

SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 3: NON-CALCULATOR PAPER

Monday 22 January 2018

Please read this information before the examination starts.

- This examination is 60 minutes long.
- **All** questions should be attempted.
- Write your answers on the dotted lines.
- You must show all your working or you may receive no marks.
- Answers given as fractions should be reduced to their lowest terms.



1. (i) George buys a hammer costing £8.49 and a screwdriver costing £2.73

How much does George spend altogether?

Answer: £ (1)

- (ii) A drill normally costs £107.05 but the price has been reduced by £28.49 in a sale.

How much does this drill cost in the sale?

Answer: £ (2)

- (iii) Theresa buys 45 nails which cost 13 pence each.

How much does Theresa pay in total for these nails?

Answer: £ (1)

- (iv) Dave spends a total of £13.05 on 15 identical sheets of sandpaper.

What is the price of 1 sheet of this sandpaper?

Answer: p (2)

2. Decide which is better value:

a 100 ml tube of *Colfresh* toothpaste costing £1.10 or

a 150 ml tube of *Colfresh* toothpaste costing £1.62

Remember to show all your working.

Answer: the ml tube is better value (2)

3. (i) Write the number 270 as a product of prime factors, using indices.

Answer: (3)

(ii) What is the smallest positive whole number 270 needs to be multiplied by to give a cube number?

Answer: (2)

4. (a) (i) Write 15.05% as a decimal.

Answer: (1)

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

15.05% 0.1 $\dot{5}$ $\frac{31}{200}$

Answer:,, (2)

- (b) (i) Work out 66% of 1500

Answer: (1)

- (ii) Only 34% of the 1500 apples in an orchard can be sold.

Only $\frac{4}{5}$ of the 800 pears in the orchard can be sold.

What percentage of all the apples and pears in the orchard can be sold?

Answer:% (3)

- (c) In a sale, the price of a suit is reduced by 25% so it now costs £240

What was the price of the suit before the sale?

Answer: £ (2)

5. Work out

(i) $1 + 2^3 \times 3^2$

Answer: (2)

(ii) $\frac{3}{2} \times (6 - 8)^3$

Answer: (2)

6. (a) If $x = 5$ $y = -1$ and $z = 2$ find the value of

(i) $xz - 2y$

Answer: (2)

(ii) $z^3 - y^3$

Answer: (2)

(iii) $\frac{2z}{x - y}$

Answer: (2)

(b) If $s = \frac{ut + vt}{2}$ work out the value of v when $s = 22$ $t = 4$ and $u = 8$

Answer: $v =$ (2)

7. Jeremy buys $1\frac{2}{5}$ kilograms of carrots.

Tom buys $2\frac{3}{4}$ kilograms of carrots.

(i) How many kilograms of carrots do Jeremy and Tom buy altogether?

Give your answer as a mixed number in its lowest terms.

Answer: kg (3)

Jeremy uses exactly $\frac{3}{20}$ of a kilogram of carrots to feed his rabbit every day.

(ii) For how many full days can Jeremy feed his rabbit using the carrots he bought?

Answer: (2)

8. (a) Solve the following equations:

(i) $5a - 9 = 36$

Answer: $a =$ (1)

(ii) $-15 = 20 - 5b$

Answer: $b =$ (2)

(iii) $\frac{2}{5}(4c - 1) = 6$

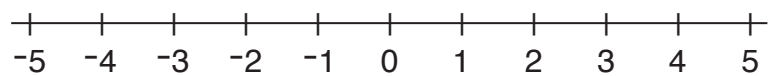
Answer: $c = \dots\dots\dots$ (2)

(b) (i) Solve the inequality

$$-6 \leq 2(d - 2)$$

Answer: $\dots\dots\dots$ (2)

(ii) Show your answer to part (b) (i) on the number line below.



(1)

(c) Look at these equations:

$$x + 3y = 8$$

$$x - y = 2$$

Work out the value of $x + y$

Answer: $x + y = \dots\dots\dots$ (3)

9. (i) A curve has the equation $y = x^2 - 2x$

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

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

(2)

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

(2)

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

Answer: (1)

(ii) A straight line has the equation $2x + y = 3$

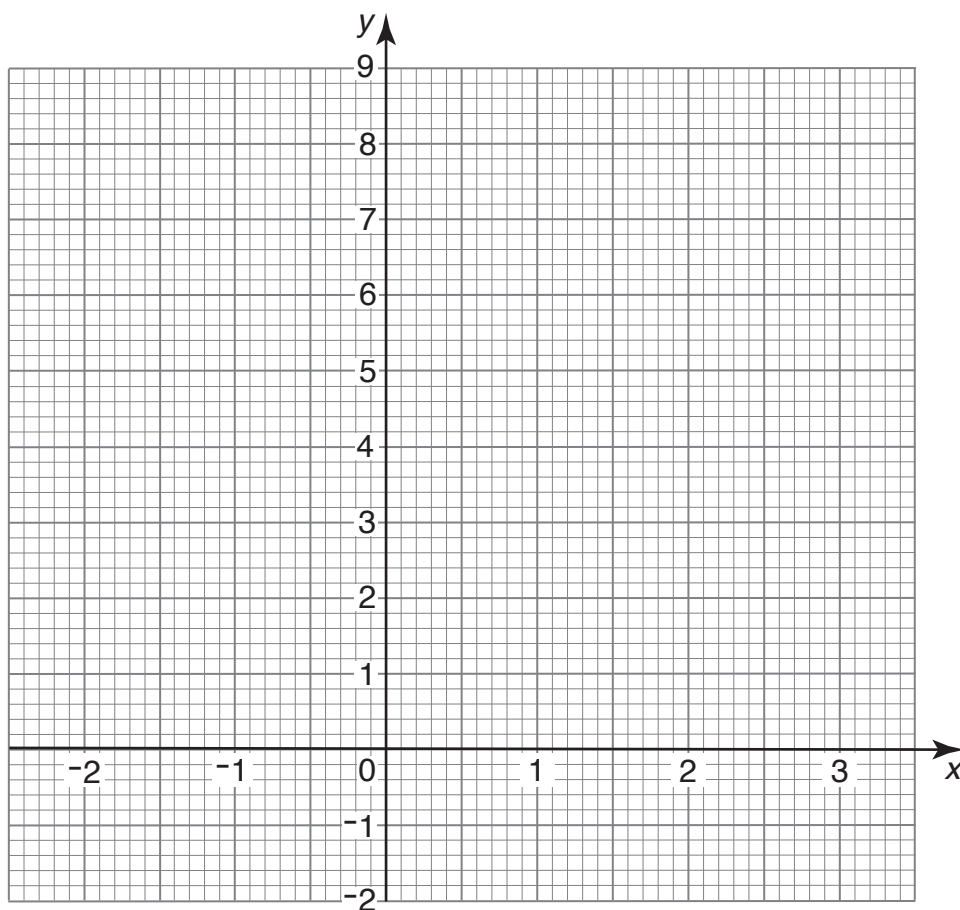
(a) Complete the table of values below for the line $2x + y = 3$

x		-1	2
y	7		-1

(2)

(b) Draw and label the line $2x + y = 3$ on the grid opposite.

(1)



(iii) $y = x^2 - 2x$ meets $2x + y = 3$ where $2x + (x^2 - 2x) = 3$

Explain why the graphs meet where $x = \sqrt{3}$

Answer:

..... (1)

10. (a) Use the fact that $216 \times 85 = 18360$ to work out

(i) 0.216×850

Answer: (1)

(ii) $18360 \div 170$

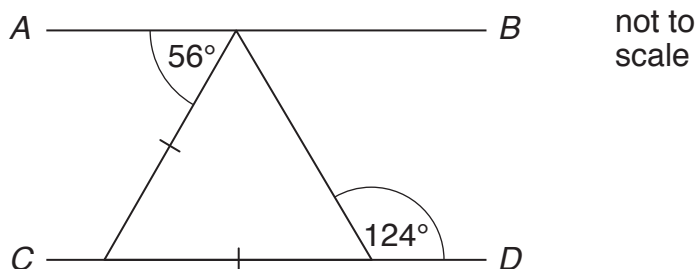
Answer: (1)

(b) Work out $2 \times 10^3 - 3 \times 10^2$
Give your answer in standard form.

Answer: (2)

11. (i) Look at the diagram.

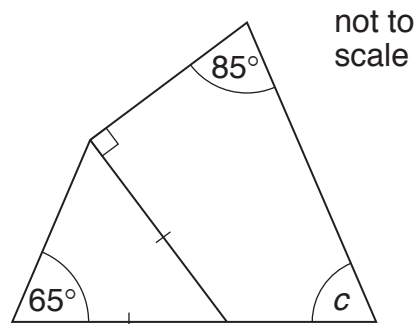
Are the lines AB and CD parallel?
Give a reason for your answer.



Answer: yes / no reason:

..... (1)

(ii) Work out the size of the angle marked c in the diagram below.



Answer: $c =$ (2)

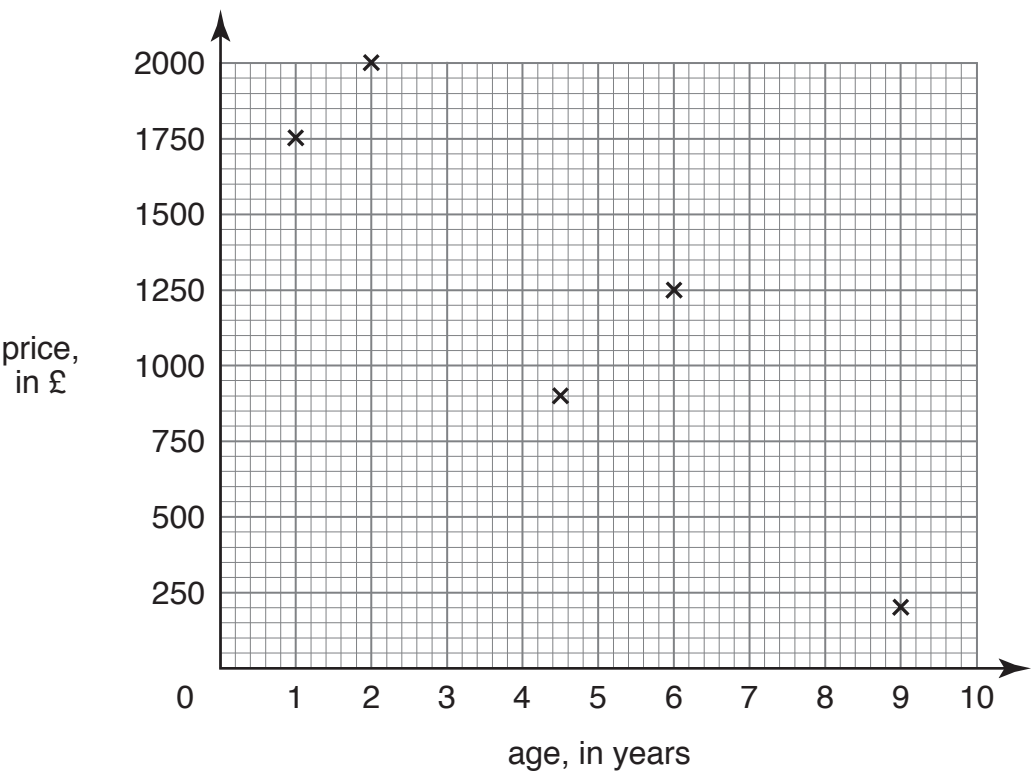
12. Emma only sells second-hand *Wolf* motorcycles.

Here are the prices and ages of seven motorcycles Emma has for sale:

age, in years	4.5	9	2	1	6	8	3
price, in £	900	200	2000	1750	1250	350	1500

The first five have been plotted as points on the scatter diagram below.

(i) Plot the remaining two points. (2)



(ii) Draw a line of best fit on the scatter diagram. (1)

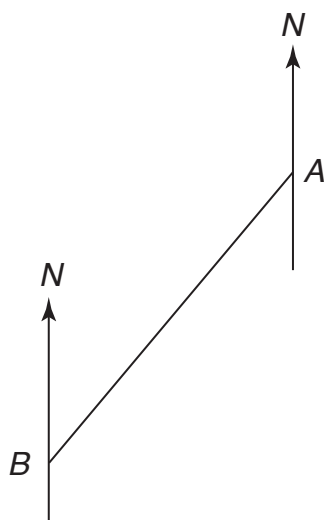
(iii) Explain what the correlation tells you about these motorcycles.

Answer:
 (1)

(iv) **Showing where you take your reading**, use your line of best fit to predict the price of a $2\frac{1}{2}$ year old *Wolf* motorcycle which Emma is selling.

Answer: £ (2)

13. The scale diagram below shows an aircraft-carrier, *A*, and a battleship, *B*.
In this diagram 1 centimetre represents 400 metres.



- (i) Measure and write down the bearing of the aircraft-carrier from the battleship.

Answer: (1)

- (ii) What is the distance between the battleship and the aircraft-carrier?

Answer: km (1)

A destroyer is on a bearing of 120° from the battleship.
The destroyer is at a distance of 3200 m from the aircraft-carrier.

- (iii) (a) Mark the position of the destroyer on the diagram and label it *D*. (2)
(b) How far is the destroyer from the battleship?

Answer: km (2)

14. *Supersuppers* serve meals consisting of a starter, a main course and a dessert.
 The starter is equally likely to be soup (S) or mussels (M).
 The main course is equally likely to be beef stew (B), pie (P) or curry (C).
 The dessert is equally likely to be ice cream (I) or rice pudding (R).

(i) Complete the table below to show all possible meals.

starter	main course	dessert
S	B	I
S	B	R
S	P	I
S	P	R
S	C	I
	C	R
	B	I
M	B	R
M		I
M		R
M		

(1)

(ii) Write down the probability that a meal

(a) includes curry

Answer: (1)

(b) includes soup and beef stew

Answer: (1)

(c) does not include ice cream or mussels

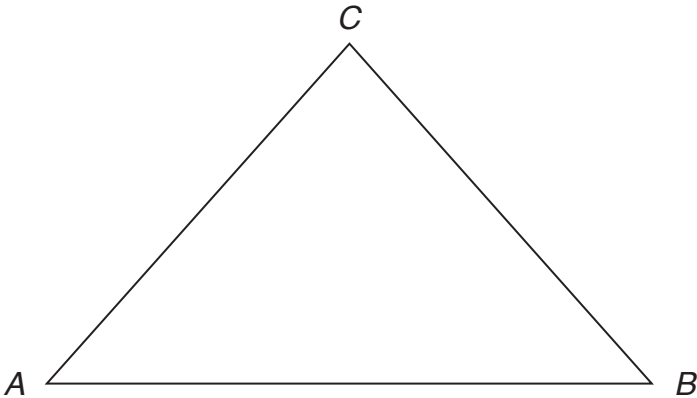
Answer: (1)

Supersuppers have run out of pies so they make equal numbers of beef stew and curry.

(iii) What is the probability that a meal now contains curry and rice pudding?

Answer: (2)

15. The diagram below shows the isosceles triangle ABC .



- (i) Using compasses and a straight edge, construct the perpendicular from C to AB . (2)
- (ii) Measure and write down the height of triangle ABC .

Answer: cm (1)

- (iii) Calculate the area of triangle ABC .

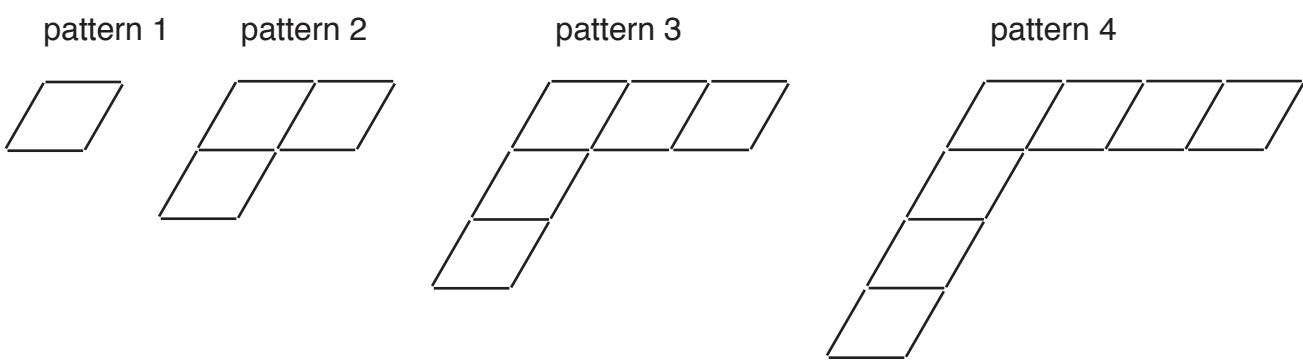
Answer:cm² (2)

- (iv) Using Pythagoras' theorem and given that $\sqrt{20} = 2 \times \sqrt{5}$ prove that the area of triangle ABC equals $8 \times \sqrt{5}$ cm²

Answer:

..... (3)

16. Look at these patterns of rhombuses  made with lines 1 centimetre long:



(i) Complete the table below.

pattern number	1	2	3	4	5
number of rhombuses	1	3		7	
number of 1-cm lines	4	10			28

(2)

(ii) How many 1-cm lines are there in the n th pattern?

Answer: (2)

(iii) If there are 15 rhombuses in a pattern, how many 1-cm lines are there?

Answer: (2)

(iv) In which pattern are there 99 more 1-cm lines than rhombuses?

Answer: pattern (2)

(Total marks: 100)

