

Centre Number						Candidate Number					
Surname											
Other Names											
Candidate Signature											

For Examiner's Use	
Examiner's Initials	
Pages	Mark
2 – 3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16	
TOTAL	



General Certificate of Secondary Education
Higher Tier
June 2014

Mathematics

43602H

Unit 2

Monday 9 June 2014 9.00 am to 10.15 am

H

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
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Time allowed

- 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 66.
- The quality of your written communication is specifically assessed in Questions 3, 4 and 18. These questions are indicated with an asterisk (*).
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

1 2476 adults watch a cricket match.

The ratio men : women is 3 : 1

How many **more** men than women watch the match?

[3 marks]

.....

.....

.....

Answer

2 Put the correct symbol in each box.

Choose from < > =

[3 marks]

11×12

22×6

3^2

2^3

$\frac{10}{0.5}$

10



***3** Here are three offers for a computer.

Tablet World
Usual price £170
20% off

IT Supplies
Usual price £180
 $\frac{1}{4}$ off

PC Heaven
Special offer
Pay £23 each month
for 6 months

Which offer is the cheapest?
You **must** show your working.

[6 marks]

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Answer

12

Turn over ►



4 (a) Factorise $x^2 - x$

[1 mark]

Answer

*4 (b) Hence, or otherwise, show that

$$(x-1)^2 - (x-1) \equiv (x-1)(x-2)$$

[2 marks]

.....
.....
.....
.....

4 (c) Multiply out and simplify $5x(x-3) - 8x$

[3 marks]

.....

Answer



5 (a) $123 \times 456 = 56\ 088$

Write down the value of 12.3×45.6

[1 mark]

Answer

5 (b) $123 \times 456 = 56\ 088$

Write down the value of $56\ 088 \div 1.23$

[1 mark]

Answer

5 (c) $123 \times 456 = 56\ 088$

Work out the value of 122×456

[2 marks]

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.....

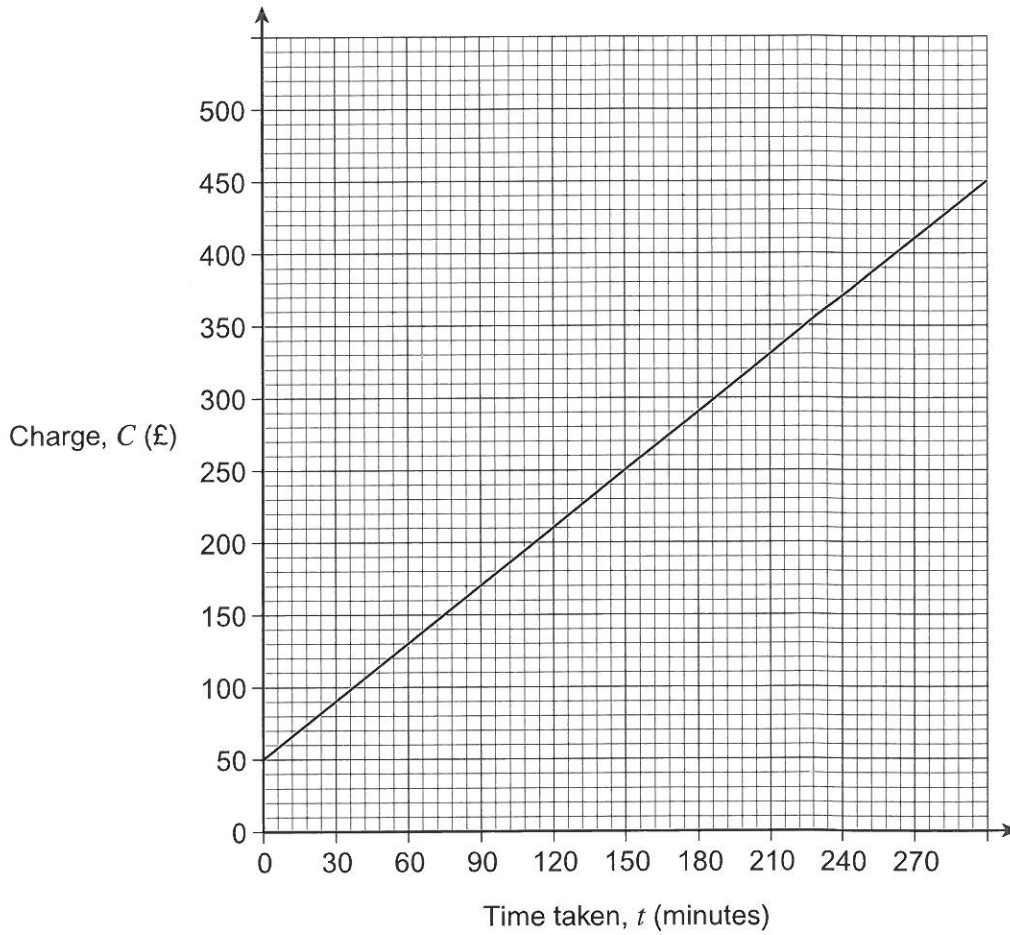
Answer

10

Turn over ►



6 Law firm A uses this graph to work out charges.



6 (a) Work out the equation of the line in terms of C and t .

[3 marks]

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.....

.....

Answer



6 (b) Law firm *B* uses this table to work out charges.

Time, t (minutes)	Charge, C (£)
$t \leq 60$	120
$t > 60$	$2t$

Draw a graph on the same grid to represent Law firm *B*'s charges.

[2 marks]

6 (c) How much cheaper is Law firm *A* than Law firm *B* for 3 hours?

[2 marks]

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Answer £

Turn over for the next question

7

Turn over ►



7

I am thinking of a number.

My number is between 20 and 30
My number and 12 have only one common factor.

What number could I be thinking of?
Give all **three** possible answers.

[2 marks]

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Answer,,

8

Two positive fractions add up to $\frac{1}{3}$

Each fraction has a **different** value.

What could the fractions be?
Give **one** possible answer.

[3 marks]

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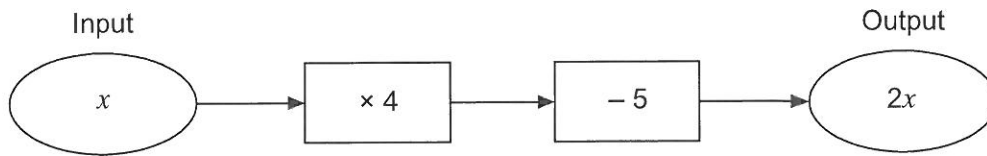
.....

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



9

Here is a number machine.

Work out the value of x .**[3 marks]**

.....

.....

.....

 $x =$

10

The equations of five straight lines are given below.
The line $y = 3x - 1$ is parallel to two of the lines.

Circle the equations of these **two** lines.**[2 marks]**

$y = 3x$

$y = -1$

$y = -3x - 1$

$y = 2x - 1$

$y = 3x + 1$



- 11 (a)** In year 1, the value of a watch increases by 12%
In year 2, the value increases by the same **amount of money** as in year 1

The owner wants to work out the value of the watch at the end of year 2

Which multiplier can be used with the original value to work this out?

Circle your answer.

[1 mark]

1.12

1.24

1.12^2

1.24^2

- 11 (b)** In year 1, the value of a car decreases by 12%
In year 2, the value decreases by 12% of the value at the end of year 1

The owner wants to work out the value of the car at the end of year 2

Which multiplier can be used with the original value to work this out?

Circle your answer.

[1 mark]

0.76

0.88

0.76^2

0.88^2



12 Solve the simultaneous equations

$$3x - 4y = 20$$

$$4x - 2y = 25$$

Do **not** use trial and improvement.
You **must** show your working.

[3 marks]

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Answer

Turn over for the next question

5

Turn over ►



13 x and y are integers such that

$$-5 < x \leq 3 \quad \text{and} \quad 2 \leq y \leq 7$$

Work out the **largest** possible value of $x^2 + y^2$

[2 marks]

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Answer



14 (a) Show that $(x + y)(x - y) \equiv x^2 - y^2$

[1 mark]

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14 (b) $x = 7\frac{4}{5}$ and $y = 2\frac{1}{5}$

Use part (a) to help you work out the value of $x^2 - y^2$

[3 marks]

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Answer

Turn over for the next question

6

Turn over ►



15 Solve the equation $(2 \times 10^5) x^2 = 1.8 \times 10^8$ [4 marks]

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.....
.....

$x = \dots\dots\dots$ or $x = \dots\dots\dots$

16 Rearrange the formula $3c = \frac{4(c - d)}{d}$ to make d the subject. [4 marks]

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Answer



17

Estimate the value of $101.4^{\frac{1}{2}} + 6.43^0 \times 7.99^{\frac{2}{3}}$

[4 marks]

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Answer

Turn over for the next question



***18**

Prove that $5x(x + 6) - (3x + 5)^2$ is negative for all values of x .

[4 marks]

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END OF QUESTIONS





AQA Qualifications

GCSE

Mathematics

Unit 2 43602H

Mark scheme

43602H
June 2014

Version/Stage: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

- M** Method marks are awarded for a correct method which could lead to a correct answer.
- M dep** A method mark dependent on a previous method mark being awarded.
- A** Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
- B** Marks awarded independent of method.
- B dep** A mark that can only be awarded if a previous independent mark has been awarded.
- ft** Follow through marks. Marks awarded following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
- oe** Or equivalent. Accept answers that are equivalent.
eg, accept 0.5 as well as $\frac{1}{2}$
- [a, b]** Accept values between *a* and *b* inclusive.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q	Answer	Mark	Comments	
1	Alternative method 1			
	$2476 \div (3 + 1)$ or 619	M1	oe	
	their $619 \times (3 - 1)$ or their 619×2 or $2476 \div (3 - 1)$ or $2476 \div 2$ or their $619 \times 3 -$ their 619 or $(2476 -$ their 619) $-$ their 619 or $1857 - 619$	M1	oe	
	1238	A1		
	Alternative method 2			
	$(3 + 1) \div (3 - 1)$ or $4 \div 2$ or $(3 - 1) \div (3 + 1)$ or $2 \div 4$	M1	oe	
	$2476 \div$ their 2 or $2476 \times$ their $\frac{1}{2}$	M1	oe	
	1238	A1		
	2	=	B1	
		>	B1	
>		B1		

Q	Answer	Mark	Comments
3	$\frac{170}{100} \times 20$ or $\frac{170}{10} \times 2$ or 17×2 or 34 or $\frac{170}{100} \times 80$ or $\frac{170}{10} \times 8$	M1	oe (Tablet World)
	136	A1	
	$180 \div 4$ or 45 or $180 \times \frac{3}{4}$	M1	oe (IT Supplies)
	135	A1	
	138	B1	(PC Heaven)
	IT Supplies	Q1ft	Strand (iii) ft for correct decision based on their values, must have both method marks and a total for PC Heaven
4(a)	$x(x - 1)$ or $x \times (x - 1)$ or $(x - 1)x$ or $(x - 1) \times x$	B1	

Q	Answer	Mark	Comments
4(b)	Alternative method 1		
	$(x - 1)(x - 1 - 1)$	Q1	Strand (ii) algebraic argument
	$(x - 1)(x - 1 - 1) = (x - 1)(x - 2)$	Q1	
	Alternative method 2		
	$x^2 - x - x + 1$ or $x^2 - 2x + 1$	Q1	Strand (ii) algebraic argument
	$x^2 - 2x + 1 - x + 1 = x^2 - 3x + 2$ $\qquad\qquad\qquad = (x - 1)(x - 2)$ or $x^2 - 2x + 1 - (x - 1) = x^2 - 3x + 2$ $\qquad\qquad\qquad = (x - 1)(x - 2)$	Q1	
	Alternative method 3		
	$x^2 - x - x + 1$ or $x^2 - 2x + 1$ or $x^2 - x - 2x + 2$ or $x^2 - 3x + 2$	Q1	Strand (ii) algebraic argument
	$x^2 - 2x + 1 - x + 1 = x^2 - 3x + 2$ and $(x - 1)(x - 2) = x^2 - 3x + 2$ or $x^2 - 2x + 1 - (x - 1) = x^2 - 3x + 2$ and $(x - 1)(x - 2) = x^2 - 3x + 2$	Q1	
	Alternative method 4 (next page)		

Q	Answer	Mark	Comments
4(b) continued	Alternative method 4		
	$(x - 1) - 1 (= x - 2)$ or $x - 1 - 1 (= x - 2)$	Q1	Strand (ii) algebraic argument
	$x - 2 (= x - 2)$	Q1	
4(c)	$5x^2$ or $-15x$	M1	oe
	$5x^2$ and $-15x$	A1	
	$5x^2 - 23x$ or $x(5x - 23)$	A1ft	ft if M1A0 awarded and two terms in x correctly collected
5(a)	560.88	B1	
5(b)	45 600	B1	
5(c)	Alternative method 1		
	56 088 – 456	M1	
	55 632	A1	
	Alternative method 2		

<p>Traditional method of long multiplication with correct use of 0s (allow one arithmetic error) and attempt to add</p> <p>or</p> <p>Grid method with correct use of 0s (allow one arithmetic error) and attempt to add</p> <p>or</p> <p>Gelosia method (allow one arithmetic error) and attempt to add</p>	<p>M1</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: left;"> $\begin{array}{r} 122 \\ \times 456 \\ \hline 732 \\ 6100 \\ \hline 48800 \\ \hline 55632 \end{array}$ </div> <div style="text-align: center;">or</div> <div style="text-align: right;"> $\begin{array}{r} 456 \\ \times 122 \\ \hline 912 \\ 9120 \\ \hline 45600 \\ \hline 55632 \end{array}$ </div> </div> <p style="text-align: center;">or</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>100</td> <td>20</td> <td>2</td> </tr> <tr> <td>400</td> <td>40000</td> <td>8000</td> <td>800</td> </tr> <tr> <td>50</td> <td>5000</td> <td>1000</td> <td>100</td> </tr> <tr> <td>6</td> <td>600</td> <td>120</td> <td>12</td> </tr> </table> <p style="text-align: center;">↓</p> $\begin{array}{r} 40000 \\ 8000 \\ 5000 \\ 1000 \\ 800 \\ 600 \\ 100 \\ 120 \\ + 12 \\ \hline 55632 \end{array}$ <p style="text-align: center;">or</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td></td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">4</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">4</td> <td style="border: 1px solid black; padding: 5px;">8</td> <td style="border: 1px solid black; padding: 5px;">8</td> <td style="border: 1px solid black; padding: 5px;">5</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">1</td> <td style="border: 1px solid black; padding: 5px;">1</td> <td style="border: 1px solid black; padding: 5px;">5</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">5</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">6</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">1</td> <td style="border: 1px solid black; padding: 5px;">1</td> <td></td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">6</td> <td style="border: 1px solid black; padding: 5px;">2</td> <td style="border: 1px solid black; padding: 5px;">2</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">6</td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td></td> </tr> </table> <p style="text-align: center;">= 55632</p>		100	20	2	400	40000	8000	800	50	5000	1000	100	6	600	120	12		1	2	2			0	0	0	4		4	8	8	5		0	1	1	5		5	0	0	6		0	1	1			6	2	2			6	3	2	
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<p>55 632</p>	<p>A1</p>																																																									

Q	Answer	Mark	Comments
6(a)	$C = \frac{4}{3}t + 50$	B3	oe oe for $\frac{4}{3}$ throughout B2 $C = \frac{4}{3}t + c$ any value of c or $\frac{4}{3}t + 50$ or gradient = $\frac{4}{3}$ and intercept = 50 or $y = \frac{4}{3}x + 50$ B1 $C = kt + 50$ $k \neq 0$ or $y = kx + 50$ $k \neq 0$ or $\frac{4}{3}t + c$ any value of c or gradient = $\frac{4}{3}$ or $\frac{4}{3}x + 50$ or intercept = 50
6(b)	Line from (0, 120) to (60, 120)	B1	
	Line from (60, 120) to at least (180, 360)	B1	
6(c)	290 or 2×180 or 360 or correct reading from their graph at $t = 180$	M1	
	70	A1ft	ft their 360 from graph or their 2×180

Q	Answer	Mark	Comments
7	23, 25 and 29	B2	any order B1 three correct and one incorrect or two correct and none or one incorrect SC1 any three or all four of 21, 22, 26 and 27 with no other number
8	A correct pair of fractions meeting all conditions eg $\frac{1}{9}$ and $\frac{2}{9}$ or $\frac{1}{12}$ and $\frac{1}{4}$	B3	B2 a pair of fractions which add to $\frac{1}{3}$ but which do not satisfy all conditions eg, $\frac{1}{6}$ and $\frac{1}{6}$ or $\frac{2}{3}$ and $-\frac{1}{3}$ or $\frac{1}{3}$ – any fraction less than $\frac{1}{3}$ correctly changed to common denominator with at least one numerator correct B1 $\frac{1}{3}$ changed to any equivalent fraction $\frac{2}{6}, \frac{3}{9}, \frac{4}{12}, \dots$ or $\frac{1}{3}$ – any fraction less than $\frac{1}{3}$

Q	Answer	Mark	Comments
9	$4x - 5$ or $\frac{2x + 5}{4}$	M1	oe
	$4x - 5 = 2x$ or $\frac{2x + 5}{4} = x$	M1	oe
	2.5	A1	oe SC2 input of 2.5 and answer 5 SC1 a correctly evaluated trial for any input
10	$y = 3x$ and $y = 3x + 1$	B2	B1 $y = 3x$ and $y = 3x + 1$ and one incorrect or $y = 3x$ or $y = 3x + 1$ and none or one incorrect
11(a)	1.24	B1	
11(b)	0.88^2	B1	

Q	Answer	Mark	Comments	
12	Alternative method 1			
	$8x - 4y = 50$	or $12x - 16y = 80$ and $12x - 6y = 75$	M1	oe allow one error
	$5x = 30$ or $x = 6$	$-10y = 5$ or $y = -\frac{1}{2}$	M1 dep	oe correct elimination of one unknown for their equations
	$x = 6$ and $y = -\frac{1}{2}$		A1	oe SC1 correct answer without working or with use of trial and improvement
	Alternative method 2			
	$x = \frac{20 + 4y}{3}$ or $y = \frac{3x - 20}{4}$ or $x = \frac{25 + 2y}{4}$ or $y = \frac{4x - 25}{2}$		M1	oe allow one error
	$10x = 60$ or $x = 6$	$10y = -5$ or $y = -\frac{1}{2}$	M1 dep	oe correct elimination of one unknown for their equations and simplification to two terms
	$x = 6$ and $y = -\frac{1}{2}$		A1	oe SC1 correct answer without working or with use of trial and improvement
13	$(-4)^2$ or 16 or 7^2 or 49	M1	condone absence of brackets	
	65	A1		

Q	Answer	Mark	Comments
14(a)	$x^2 - xy + xy - y^2$	B1	oe
14(b)	Alternative method 1		
	$7\frac{4}{5} + 2\frac{1}{5}$ or $7\frac{4}{5} - 2\frac{1}{5}$	M1	oe
	10 and $5\frac{3}{5}$	M1	oe
	56	A1	
	Alternative method 2		
	$\frac{39}{5} \times \frac{39}{5}$ or $\frac{11}{5} \times \frac{11}{5}$ or full valid method to work out 7.8×7.8 or 2.2×2.2 or digits 6084 or 484	M1	Allow one error in computation
	$\frac{1521}{25}$ or $\frac{121}{25}$ or $\frac{1400}{25}$ or 60.84 or 4.84	M1	oe
56	A1		

Q	Answer	Mark	Comments
15	Alternative method 1		
	$(x^2 =) \frac{1.8 \times 10^8}{2 \times 10^5}$	M1	oe
	0.9×10^3	M1	
	9×10^2 or 900 or 30 or – 30	A1	
	30 and – 30	A1ft	ft positive and negative square root of their 900 if M1M1A0 or M1M0A0 scored
	Alternative method 2		
	180 000 000 or 200 000	M1	
	$(x^2 =) \frac{\text{their}180000000}{\text{their}200000}$	M1 dep	oe
	900 or 30 or – 30	A1	
	30 and – 30	A1ft	ft positive and negative square root of their 900 if M1M1A0 or M1M0A0 scored

Q	Answer	Mark	Comments
16	Alternative method 1		
	$3cd = 4(c - d)$ or $3c = \frac{4c - 4d}{d}$	M1	
	$3cd = 4c - 4d$	M1	
	$3cd + 4d = 4c$ or $d(3c + 4) = 4c$ or $\frac{4c}{3c + 4}$	M1	
	$d = \frac{4c}{3c + 4}$	A1	
	Alternative method 2		
	$3c = \frac{4c - 4d}{d}$	M1	
	$3c = \frac{4c}{d} - 4$	M1	
	$3c + 4 = \frac{4c}{d}$ or $\frac{1}{3c + 4} = \frac{d}{4c}$ or $\frac{4c}{3c + 4}$	M1	
	$d = \frac{4c}{3c + 4}$	A1	
17	$101.4^{\frac{1}{2}}$ estimated as 10	B1	condone – 10
	$(6.43^0 =) 1$	B1	
	$7.99^{\frac{2}{3}}$ estimated as 4	B1	
	14	B1ft	condone – 6 if – 10 used ft fully correct evaluation with B2 scored

Q	Answer	Mark	Comments
18	$5x^2 + 30x$ or $9x^2 + 15x + 15x + 25$ or $9x^2 + 30x + 25$	M1	
	$5x^2 + 30x - (9x^2 + 15x + 15x + 25)$ or $5x^2 + 30x - (9x^2 + 30x + 25)$ or $5x^2 + 30x - 9x^2 - 15x - 15x - 25$ or $5x^2 + 30x - 9x^2 - 30x - 25$	M1	allow one error
	$-4x^2 - 25$ or $-(4x^2 + 25)$ from fully correct algebra	A1	
	Argues that both terms have to be negative so expression is negative	Q1ft	Strand (ii) correct mathematical argument and M2 scored argument may be that their expression is not negative for all values of x