

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
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12	
TOTAL	



General Certificate of Secondary Education  
Higher Tier  
June 2011

# Mathematics

**43602H**

## Unit 2

Tuesday 21 June 2011 9.00 am to 10.15 am

**H**

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>● mathematical instruments.</li> </ul> <p>You must <b>not</b> 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 and 9. 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.



J U N 1 1 4 3 6 0 2 H 0 1

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

**1** Given that  $d = 6$  and  $f = -12$   
work out the value of  $\frac{9(d - 10)}{f}$

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Answer ..... (3 marks)

**2** Use approximations to estimate the value of  $\frac{795.4}{2.1^2 \times 9.8}$   
You **must** show your working.

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Answer ..... (3 marks)



\*3

Simon sees the same model of digital camera for sale in two different shops.

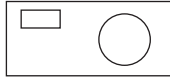
**Clix**



Normal price    £210

Sale price    40% off

**Snapz**



Normal price    £195

Sale price     $\frac{1}{3}$  off

Which shop has the cheaper sale price?  
You **must** show your working.

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(5 marks)

**Turn over for the next question**



4 A bag contains only red, blue and yellow counters.  
There are three times as many blue counters as yellow counters.  
There are 43 counters in the bag.

Some red counters are added to the bag.  
There are now 50 counters in the bag.  
The number of red counters has doubled.

How many yellow counters are in the bag?

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Answer ..... (3 marks)



5 (a) Solve  $7x = 15 - 3x$

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Answer  $x =$  ..... (2 marks)

5 (b)  $2(x + 16) + 4(x - 5)$  simplifies to  $a(x + b)$

Work out the values of  $a$  and  $b$ .

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Answer  $a =$  ..... ,  $b =$  ..... (3 marks)

6 Amy, Ben, Colleen and Dave share some money.

Amy has  $\frac{1}{6}$  of the money.

Ben has  $\frac{1}{5}$  of the money.

The difference between Amy's share and Ben's share is added to Colleen's share.  
The answer is equal to half the money.

Show that Amy and Dave each have the same amount of money.

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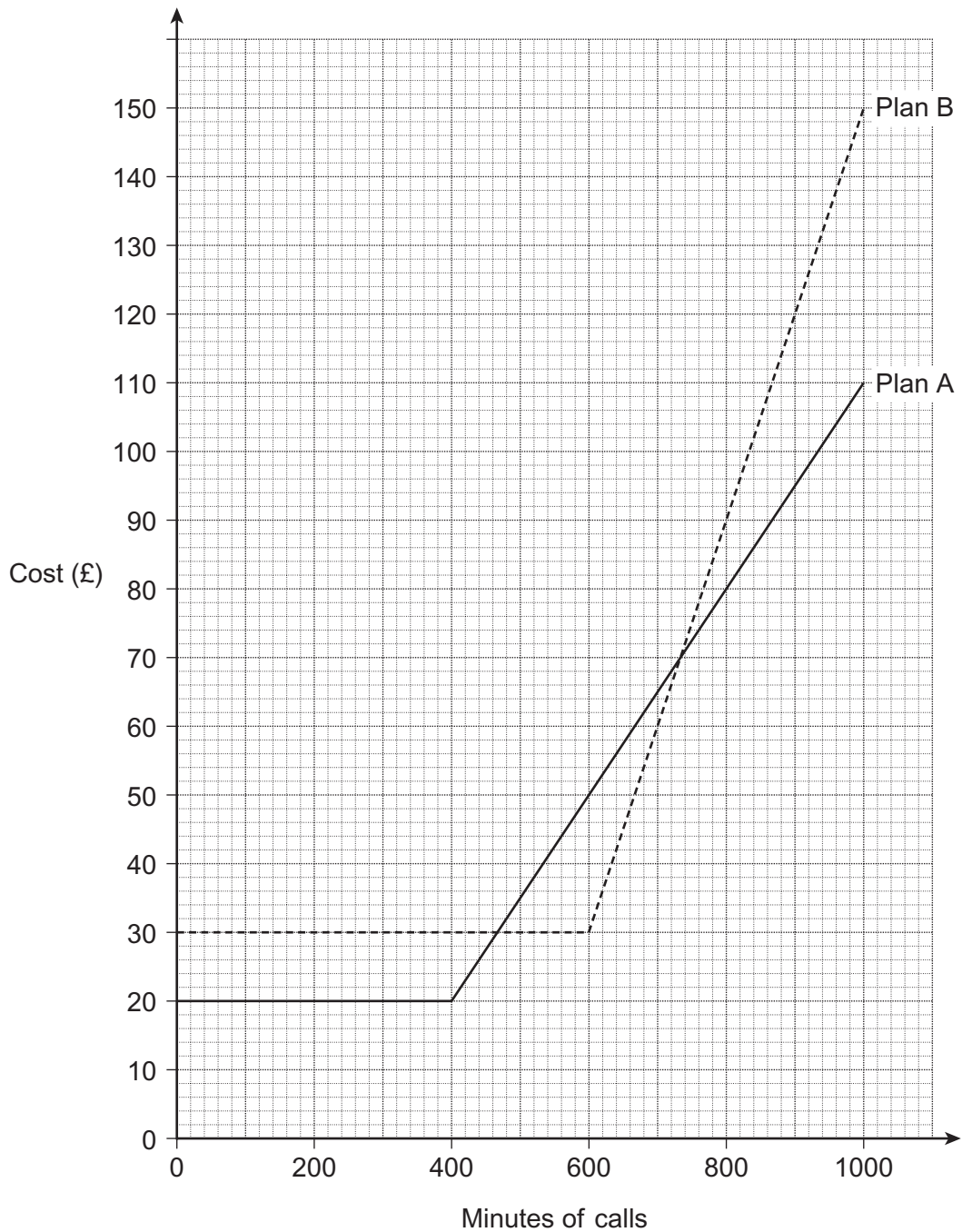
(5 marks)



- 7 Plan A and Plan B are two monthly mobile phone plans. Here are the details of Plan A.

Monthly charge	£20
400 minutes of calls	Free
Each extra minute	15p

The graph shows the costs for both plans.



**7 (a)** Ben usually makes about 800 minutes of calls a month.

Which plan should he choose?  
Give a reason for his choice.

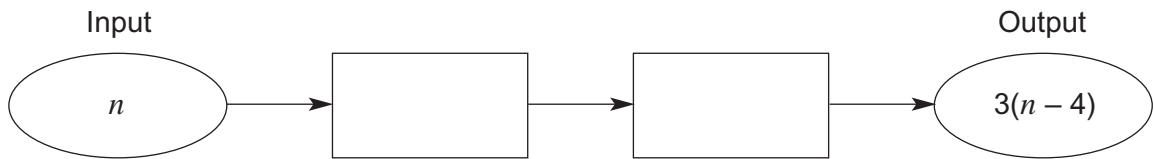
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..... (2 marks)

**7 (b)** Sarah chooses Plan B.

How much does she pay for each extra minute of calls?

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Answer ..... (3 marks)

**8** Here is a number machine.



**8 (a)** Write an operation in each box to make the number machine work.

(2 marks)

**8 (b)** Work out the value of  $n$  when the input and output are equal.

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Answer  $n =$  ..... (2 marks)



**\*9**

The first three terms of a sequence are

 $a \quad b \quad c \quad \dots\dots$ 

The term-to-term rule of the sequence is

Multiply by 2 and subtract 4

Show that  $c = 4(a - 3)$ 

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*(4 marks)*



10 (a) Simplify  $2x^3y^2 \times 4xy^5$

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Answer ..... (2 marks)

10 (b) Factorise fully  $20y^2 - 8xy$

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Answer ..... (2 marks)

10 (c) Make  $x$  the subject of  $w = y + \frac{x}{r}$

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Answer ..... (2 marks)

10 (d) Work out the least common multiple (LCM) of  $6xy^2$  and  $3x^2y$

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Answer ..... (2 marks)



11 There are some boys and girls at a bus stop.

11 girls get on the first bus to arrive.

The number of boys and girls at the bus stop is now the same.

16 boys get on the second bus to arrive.

The ratio of the number of boys to the number of girls at the bus stop is now 1 : 3

How many girls were at the bus stop to start with?

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Answer ..... (4 marks)

12 Two numbers,  $a$  and  $b$ , are combined using the operation  $\nabla$  in the following way.

$$a \nabla b = 2a^2 - 7a - b + b^2$$

Work out **all** solutions of the equation  $x \nabla 3 = 0$

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Answer ..... (4 marks)



13 Show that  $7 + \frac{10}{x+2} = \frac{9}{x}$

simplifies to  $7x^2 + 15x - 18 = 0$

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(3 marks)

14 Expand and simplify fully  $(\sqrt{10} + \sqrt{2})(\sqrt{15} - \sqrt{3})$

Give your answer in the form  $a\sqrt{b}$ , where  $a$  and  $b$  are integers.

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Answer ..... (4 marks)

Turn over for the next question

Turn over ►



15 (a) Work out the value of  $9^{-\frac{3}{2}}$

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Answer ..... (3 marks)

15 (b) Work out **all** solutions of the equation

$$8^m = 2^{m^2}$$

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Answer ..... (3 marks)

**END OF QUESTIONS**

