

SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 3: CALCULATOR PAPER

Wednesday 7 June 2017

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.
- Where answers are not exact, they should be given to three significant figures, unless specified otherwise.
- The π button on your calculator should be used for calculations involving π .



1. (i) (a) Write each of the numbers in the following calculation correct to 1 significant figure:

$$\frac{57.27 \times 8.394}{397.4}$$

Answer: $\frac{\dots\dots\dots \times \dots\dots\dots}{\dots\dots\dots}$ (2)

- (b) Work out the value of your answer to part (i) (a).

Answer: (1)

- (ii) (a) Writing down the first 6 figures shown on your calculator display, find the value of

$$\frac{57.27 \times 8.394}{397.4}$$

Answer: (1)

- (b) Write your answer to part (ii) (a) correct to 3 significant figures.

Answer: (1)

- (c) Write your answer to part (ii) (a) correct to 3 decimal places.

Answer: (1)

2. (i) Mr Green buys a car with a price of £18 000
He chooses some extras which add 14.5% to the price.
What is the total cost of Mr Green's car?

Answer: £ (2)

- (ii) Mrs Brown buys a car and a trailer for a total cost of £12 000
The price of the car is £9840
What percentage of the total cost is the price of the trailer?

Answer:% (2)

- (iii) Mrs White bought a car from *Cowboy Motors*.
After 1 year the value of Mrs White's car had decreased by 20%.
The value of Mrs White's car after 1 year was £20 000
What price did Mrs White pay for her car when she bought it?

Answer: £ (2)

3. (i) A sequence begins with the following numbers:

1 9 17 25 33

- (a) Write down the next two numbers in the sequence.

Answer:, (1)

- (b) Which prime numbers smaller than 50 are in the full sequence?

Answer: (1)

- (ii) A different sequence follows the rule *multiply by 2 then add 4*

- (a) If the first number is 8, what is the third number in the sequence?

Answer: (1)

- (b) If the third number is 8, what is the first number in the sequence?

Answer: (2)

4. In January, *Nibblers Petshop* sold gerbils, hamsters and mice in the ratio 5 : 3 : 4
The shop sold a total of 108 gerbils, hamsters and mice.

(i) How many mice did the shop sell in January?

Answer: (2)

In February, *Nibblers Petshop* sold gerbils, hamsters and mice in the ratio 2 : 3 : 6
The shop sold 24 more mice than gerbils.

(ii) How many gerbils, hamsters and mice did the shop sell altogether in February?

Answer: (2)

In March, *Nibblers Petshop* sold gerbils, hamsters and mice in the ratio 4 : 6 : 5
In April, *Nibblers Petshop* sold gerbils, hamsters and mice in the ratio 6 : 8 : 3
In each of these months the shop sold 24 hamsters.

(iii) How many gerbils did the shop sell altogether in March and April?

Answer: (2)

5. Simplify

(i) $3a + 2a^2 + 4a - 5a^2$

Answer: (2)

(ii) $4b^2c^3 \times 6b^4c$

Answer: (2)

(iii) $(3d)^3 - 9d^3$

Answer: (2)

(iv) $\frac{12e^2 + 8e}{8e}$

Answer: (2)

6. Multiply out the bracket and simplify

$$4x - 3(5 - 3x)$$

Answer: (2)

7. (i) Factorise fully

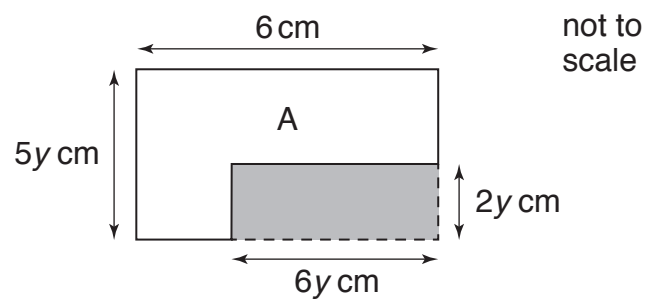
$$30y - 12y^2$$

Answer: (2)

Shape A is formed from a rectangle which has one corner cut off.

The rectangle has width 6 cm and height 5y cm.

The corner has width 6y cm and height 2y cm.



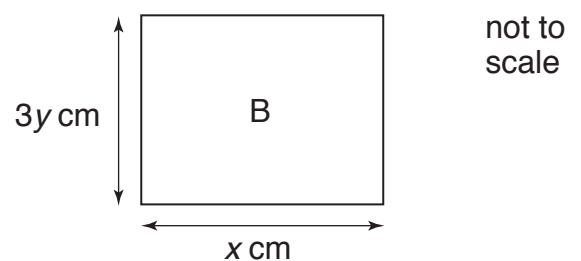
(ii) Write down, in terms of y , an expression for the area of shape A.

Answer: area A = cm^2 (1)

Rectangle B has the same area as shape A.

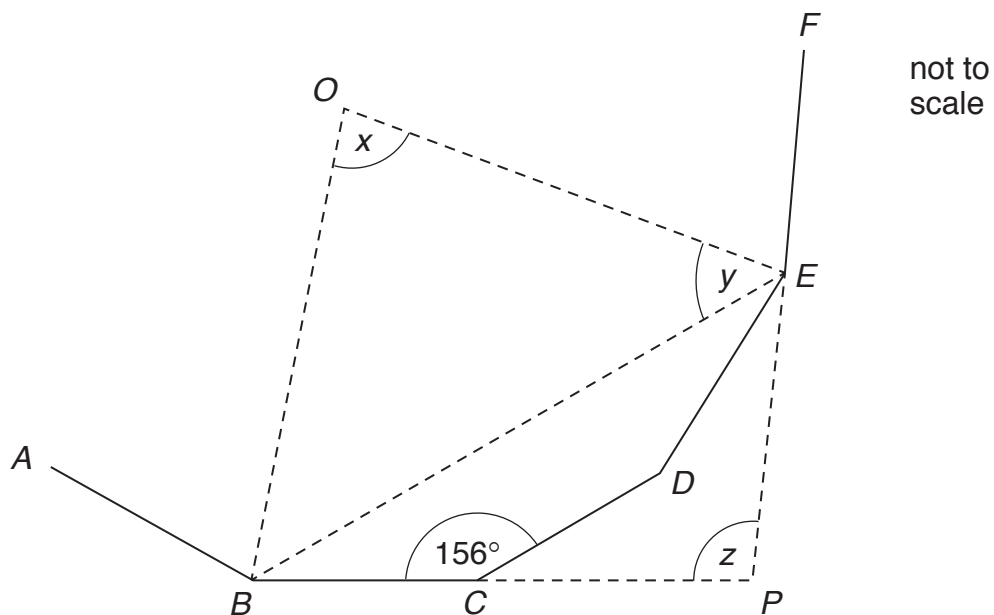
Rectangle B has width x cm and height 3y cm.

(iii) Write down the value of x in terms of y



Answer: $x =$ (1)

8. In the diagram below, $ABCDEF$ is part of a regular polygon with centre O .
 BCP and FEP are straight lines.



- (i) How many sides does the regular polygon have?

Answer: (2)

- (ii) Calculate the size of angle x

Answer: $x = \dots\dots\dots^\circ$ (2)

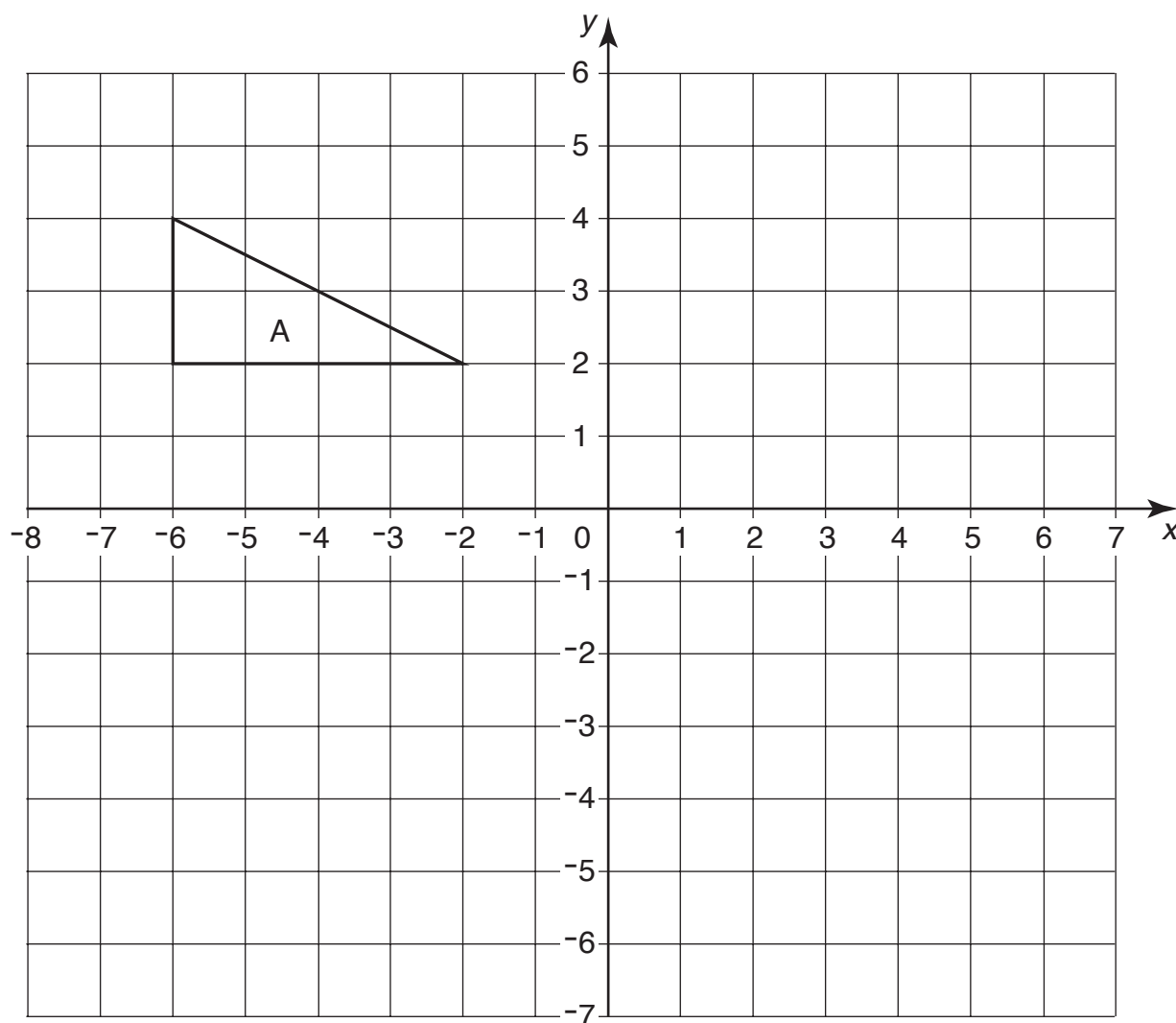
- (iii) Calculate the size of angle y

Answer: $y = \dots\dots\dots^\circ$ (2)

- (iv) Calculate the size of angle z

Answer: $z = \dots\dots\dots^\circ$ (2)

9. Shape A is drawn on the grid below.



- (i) Translate shape A by *8 units to the right* and *4 units down*.
Label the new shape B. (2)
- (ii) (a) Draw and label the line $y = x$ (1)
- (b) Reflect shape A in the line $y = x$
Label the new shape C. (1)
- (iii) Rotate shape A through 90° anti-clockwise about the point (1, 1).
Label the new shape D. (2)
- (iv) Describe fully the single transformation that maps shape D onto shape B. (2)
- Answer:

10. On Sports Day, the pupils in the three Houses A, B and C compete in 20 events. In each event, medals are awarded for 1st, 2nd and 3rd place. Here is part of the final medal table.

		number of medals			
		1st	2nd	3rd	total
House	A	5	8		21
	B	6		6	
	C		4		
	total	20		20	

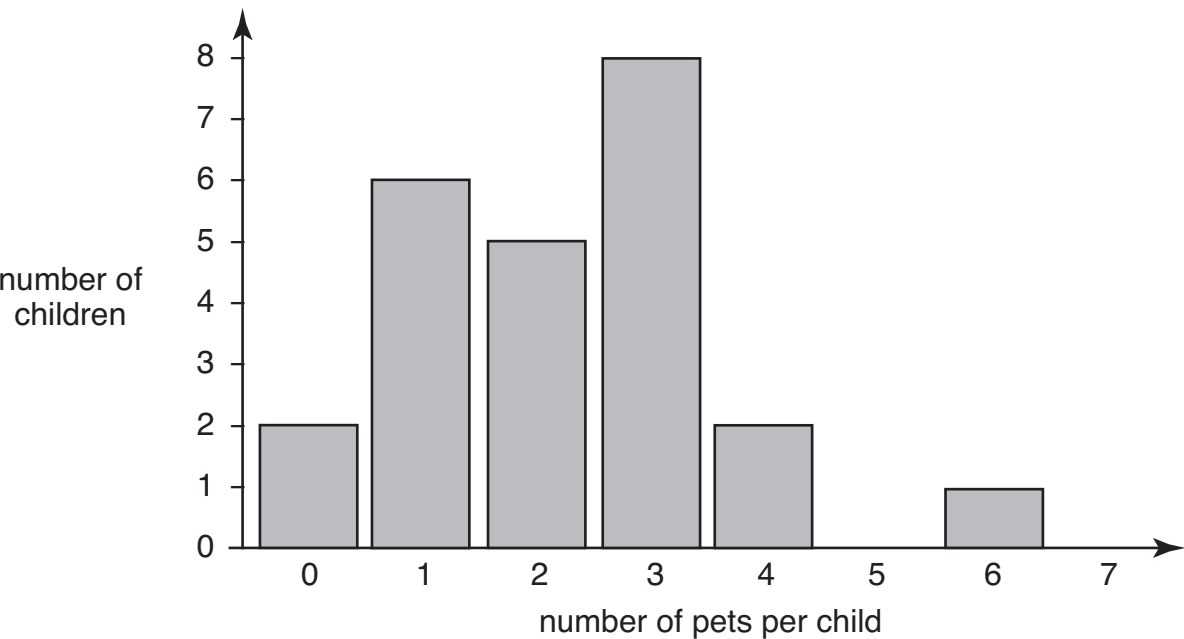
(i) Fill in the missing numbers in the table. (2)

In each event, there are 3 points for 1st place, 2 points for 2nd and 1 point for 3rd.

(ii) Which House has the most points?
Make sure you show all your working.

Answer: House (2)

11. The 24 children in class 8A were each asked how many pets they owned. The results are shown on the chart below.



(i) What is the median number of pets per child?

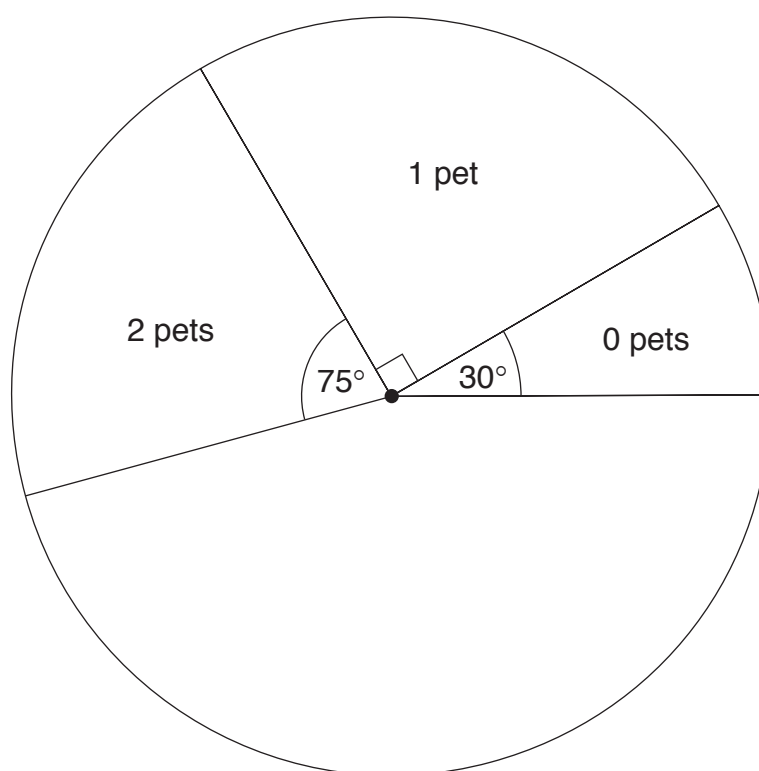
Answer: (2)

(ii) Calculate the mean number of pets per child.

Answer: (3)

The class now draws a pie chart to show the results of the survey.

(iii) Complete the fully-labelled pie chart below to show the results of the survey.



(2)

(iv) One child leaves the class.

She has 3 pets.

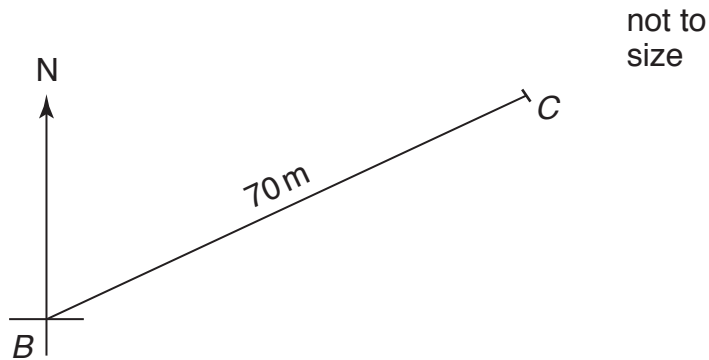
Does the mean number of pets per child increase or decrease?

Give a reason for your answer.

Answer: increase / decrease because

..... (1)

12. The diagram below shows the position of a bridge (B) and a church (C).
The distance from B to C is 70 metres.



- (i) Measure the length of the line BC in centimetres and use your result to explain why the scale of the diagram is 1 : 1000

Answer:
..... (1)

- (ii) What is the bearing of B from C ?

Answer: (1)

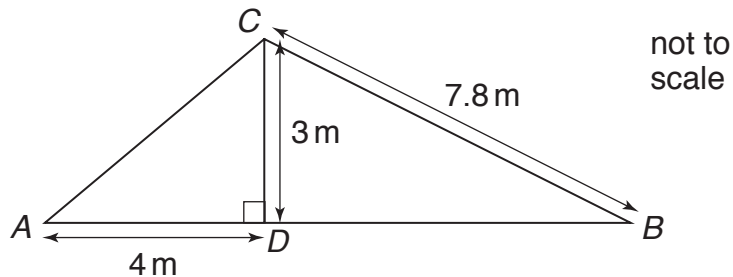
There is a lighthouse 75 metres north-west of the bridge.

- (iii) Show the position of the lighthouse on the diagram and label it L . (2)
- (iv) What is the distance from the lighthouse to the church correct to the nearest 5 metres?

Answer: m (1)

13. In the diagram ADB is a straight line and angle $ADC = 90^\circ$
All measurements are in metres.

(i) Calculate the length of AC .



Answer: $AC = \dots\dots\dots$ m (1)

(ii) Calculate the length of DB .

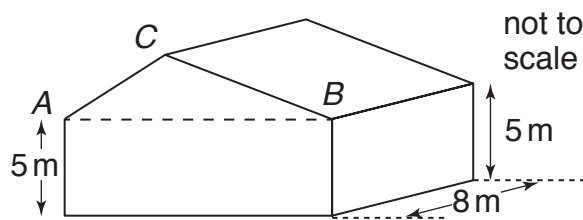
Answer: $DB = \dots\dots\dots$ m (2)

(iii) Calculate the area of triangle ABC .

Answer: $\dots\dots\dots$ m² (2)

Triangle ABC is one end of the roof of a barn.
The barn is 5 metres high at the edges and is 8 metres deep.

(iv) Calculate the volume of the inside of the barn including the roof.



Answer: $\dots\dots\dots$ m³ (3)

14. Ann is taking part in a cycle race for charity.

She completes the first part of the race in $2\frac{1}{2}$ hours, cycling at an average speed of 16 km/h.

(i) How far does she cycle during the first part of the race?

Answer: km (1)

During the second part of the race, Ann takes 48 minutes to cycle 16 kilometres.

(ii) What is her average speed during the second part of the race?

Answer: km/h (2)

The third part of the race is 18 kilometres long.

Ann cycles at an average speed of 15 km/h during the third part of the race.

(iii) How long does it take her to cycle the third part of the race?

Answer: h min (2)

(iv) Work out Ann's average speed for the whole race.

Answer: km/h (2)

15. (i) A circle has area 141 square metres.

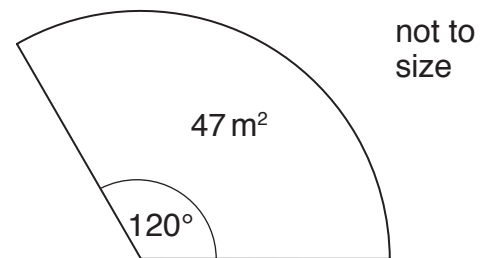
Calculate the radius of the circle.

Answer: m (2)

- (ii) *Green Gardens* has 4 identical flowerbeds.

Each flowerbed is a sector of a circle and has an area of 47 square metres.

- (a) Work out the perimeter of a flowerbed.



Answer: m (3)

Gary the gardener plants bulbs 10 cm apart round the edge of each flowerbed.

- (b) How many bulbs does he need for the 4 flowerbeds altogether?

Give your answer correct to the nearest 100

Answer: (2)

TURN THE PAGE FOR QUESTION 16

16. Simon and Tara each buy some DVDs and some Blu-ray discs.

The cost of each DVD is £ d and the cost of each Blu-ray disc is £ r

Simon buys 4 DVDs and 1 Blu-ray disc.

The total cost of Simon's discs is £42

(i) Write down, in terms of d and r , an equation to show this information.

Answer: (1)

Tara buys 2 DVDs and 3 Blu-ray discs.

The total cost of Tara's discs is £51

(ii) Write down, in terms of d and r , a second equation to show this information.

Answer: (1)

(iii) Solve the two equations to find the value of d and the value of r

Answer: $d =$

$r =$ (4)

Vince buys the same number of DVDs as Blu-ray discs at the same shop.

He spends a total of £78

(iv) What is the total cost of his DVDs?

Answer: £ (2)

(Total marks: 100)