

# SUKELLEMO JOINT MOCKS

## MATHEMATICS PP1

### MARKING SCHEME

#### WORKING

#### AWARDING

Numerator

$$\left(\frac{3}{5} \times \frac{30}{6}\right) + \left(\frac{35}{6} \times \frac{12}{7}\right) - \left(\frac{8}{3} \times \frac{1}{2}\right)$$

$$18 + 10 - 4$$

$$= 24 \checkmark$$

Denominator

$$\left(\frac{45}{8} \times \frac{16}{9}\right) - \left(\frac{1}{9} \times \frac{8}{5}\right) + \left(\frac{14}{5} \times \frac{16}{7}\right)$$

$$10 - \frac{8}{3} + 4$$

$$= 11\frac{1}{3} \checkmark$$

$$24 \div \frac{34}{3}$$

$$24 \times \frac{3}{34} = 2\frac{2}{17} \checkmark$$

A<sub>1</sub> For correct value for numerator

A<sub>1</sub> - For correct value for Denominator

A<sub>1</sub> - For correct Answer.

3

2.

$$\frac{2}{5.8703} + \frac{5}{75.169}$$

$$2(0.1703) + 5(0.01330) \checkmark$$

$$0.3406 + 0.06650 \checkmark$$

$$= 0.4071$$

$$= 0.41 \checkmark$$

M<sub>1</sub> - For obtaining correct reciprocals for both.

M<sub>1</sub> - For correct Additions.

A<sub>1</sub> \checkmark  
(correct to 2dp)

3



$$3] \quad 3(25x^2 - 9y^2) \checkmark$$

$$3(5x - 3y)(5x + 3y) \checkmark$$

$M_1$  - For correct factorisation of 3  
 $A_1$  - Correct answer

---

2

$$4.] \quad \sin 60^\circ = \frac{AM}{10}$$

$$AM = 10 \sin 60^\circ \checkmark$$

$$= 8.6603.$$

$M_1$  - Correct attempt of obtaining AM

$$\cos 60^\circ = \frac{BM}{10}$$

$$BM = 10 \cos 60 = 5.$$

$M_1 \checkmark$  - Correct attempt of obtaining MC

$$\tan 45^\circ = \frac{8.6603 \checkmark}{MC}$$

$$MC = 8.6603.$$

$M_1 \checkmark$  - For correct addition to obtain BC

$$BC = 8.6603 + 5 = 13.66 \checkmark$$

$A_1$  - Correct Area.

$$\text{Area} = \frac{1}{2} \times 13.66 \times 8.6603 = 59.15 \checkmark$$

4

$$5. \quad 2^x + 3^y = 59 \quad | \quad 2^{x+3} - 3^{y+2} = 13$$

$M_1$  - Correct expression in terms of base 2 and 3.

$$2^x \times 2^3 - 3^y \times 3^2 = 13 \checkmark$$

$$\text{let } 2^x = a \quad \text{and } 3^y = b$$

$$a + b = 59$$

$$8a - 9b = 13$$

$$a = 59 - b$$

$$8(59 - b) - 9b = 13 \checkmark$$

$$472 - 17b = 13$$

$$-17b = -459 \therefore b = 27$$

$M_1$  - For correct substitution

$B_1 \checkmark$  - For correct value of a and b

$$a = 59 - 27 = 32$$

$$2^x = 32$$

$$x = 5 \checkmark$$

$$3^y = 27$$

$$y = 3 \checkmark$$

$A_1$  - For both x and y

---

4



6.] 235, 335, 405, 414, 418, 431, 504, 609,

626, 717, 918

$Q_1 = 405$  ✓

$Q_3 = 626$  ✓

$$\frac{1}{2} (Q_3 - Q_1) = \frac{626 - 405}{2}$$

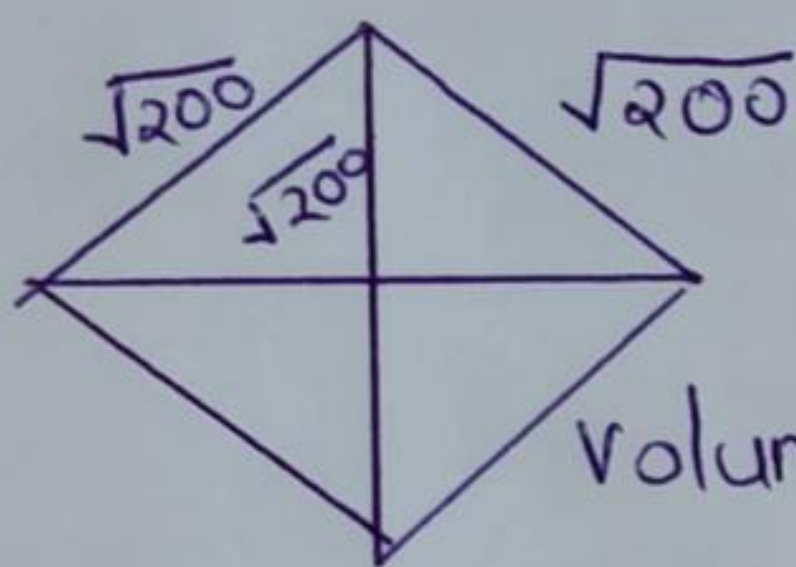
$$= \frac{221}{2}$$

$$= 110.5$$

M<sub>1</sub> - For  
obtaining of  
Q<sub>1</sub> and Q<sub>3</sub>  
M<sub>1</sub> - Substituting  
and dividing by  
2.

A<sub>1</sub> - Correct  
Answer  
3

7.]



$$\text{Volume} = \frac{1}{2} \times \sqrt{200} \times \sqrt{200} \sin 60 \times 10\sqrt{3}$$

$$= 1500$$

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

$$1500 = \frac{22}{7} \times r^2 \times 10\sqrt{3}$$
 ✓

$$r^2 = 1500 \times \frac{7}{22} \times \frac{1}{10\sqrt{3}}$$
 ✓

$$\sqrt{r^2} = \sqrt{27.56}$$

$$r = 5.249$$
 ✓

M<sub>1</sub> - For  
Getting  
Volume.

M<sub>1</sub> - For correct  
subst. of volume of  
cylinder to the other

M<sub>1</sub> - Attempt  
to get r<sup>2</sup>

A<sub>1</sub> - For Correct  
Answer  
4.

x	4.25	4.75	5.25	5.75
$y = x^3 - 5$	71.77	102.17	139.70	185.12

$$A = \frac{1}{2} (71.77 + 102.17 + 139.70 + 185.12)$$
 ✓

$$= 0.5 \times 498.76$$

$$= 249.38 \text{ sq units}$$
 ✓

M<sub>1</sub> - For all  
values of y  
correct

M<sub>1</sub> - correct  
substitution in  
the formula

A<sub>1</sub> - Correct  
Answer

3.



$$9.] b^2 = 4ac$$

$$(-10)^2 = 4 \times 25 \times c \checkmark$$

$$\frac{100}{100} = \frac{100}{100} c$$

$$c = 1$$

$$c = \frac{1}{3} + d \checkmark$$

$$1 = \frac{1}{3} + d$$

$$d = \frac{2}{3} \checkmark$$

M<sub>1</sub> - Correct attempt of getting c

M<sub>1</sub> - Correct substitution Follow through

A<sub>1</sub> - Correct answer

3

$$10.] 125\% \rightarrow 120\% =$$

$$100\% = \frac{100 \times 120}{100} \checkmark$$

$$= \text{Ksh. } 125 \cdot 96$$

$$150\% \rightarrow 96\% =$$

$$100\% = ?$$

$$\frac{100\% \times 96}{150\%} \checkmark$$

$$= \text{Ksh. } 64 \checkmark$$

M<sub>1</sub> - Correct working to obtain 96

M<sub>1</sub> - Correct working to obtain 64

A<sub>1</sub> - Correct answer

3

$$11.] L_1 \quad \frac{x}{3} + \frac{y}{2} = 1$$

$$2x + 3y < 6 \checkmark$$

$$L_2 \quad \frac{x}{4} - \frac{y}{3} = 1$$

$$3x - 4y \leq 12 \checkmark$$

$$L_3 \quad \frac{x}{-1} + \frac{y}{-3} = 1$$

$$3x + y \geq -3 \checkmark$$

B<sub>1</sub> - Correct inequality L<sub>1</sub>

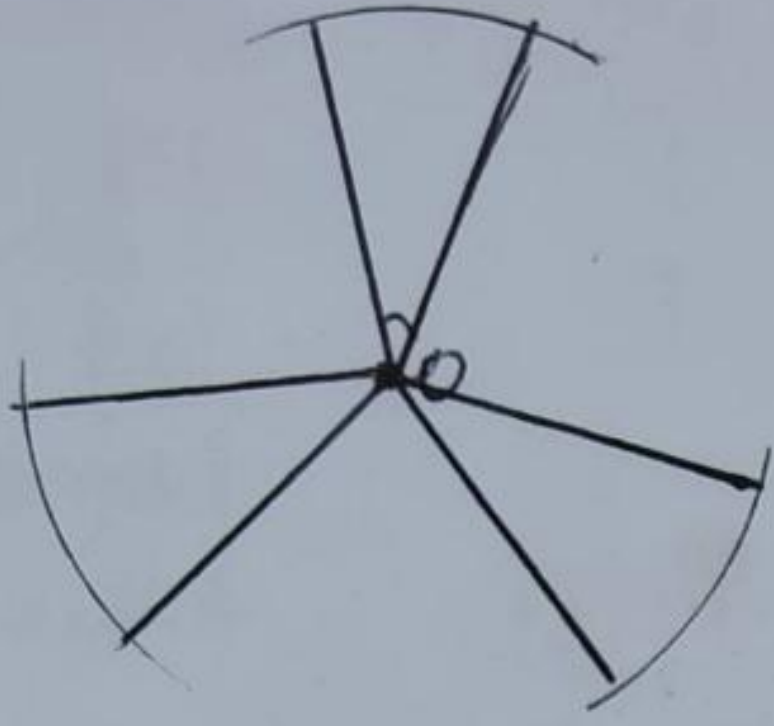
B<sub>1</sub> - Correct inequality L<sub>2</sub>

B<sub>1</sub> - Correct inequality L<sub>3</sub>

3



12]



$$\text{Order} = \frac{360}{\text{angle}}$$

$$3 = \frac{360}{x}$$

$$\frac{3x}{3} = \frac{360}{3}$$

$$x = 120$$

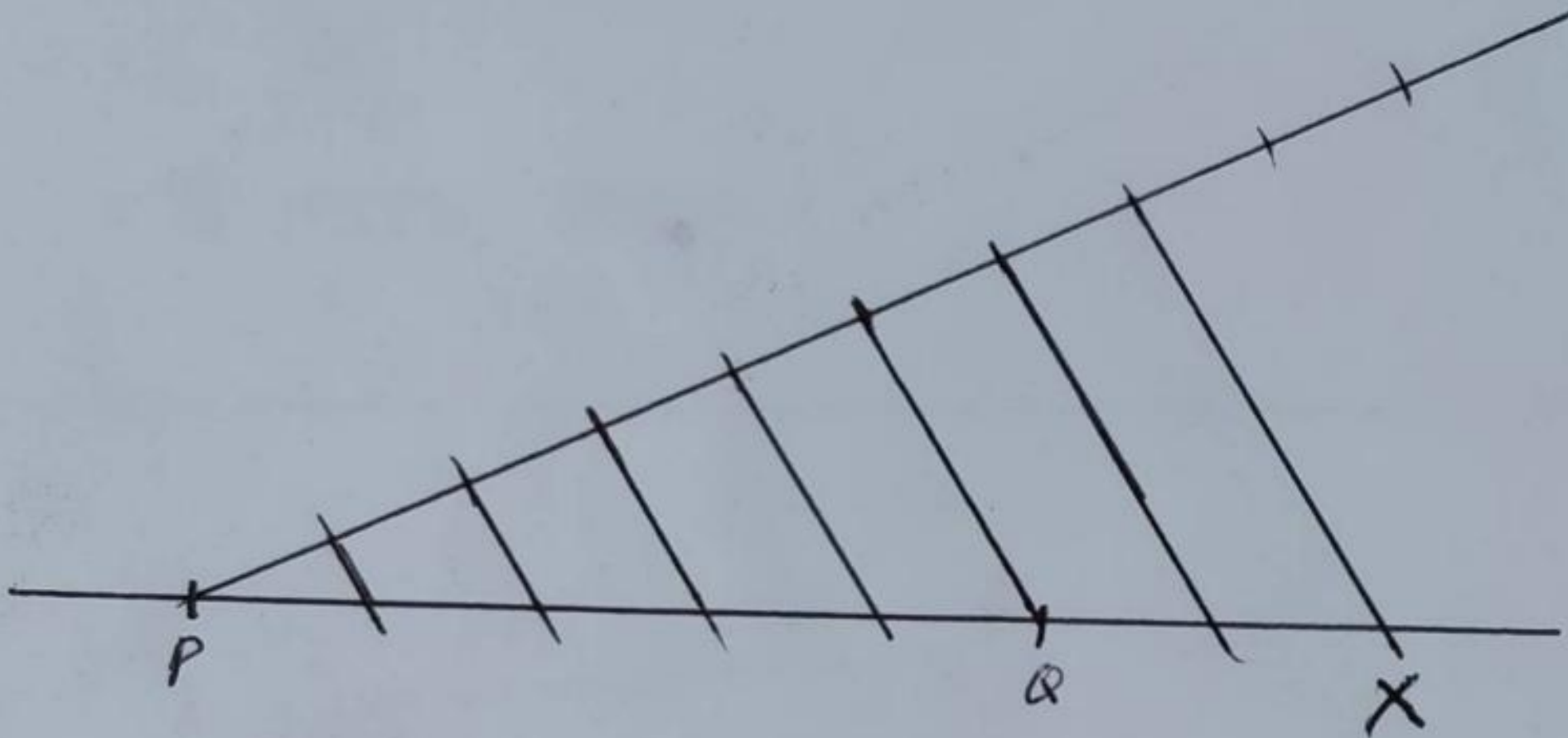
B<sub>1</sub> correct angle  
120°

B<sub>1</sub> correct construction  
of 1<sup>st</sup> sector

B<sub>1</sub> correct construction  
of 2<sup>nd</sup> sector

3

13



B<sub>1</sub> - correct line  
PQ

B<sub>1</sub> - correct division  
of upper line  
into 7 divisions

B<sub>1</sub> - correct location  
of X.

3

14.]

Tan = Gradient

$$\tan 75.97 = 4 \checkmark$$

$$y = 4x + 8$$

along x axis  $y = 0$ .

$$4x + 8 = 0 \checkmark$$

$$4x = -8$$

$$\frac{4x}{4} = \frac{-8}{4}$$

$$x = -2$$

$$(-2, 0) \checkmark$$

M<sub>1</sub> - correct  
way of obtaining  
4

M<sub>1</sub> - correct  
substitution.

A<sub>1</sub> - correct  
answer in  
3. coordinate  
form.



15.] Men	days	hrs
16	14	9
	12	7
days	decreased	12:14.
men	increased	<u>14:12</u>
Hrs	decreased	7:9
Men	increased	<u>9:7</u>

$$\frac{14}{12} \times \frac{9}{7} \times 16 \checkmark$$

$$= 24 \text{ men}$$

$$24 - 16 \checkmark$$

$$= 8 \text{ more men } \checkmark$$

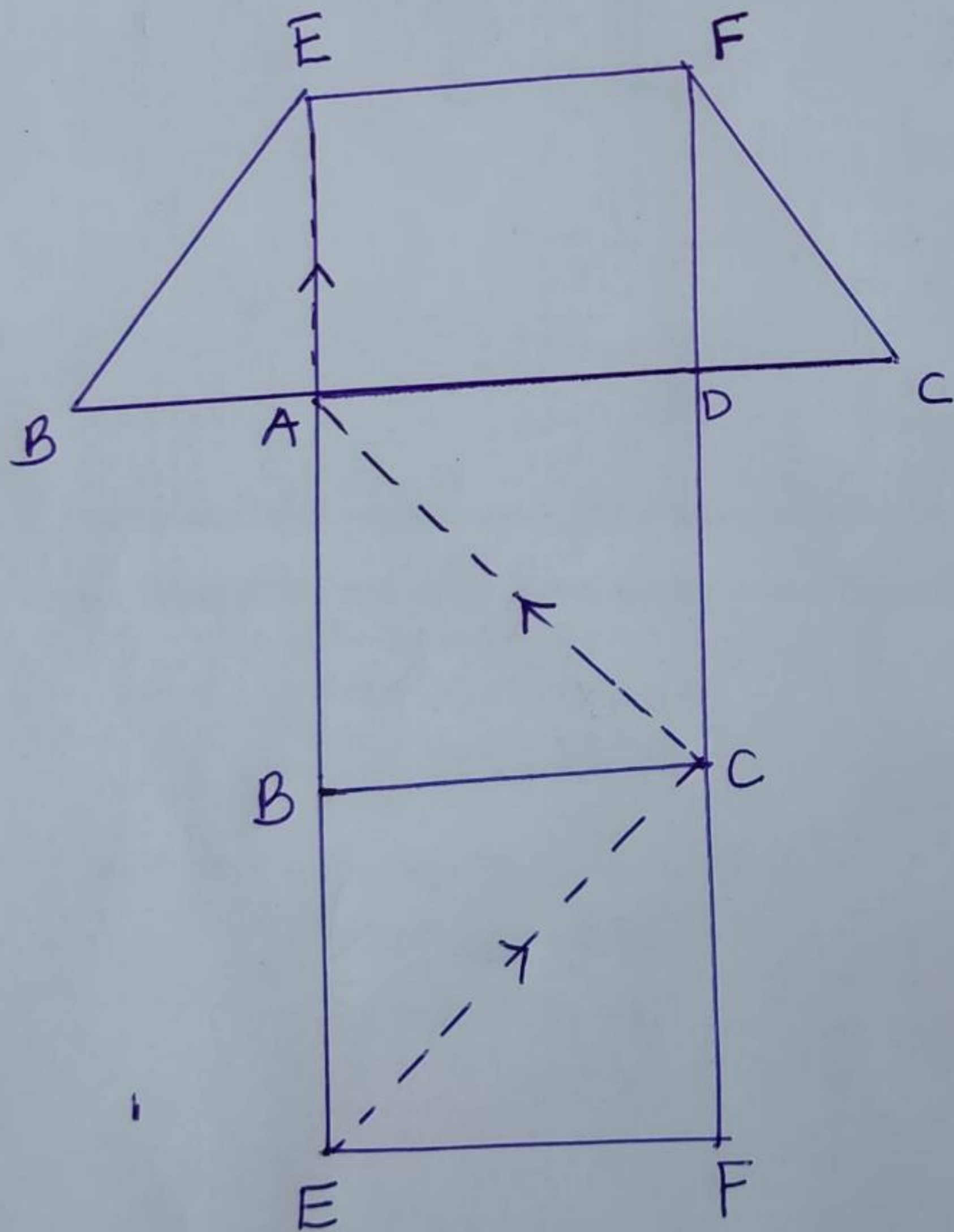
M<sub>1</sub> - Correct working

M<sub>1</sub> - For subtraction

A<sub>1</sub> - Correct Answer.

3

16]



B<sub>1</sub> - Correct drawing

B<sub>1</sub> - Correct labeling

B<sub>1</sub> - Correct showing of the path of string.



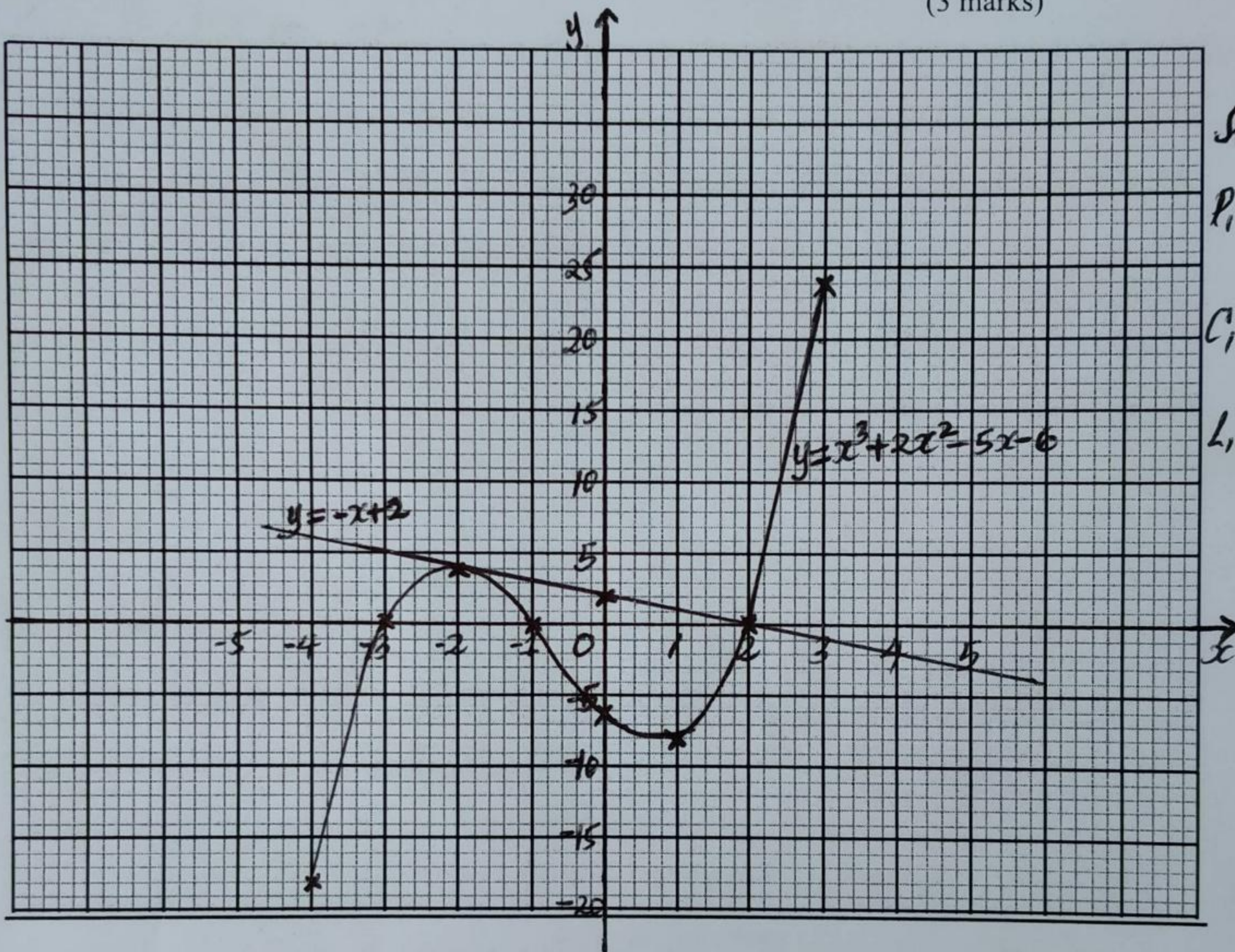
**SECTION II (Answer ONLY 5 questions in this section)**

17. (a). Complete the table below for the function  $y = x^3 + 2x^2 - 5x - 6$  (2 marks)

x	-4	-3	-2	-1	0	1	2	3
y	-18	0	4	0	-6	-8	0	24

B<sub>1</sub> - 4 correct points  
B<sub>1</sub> - other 3 correct points

(b). Using the values obtained in the table above draw the graph of  $y = x^3 + 2x^2 - 5x - 6$  (3 marks)



S<sub>1</sub> - correct scale  
P<sub>1</sub> - correct plotting  
C<sub>1</sub> - smooth curve  
L<sub>1</sub> - correct line

(c) Using your graph in (b) above, solve the following equations.

i.  $x^3 + 2x^2 - 5x - 6 = 0$  (2 marks)

$$\begin{aligned} x \quad y &= x^3 + 2x^2 - 5x - 6 \\ 0 &= x^3 + 2x^2 - 5x - 6 \\ \hline y &= 0 \end{aligned}$$

$x = -3$  or  $x = -1$  or  $x = 2$  B<sub>1</sub> - all the 3 points

ii.  $x(x^2 + 2x - 4) = 8$  (3 marks)

$$\begin{aligned} x^3 + 2x^2 - 4x - 8 &= 0 \\ y &= x^3 + 2x^2 - 5x - 6 \\ 0 &= x^3 + 2x^2 - 4x - 8 \\ \hline y &= -x + 2 \end{aligned}$$

x	0	1	2
y	2	1	0

$x = -2$  or  
 $x = -2$  or  
 $x = 2$

B<sub>1</sub> - correct eqns  
B<sub>1</sub> - all the 3 points



18.

$$(i) \quad \frac{30+h}{h} = \frac{40}{30}$$

$$30(30+h) = 40h$$

$$900 + 30h = 40h$$

$$10h = 900$$

$$\therefore h = 90 \text{ cm}$$

$$V = \frac{1}{3} \pi (20^2 \times 120 - 15^2 \times 90)$$

$$\frac{1}{3} \pi (48000 - 20250) = 9250\pi \text{ cm}^3$$

$$1 \text{ m}^3 = 1000 \text{ cm}^3$$

$$? = \frac{9250\pi \text{ cm}^3}{1000}$$

$$= \frac{9250\pi}{1000} = \underline{\underline{9.25\pi \text{ litres}}}$$

M<sub>1</sub> correct expression for h

M<sub>1</sub> correct h

M<sub>1</sub> for substitution to get volume

M<sub>1</sub> correct volume in cm<sup>3</sup>/m<sup>3</sup>

A<sub>1</sub> correct capacity in π

$$(ii) \quad V = \pi r^2 h$$

$$= \pi \times 12^2 \times 1.35$$

$$= 1.944\pi \text{ m}^3$$

$$1 \text{ m}^3 = 1000 \text{ litres}$$

$$1.944\pi \text{ m}^3 = ?$$

$$1.944\pi \times 1000$$

$$= \underline{\underline{1944\pi \text{ litres}}}$$

M<sub>1</sub> correct volume in m<sup>3</sup>/cm<sup>3</sup>

A<sub>1</sub> correct capacity in π

$$(iii) \quad \text{Number of Buckets} = \frac{\text{Volume of tank}}{\text{Volume of 1 bucket}}$$

$$= \frac{1944\pi \text{ litres}}{9.25\pi \text{ litres}}$$

$$= 210.16$$

$$= \underline{\underline{211 \text{ Buckets}}}$$

M<sub>1</sub> M<sub>1</sub> correct divisions

A<sub>1</sub> correct answer rounded off to 211.



19.]

a)

$$\cos \theta = \frac{3.5^2 + 6^2 - 4.2^2}{2 \times 3.5 \times 6}$$

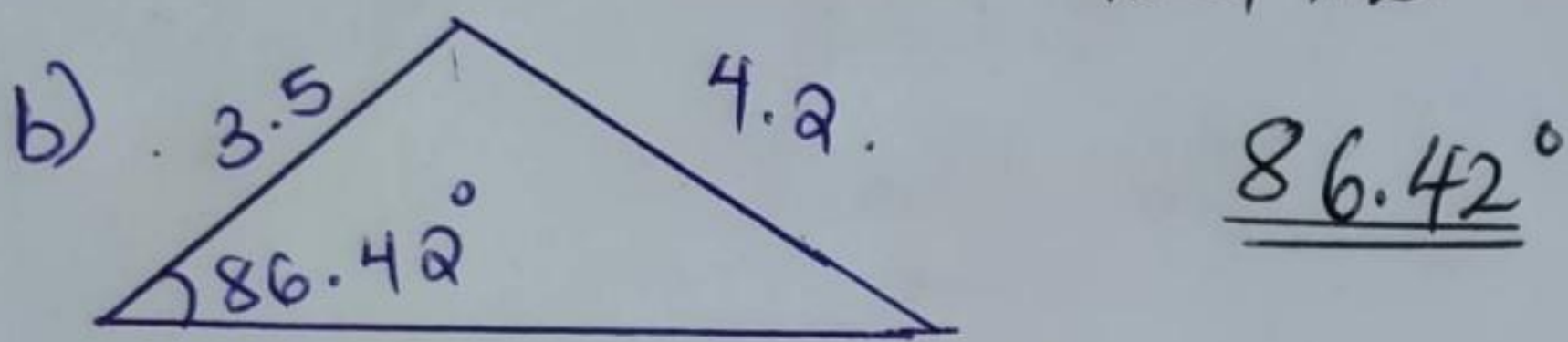
$$= \frac{12.25 + 36 - 17.64}{42}$$

$$= 0.7276$$

$$\theta = \cos^{-1} 0.7276$$

$$= 43.21$$

43.21 x 2



$$\frac{4.2}{\sin 86.42} = \frac{3.5}{\sin \theta}$$

$$\sin \theta = \frac{3.5 \sin 86.42}{4.2}$$

$$\theta = 34.8$$

$$\angle AYB = 34.8 \times 2$$

$$= 69.6^\circ$$

$$c) \frac{1}{2} \times 3.5 \times 3.5 \sin 86.42 + \frac{1}{2} \times 4.2 \times 4.2 \sin 69.2$$

$$6.113 + 8.245$$

$$= 14.358 \text{ cm}^2$$

$$d) A \text{ of } XAYB = \frac{\theta}{360} \pi r^2$$

$$14.358 - \frac{86.42}{360} \times \frac{22}{7} \times 3.5^2$$

$$14.358 - 9.242$$

$$= 5.116 \text{ cm}^2$$

M<sub>1</sub> - For cosine rule substitution

M<sub>1</sub> - simplification

M<sub>1</sub> - Multiplication by 2

A<sub>1</sub> - correct answer.

M<sub>1</sub> - substitution to sine rule

A<sub>1</sub> correct answer

M<sub>1</sub> - sum of the two areas

A<sub>1</sub> - correct answer.

M<sub>1</sub> - Difference of areas

A<sub>1</sub> correct answer



20.]

a). T : L : M

4 : 2 : 6.

4x : 2x : 6x ⇒ 12x

New costs.

1.06 × 4x : 1.09 × 2x : 1.2 × 6x

4.24x : 2.18x : 7.2x

Total ⇒ 13.62x

% change =  $\frac{\text{Incre}}{\text{Org}} \times 100$

=  $\frac{13.62x - 12x}{12x} \times 100$

=  $\frac{1.62x}{12x} \times 100 = 13.5\%$

b) 13.62x = 680

12x = ?

$\frac{12x \times 680}{13.62x} = 599.12$

c) 599 × 12 = 7189.44

New 680 × 12 = 8160

Saved 8160 - 7189.44

= Sh. 970.56

M<sub>1</sub> rep of ratios

M<sub>1</sub> Introduction of a constant

M<sub>1</sub> New prices in x

M<sub>1</sub> Total cost in x

M<sub>1</sub> for % change representation

A<sub>1</sub> Correct answer

M<sub>1</sub> implication

A<sub>1</sub> Correct answer

M<sub>1</sub> Multiplication by 12

A<sub>1</sub> Correct answer.



21.]  
a)

$$T = \frac{D}{S}$$

$$T = \frac{300}{80} = 3.75 \text{ hrs}$$

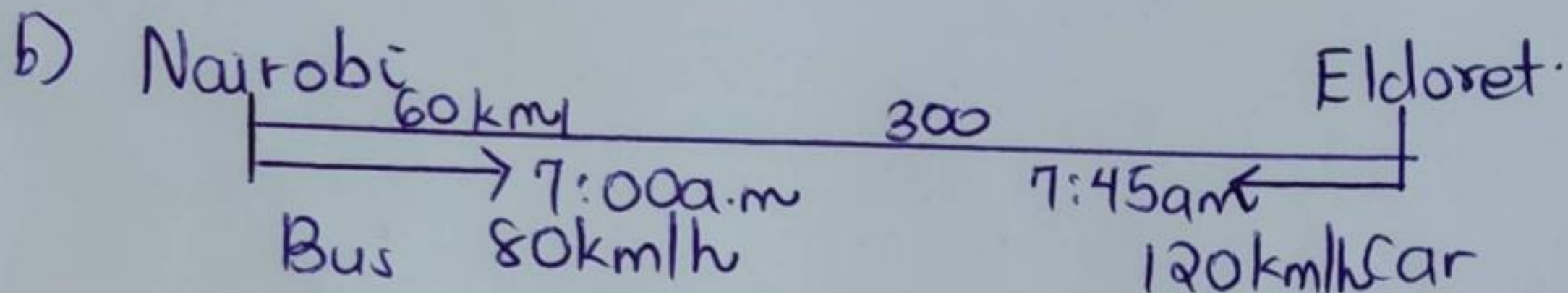
$$= 3 \text{ hrs } 45 \text{ mins}$$

$$\begin{array}{r} 7:00 \text{ a.m.} \\ + 3:45 \\ \hline 10:45 \text{ a.m.} \end{array}$$

→ M<sub>1</sub> correct time taken

→ A<sub>1</sub> correct time of the day

2



$$D = S \times T$$

$$= 80 \times \frac{3}{4} = 60 \text{ km}$$

$$D_R = 300 - 60 = 240 \text{ km}$$

$$R.S = 120 + 80 = 200 \text{ km/h}$$

$$T = \frac{D}{S} = \frac{240}{200} = 1.2 \text{ hrs}$$

$$= 1 \text{ hr } 12 \text{ mins}$$

$$\begin{array}{r} 7:45 \\ + 1:12 \\ \hline 8:57 \end{array}$$

$$= 8:57 \text{ a.m.}$$

→ M<sub>1</sub> for the dist of bus

→ M<sub>1</sub> correct time taken.

→ M<sub>1</sub> Addition of the time

→ A<sub>1</sub> correct answer.  
4 mks

c)

$$D = S \times T$$

$$120 \times 1.2 = 144 \text{ from Eld}$$

$$300 - 144 = 156 \text{ km}$$

→ M<sub>1</sub> Distance From Eld

→ A<sub>1</sub> correct answer  
2

d) Time of arrival =  $\frac{D}{S} = \frac{156}{120} = 1.3 \text{ hrs}$   
after meeting.

Bus was  $(1.3 \times 80) \text{ km}$  from meeting point

$$= 104$$

$$= 144 - 104$$

$$= 40 \text{ km}$$

→ M<sub>1</sub> Time of arrival

→ A<sub>1</sub> correct answer.  
2

Follow through for other methods.



22.]

$$\begin{aligned}
 a) \quad y &= mx + c \\
 3 &= -\frac{1}{2}(-1) + c \\
 3 &= \frac{1}{2} + c \\
 c &= 2.5 \\
 y &= -\frac{1}{2}x + 2.5
 \end{aligned}$$

$$\begin{aligned}
 b) \quad \frac{5 - -3}{4 - 1} \\
 = \frac{8}{3} \\
 = 2\frac{2}{3}
 \end{aligned}$$

$$\begin{aligned}
 c) \quad y &= mx + c \\
 5 &= \frac{8}{3}(4) + c \\
 c &= -5\frac{2}{3} \\
 y &= \frac{8}{3}x - \frac{17}{3} \quad \text{OR} \quad y = 2\frac{2}{3}x - 5\frac{2}{3}
 \end{aligned}$$

$$\begin{aligned}
 d) \quad g = M_1 \times M_2 &= -1 \\
 \frac{8}{3} \times M_2 &= -1 \\
 M_2 &= -\frac{3}{8}
 \end{aligned}$$

$$\begin{aligned}
 y &= mx + c \\
 5 &= -\frac{3}{8}(0) + c \\
 y &= -\frac{3}{8}x + 5
 \end{aligned}$$

$$\begin{aligned}
 e) \quad g \text{ of } L_1 &= -\frac{1}{2} \quad R(4, 5) \\
 5 &= -\frac{1}{2}(4)^2 + c \\
 5 &= -2 + c \\
 c &= 7 \\
 y &= -\frac{1}{2}x + 7
 \end{aligned}$$

M<sub>1</sub> expression for getting the eqn

$\frac{A_1}{2}$  correct eqn

$\frac{B_1}{1}$  correct gradient

M<sub>1</sub> correct c

$\frac{A_1}{2}$  correct eqn

M<sub>1</sub> correct gradient

M<sub>1</sub> expression to get eqn

$\frac{A_1}{3}$  correct eqn

M<sub>1</sub> correct c

$\frac{A_1}{2}$  correct eqn

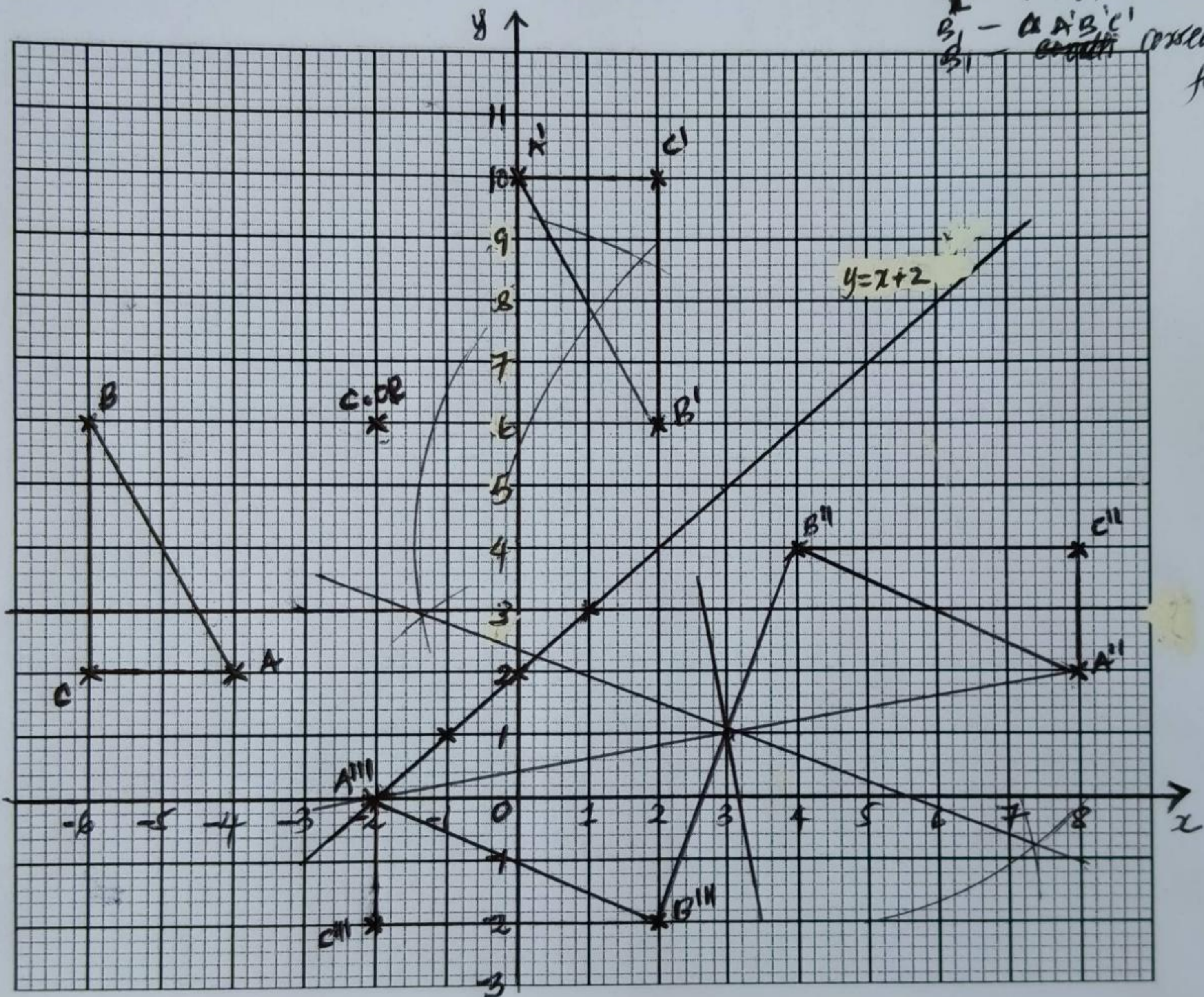


23. A triangle with A (-4, 2), B (-6, 6) and C (-6, 2) is enlarged by a scale factor -1 and centre (-2, 6) to produce triangle A'B'C'.

a) Draw triangle ABC and A'B'C'. and state its coordinates

A'(0,10) B'(2,6) C'(2,10)

(4 marks)  
 B<sub>1</sub> - Δ ABC  
 B<sub>2</sub> - correct rotation  
 B<sub>3</sub> - Δ A'B'C' correct coordinates  
 B<sub>4</sub> - correct coordinates for A'B'C'



b) Triangle A'B'C' is then reflected in the line  $y = x + 2$  to give triangle A''B''C'' draw A''B''C'' and state its coordinates

x	1	0	-1
y	3	2	1

A''(8,2) B''(4,4) C''(8,4)

(3 marks)  
 B<sub>1</sub> - correct line  $y = x + 2$   
 B<sub>2</sub> - correct A''B''C''  
 B<sub>3</sub> - coordinates of A''B''C''

c) If triangle A''B''C'' is mapped onto A'''B'''C''' whose co-ordinates are A'''(-2, 0), B'''(2, -2) and C'''(-2, -2) by a rotation. Find the centre and angle of rotation.

C.O.R (3,1)

A.O.R  $\pm 180^\circ$  accept  $-180^\circ$

(3 marks)  
 B<sub>1</sub> - correct Δ A'''B'''C'''  
 B<sub>2</sub> - correct C.O.R  
 B<sub>3</sub> - correct angle of rotation



24.] i)  $v = \frac{1}{2}t^2 - 3t + 7$   
 $v = \frac{1}{2}(8)^2 - 3(8) + 7$   
 $32 - 24 + 7$   
 $15 \text{ m/s}$

M<sub>1</sub> correct  
Substitution

A<sub>1</sub> correct answer  
2

ii)  $a = t - 3$   
 $a = (0) - 3$   
 $= -3 \text{ m/s}^2$

M<sub>1</sub> a equation

A<sub>1</sub> correct answer  
2

iii) at min v, a = 0.

$$0 = t - 3$$

$$t = 3 \text{ sec}$$

$$v = \frac{1}{2}(3^2) - 3(3) + 7$$

$$= 2.5 \text{ m/s}$$

M<sub>1</sub> correct time  
t = 3

A<sub>1</sub> correct answer  
2

iv)  $s = \frac{1}{2} \times \frac{t^3}{3} - 3 \frac{t^2}{2} + 7t + c$

$$t = 0, s = 0 \quad \therefore c = 0$$

$$s = \frac{t^3}{6} - \frac{3}{2}t^2 + 7t$$

$$s = \frac{2^3}{6} - \frac{3}{2}(2)^2 + 7(2)$$

$$\frac{1}{3} - 6 + 14$$

$$9\frac{1}{3} \text{ m}$$

M<sub>1</sub> for integration

M<sub>1</sub> correct s  
function

M<sub>1</sub> for  
substitution

A<sub>1</sub> correct answer  
4