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Independent Schools  
Examinations Board

## COMMON ENTRANCE EXAMINATION AT 13+

# MATHEMATICS

## PAPER 2

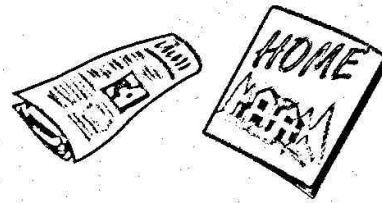
### Non-Calculator Paper

Monday 5 June 2006

Please read this information before the examination starts.

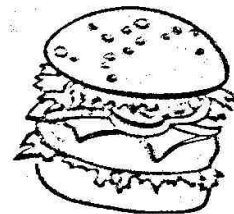
- This examination is 60 minutes long.
- All questions should be attempted.
- A row of dots ..... denotes a space for your answer.
- A completely correct answer may receive **no** marks unless you show all your working.
- Answers given as fractions should be reduced to their lowest terms.

1. (a) Ann buys a newspaper costing 48 p and a magazine costing £1.85  
How much does Ann spend altogether?



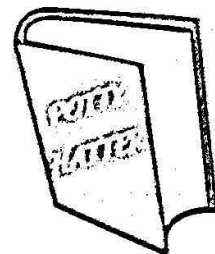
Answer: £ ..... (1)

- (b) Billy buys a 'Mega' burger costing £4.49  
How much change should he receive when  
he pays with a £10 note?



Answer: £ ..... (1)

- (c) A copy of 'Potty Hatter' costs £5.95  
What is the cost of 6 copies of 'Potty Hatter'?



Answer: £ ..... (2)

- (d) Tickets for the cinema are all the same price.  
The Jones family spends £46 on 8 cinema tickets.  
What is the cost of each ticket?



Answer: £ ..... (2)

2. (a) Write the following in order of size, starting with the smallest:

0.35

$\frac{7}{20}$

36%

Answer: ..... (2)

(b) Write  $\frac{5}{8}$  as a decimal.

Answer: ..... (2)

3. (a) Calculate  $12\frac{1}{2}\%$  of £20

Answer: £ ..... (2)

(b) Write 135 centimetres as a percentage of 3 metres.

Answer: ..... % (2)

4. (a) Calculate

(i)  $24 - 12 \div 3$

Answer: ..... (2)

(ii)  $\sqrt[3]{27} - 5^2$

Answer: ..... (2)

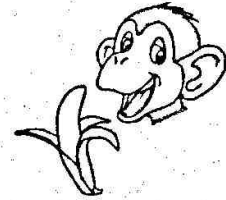
(b) (i) Write 378 as a product of its prime factors, using indices.

Answer: ..... (3)

(ii) Hence, or otherwise, calculate the number by which 378 must be divided to give the answer 42

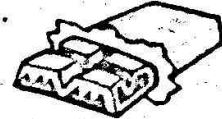
Answer: ..... (1)

5. (a) Tom's baby monkey eats  $\frac{3}{4}$  of a banana each day.  
How many bananas does the monkey eat in 28 days?



Answer: ..... (2)

- (b) Julie shares 12 bars of chocolate equally amongst her pupils.  
Each pupil receives  $\frac{2}{3}$  of a bar and none is left over.  
How many pupils are there?



Answer: ..... (2)

6. (a) Write down the next two terms in the following sequences:

(i) 1, 2, 5, 10, ..... .....

Answer: ..... , ..... (2)

(ii) 10 000, 1000, 100, 10, ..... .....

Answer: ..... , ..... (2)

- (b) The rule for making a sequence is *add 1 and then double*  
The first term of the sequence is 0  
Write down the 2nd, 3rd and 4th terms of the sequence.

Answer: ..... , ..... , ..... (2)

7. (a) Simplify

(i)  $3a^3 + 2a^3$

Answer: ..... (1)

(ii)  $3a^3 \times 2a^3$

Answer: ..... (1)

(iii)  $\frac{a^6b}{a^2b^4}$

Answer: ..... (2)

(iv)  $\frac{(3a^3)^2 + 3a^6}{3a^3}$

Answer: ..... (2)

(b) Factorise completely

$12y^3 - 18y^2$

8. Multiply out the brackets and simplify

$$3(2p - 5) - 2(p + 4)$$

Answer: ..... (3)

9. When  $a = 2$ ,  $b = -3$  and  $c = 4$   
find the value of

(i)  $5a + 2bc$

Answer: ..... (2)

(ii)  $2b^2 - b^3$

Answer: ..... (2)

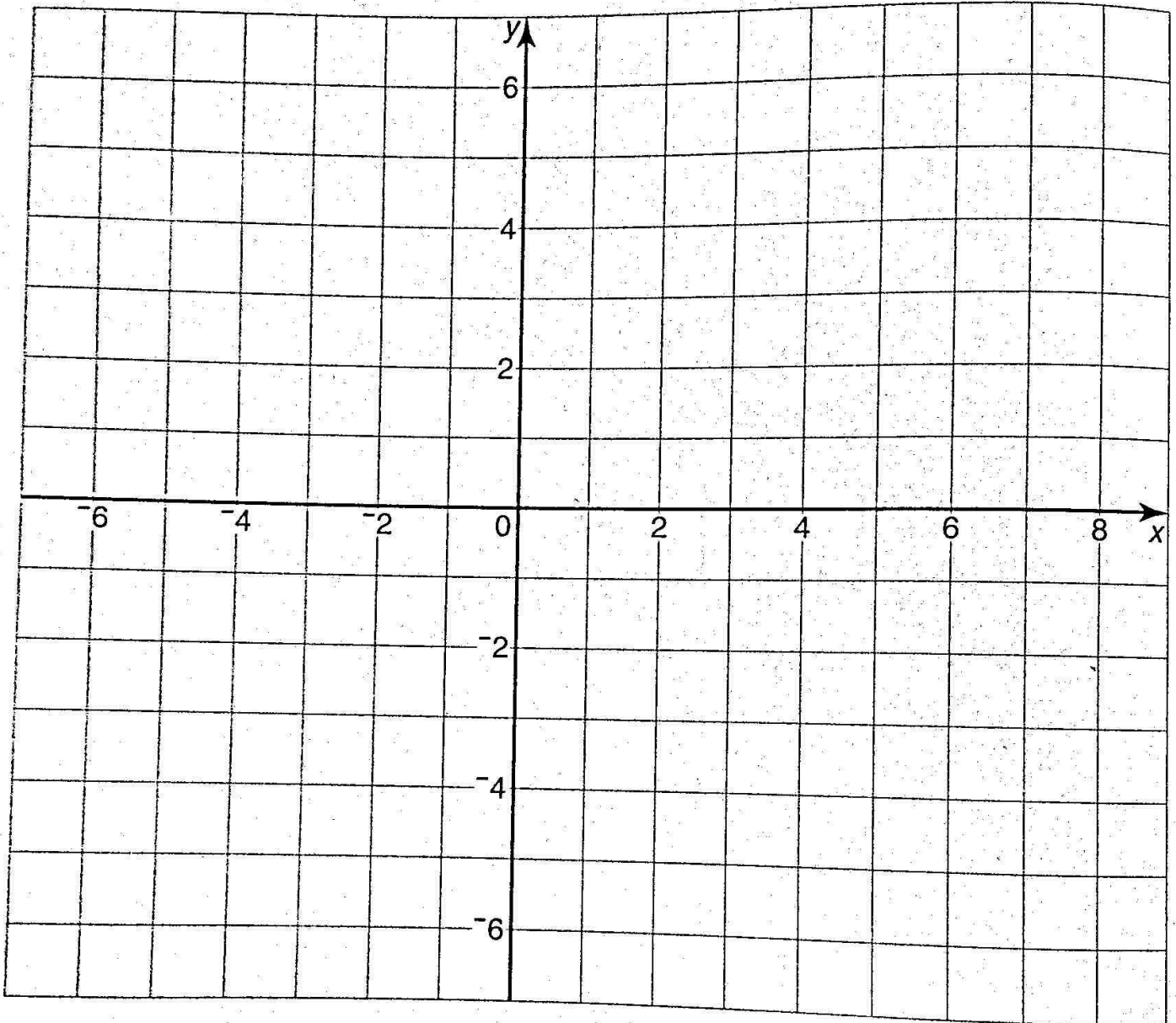
(iii)  $(ab)^2 - ac^2$

Answer: ..... (3)

10. (i) On the grid below

(a) plot the points  $(-3,1)$ ,  $(-5,4)$ ,  $(-3,6)$  and  $(-1,4)$  (1)

(b) join the points in order and label the figure A. (1)





(ii) On the grid opposite

(a) reflect A in the  $x$  axis and label the image B (2)

(b) rotate A through  $180^\circ$  about the point (1,0) and label the image C. (2)

(iii) A is translated so that the completed pattern of 4 shapes has 2 lines of symmetry.

(a) Draw the image of A. Label this image D. (1)

(b) Describe this translation in words.

Answer: ..... (1)

(c) Write down the equation of each line of symmetry.

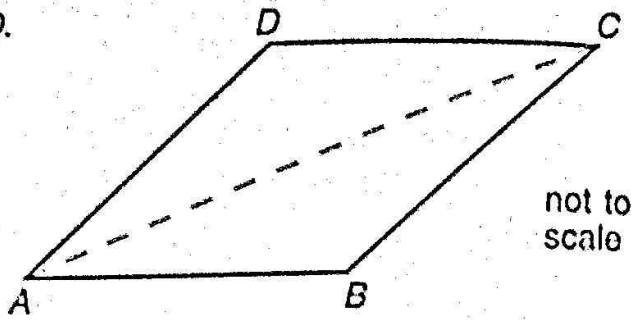
Answers: ..... (1)

..... (1)

(iv) What is the order of rotational symmetry of the completed pattern?

Answer: order ..... (1)

11. The sketch shows a rhombus  $ABCD$ .



(i) Using ruler and compasses, construct a full scale drawing of  $ABCD$  when  $AB = 5$  cm and  $AC = 8$  cm.

Point  $A$  is plotted for you.

+  
A

(3)

(ii) Measure and write down the length of  $BD$ .

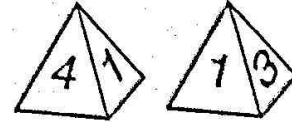
Answer: ..... cm (1)

(iii) Calculate the area of  $ABCD$ .

Answer: .....  $\text{cm}^2$  (3)

12. Dick has two fair four-sided dice, each with numbers 1 to 4 on its faces.  
One is red and the other is blue.

He rolls both dice at the same time.



If both numbers are odd, he multiplies them together:

$$1 \text{ \& } 3 \text{ scores } 1 \times 3 = 3$$

If both numbers are even, he multiplies them together:

$$2 \text{ \& } 4 \text{ scores } 2 \times 4 = 8$$

If one number is odd and the other is even, he adds them together:

$$1 \text{ \& } 2 \text{ scores } 1 + 2 = 3$$

Dick records the scores in the table below.

(i) Complete the table.

		RED			
		1	2	3	4
BLUE	1		3	3	
	2				8
	3				
	4				

(3)

(ii) What is the probability that the score is

(a) an odd number

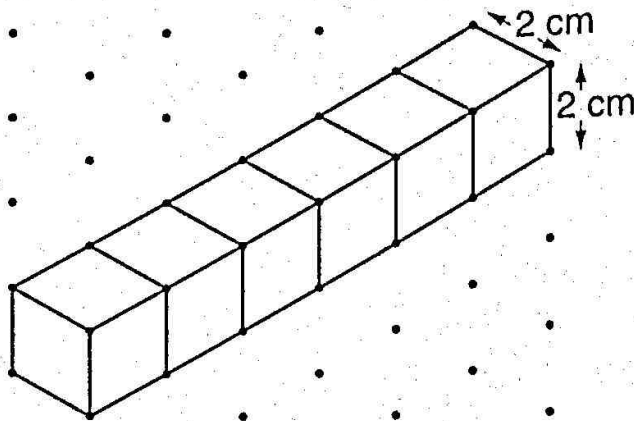
Answer: ..... (2)

(b) a prime number?

Answer: ..... (1)

13. Six gravy cubes of side 2 cm are to be packed tightly in a box.

(i) One possible way of packing the cubes is shown below.



not to  
size

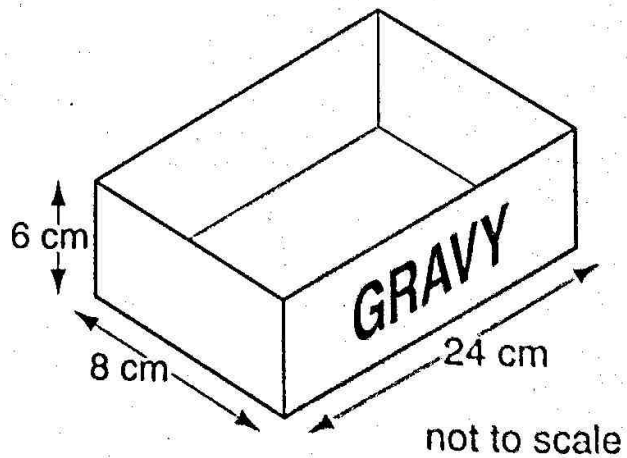
These cubes are packed like this in box A.

(a) What are the measurements of box A?

Answer: ..... cm by ..... cm by ..... cm (1)

(b) How many of box A are needed to fill this container?

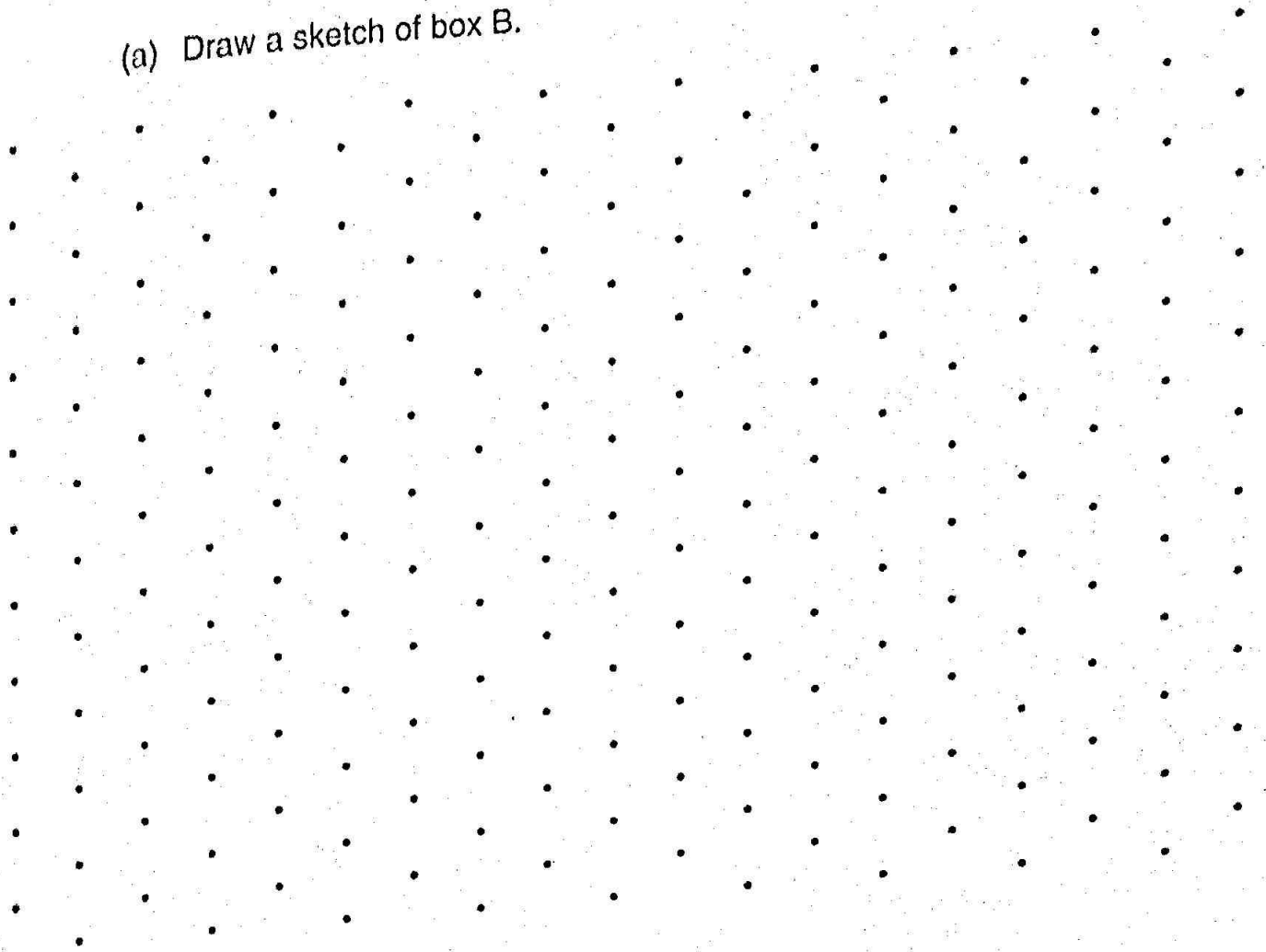
*(Ignore the thickness of packaging.)*



(ii) The six cubes can be packed tightly in a box of a different shape.  
This is box B.

(a) Draw a sketch of box B.

(2)



(b) What are the measurements of box B?

Answer: ..... cm by ..... cm by ..... cm (1)

(c) Calculate the total surface area of box B.

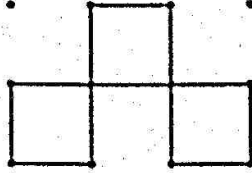
Answer: .....  $\text{cm}^2$  (3)

14. Here are the first three patterns in a sequence drawn on 1 centimetre 'dotted' paper.

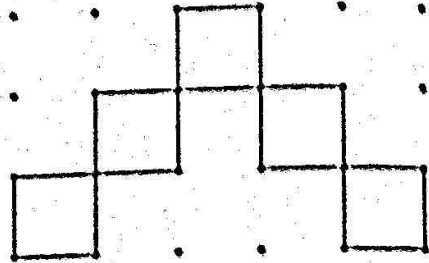
pattern 1



pattern 2

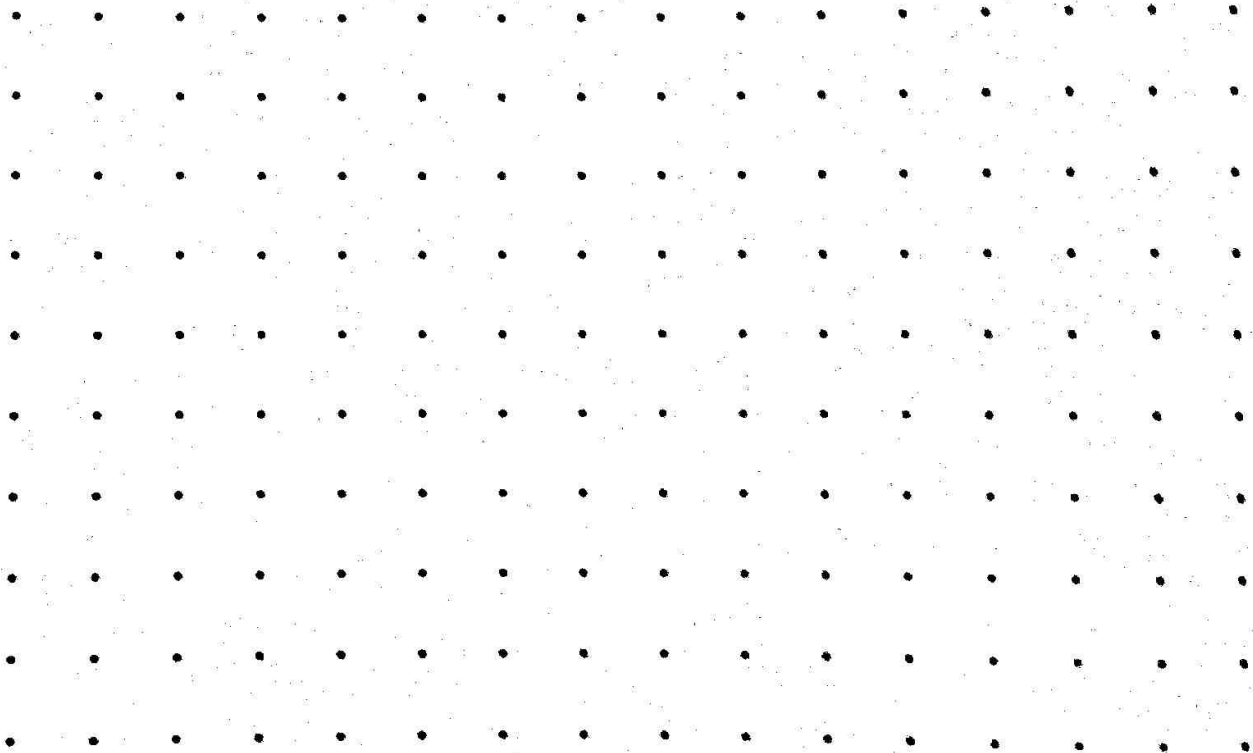


pattern 3



(i) Draw pattern 4 below.

(1)



(ii) Complete the table below.

pattern	1	2	3	4	$n$
number of squares	1		5		
number of dots	4	10			
length of perimeter (cm)	4		20		

(4)

(iii) How many dots are there in pattern 50?

Answer: ..... (1)

(iv) One pattern has a perimeter of 996 cm.  
How many dots are there in this pattern?

Answer: ..... (2)

15. In a game of *Lobbit*,  $x$  points are scored if you lob your ball into the 'inner' and  $y$  points if you lob it into the 'outer',  
1 'inner' and 2 'outers' score 9 points in total.

(i) Express this information as an equation in terms of  $x$  and  $y$ .

Answer: ..... (1)

2 'inners' score 8 more points than 1 'outer'.

(ii) Express this information as an equation in terms of  $x$  and  $y$ .

Answer: ..... (1)

(iii) Using your answers to parts (i) and (ii), solve equations to find the values of  $x$  and  $y$ .

Answer:  $x = \dots\dots\dots$   $y = \dots\dots\dots$  (4)

A game of *Lobbit* consists of 10 lobs.

Cedric scored with all his 10 lobs and totalled 41 points.

(iv) How many 'inners' and 'outers' did he get?

Answer: ..... 'inners' and ..... 'outers' (2)

(Total marks: 100)