SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 3: NON-CALCULATOR PAPER

Monday 26 January 2015

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.
- You must show all your working or you may receive no marks.
- Answers given as fractions should be reduced to their lowest terms.

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1. (a) Ann has £59.25 and Beth has £49.89

How much money do Ann and Beth have in total?

Answer: £ ..... (2)

(b) Colin has £20.02 and then he buys a bag which costs £8.73

How much money does Colin have left?

Answer: £ ..... (2)

(c) A box of pens costs £3.35

How much would it cost to buy 9 of these boxes of pens?

Answer: £ ..... (2)

(d) 9 identical boxes of pencils cost £31.05 altogether.

How much does 1 box of these pencils cost?

Answer: £ ..... (2)

2. Dan is 12 years old and Emma is 21 years old.

(i) Write down the ratio of Dan's age to Emma's age in its simplest form.

Answer: .....:..... (1)

Mother shares £132 between Dan and Emma in the ratio of their ages.

(ii) How much does Dan receive?

Answer: £ ..... (2)

3. Work out the value of

(a) (i) $^{-}4 + 8 \times {}^{-}5$

Answer: ..... (2)

(ii) $5 \times \sqrt{121} + 7$

Answer: ..... (2)

(b) (i) Which number should be written in the box to complete the following calculation?

$$72 \div (9 \times \square) = 8^2 \div 4^2$$

Answer: ..... (2)

(ii) Which mathematical operation (+, −, ×, ÷) should be written in the box to complete the following calculation?

$$12 - 8 \square 2 = 2$$

Answer: ..... (1)

4. (a) Jack scored 36 marks out of 80 in a test.

What is 36 out of 80 as a percentage?

Answer: ..... % (2)

(b) Jessica's first throw of a javelin is 33 metres.
Her second throw is 11% longer.

How long is Jessica's second throw?

Answer: ..... m (2)

(c) Write the following numbers in order of size, starting with the smallest.

$\frac{5}{9}$ 55% 0.505

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

5. (i) Write the number 32 as a product of its prime factors, using indices.

Answer: ..... (2)

(ii) Write 320 as a product of its prime factors, using indices.

Answer: ..... (1)

6. You are told that $654 \times 32.5 = 21\,255$
Use this fact to work out

(i) 654×3.25

Answer: ..... (1)

(ii) 655×32.5

Answer: ..... (1)

(iii) $2125.5 \div 325$

Answer: ..... (1)

7. By first writing each number in the following calculation correct to 1 significant figure, estimate the value of

$$\frac{305 \times 6.123}{0.499}$$

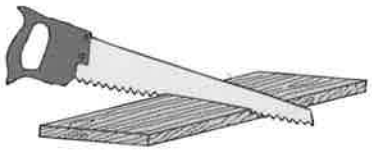
Answer: ..... (3)

8. Paul is building a bookcase.

All the shelves are $\frac{7}{8}$ of a metre long.

Paul has a piece of wood which is $2\frac{3}{20}$ metres long.

He cuts two shelves from this piece of wood.



(i) What is the length, in centimetres, of the piece of wood that remains?

Answer: ..... cm (3)

Paul buys a piece of wood which is $4\frac{1}{2}$ metres long.

(ii) How many shelves can he cut from this piece?

Answer: ..... (2)

9. (i) At 9 am the temperature in Alaska is $^{-}12.7\,^{\circ}C$ and in Washington it is $^{-}2.9\,^{\circ}C$.

(a) What is the difference between these two temperatures?

Answer: ..... °C (1)

By noon, the temperature in Washington has risen by 4.5 °C.

(b) What is the temperature in Washington at noon?

Answer: ..... °C (1)

(ii) There are two different temperature scales: Celsius (°C) and Fahrenheit (°F).
To convert Celsius to Fahrenheit, this formula can be used:

$$F = \frac{9}{5}C + 32$$

Where F is the temperature in °F and C is the temperature in °C.

(a) If the temperature is $^{-}10\,^{\circ}C$, what is the temperature in Fahrenheit?

Answer: ..... °F (2)

(b) If the temperature is 50 °F, what is the temperature in Celsius?

Answer: ..... °C (2)

10. If $x = 2$ $y = -2$ and $z = -6$ find the value of

(i) $7x - 4y$

Answer: ..... (1)

(ii) $2xyz$

Answer: ..... (2)

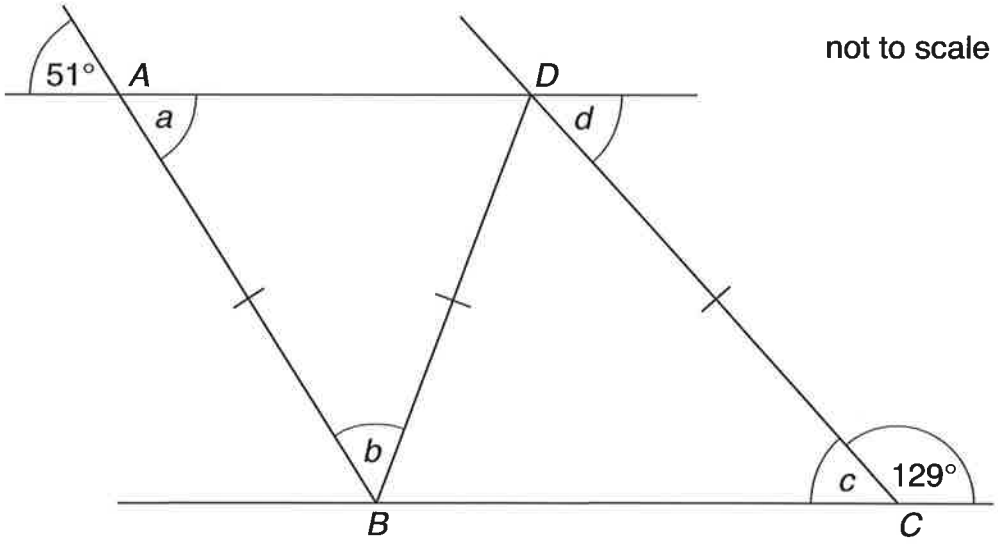
(iii) $z - y^3$

Answer: ..... (2)

(iv) $\frac{2z}{3y}^2$

Answer: ..... (2)

11. (i) Work out the size of each of the angles marked *a*, *b*, *c* and *d* in the diagram below.



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Answer: a = ... ° (1)

b = ... ° (2)

c = ... ° (1)

d = ... ° (1)

(ii) Is shape *ABCD* a parallelogram?
Give a reason for your answer.

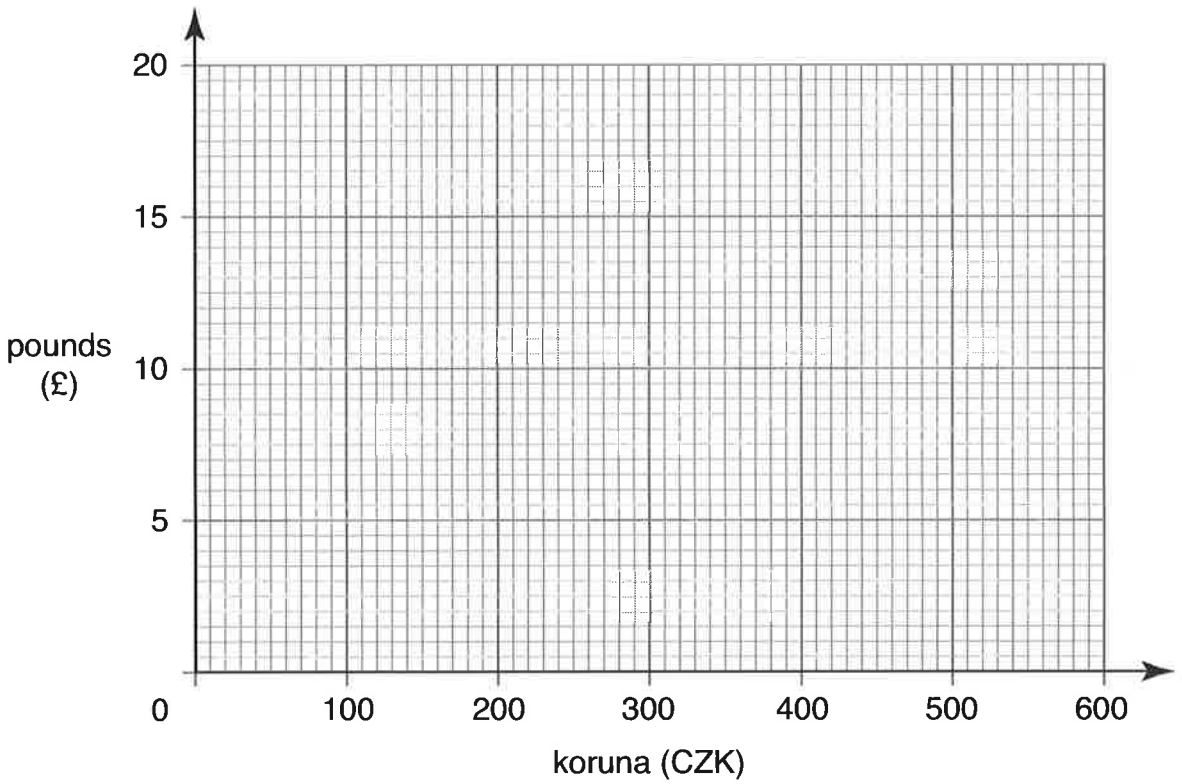
Answer: Yes/No reason: .....

..... (2)

12. The currency in the Czech Republic is the koruna (CZK).

£1 is worth 28 CZK.

(i) Draw a straight line on the grid below to convert CZK to £.



(2)

(ii) **Showing clearly where you take your readings**, use your graph to help you answer the following questions:

(a) How many CZK are worth £17.50?

Answer: ..... CZK (2)

(b) How many pounds are worth 420 CZK?

Answer: £ ..... (2)

(c) Tomas has 350 CZK.

James has £14

Who has more money and by how many pounds?

Answer: ..... by £ ..... (2)

13. (i) Explain why the triangle *PQR* with sides of length 5 cm, 12 cm and 13 cm contains a right angle.

Answer: .....

..... (2)

(ii) Using ruler and compasses, construct this triangle and label it *PQR*.
(One side, *QR*, has already been drawn for you.)



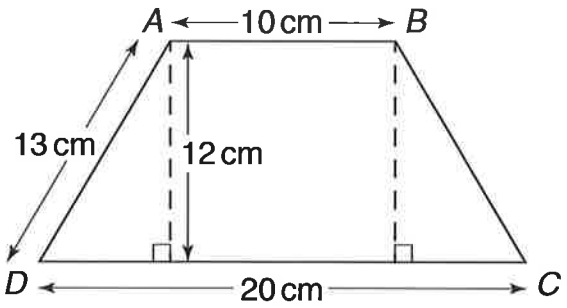
(2)

(iii) Calculate the area of triangle *PQR*.

Answer: ..... cm^2 (1)

Look at the trapezium *ABCD*.

(iv) (a) What is the area of *ABCD*?



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Answer: ..... cm^2 (2)

(b) What is the perimeter of *ABCD*?

Answer: ..... cm (1)

14. (i) A straight line has the equation $y = 1 - 2x$

(a) Complete the table of values below for the line $y = 1 - 2x$

x	-2	0	2
y			-3

(1)

(b) Draw and label the line $y = 1 - 2x$ on the grid opposite. (1)

(ii) A curve has the equation $y = 2x^2 - 2$

(a) Complete the table of values below for the curve $y = 2x^2 - 2$

x	-2	-1	0	1	2
y		0			6

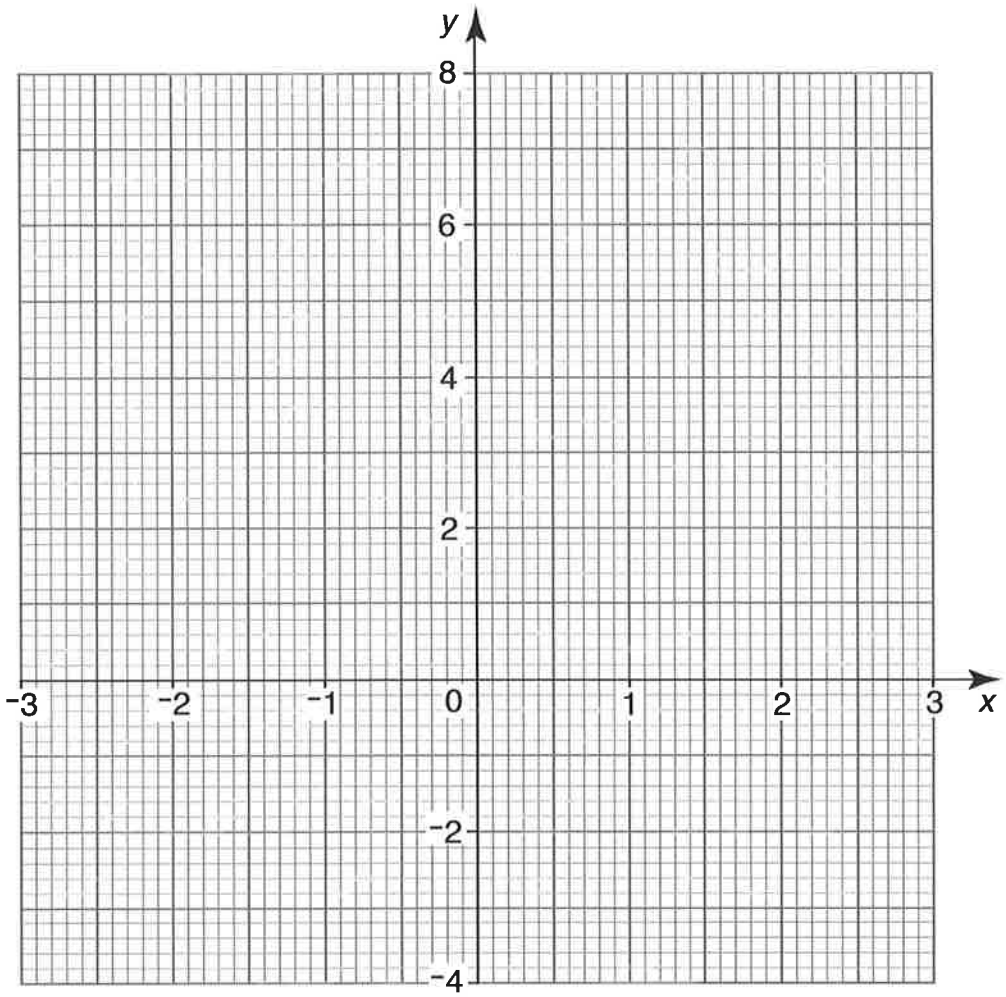
(2)

(b) Draw and label the curve $y = 2x^2 - 2$ on the grid opposite. (2)

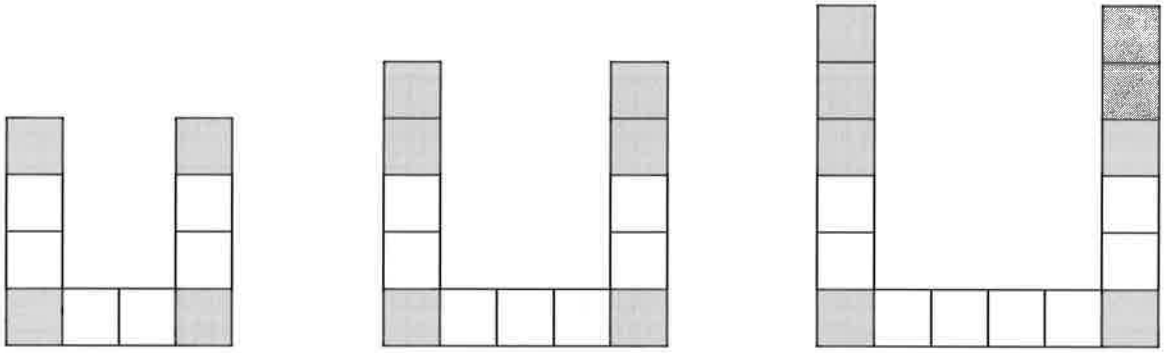
(iii) Use your graph to find the positive x-value which satisfies the equation

$$1 - 2x = 2x^2 - 2$$

Answer: $x =$ ..... (1)

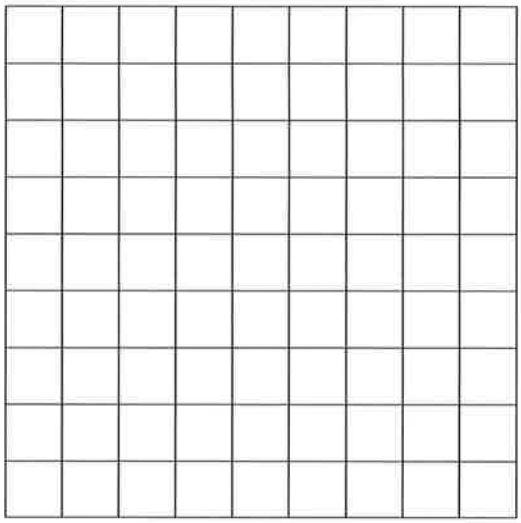

y
8
6
4
2
-3
-2
-1
0
1
2
3
x
-2
-4

15. (a) The patterns below are made up of grey and white squares.



pattern 1 pattern 2 pattern 3

(i) Draw pattern 4 in the grid below.



(1)

(ii) Complete the table below to show the number of grey and white squares in each pattern.

pattern	1	2	3	4	*n*
grey squares	4		8		
white squares	6		8		

(2)

(iii) In which pattern are there 20 grey squares?

Answer: ..... (1)

(iv) In which pattern is the number of grey squares 15 more than the number of white squares?

Answer: ..... (2)

(b) A sequence of numbers is generated using the following formula for the nth term:

$$(n + 1)^2 + 3$$

The first term of this sequence is 7

(i) Write down the next three terms of the sequence.

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

(ii) Explain why the number 68 is not a number in this sequence.

Answer: .....

..... (1)

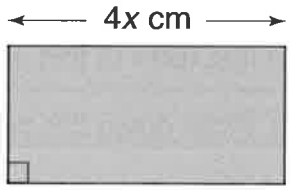
(iii) Which term in the sequence is 147?

Answer: term ..... (1)

TURN OVER FOR QUESTION 16

16. (a) Chris is building a patio using the rectangular paving blocks shown below.

(i) In terms of x, what is the perimeter of the block? Simplify your answer.



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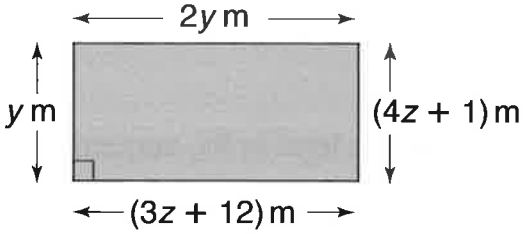
Answer: ..... cm (2)

(ii) Find the value of x if the perimeter of the block is 1.2 metres.

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

(b) Matt is building a rectangular swimming pool and has drawn the plan of it below.

(i) (a) By considering the height of this rectangle, write down an equation in terms of y and z



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Answer: ..... (1)

(b) By considering the width of this rectangle, write down an equation in terms of y and z

Answer: ..... (1)

(ii) Using your answers to part (b) (i), solve simultaneous equations to find the value of y and the value of z

Answer: $y =$ ..... $z =$ ..... (3)

(Total marks: 100)