

FORM THREE MATH MARKING SCHEME

PAPER 2 121/2

1 num $36+32+5 = 73$ M1
 den $9-8(-8) = 9+64 = 73$ M1
 Ans $\frac{73}{73} = 1$ A1

2 $\frac{a+b}{2} - \frac{2a-b}{3} = \frac{3(a+b)-2(2a-b)}{6}$ M1
 $= \frac{3a+3b-4a+2b}{6}$ M1
 $= \frac{5b-a}{6}$ or $-\frac{a+5b}{6}$ A1

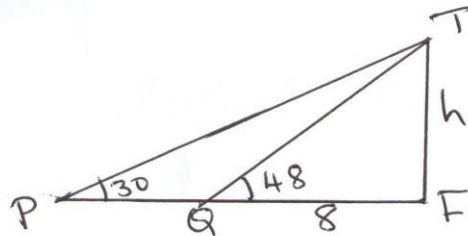
3 GCD of $181-5$ and $236-5$ M1
 $=$
$$\begin{array}{r|rr} 11 & 176 & 231 \\ & 16 & 21 \end{array}$$

 The number is 11 A1

4. (a) Original perimeter $= 2(20+15) = 70$
 increase $= 4 \times 2.5 = 10$ M1
 $\% \text{ inc} = \frac{10}{70} \times 100 = 14.29\%$ A1

(b) Original area $= 20 \times 15 = 300$
 area with increase $= (2.5+20)(2.5 \times 15) = 393.75$ M1
 Increase $= 93.75$
 $\% \text{ inc} = \frac{93.75}{300} \times 100 = 31.25\%$ A1

5



$$\textcircled{a} \quad \tan 48 = \frac{h}{8}$$

$$h = 8 \tan 48 = 8.885$$

B1

$$\textcircled{b} \quad \tan 30 = \frac{8.885}{PF}$$

$$PF = \frac{8.885}{\tan 30} = 15.39$$

M1

$$PQ = 15.39 - 8 = 7.389$$

A1

6

$$\theta = \cos^{-1}(-0.8070)$$

$$\text{acute } \theta = 36.20^\circ$$

2nd & 3rd quad.

$$\theta = 180 - 36.20 = 143.8^\circ$$

$$\theta = 180 + 36.20 = 216.2^\circ$$

$$\text{Beyond } 360^\circ \quad \theta = 143.8 + 360 = 503.8^\circ$$

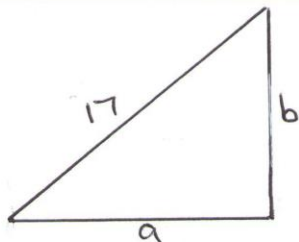
$$\theta = 216.2 + 360 = 576.2^\circ$$

B1

B1

B1

7



$$a + b = 23 \quad \text{--- (i)}$$

$$a^2 + b^2 = 289 \quad \text{--- (ii)}$$

subst (i) in (ii)

$$a^2 + (23 - a)^2 = 289$$

$$a^2 + 529 - 46a + a^2 = 289$$

$$2a^2 - 46a + 240 = 0$$

$$a^2 - 23a + 120 = 0$$

$$a^2 - 8a - 15a + 120 = 0$$

$$a(a - 8) - 15(a - 8) = 0$$

2

$$a = 15 \text{ or } 8$$

$$b = 8 \text{ or } 15$$

M1 both eqns

M1 quad eqn

M1 Attempt to solve correctly.

A1

$$8. \log 5 - 2\log 10 + \log(2x+10) = \log(x-4) \quad M1 \quad \log 10$$

$$\log \left(\frac{5}{10^2} \times (2x+10) \right) = \log(x-4) \quad M1$$

$$\frac{x}{10} + \frac{1}{2} = x-4$$

$$-\frac{9}{10}x = -\frac{9}{2}$$

$$x = -\frac{9}{2} \times \frac{10}{-9} = 5 \quad A1$$

$$9. \quad x^2 - \frac{13}{11} = -\frac{3}{11}$$

$$x^2 - \frac{13}{11} + \left(\frac{13}{11}\right)^2 = -\frac{3}{11} + \left(\frac{13}{11}\right)^2 \quad M1$$

$$\left(x - \frac{13}{11}\right)^2 = -\frac{3}{11} + \frac{169}{121}$$

$$= \frac{136}{121}$$

$$x - \frac{13}{11} = \pm \sqrt{\frac{136}{121}} \quad M1$$

$$\text{either } x = \sqrt{\frac{136}{121}} + \frac{13}{11}$$

$$= \frac{11.66}{11} + \frac{13}{11} = 2.242 \quad A1$$

$$\text{or } x = -\sqrt{\frac{136}{121}} + \frac{13}{11}$$

$$= -\frac{11.66}{11} + \frac{13}{11} = 0.1218 \quad A1$$

$$10. \frac{(4\sqrt{5} + 3\sqrt{2})(2\sqrt{2} + \sqrt{5})}{(2\sqrt{2} - \sqrt{5})(2\sqrt{2} + \sqrt{5})} \quad M1 \quad \text{Conjugate}$$

$$\frac{\text{num}}{8\sqrt{10} + 20 + 12 + 3\sqrt{10}} \quad M1$$

$$= 32 + 11\sqrt{10}$$

den

$$8 + 2\sqrt{10} - 2\sqrt{10} - 5 \quad M1$$

$$= 3$$

$$\text{Ans} = \frac{32 + 11\sqrt{10}}{3} \quad A1$$

11	(a) 0.6816 (b) 0.2030	B1 B1
12	1 Eth. Birr = sh 7.95 ? = sh 9898 = Birr 1245.03 Bal after spending $= \frac{1}{4} \times 1245.03 = 311.26$ 1 Eth Birr = sh 7.98 311.26 = ? $= 311.26 \times 7.98 =$ sh 2483.80	M1 M1 A1
13	num $(3t - 5a)(3t + 5a)$ den $6t^2 + 9at + 10at + 15a^2$ $= 3t(2t + 3a) + 5a(2t + 3a)$ $= (3t + 5a)(2t + 3a)$ $\frac{(3t - 5a)(\cancel{3t + 5a})}{(\cancel{3t + 5a})(2t + 3a)} = \frac{3t - 5a}{2t + 3a}$	M1 M1 A1
14	$130\% = 221$ $100\% = ?$ $= \frac{22100}{130} = \text{sh } 170$ $\frac{2}{7+K}(203) + \frac{5}{7+K}(146) + \frac{K}{7+K}(197) = 170$ $406 + 730 + 197K = 170(7+K)$ $1136 + 197K = 1190 + 170K$ $27K = 54$ $K = 2$	M1 M1 A1

15 Let the number be xy
 $4y - x = 1$ --- (i)

$$10x + y - (10y + x) = 45$$

$$10x + y - 10y - x = 45$$

$$9x - 9y = 45$$
 --- (ii)

From (i) $x = 4y - 1$, subst in (ii)

$$9(4y - 1) - 9y = 45$$

$$36y - 9 - 9y = 45$$

$$27y = 54$$

$$y = 2$$

$$x = 4 \times 2 - 1$$

$$= 8 - 1 = 7$$

The no. is 72.

M1

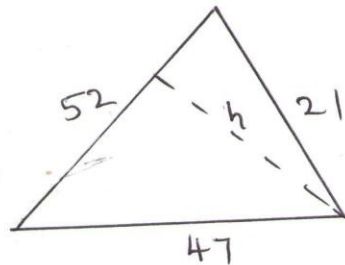
both eqns

M1

attempt to eliminate one letter.

A1

16.



(a)

Area

$$S = \frac{1}{2} (47 + 21 + 52) = 60$$

$$A = \sqrt{60(60-52)(60-47)(60-21)}$$

$$= \sqrt{60 \times 8 \times 13 \times 39} = 493.3 \text{ m}^2$$

$$= 493 \text{ m}^2$$

M1

A1

(b)

$$\frac{1}{2} \times 52 \times h = 493$$

$$h = \frac{493 \times 2}{52} = 18.96 \text{ m.}$$

B1

17	(a) i) $\frac{57600}{x}$	BI
	ii) $\frac{57600}{x} - 480$	BI
	(b) No. of cartons bought from Kerugoya bookstore = $x+4$	MI
	$(x+4) \left(\frac{57600}{x} - 480 \right) = 57600$	MI
	$57600 - 480x + \frac{230400}{x} - 1920 = 57600$	
	$55680x - 480x^2 + 230400 = 57600x$	MI
	$-1920x - 480x^2 + 230400 = 0$	
	$x^2 + 4x - 480 = 0$	MI
	$x^2 - 20x + 24x - 480 = 0$	
	$x(x-20) + 24(x-20) = 0$	
	$x = 20$	AI
	$x = -24$	
	No of cartons = 20	BI
	(c) $\frac{720 \times 20}{57600} \times 100 = 25\%$	MAI
		10

18 (a) Volm of metal bar

$$\frac{22}{7} \times 7 \times 7 \times 200 = 30,800 \text{ cm}^3$$

m1

$$\text{Remaining} = \frac{95}{100} \times 30800 = 29260 \text{ cm}^3$$

m1

A1

(b) $\frac{4}{3} \times \frac{22}{7} \times 3.5^3$ - volm of 1 ball

$$\text{no. of balls} = \frac{29260 \times 21}{4 \times 22 \times 3.5^3}$$

m1

$$= 162.86$$

A1

$$= 162 \text{ balls}$$

B1

(c) circles

$$2 \times \frac{22}{7} \times 7^2 = 308$$

$$\text{C.S} = 2 \times \frac{22}{7} \times 7 \times 200 = 8800$$

m1

$$\text{T.S.A} = 8800 + 308$$

$$= 9108 \text{ cm}^2$$

A1

(d) $162 \times 4 \times \frac{22}{7} \times 3.5^2$

m1

$$= 24948 \text{ cm}^2$$

A1

10

19. $y = 2x^2 - 2x - 3x + 3$
 $y = 2x^2 - 5x + 3$

x	-2	-1	0	1	2	3	4
$2x^2$	8	2	0	2	8	18	32
$-5x$	10	5	0	-5	-10	-15	-20
3	3	3	3	3	3	3	3
y	21	10	3	0	1	6	15

Table
83

BI — $2x^2$
 BI — $-5x$
 BI — y

S1

P1

C1

(b) $y = 0$
 $x = 0$

BI

(b) $y = 2x^2 - 2x - 3x + 3$
 $y = 2x^2 - 5x + 3$
 $- 0 = 2x^2 - 3x - 2$
 $y = -2x + 5$

BI

x	0	-1	1
y	5	7	3

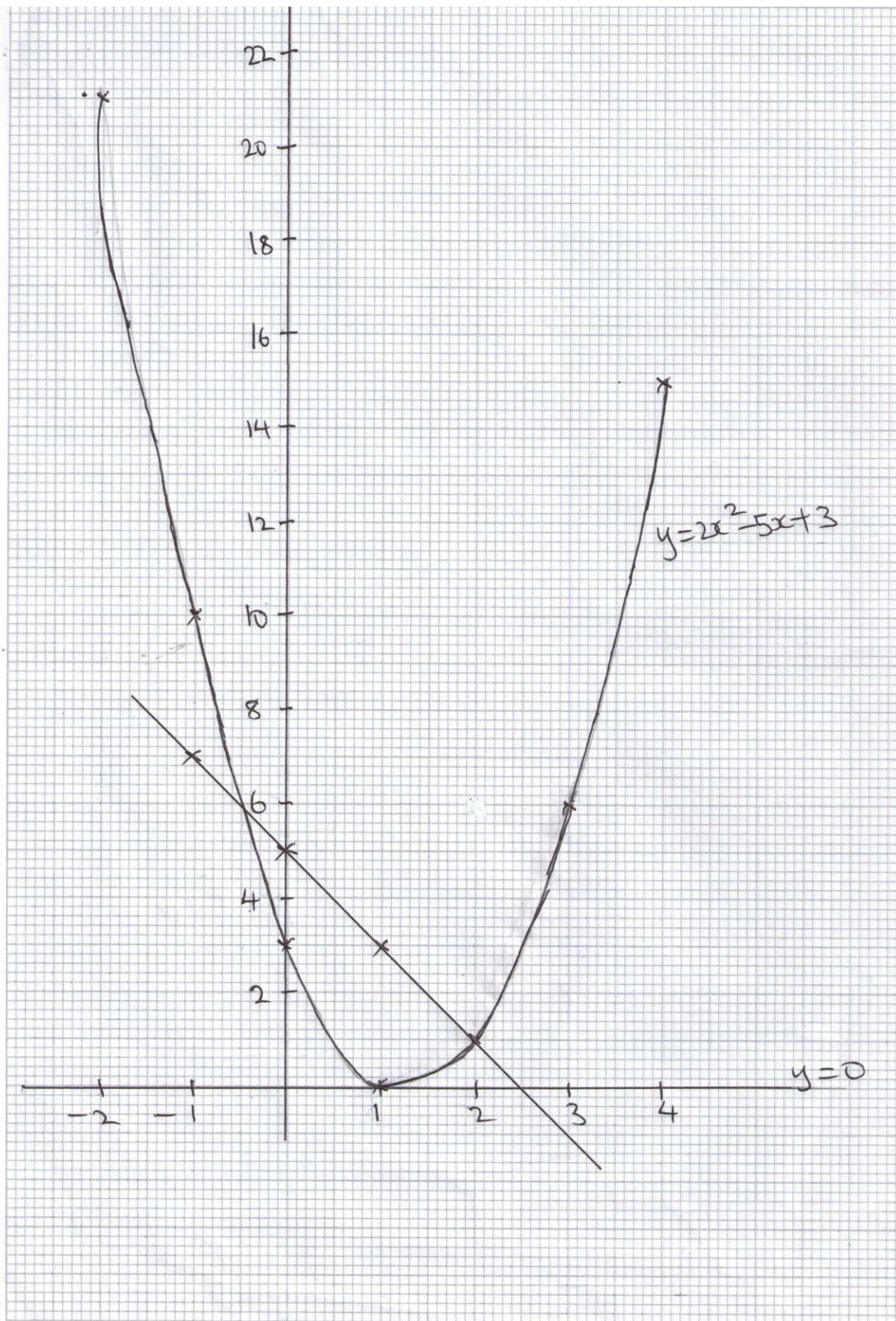
L1

$x = 2$

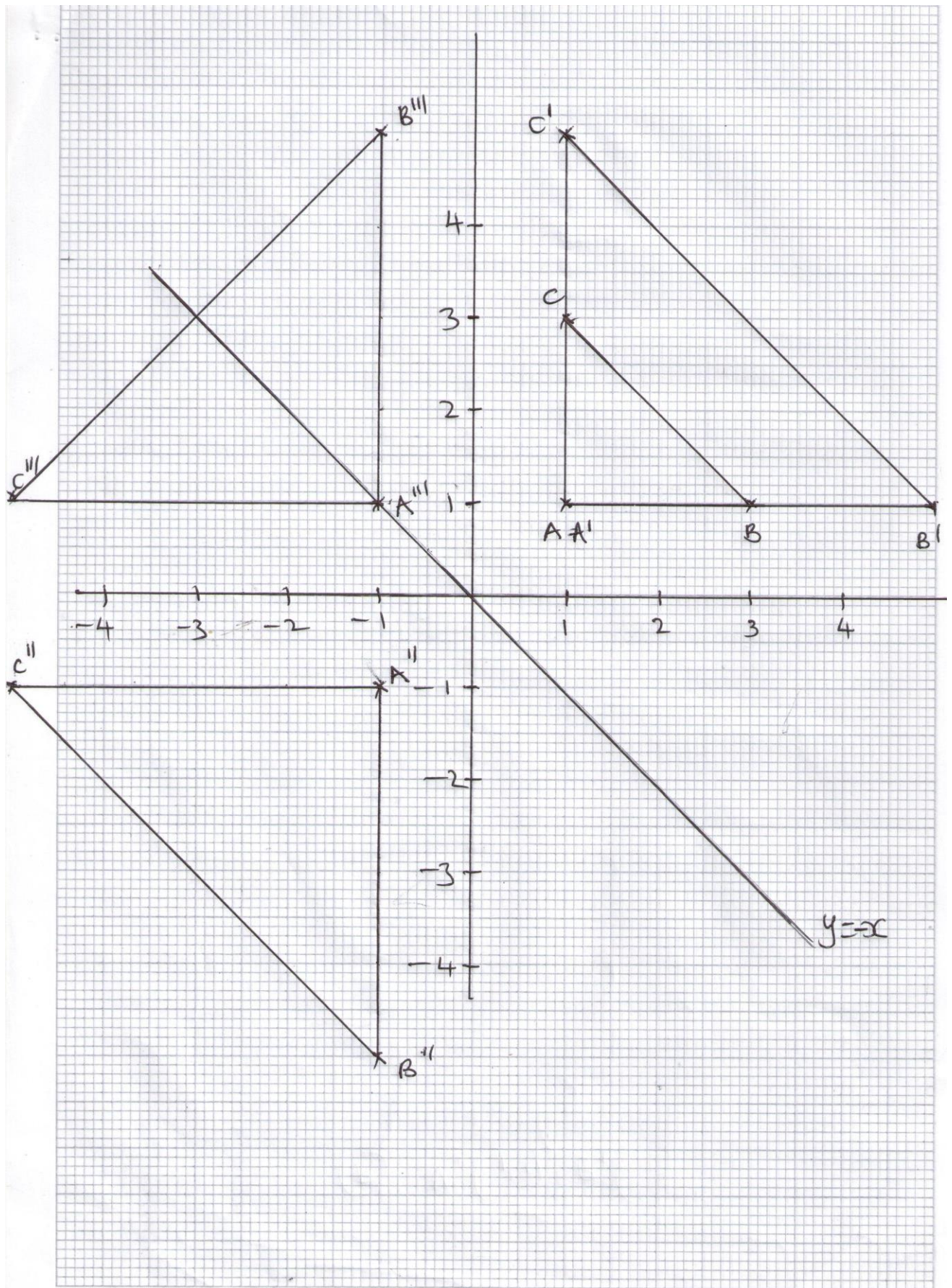
BI

$x = -0.45$

10



20	(b) $A'(1,1) B'(5,1) C'(1,5)$	BI BI BI	object
	(c) $A''(-1,-1) B''(-1,-5), C''(-5,-1)$	LI BI BI	Mirror line can be implied
	(d) $A'''(-1,1) B'''(-1,5) C'''(-5,-1)$	BI BI	
	(e) Rotation -90° about $(0,0)$	BI BI	
		10	
22	(a) $\frac{60}{100} \times 2800000 = \text{sh}1,680000$	BI	
	(b) Wangiku = $\frac{3}{10} \times 1680000 = 504,000$	BI	
	Muthoni = $\frac{2}{10} \times 1680000 = 336,000$	BI	
	Njoki = $\frac{5}{10} \times 1680000 = 840,000$	BI	
	(c) $\frac{5}{10} \times 2080000 = 1,040,000$	BI	
	(d) Bal = $\frac{40}{100} \times 2800000 = 1,120,000$	MI	
	$\frac{7}{10} \times 1120000 = 784000$	MIAI	
	(e) Received $\frac{3}{10} \times 2080000 = 624000$		
	Paid $\frac{3}{10} \times 1120000 = 336000$	MI	
	Remained = 288000	AI	
		10	



23 (b) $\cos \theta = \frac{1}{2} = 0.5$
 $\theta = 60^\circ$
 Angle at centre = 120°

(c) i) $\frac{120}{360} \times 2 \times \frac{22}{7} \times 2 = 4.190$

ii) $\frac{120}{360} \times 2 \times \frac{22}{7} \times 2^2 - \frac{1}{2} \times 2^2 \sin 120$
 $= 4.190 - 1.7321 = 2.4579$

M1

A1

M1

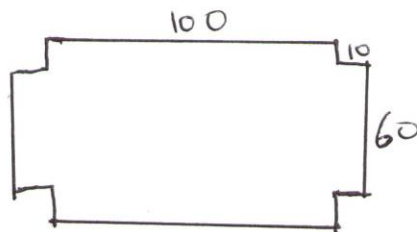
A1

M1

M1

A1

24



(a) i) $99.7 \times 59.7 \times 9.85$
 $= 58628 \text{ cm}^3$

B1 — dimensions

M1

A1

ii) Outer volm = $100 \times 60 \times 10$
 $= 60000$

Inner volm = $\frac{58628}{1000}$

M1

Volm of material = 1372 cm^3

M1

Mass = $\frac{1372 \times 2.2}{1000} = 3 \text{ kg}$

A1

(b) Mass of liquid
 $= \frac{0.75 \times 58628}{1000} = 43.971 \text{ kg}$

M1

Total mass = 46.971 kg

A1

(c) $4 \times 10 \times 10 \times 0.15 = \text{volm}$
 $= 60 \text{ cm}^3$

M1

Mass = $60 \times 2.2 = 132 \text{ g}$

A1

14

10

