Class	Index Number	Name

ANG MO KIO SECONDARY SCHOOL
FINAL EXAMINATION 2018
SECONDARY TWO NORMAL ACADEMIC

MATHEMATICS SYLLABUS A **4045/01**

Paper 1

Wednesday **1 hour 15 minutes**

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
Calculators should be used where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is **50**.

For Examiner's Use
50

This document consists of **13** printed pages and **1** blank page

Answer **all** the questions

1 5 men take 28 days to build a boat. Assuming the men work at the same rate, calculate the number of men needed to build a boat in 20 days.

Answer ..... men [2]

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2 A map is drawn to a scale of 1 : 250 000.

(a) If the actual distance between two towns is 7 km, find the distance, in centimetres, between the two towns on the map.

Answer ..... cm [2]

(b) A forest has an area of 4.5 cm^2 on the map. Calculate, in square kilometres, the actual area of the forest.

Answer ..... km^2 [2]

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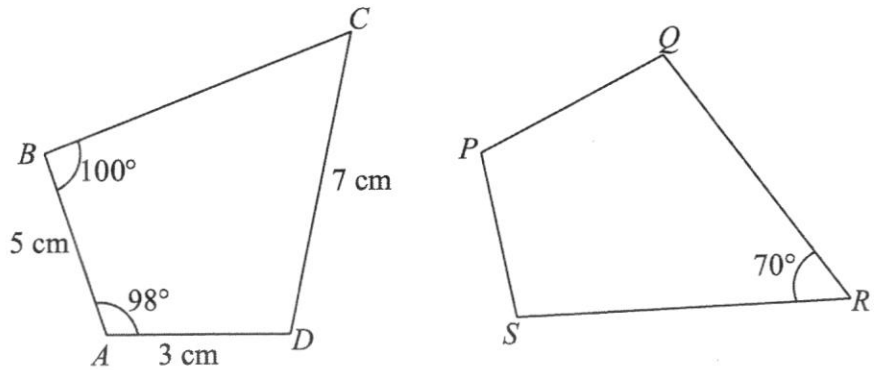
3 In the diagram not drawn to scale, $ABCD$ is congruent to $PSRQ$. Find



(a) the length of PS,

Answer $PS =$ ..... cm [1]

(b) the size of $\angle PQR$.

Answer $\angle PQR =$ ..... ° [2]

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4 Given that a is directly proportional to the cube of b, and $a = 24$ when $b = 2$,

(a) Express a in terms of b.

Answer $a =$ ..... [2]

(b) Find the value of a when $b = 4$.

Answer $a =$ ..... [1]

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5 A bag contains 30 balls of which x balls are red, 8 balls are blue and the rest are white. A ball is drawn at random from the bag.

(a) Find the probability of picking

(i) a blue ball,

Answer ..... [1]

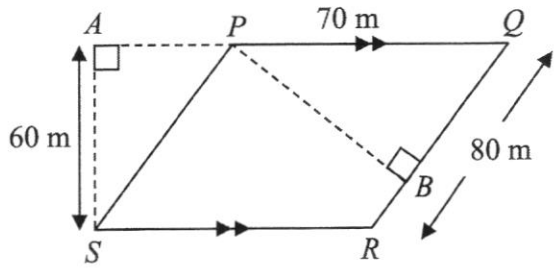
(ii) a black ball.

Answer ..... [1]

(b) If the probability of picking a white ball is $\frac{1}{5}$, find the value of x.

Answer $x =$ ..... [2]

6 The diagram shows a garden $PQRS$ in the shape of a parallelogram, where $PQ = 70$ m and $QR = 80$ m. The line PB is perpendicular to QR, while the perpendicular distance between PQ and SR is 60 m.



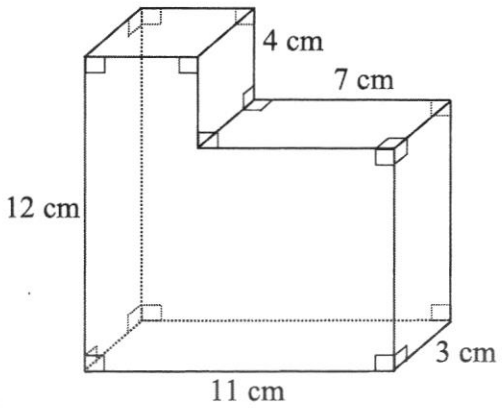
(a) Find the area of the garden $PQRS$.

Answer ..... m^2 [1]

(b) Hence, calculate the length of PB.

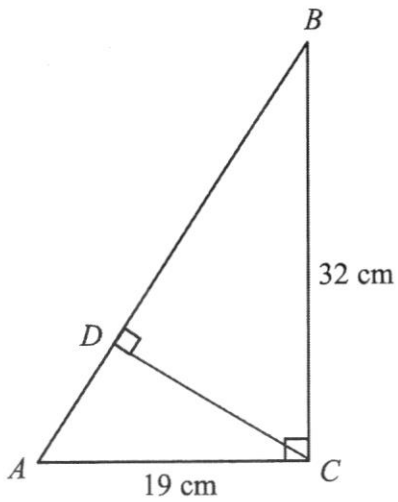
Answer $PB =$ ..... m [2]

7 Find the total surface area of the prism below.



Answer ..... cm^2 [3]

8 In the diagram, ABC is a right-angled triangle and ADB is a straight line. It is given that $BC = 32$ cm, $AC = 19$ cm and $\angle BDC = 90°$.



Find

(a) $\angle DBC$,

Answer $\angle DBC =$ ..... ° [2]

(b) DC.

Answer $DC =$ ..... cm [2]

9 **(a)** Simplify $3-4(2x-1)$.

.....

Answer ..... [2]

(b) Factorise completely $a^2-4ab+ax-4bx$.

Answer ..... [2]

(c) Simplify the expression $\frac{24x^2y^3}{x} \div \frac{3y^2}{4}$.

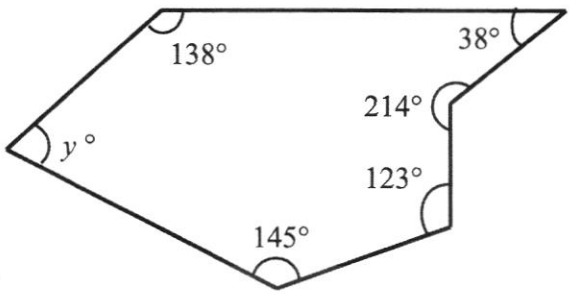
Answer [2]

10 Express as a single fraction

$$\frac{5}{x+2}-\frac{2}{x-1}.$$

Answer ..... [2]

11 **(a)** The figure is a hexagon. Calculate the value of y.



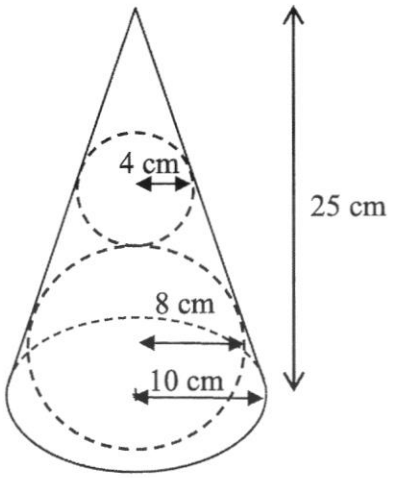
Answer ..... ° [2]

(b) The size of each exterior angle of a regular n-sided polygon is 20°. How many sides does this polygon have?

Answer ..... [2]

12 **(a)** 2 spherical metal balls, of radii 8 cm and 4 cm respectively are put into a regular conical container. The radius of the cone is 10 cm and the height of the cone is 25 cm.

[Volume of sphere $= \frac{4}{3}\pi r^3$, Volume of cone $= \frac{1}{3}\pi r^2 h$]



(i) Show that the volume of the 2 spherical metal balls is approximately 2410 cm^3 .

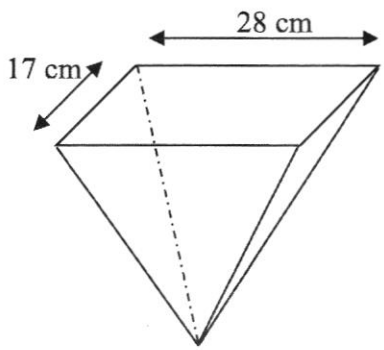
Answer ..... cm^3 [2]

(ii) Calculate the volume in the cone not occupied by the balls.

Answer ..... cm^3 [2]

Question 12(b) is on the next page.

(b) The 2 spherical metal balls are melted and recast to form a solid rectangular pyramid as shown below.



Calculate the height of the solid pyramid.

Answer ..... cm [2]

13 **(a)** Construct triangle PQR where $PR = 8$ cm and $QR = 11$ cm. PQ has already been drawn.

Answer (a), (c)

[2]

(b) Measure and write down $\angle PRQ$.

Answer $\angle PRQ =$ ..... ° [1]

(c) Construct

(i) the angle bisector of $\angle QPR$, [1]

(ii) the perpendicular bisector of PQ. [1]

(d) The perpendicular bisector of PQ meets the angle bisector of $\angle QPR$ at X. Mark the point X and write down the length of QX.

Answer $QX =$ ..... cm [1]

END OF PAPER

Class	Index Number	Name

ANG MO KIO SECONDARY SCHOOL
FINAL EXAMINATION 2018
SECONDARY TWO NORMAL ACADEMIC

MATHEMATICS SYLLABUS A **4045/02**

Paper 2

Thursday **1 hours 30 minutes**

Additional Materials: Answer Paper
Graph Paper (1 sheet)

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
Calculators should be used where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is **50**.

1 **(a)** Javier spends £250 on his credit card when he is in the UK. He pays a credit card fee of 1.25% of this amount. The credit card company uses an exchange rate between Singapore dollars ($) and pounds (£) of $1 = £0.57.
Calculate the total cost in Singapore dollars that Javier has to pay the credit card company. Give your answer correct to the nearest cent. [2]

(b) A salesman sells a laptop for $1300. He makes a loss of 12% on the price he paid for the laptop. Calculate the price the salesman paid for the laptop. [2]

(c) Given that $k = \sqrt{\frac{p}{x}}$,

(i) express x in terms of k and p, [2]

(ii) hence or otherwise, find x given that $p = 2$ and $k = -4$. [2]

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2 An adult movie ticket at Cathay cinemas costs $\$x$ and a child movie ticket costs $\$y$.

(a) Mr Chua bought 2 adult tickets and 1 child ticket and paid $25 in total. Write down an equation in terms of x and y. [1]

(b) On the same day, Mr Ali bought 2 adult tickets and 3 children tickets and paid $39 in total. Write down another equation in terms of x and y. [1]

(c) Solve the equations in **(a)** and **(b)** simultaneously to find the value of x and of y. [3]

(d) Mr Muthu intends to bring his wife, mother and two children to the cinema. Find the expected total cost that Mr Muthu would have to pay. [2]

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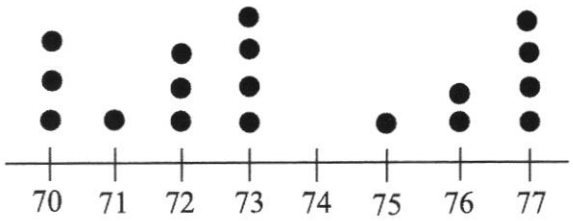
3 The dot diagram represents the speeds, in kilometres per hour of 18 motorists travelling along the Pan Island Expressway (PIE) during peak hour.



(a) Find the modal speed. [1]

(b) Find the median speed. [1]

(c) What percentage of the motorists travelled at most 75 km/h? [2]

(d) Find the mean speed of the 18 motorists. [2]

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4 Mr Lee bought p apples for \$3.

(a) Find an expression, in terms of p, for the cost in cents, of each apple. [1]

(b) It was found that 2 of the apples were bad, and could not be sold.
Mr Lee sold each remaining apple for 10 cents more than he paid for it.
Write down an expression, in terms of p, for the total sum he received, in cents, from the sale of the apples. [1]

(c) He made a profit of 20 cents from the sale of the apples.
Write down an equation to represent this information, and show that it simplifies to $p^2 - 4p - 60 = 0$. [3]

(d) Solve the equation $p^2 - 4p - 60 = 0$. [3]

(e) Find the selling price of each apple. [1]

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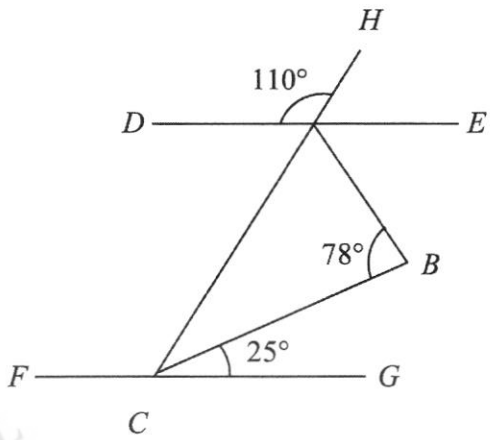
5 In the diagram, DE is parallel with FG, $\angle DAH = 110°$, $\angle ABC = 78°$ and $\angle BCG = 25°$.



Find

(a) $\angle ACB$, [2]

(b) $\angle CAB$. [1]

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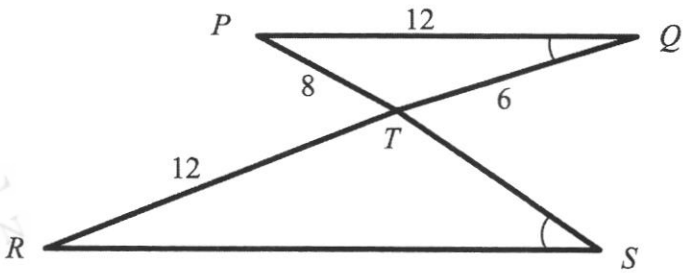
6 In the diagram, triangle PQT is similar to triangle RST and $\angle PQT = \angle RST$.

All measurements are in centimetres.



Calculate

(a) the length of ST, [2]

(b) the area of triangle RST is 49.7 cm^2. Find the perpendicular distance of T to RS. [2]

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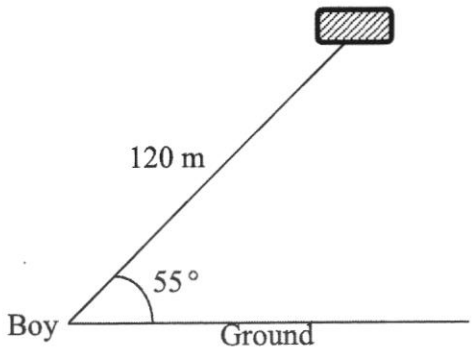
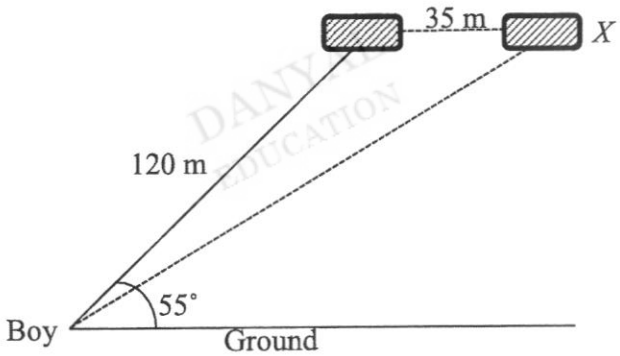
7 A boy releases 120 m of string while flying a kite. The string makes an angle of 55° with the ground.



(a) Calculate the height of the kite, above the ground. [2]

(b) The wind blows stronger and the kite is carried 35 m further away from the boy, to point X as shown below.



Assuming the boy releases more string and there is no change in the height of the kite above the ground, calculate

(i) the length of the string, [3]

(ii) the angle the string now makes with the ground. [2]

8 Answer the whole of this question on the graph paper provided.

David wants to open a hipster café selling drinks. After conducting a market research, he found that if he were to price his drinks at $\$x$, the profit, $\$y$ would be given by the formula $y = x^2 - 4x$. Some of the corresponding values of x and y are given in the following table.

x	0	1	2	3	4	5	6
y	0	-3	-4	-3	p	5	12

(a) Calculate the value of p. [1]

(b) Using a scale of 2 cm to represent \$1 unit, draw a horizontal x-axis for $0 \leq x \leq 6$.
Using a scale of 1 cm to represent \$1 units, draw a vertical y-axis for $-4 \leq y \leq 12$.
On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) Use your graph to estimate

(i) the profit if the price of his drinks is at \$4.50, [1]

(ii) the range of price he should sell his drinks in order not to incur a loss. [1]

END OF PAPER

AMKSS 2NA EM P1 FE 2018 Answer Scheme

Qn	Answers	Marking Scheme
1	$(5)(28) = 20m$ $m = (5)(28) \ / 20$ $= 7$ men	 M1 A1
2(a)	1 cm : 2.5 km $7 \div 2.5$ $= 2.8$ cm	 M1 A1
2(b)	$1\ cm^2 : 6.25\ km^2$ 4.5×6.25 $= 28.125\ km^2$	M1 A1
3(i)	$PS = AB = 5$ cm	B1
3(ii)	Angle $PQR = 360° - 100° - 98° - 70°$ $= 92°$	M1 A1
4(a)	$a = kb^3$ $24 = 8k$ $k = 3$ $a = 3b^3$	 M1 A1
4(b)	$a = 3(4)^3$ $=192$	 B1
5(a)(i)	$\frac{4}{15}$	B1
5(a)(ii)	0	B1
5(b)	$\frac{22-x}{30} = \frac{1}{5}$ $110 - 5x = 30$ $5x = 80$ $x = 16$	M1 A1

6(a)	$70 \times 60 = 4200\ m^2$	B1
6(b)	$4200 \div 80$ $= 52.5\ m$	M1 A1
7	Cross-sectional area = $(11 \times 8) + (4 \times 4)$ $= 104\ cm^2$ Lateral area = $(12+11+8+7+4+4) \times 3$ $= 138\ cm^2$ TSA = $(104 \times 2) + 138$ $= 346\ cm^2$	M1 M1 A1
8(a)	$\tan \angle EBC = \frac{19}{32}$ $\angle EBC = 30.7°$	M1 A1
8(b)	$\sin 30.70 = \frac{EC}{32}$ $EC = 16.3cm$	M1 A1
9(a)	$= 3 - 8x + 4$ $= 7 - 8x$	B1
9(b)	$= a(a-4b) + x(a-4b)$ $= (a+x)(a-4b)$	M1 A1
9(c)	$= \frac{24x^2y^3}{x} \times \frac{4}{3y^2}$ $= 32xy$	M1 A1
10	$= \frac{5(x-1)-2(x+2)}{(x+2)(x-1)}$ $= \frac{5x-5-2x-4}{(x+2)(x-1)}$ $= \frac{3x-9}{(x+2)(x-1)}$ $= \frac{3(x-3)}{(x+2)(x-1)}$	M1 M1 A1
11(a)	(6-2)×180=720 $y =$ $720-214-145-138-123-38 = 62$	M1 A1

11(b)	$\frac{360}{20}$ $=18$	M1 A1
12(a)(i)	$\frac{4}{3}(3.142)(8)^3+\frac{4}{3}(3.142)(4)^3$ $=2413.056cm^2$ Allow calculator π	M1 A1
12(a)(ii)	$\frac{1}{3}(3.142)(10)^2(25)-2413.056$ $=205cm^3$ Allow calculator π	M1 A1
12(b)	$\frac{1}{3}(17)(28)h=2413.056$ $h=15.2cm$ Allow calculator π	M1 A1
13(a)	No arc – 1m	C2
13(b)	39.5° ± 0.5	B1
13(c)(i)	Refer to construction	B1
13(c)(ii)	See attached	B1
13(d)	5.1cm ± 0.1	B1

AMKSS 2NA EM P2 FE 2018 Answer Scheme

Qn	Answers	Marking Scheme
1(a)	$\frac{250}{100}\times 101.25$ $=253.125$ $253.125\div 0.57=444.078=444.08$	M1 A1
1(b)	$\frac{1300}{88}\times 100=1477.27$	M1 A1
1(c)(i)	$(k)^2=(\sqrt{\frac{p}{x}})^2$ $k^2=\frac{p}{x}$ $x=\frac{p}{k^2}$	M1 M1 A1
1(c)(ii)	$x=\frac{(2)}{(-4)^2}=\frac{1}{8}$	B1
2(a)	$2x+y=25$	
2(b)	$2x+3y=39$	
2(c)	$2x+y=25$ ----(1) $2x+3y=39$ ---(2) $x=9$ $y=7$	M1— Sub/Elimination method A1 A1
2(d)	$3(9)+2(7)$ $=41$	M1 A1
3(a)	73 and 77	B1
3(b)	73	
3(c)	$\frac{12}{18}\times 100$	M1

	=66.7%	A1
3(d)	$\frac{1324}{18}$ 73.6	M1 A1
4(a)	$\frac{300}{p}$	[B1]
(b)	$(\frac{300}{p}+10)(p-2)$ $=300-\frac{600}{p}+10p-20$ $=280+10p-\frac{600}{p}$	 B1
(c)	$280+10p-\frac{600}{p}-300=20$ $10p-\frac{600}{p}-40=0$ $10p^2-40p-600=0$ $p^2-4p-60=0$ (shown)	M1 M1 A1
(d)	$(p-10)(p+6)=0$ $p=10, p=-6$	M1 A2
(e)	$\frac{300}{10}+10=40$ cents	B1
5a	$180-110-25$ $=45°$	M1 A1
5b	$180-45-78$ $=57°$	
7(a)	$\sin 55° = \frac{opp}{120}$ $opp = 98.29824531$ $opp \approx 98.3m$	M1 A1

7(b)(i)	$\cos 55° = \frac{adj}{120}$ $adj = 68.82917236m$ 68.82917236 + 35 =103.8291724 m $x^2 = 98.29824531^2 + 103.8291724^2$ $x^2 = 20443.04206$ $x = 142.9791665$ $x \approx 143m$	M1 M1 A1
7(b)(ii)	$\tan\theta = \frac{98.29824531}{103.8291724}$ $\theta = \tan^{-1}\left(\frac{98.29824531}{103.8291724}\right)$ $\theta = 43.43257424$ $\theta = 43.4°$	M1 A1
6(a)	$\frac{PT}{RT} = \frac{QT}{ST}$ $\frac{8}{12} = \frac{6}{ST}$ $8ST = 72$ $ST = 9cm$	M1 A1
6(b)	$\frac{1}{2} \times 18 \times h = 49.7$ $h = 5.52cm$	M1 A1
8a	0	B1
8b	All pts plot correctly Smooth curve Labelling of axes and graph	B1 B1 B1
8ci	\$2.30 (±\$0.10)	B1

8cii	$4 to $6	B1