Version 1.0

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	
TOTAL	

General Certificate of Secondary Education
Higher Tier

Mathematics 43602H

Unit 2 Higher Tier

Specimen Paper 2012 Specification

H

For this paper you must have: • mathematical instruments. You must **not** use a calculator	

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 space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

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 2, 3, 11 and 14.
  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 booklet.

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

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

1 Estimate the value of $\frac{\sqrt{99}}{19}$

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Answer ..... *(2 marks)*

✶**2** The rate of VAT was reduced in December 2008 from $17\frac{1}{2}$% to 15%.

For sale

Lawnmower £140 + VAT

Work out the difference in price of a lawnmower due to the reduction in VAT.

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Answer £ ..... *(3 marks)*

✶**3** Barbara uses her car to work as a volunteer driver at her local hospital.
She is paid 40p for every mile she drives.
On average she drives 2000 miles each month.

Here is some information about the running costs of Barbara's car.

Fuel Consumption	50 miles per gallon
Other running costs	10 pence per mile

3 (a) Petrol costs £5 per gallon.

Calculate Barbara's annual fuel bill.

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Answer £ ..... *(2 marks)*

3 (b) After paying for fuel and other running costs, Barbara saves the money left over.
Barbara is planning to use this money for a holiday that will cost £3000.

Will Barbara have enough money after saving for one year?

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(4 marks)

11

4 (a) A magazine contains adverts, photographs and features.

$\frac{1}{4}$ of the pages are adverts and $\frac{2}{5}$ are photographs.

What fraction are features?

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Answer ..... *(3 marks)*

4 (b) There are 24 photographs in the magazine.
The ratio of sports photographs to other photographs is 5 : 3

How many sports photographs are there in the magazine?

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Answer ..... *(2 marks)*

5 (a) Simplify $m^3 \times m^5$

Answer ..... *(1 mark)*

5 (b) Simplify $\frac{m^4}{m^6}$

Answer ..... *(1 mark)*

5 (c) Simplify fully $\sqrt{\frac{\pi a^3}{4\pi a}}$

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Answer ..... *(2 marks)*

6 (a) A sequence starts

2 7 17 .....

The rule for finding the next term in this sequence is to multiply the previous term by 2 and then add on 3

Work out the next term.

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Answer ..... *(1 mark)*

6 (b) The rule for finding the next term in a different sequence is to multiply the previous term by 2 and then add on a, where a is an integer.

The first term is 8 and the fourth term is 127

8 127

Work out the value of a.

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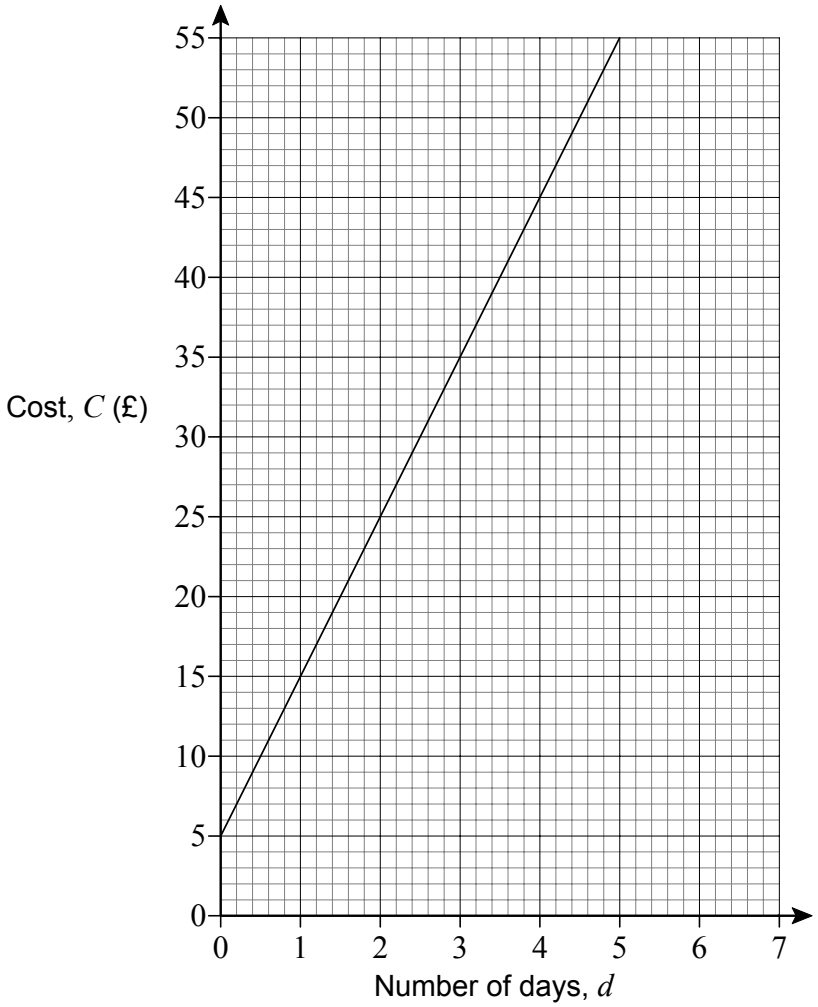
Answer $a =$ ..... *(4 marks)*

14

7 An activity centre hires out road bikes and mountain bikes.

The graph shows the cost, C (£) of hiring a road bike for a number of days, d.



7 (a) Circle the correct formula connecting the cost, C and the number of days, d for hiring a road bike.

$C = 2d + 5$ $C = 5d + 10$ $C = 10d + 5$

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..... *(1 mark)*

7 (b) The cost of hiring a mountain bike is given by the formula $C = 5d + 15$

Rowan would like to hire a mountain bike.

He thinks that a mountain bike will always cost more to hire than a road bike.

Is this true? Yes ☐ No ☐

Explain your answer.

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..... *(3 marks)*

Do not write outside the box

8 Greg thinks of a positive whole number smaller than 15.
He subtracts 4 from the number and then doubles his result.
He subtracts 4 from the new number and then doubles this result.
He repeats this process several times.
He stops when he gets an answer of 40.

8 (a) Show that when Greg starts with 12 he gets an answer of 40.

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(2 marks)

8 (b) Find another number that Greg could have started with to get an answer of 40.

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Answer ..... *(2 marks)*

9 (a) Factorise fully $12x^3 - 8xyz$

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Answer ..... *(2 marks)*

9 (b) Factorise $x^2 + 3x + 2$

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Answer ..... *(2 marks)*

9 (c) Simplify $\dfrac{x+2}{3(x+2)}$

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Answer ..... *(1 mark)*

9 (d) Factorise fully $10x^2 - 40y^2$

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Answer ..... *(3 marks)*

16

10 Two families go to a pantomime.
The Khan family of two adults and three children pay £69.
The Lewis family of three adults and five children pay £109.

Work out the cost of an adult ticket and the cost of a child ticket.

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Answer Adult ticket £ ..... Child ticket £ ..... *(5 marks)*

✳**11 (a)** Simplify $(9 + \sqrt{7})(9 + \sqrt{7})$

Give your answer in the form $a + b\sqrt{7}$

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Answer ..... *(2 marks)*

✳**11 (b)** Prove that $\dfrac{\sqrt{12}+6}{\sqrt{3}} \equiv 2(1+\sqrt{3})$

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(4 marks)

12 (a) Solve the inequality $3x + 7 > x + 8$

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Answer ..... *(2 marks)*

12 (b) Make a the subject of the formula $\sqrt{a+3} = b$

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Answer ..... *(2 marks)*

13 The difference between the squares of two consecutive even numbers is twice the sum of the numbers.

For example $8^2 - 6^2 = 28$

$2 \times (8 + 6) = 28$

Prove this result algebraically.

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(4 marks)

19

Do not write outside the box

✳**14** Solve $\frac{10}{2x-1} - \frac{3}{x} = 3$

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Answer ..... *(6 marks)*

END OF QUESTIONS

6

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