.3 R2\,625 \checkmark [1]$$

$$8.4 R21\,928 - R2\,625 = R19\,303. [2]$$

$$8.5 \text{ Amount due to her}$$

$$= R20\,400 - R19\,303 \checkmark$$

$$= R1\,097. \checkmark [4]$$

SECTION D

QUESTION 9

$$9.1 r \checkmark [1]$$

$$9.2 57,3^\circ \checkmark [1]$$

$$9.3 0,96 \text{ rad.} = 0,96 \times \frac{180^\circ}{\pi} = 55,01^\circ [2]$$

$$9.4 21^\circ = 21^\circ \times \frac{\pi}{180} = 0,37 \text{ radians} [2]$$

$$9.5 360^\circ = 360^\circ \times \frac{\pi}{180} = 2\pi [2]$$

QUESTION 10

- 10.1 300 mm ✓ [1]
- 10.2 $v = \frac{90 \times 1000 \text{ m}}{3600 \text{ s}} = 25 \text{ m} \cdot \text{s}^{-1}$ ✓ [2]
- 10.3 $\omega = \frac{v}{r} = \frac{25 \text{ m} \cdot \text{s}^{-1}}{0.3 \text{ m}}$ ✓
 $\omega = 83,33 \text{ rad/s}$ ✓ [3]
- 10.4 $2\pi N = \omega$
 $N = \frac{\omega}{2\pi} = \frac{83,33}{2\pi} = 13,26 \text{ rev/s} \rightarrow$ ✓ [3]
- 10.5 $N = 13,26 \times 60$ ✓
 $N = 795,60 \text{ rev./min.}$ ✓ [2]

QUESTION 11

- 11.1) 11.1.1 $\tan \theta = \frac{75}{45}$ ✓
 $\theta = 59^\circ$ ✓ [3]

$\theta = 59^\circ \times \frac{\pi}{180} = 1,03 \text{ rad.}$

- 11.1.2) 11.2.1 (a) $A = \frac{1}{2} r^2 \theta$ ✓
 $= \frac{1}{2} (45 \text{ cm})^2 \times 1,03$ ✓
 $A = 1042,88 \text{ cm}^2$ ✓ [3]

- 11.1.2.2 (b) $A = \frac{1}{2} (OB)(BC)$ ✓
 $= \frac{1}{2} (45 \text{ cm})(75 \text{ cm})$ ✓
 $= 1687,50 \text{ cm}^2$ ✓ [3]

- 11.1.2.3 (c) $A = 1687,50 - 1042,88$ ✓
 $A = 644,62 \text{ cm}^2$ ✓ [2]

- 11.2) 11.2.1 $\frac{4}{3}\pi = 240^\circ$ ✓
 $V = \frac{1}{2} r^2 \theta \times h$ ✓
 $= \frac{1}{2} (20,5)^2 \left(\frac{4}{3}\pi\right) (50)$ ✓
 $V = 4400,847,7 \text{ mm}^3$ ✓ [4]

- 11.2.2 $\widehat{BAF} = 2\pi - \frac{4}{3}\pi$ ✓
 $= \frac{2}{3}\pi$ ✓ [2]

SECTION E

QUESTION 12

- 12.1 $\frac{AE}{AC}$ ✓ [2]
- 12.2 $\frac{AY}{YC} = \frac{AP}{PX} = \frac{6}{4}$ (Prop. Thm.) ✓
 $\frac{AX}{XB} = \frac{AY}{YC} = \frac{10}{6}$ (XY || BC) ✓
 $\therefore \frac{6}{4} = \frac{10}{BX}$ ✓
 $BX = \frac{40}{6} = 6\frac{2}{3}$ ✓ [1]
- 12.3 $\frac{XB}{BZ} = \frac{XA}{AZ}$ (BA || ZY) ✓
 $\frac{y+1}{2,4} = \frac{4}{3}$ ✓

$3y+3 = 9,6$ ✓
 $y = 2,2$ ✓ [5]

QUESTION 13

- 13.1) 13.1.1 III (Similar) [1]
 13.1.2 KLV, BCL [2]

- 13.2) $\triangle PUS$ and $\triangle PQR$
 $\hat{U}_1 = \hat{P}_1 = \hat{R}_1$ (common) ✓
 $\hat{U}_2 = \hat{Q}_2$ (Given) ✓
 $\therefore \triangle USP = \triangle R$ (3rd \angle 's =) ✓ [3]

- 13.2.2 $\frac{PU}{PS} = \frac{PQ}{PR} = \frac{16}{24} = \frac{2}{3}$ ✓ [2]

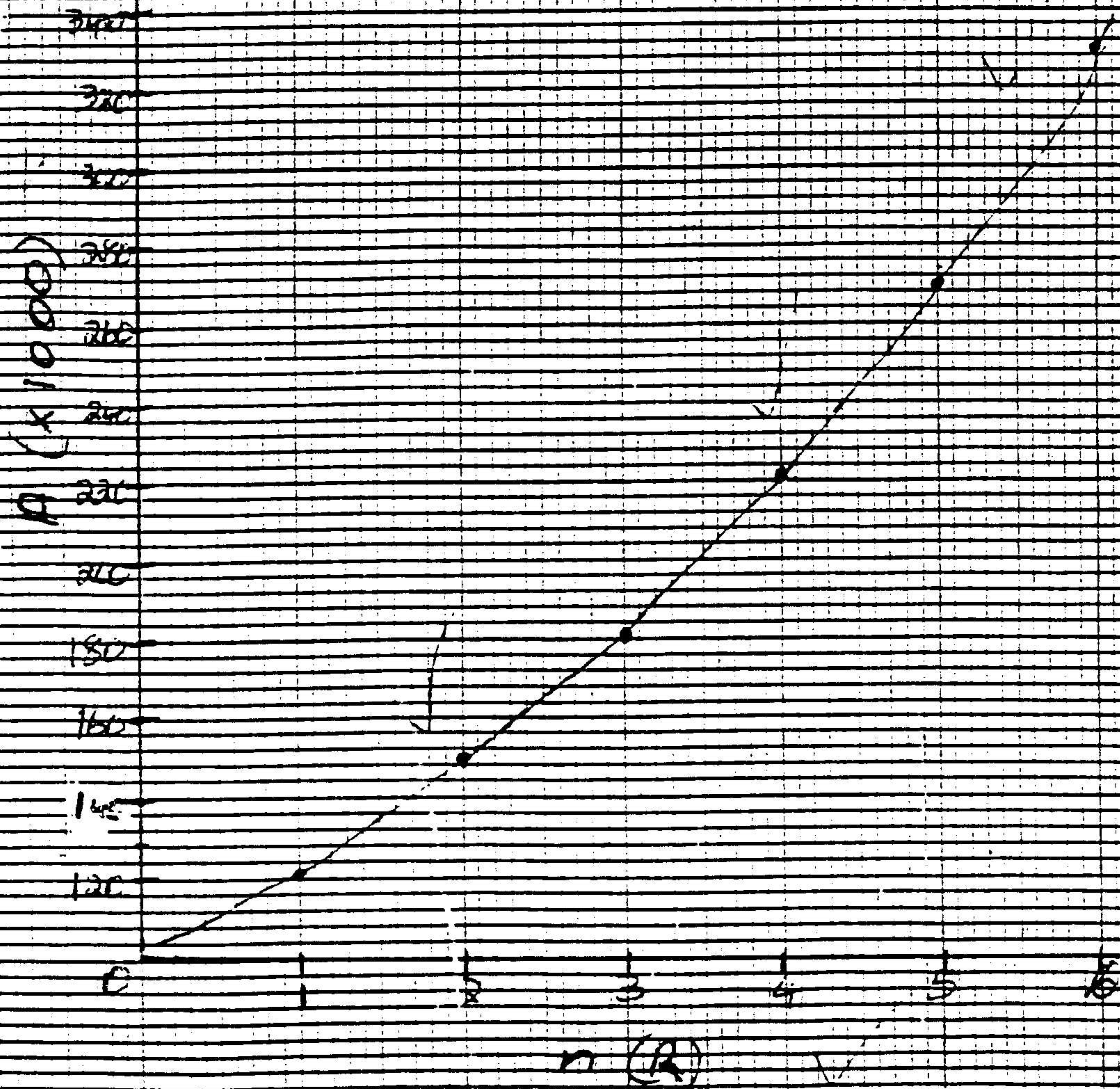
- 13.2.3 $PU = \frac{2}{3} PS = \frac{2}{3} (10) = \frac{20}{3}$ ✓
 $\therefore PU = 6,67 \text{ units cm}$ ✓ [3]

- 13.2.4 $\frac{PT}{TR} = \frac{10}{6} = \frac{5}{3}$ ✓

- $\therefore PT = \frac{5}{3} TR$ ✓
 $PT = \frac{5}{8} (24) = 15 \text{ cm}$ ✓ [4]

QUESTION 7

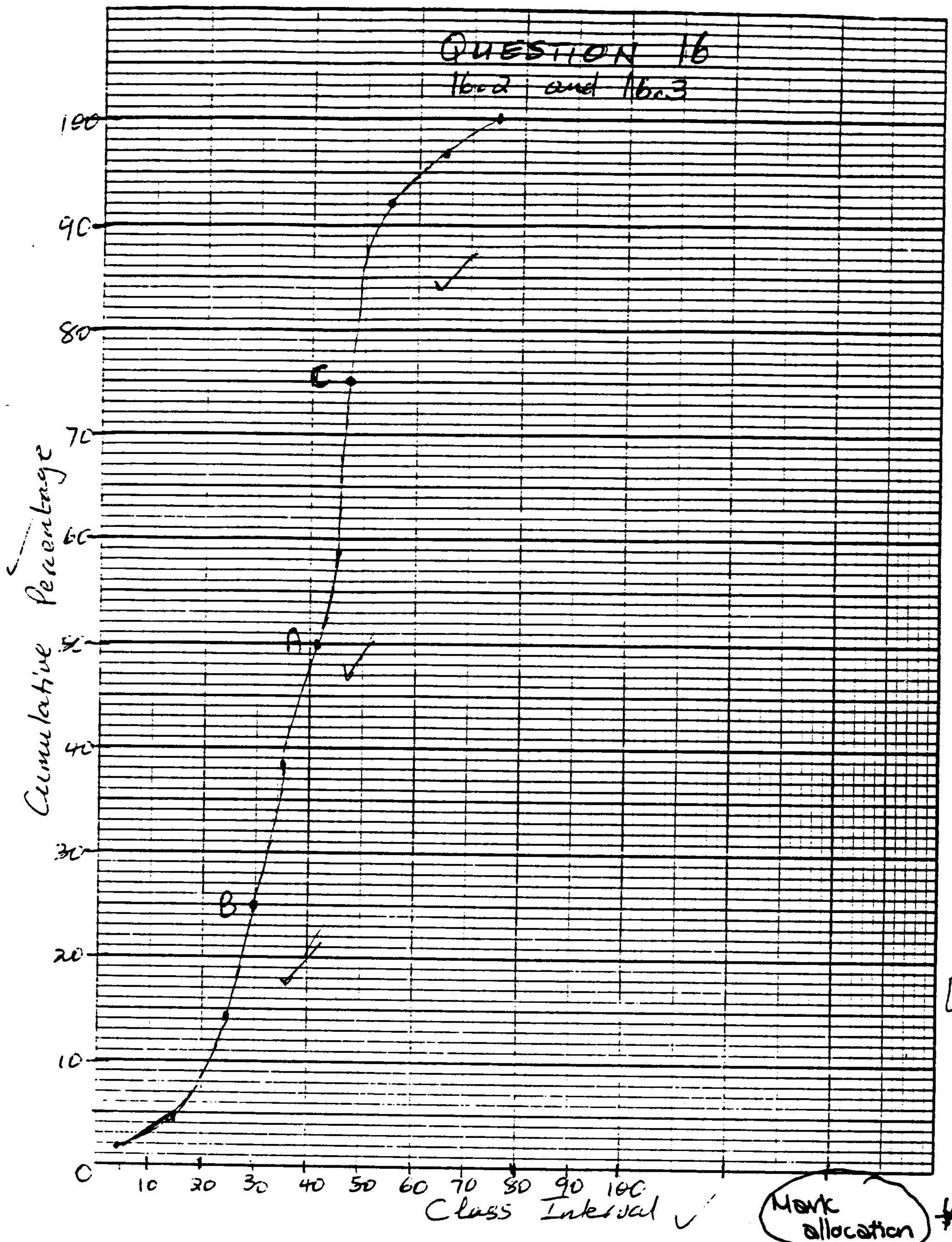
7.3.3



[5]

Mark allocation

QUESTION 16
16a2 and 16a3



Mark allocation *

5

13.2.5 $TU = (15 - 6,67) \text{ cm}$ ✓
 $TU = 8,33 \text{ cm}$ ✓ [2]

QUESTION 14

14.1 ~~FLD = y~~ (ext. \angle of e)
 $FLD = x$ (corr. \angle 's =) ✓ [1]

14.2 $FDL = y$ (corr. \angle 's =) ✓ [1]

14.3 ΔFLD ✓ [2]

✓ 14.4 KE , FD ✓ [2]

SECTION F

QUESTION 15

15.1 170 170 179 ¹⁸³ 187 187 187 188 194
 195 195 196 203 212 ✓ ✓ [3]

15.2 187 ✓ [1]

15.3 $\frac{187 + 188}{2} = 187,5$ ✓ [2]

15.4 $\bar{x} = \frac{\sum x}{N} = \frac{2646}{14} = 189$ ✓ [3]

15.5 $212 - 170 = 42$ ✓ [2]

15.6 $s = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n-1}}$ ✓
 $= \sqrt{\frac{501836 - 14(189)^2}{13}}$ ✓
 $= \sqrt{134}$ ✓
 $= 11,58$ ✓ [6]

QUESTION 16

* 16.1

Class midpoint	Cumulative Frequency	Cumulative Percentage
79,5	60	100
69,5 ✓	58	✓ 96,67
59,5	55	91,67
49,5 ✓	34	✓ 56,67
39,5	15	25,00
29,5 ✓	6	✓ 10,00 ✓
19,5		5,00
9,5 ✓		✓ 1,67 ✓

* Memo incorrect

[12]

16.2 * Refer to graphs. [5]

16.3 * Refer to Graph. [3]

* Mark allocation