ST EDWARD'S
OXFORD

13+ SCHOLARSHIP EXAMINATION
2012

MATHEMATICS
Paper 1

1 hour

Name: _____

There are 60 marks available.

Calculators are allowed.

Write all answers, including your workings, in this booklet.

1. Circle all of the fractions below which are **smaller than** $\frac{1}{9}$

$\frac{1}{10}$ $\frac{4}{9}$ $\frac{1}{2}$ $\frac{1}{100}$ $\frac{1}{8}$

1 mark

(b) To the nearest per cent, what is $\frac{1}{9}$ **as a percentage**? Circle the nearest value.

0.9% 9% 10% 11% 19%

1 mark

(c) Complete the sentences below:

$\frac{1}{9}$ is half of .....

$\frac{1}{9}$ is two thirds of .....

There are ..... ninths in $6\frac{1}{3}$

3 marks

TOTAL FOR THIS QUESTION 5

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2. The ancient Egyptians used fractions, but only *unit* fractions.

$\frac{1}{3}, \frac{1}{8}, \frac{1}{5}$ are all examples of unit fractions; the numerator must be 1 and the denominator is an integer greater than 1.

For $\frac{3}{4}$, they wrote the sum $\frac{1}{2} + \frac{1}{4}$

(a) For what fraction did they write the sum $\frac{1}{2} + \frac{1}{5}$? Show your working.

.....

1 mark

(b) They wrote $\frac{9}{20}$ as the sum of two unit fractions. One of them was $\frac{1}{4}$

What was the other? You must show your working.

1 mark

.....

1 mark

TOTAL FOR THIS QUESTION 3

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3. Solve these equations:

a) $75 + 2t = 100 - 2t$

.....

2 marks

b) $7(5y - 3) - 10 = 2(3y - 5) - 3(5-7y)$

.....

3 marks

c) $\frac{x}{3} + \frac{10 - 2x}{2} = 3$

.....

3 marks

TOTAL FOR THIS QUESTION 8

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4. (a) A rectangle is 3a units long and 5b units wide. Write a simplified expression for the area and the perimeter of this rectangle.

Area: .....

1 mark

Perimeter: .....

1 mark

(b) A different rectangle has **area $12a^2$** and **perimeter $14a$.** What are the dimensions of this rectangle?

Dimensions: ..... by .....

1 mark

TOTAL FOR THIS QUESTION 3

5. On a farm many years ago the water tanks were filled using a bucket from a well.

(a) The table shows the numbers of buckets, of different capacities, needed to fill a tank of capacity 2400 pints. Complete the table:

Capacity of bucket (pints)	8	10	12	15	16		
Number of buckets			200		150	100	80

(b) Write an equation using symbols to connect **T**, the capacity of the tank, **B**, the capacity of a bucket, and **N**, the number of buckets.

.....

1 mark

(c) Now tanks are filled through a hosepipe connected to a tap. The rate of flow through the hosepipe can be varied. The tank of capacity **4000** litres fills at a rate of **12.5** litres per minute. How long in hours and minutes does it take to fill the tank? Show your working.

..... hours ..... minutes

2 marks

TOTAL FOR THIS QUESTION 3

6. In one week James watches television for **26 hours**. In that week, he watched television for the **same** length of time on Monday, Tuesday, Wednesday and Thursday. On each of Friday, Saturday and Sunday, he watched television for **twice as long** as on Monday. How long did he spend watching television on **Saturday**? Write your answer in hours and minutes.

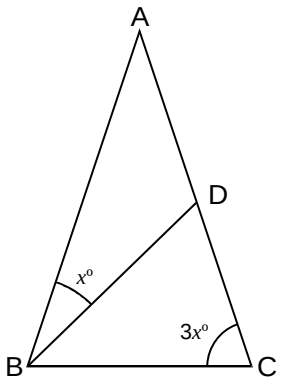
..... hours .....minutes

TOTAL FOR THIS QUESTION 2

7. In the diagram (NOT TO SCALE), side AB is the same length as side AC.

Side BD is the same length as side BC. Calculate the value of x

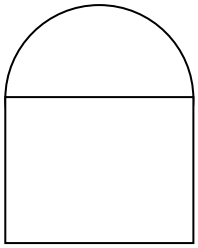
Show your working.



x = ...

TOTAL FOR THIS QUESTION 2

8. A window is made with two pieces of glass - one is semi-circular, the other is square.



The area of the square is $1m^2$. What is the approximate area of the semi-circle? Give your answer in cm^2 to the nearest whole number.

TOTAL FOR THIS QUESTION 3

9. (a) Estimate the answer to $\dfrac{8.62 + 22.1}{5.23}$

Give your answer to **1 significant figure**.

.....

1 mark

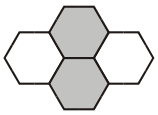
(b) **Estimate** the answer to $\dfrac{28.6 \times 24.4}{5.67 \times 4.02}$

.....

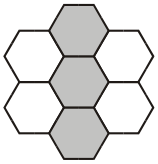
1 mark

TOTAL FOR THIS QUESTION 2

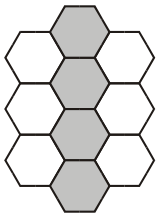
10. This is a series of patterns with grey and white tiles.



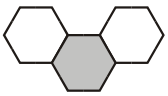
pattern number 1



pattern number 2



pattern number 3

The series of patterns continues by adding  each time.

(a) Complete this table:

pattern number	number of **grey** tiles	number of **white** tiles
5		
16		
n		

4 marks

(b) Write an expression to show the **total** number of tiles in pattern number n.
Simplify your expression.

1 mark

TOTAL FOR THIS QUESTION 5

11. (a) Each of these calculations has the same answer, **60.** Fill in the gaps:

2.4 × 25 = 60	**600 ÷ 10 = 60**
0.24 × ……. = 60	6 ÷ ……. = 60
2400 × ……. = 60	0.06 ÷ ……. = 60

TOTAL FOR THIS QUESTION 4

12. (a) Find the values of a and b when $\boldsymbol{p = 10}$

$$a = \frac{3p^3}{2}$$

a = ...

1 mark

$$b = \frac{2p^2(p-3)}{7p}$$

b = ...

1 mark

(b) Simplify this expression as fully as possible:

$$\frac{3cd^2}{5cd}$$

1 mark

TOTAL FOR THIS QUESTION 3

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13. (a) $\boldsymbol{m}$ is an **odd** number. Which of the numbers below must be even, and which must be odd? Write 'odd' or 'even' under each one.

$2m$	m^2	$3m - 1$	$(m-1)(m+1)$

2 marks

(b) $\boldsymbol{m}$ is an **odd** number. Is the number $\frac{\boldsymbol{m+1}}{\boldsymbol{2}}$ odd, or even, or is it not possible to tell?

odd		even		not possible to tell	

Explain your answer.

1 mark

TOTAL FOR THIS QUESTION 3

14. Solve these simultaneous equations using an algebraic method.

$4x + 3y = 21$

$2x + y = 8$

You **must** show your working.

x =..... y = ...

TOTAL FOR THIS QUESTION 3

15. Write the next two terms in each of these sequences, and give the rule for the ***nth term***:

4, 8, 12, 16, ….., …….. nth term: …….

4, 9, 16, 25, ….., …….. nth term: …….

TOTAL FOR THIS QUESTION 4

16. To cover a distance of 10km, Jacob runs some of the way at 15 km/hr, and walks the rest of the way at 5 km/hr. His total journey time was 1 hour. How far did Jacob run?

TOTAL FOR THIS QUESTION 3

17. David puts five cards face down on a table. All have the same design on the back – on the other side, one shows a circle, two show squares, and two show triangles. He turns two cards over. What is the probability that at least one of the cards is a square?

TOTAL FOR THIS QUESTION 4

END OF TEST