

Name:



# OUNDLE

School



Junior Entrance and Scholarship Examination 2013  
First Form Entry

## Mathematics

Time Allowed: 1 hour

- **All** candidates must answer Section A (but *may* attempt questions from Section B if they have time).
- Scholarship candidates should answer Sections A and B.
- All working and answers must be shown on this paper. Marks will be given for demonstrating your method.
- Calculators are *not* permitted.

## Section A

1. (a) Work out  $37 + 64$ .

Answer .....

- (b) Work out  $2472 - 358$ .

Answer .....

- (c) Work out  $78 \times 13$ .

Answer .....

- (d) Work out  $864 \div 9$ .

Answer .....

- (e) Work out  $864 \div 36$ .

Answer .....

- (g) Work out  $96 + 4751 - 95$ .

Answer .....

2. Write as a number: Seven hundred million fifty eight thousand and twenty four.

Answer .....

3. Calculate the following

(a)  $5 + (4 \times 3)$

Answer .....

(b)  $(5 + 4) \times 3$

Answer .....

(c) (i) What is the answer to  $5 + 4 \times 3$ ?

Answer .....

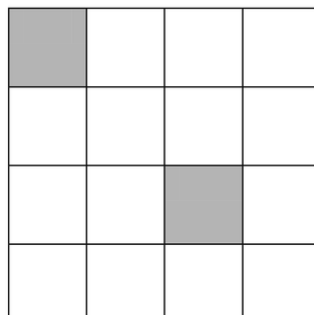
(ii) Explain your answer.

Answer .....

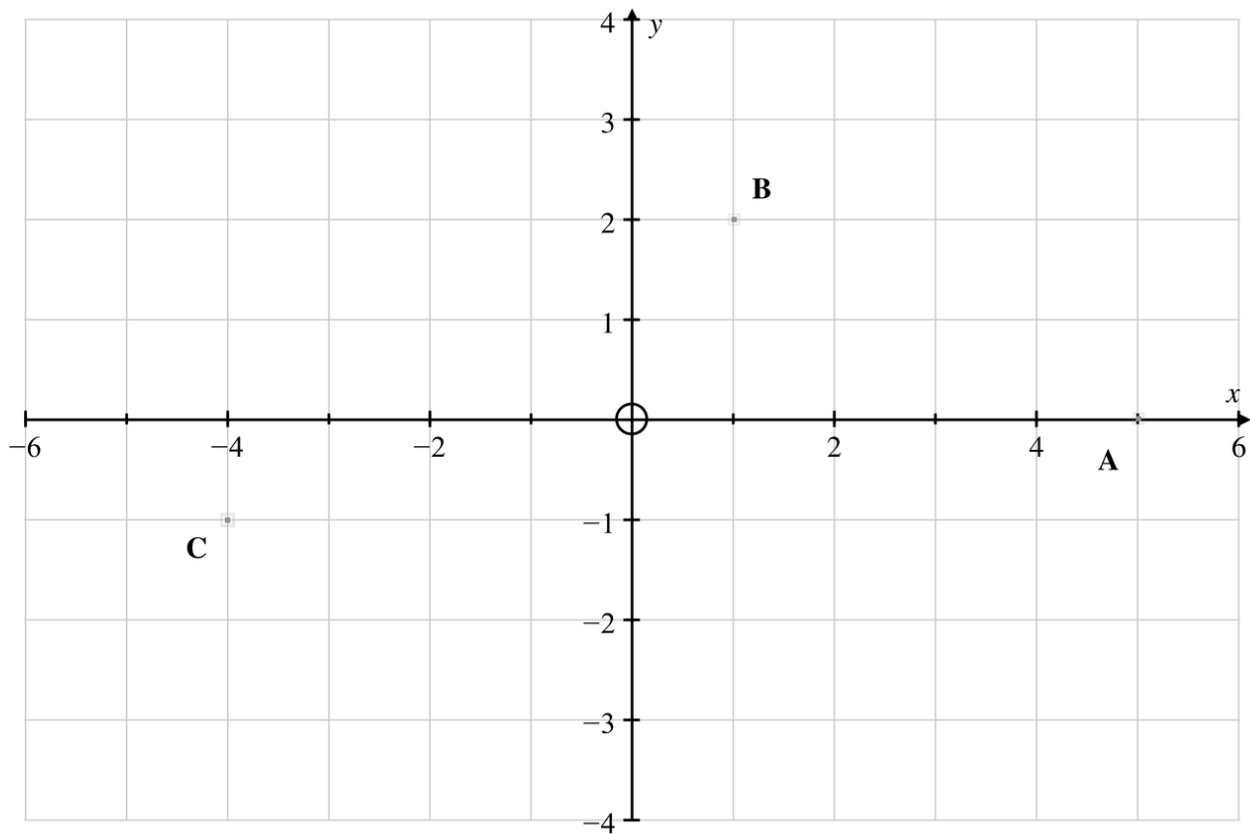
4. (a) Draw any lines of symmetry on the following shape.



(b) Shade *two* white squares so that the pattern below has 2 (*and only* 2) lines of symmetry.  
*You should use a pencil in case you change your mind.*



5. (a) Write down the coordinates of the points marked A, B and C.



Answer: A is at (....., .....), B is at (....., .....), C is at (....., .....)

- (b) On the diagram above, mark the point (0, -3). Label it D.

- (c) Write down the name of the shape formed by the points ABCD.

Answer .....

6. Write down the next *two* numbers in each of the following sequences.

- (a) 3, 7, 11, 15,

Answers ....., .....

- (b) 7.9, 5, 2.1, -0.8,

Answers ....., .....

- (c) 1, 4, 9, 16,

Answers ....., .....

7. William was using his calculator to work out the answers to some calculations. He couldn't remember which answer went with which question though. Match each question with the correct answer by *estimating*. Show the numbers you have used to make your estimations.

Questions	Answers
$\frac{307 \times 42}{592}$	12437.24076
$(11.13)^2 (23.7 + 76.7)$	0.969298245
$(89 + 43)(32 \div 63)$	21.78040541
$\frac{17}{36} \times \frac{39}{19}$	67.04761905

You may use this blank space for any calculations you do, but make sure to pair up the questions and answers above.

8. Write the following numbers in order, starting with the lowest.

$$\frac{3}{5} \qquad -\frac{3}{8} \qquad \frac{3}{10} \qquad -\frac{3}{4} \qquad \frac{3}{7}$$

Answer ....., ....., ....., ....., .....

9. (a) I think of a number, then add three. The result is seven.  
What was the original number?

Answer .....

- (b) I think of a number, double it, then add nine. The result is fifteen.  
What was the original number?

Answer .....

- (c) I think of a number, double it, then add five. The result is minus fifteen.  
What was the original number?

Answer .....

10. Find

- (a) 30% of 750.

Answer: .....

- (b)  $\frac{5}{8}$  of 72.

Answer: .....

11. You have the numbers  $-3$ ,  $-1$ ,  $2$  and  $10$  available.  
Any of these numbers can be used in each part of the question.

(a) What is the highest number that can be obtained by adding two of the above numbers?

Answer: .....

(b) What is the lowest number that can be obtained by adding two of the above numbers?

Answer: .....

(c) What is the highest number that can be obtained by subtracting two of the above numbers?

Answer: .....

(d) What is the lowest number that can be obtained by multiplying two of the above numbers?

Answer: .....

12.  $1\,487 \times 32\,761 = 48\,715\,607$

Use the above fact to answer the following questions:

(a)  $1\,487 \times 327\,610$

Answer: .....

(b)  $48\,715\,607 \div 1\,487$

Answer: .....

(c)  $148\,700 \times 3\,276.1$

Answer: .....

13. A room in an office building is 13m long and 11.9m wide.

(a) Find the area of the floor of this room.

Answer: .....

Carpet is £25 per square metre.

(b) What does it cost to carpet the room in part (a)?

Answer: .....

14. Below is a specification table for various smartphones. Use it to answer the questions which follow.

Physical Comparison				
	Apple iPhone 5	Samsung Galaxy S 3	Samsung Galaxy Nexus	LG Nexus 4
<b>Height</b>	123.8 mm (4.87")	136.6 mm (5.38" )	135.5 mm (5.33")	133.9 mm (5.27")
<b>Width</b>	58.6 mm (2.31")	70.6 mm (2.78")	67.94 mm (2.67)	68.7 mm (2.7")
<b>Depth</b>	7.6 mm (0.30")	8.6 mm (0.34")	8.94 mm (0.35")	9.1 mm (0.36")
<b>Weight</b>	112 g (3.95 oz)	133g (4.7 oz)	135 g (4.8 oz)	140 g
<b>CPU</b>	1.3 GHz Apple A6 (Dual Core Apple Swift)	1.5 GHz MSM8960 (Dual Core Krait)	1.2 GHz OMAP 4460 (Dual Core Cortex A9)	1.5 GHz APQ8064 (Quad Core Krait)
<b>GPU</b>	PowerVR SGX 543MP3	Adreno 225	PowerVR SGX 540 @ 304 MHz	Adreno 320
<b>RAM</b>	1 GB LPDDR2	2 GB LPDDR2	1 GB LPDDR2	2 GB LPDDR2
<b>NAND</b>	16, 32, or 64 GB integrated	16/32 GB NAND with up to 64 GB microSDXC	16/32 GB NAND	8/16 GB NAND
<b>Camera</b>	8 MP with LED Flash + 1.2MP front facing	8 MP with LED Flash + 1.9 MP front facing	5 MP with AF/LED Flash, 1080p30 video recording, 1.3 MP front facing	8 MP with AF/LED Flash, 1.3 MP front facing
<b>Screen</b>	4" 1136 x 640 LED backlit LCD	4.8" 1280x720 HD SAMOLED	4.65" 1280x720 SAMOLED HD	4.7" 1280x768 HD IPS+ LCD
<b>Battery</b>	Internal 5.45 Whr	Removable 7.98 Whr	Removable 6.48 Whr	Internal 8.0 Whr

(a) Which smartphone has the greatest height?

Answer: .....

(b) Which smartphone has the largest battery?

Answer: .....

(c) Which smartphone is lightest?

Answer: .....

(d) What is the average weight (in grams) of the four smartphones?

Answer: .....

15. Credit cards use “check digits” to detect errors when people type in the number. The last digit is chosen so that the sum of the first fifteen digits is a multiple of 11.

For example, if the first fifteen numbers of a credit card are 1234 5678 9012 345? then the last digit is 6 because the total of the first fifteen numbers is 60. Six more makes 66 which is divisible by 11.

(a) Find the missing digit in this credit card number 8421 4902 7130 811?.

Answer .....

(b) Find the missing digit in this credit card number 7680 4821 12?9 4215

Answer .....

(c) In this credit card number 4522 317*a* 4210 84*b*8, write down five possible values for the unknown numbers *a* and *b*.

Answer:

<i>a</i>	<i>b</i>

16. Work out  $20 \times 98564 \times 5$ .

Answer .....

## Section B

1. There are ten people in a room. Everybody shakes hands once with everybody else. How many handshakes occur?

Answer .....

2. (a) Write down the prime factors of 300.

Answer .....

- (b) If I work out  $2^4 \times 3^2 \times 5^3$ , how many zeros will be at the end?

Answer .....

- (c) If I work out  $2^{18} \times 3^{25} \times 5^{13}$ , how many zeros will be at the end?

Answer .....

3. (a) How many different ways are there of ordering the letters M A T H S?  
(the letters do not need to form real words)

Answer .....

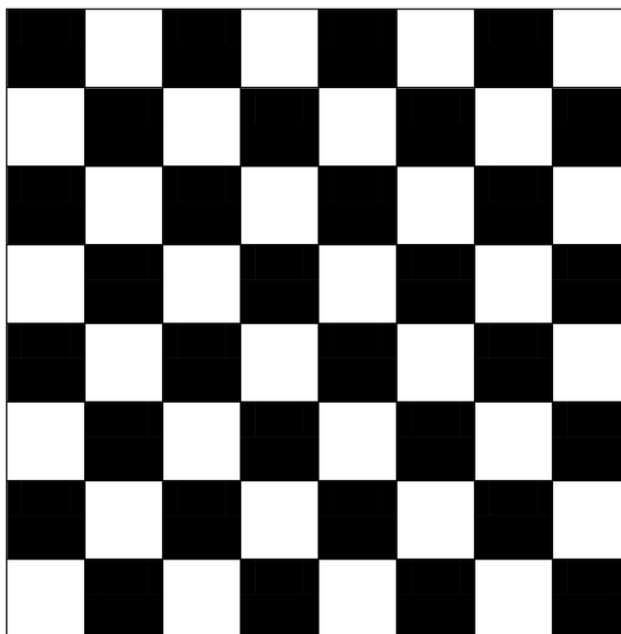
- (b) How many different ways are there of ordering four letters selected from M A T H S?

Answer .....

- (c) How many different ways are there of ordering three letters selected from M A T H S?

Answer .....

4. Consider a standard  $8 \times 8$  chessboard consisting of 64 small squares coloured in the usual pattern, so 32 are black and 32 are white. A zig-zag path across the board is a collection of eight white squares, one in each row, which meet at their corners. How many zig-zag paths are there?



Answer .....

5. The *decimal* number system uses a units column, and tens column, a hundreds column etc. It is called the decimal system because each column is ten times the column before. The only allowable decimal digits are 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

The number one hundred and forty nine is written as one 100, 4 10s and nine 1s.

100s	10s	1s
<b>1</b>	<b>4</b>	<b>9</b>

The *binary* number system uses a units columns, a twos column, a fours columns etc. It is called the binary system because each column is two times the column before. The only allowable binary digits are 0 and 1.

The number one hundred and forty nine is written as one 128, one 16, one 4 and one 1. (zeros must go in all other columns)

128s	32s	16s	8s	4s	2s	1s
<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>

- (a) (i) How would the binary number 1000 be written in *decimal*?

Answer .....

- (ii) How would the binary number 101010 be written in *decimal*?

Answer .....

(b) (i) How would the decimal number 13 be written in *binary*?

Answer .....

(ii) How would the decimal number 31 be written in *binary*?

Answer .....

(c) What is the largest decimal number that can be represented with eight binary digits?

Answer .....

(d) Describe a way to multiply a *binary* number by two, *without* converting it to decimal first.

Answer

.....  
.....

6. You have two jugs available, one is 3 pints in volume, the other 5 pints in volume. You also have a tap which can supply any amount of water.
- (a) If both jugs start empty, describe how to (accurately) get 1 pint of water in one of the jugs.

Now consider starting with both jugs empty. A third jug, 8 pints in volume, is full of water.

- (b) Without spilling any water, and without using any extra water, describe how to get 4 pints in at least one of the jugs.