SURNAME ..... FIRST NAME .....
(Block capitals, please)
JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER 3

Calculator Paper

Tuesday 28 February 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.
- 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.

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1. 1 kilogram (kg) = 2.2 pounds (lb)

(i) Writing down all the figures shown on your calculator, find

(a) the number of pounds in 18 kilograms

Answer: ..... pounds (1)

(b) the number of kilograms in 18 pounds.

Answer: ..... kilograms (1)

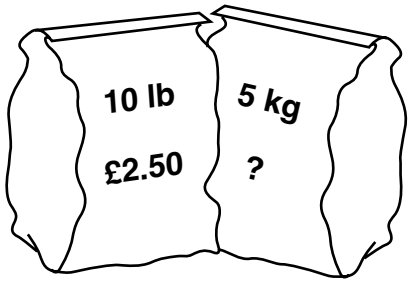
(ii) (a) Write your answer to part (i) (a) correct to the nearest pound.

Answer: ..... pounds (1)

(b) Write your answer to part (i) (b) correct to 1 decimal place.

Answer: ..... kilograms (1)

(iii) Find the cost of 5 kilograms of potatoes if 10 pounds of potatoes cost £2.50



Answer: £..... (2)

2. The mean rainfall during the first 6 days of a week was 4.3 millimetres per day.

(i) What was the total rainfall during these 6 days?

Answer: ..... mm (2)

After a wet day on the 7th day of the week, the total rainfall increased to 32.2 millimetres.

(ii) (a) What was the rainfall on the 7th day?

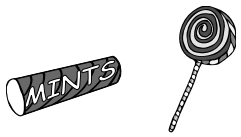
Answer: ..... mm (1)

(b) What was the mean daily rainfall for all 7 days?

Answer: ..... mm (1)

3. (a) The prices of a packet of mints and a lollipop are in the ratio of 4:1
The total cost of 1 packet of mints and 1 lollipop is £1

(i) What is the cost of a lollipop?



Answer: ..... pence (2)

A box of chocolates is 5 times as expensive as a packet of mints.

(ii) What is the cost of a box of chocolates?

Answer: £..... (1)

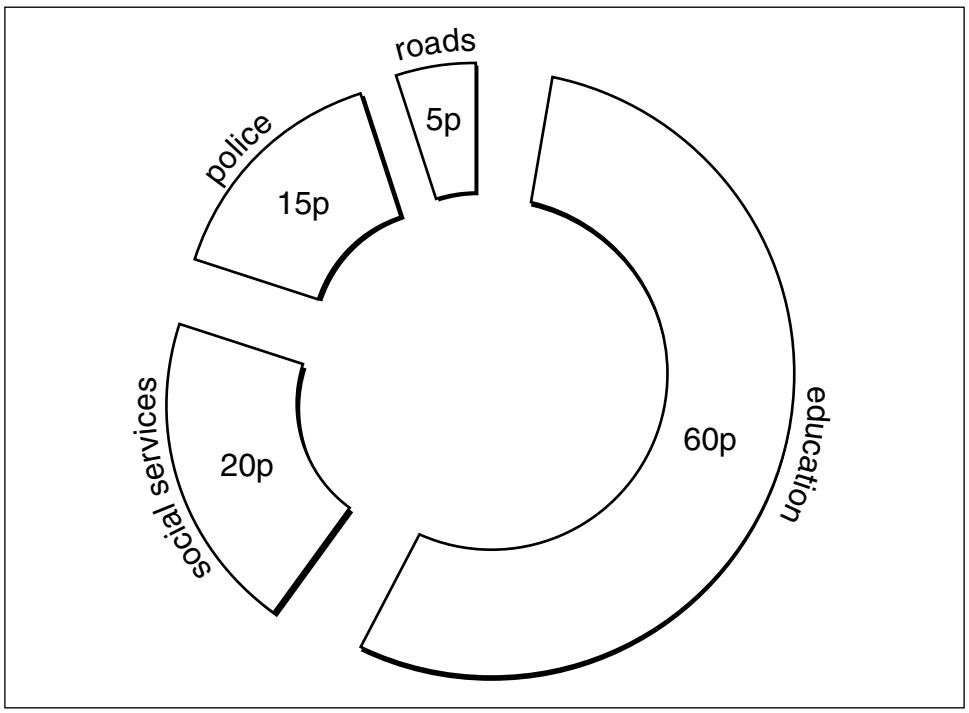
(b) Find the total amount if £3.50 is increased by 28%.

Answer: £..... (2)

(c) Express 480 metres as a percentage of 2 kilometres.

Answer: .....% (2)

4. The diagram below shows how each £1 is spent on different services by Shire District Council during a one-year period.



(i) Which service spends the most?

Answer: ..... (1)

(ii) The total amount spent is £18 000 000

(a) How much is spent on roads?

Answer: £..... (2)

A quarter of the education budget is spent on nursery education.

(b) Calculate the size of the remainder of the education budget.

Answer: £..... (2)

5. Richard has a bag of 27 coloured sweets – red ones, yellow ones and orange ones.

The probability that, at random, he picks out a red sweet is $\frac{1}{3}$

(i) How many red sweets are there in the bag?

Answer: ..... (1)

Richard eats all the red sweets.

He then finds there are 4 more yellow sweets than there are orange ones.

(ii) (a) How many yellow sweets are there?

Answer: ..... (1)

(b) If he picks out one sweet at random, what is the probability that it is yellow?

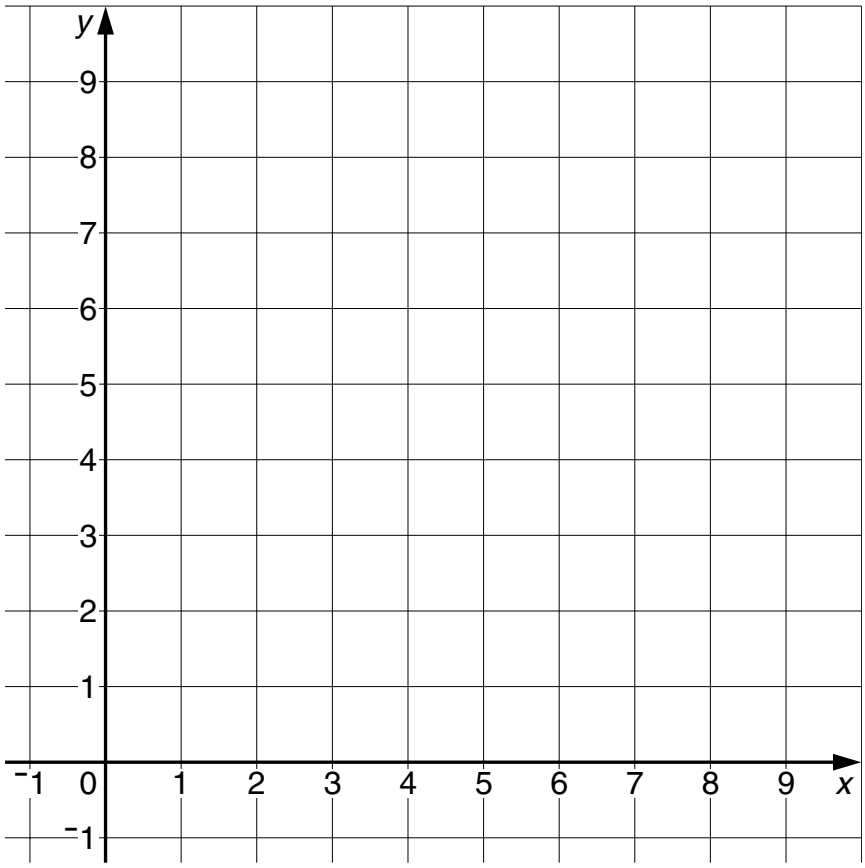
Answer: ..... (1)

He picks a yellow sweet and eats it.

(iii) If he picks another sweet at random, what is the probability it is not yellow?

Answer: ..... (1)

6.



(i) On the co-ordinate grid, plot the points (1, 2), (4, 1), (3, 4) and (1, 4). Join the points to form a quadrilateral and label it A. (2)

(ii) With centre (0, 1), enlarge the quadrilateral by scale factor 2 Label the enlarged quadrilateral B. (3)

The area of quadrilateral A is 6 cm^2.

(iii) What is the area of quadrilateral B?

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

7. (a) Simplify

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

Answer: ..... (2)

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

Answer: ..... (3)

(iii) $c \times c^4$

Answer: ..... (1)

(b) Factorise

$4p + 6r$

Answer: ..... (2)

8. Captain Kirk sails from port, *P*, on a bearing of 060° towards a fishing boat, *F*, which is 5 kilometres away.

(i) Using a scale of 1:100 000, draw the course that Captain Kirk takes from *P* to the fishing boat and label the position of the fishing boat, *F*. (2)

(ii) Draw a north line through *F*. (1)

Captain Kirk then tows the fishing boat back to harbour, *O*, a distance of 8 kilometres on a bearing of 200° from *F*.

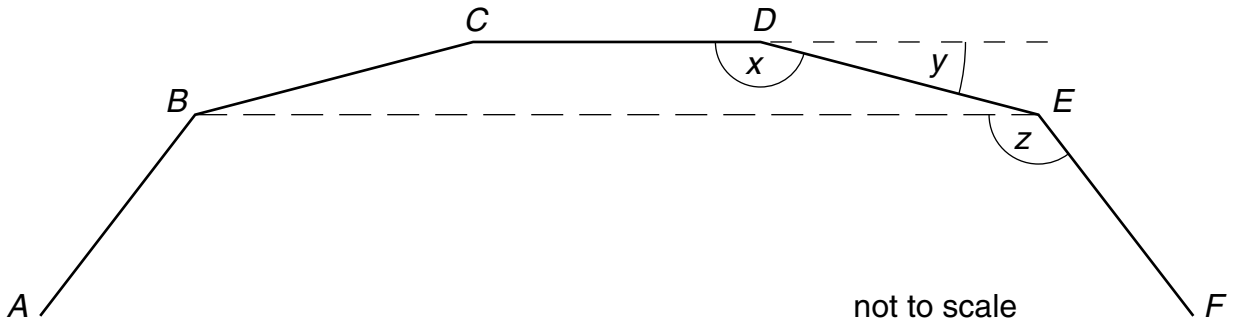
(iii) Draw the course of the boats to the harbour, *O*. (2)

(iv) Measure and write down the distance and bearing of *O* from *P*.

Answer: distance ..... km (1)

bearing .....° (2)

9. *ABCDEF* shows part of a regular polygon with interior angle *x* equal to 156°.



(i) Calculate the size of the exterior angle *y*.

Answer: *y* = ... ° (2)

(ii) How many sides has the regular polygon?

Answer: ..... (2)

(iii) What is the sum of all the interior angles of the regular polygon?

Answer: ..... ° (1)

(iv) Which type of 4-sided figure is *BCDE*?

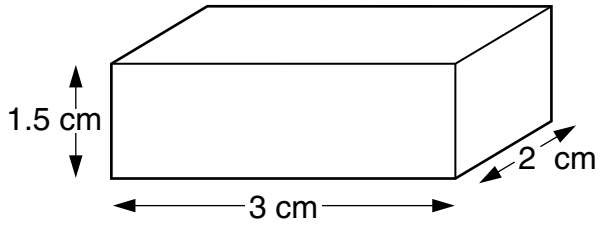
Answer: ..... (1)

(v) Calculate the size of the angle marked *z*.

Answer: *z* = ... ° (2)

10. A toy brick is in the shape of a cuboid measuring 3 cm by 2 cm by 1.5 cm.

(i) What is the volume of the brick?



not to scale

Answer: ..... cm^3 (2)

Each cubic centimetre of the brick has a mass of 2.3 grams.

(ii) What is the mass of one brick?

Answer: ..... g (1)

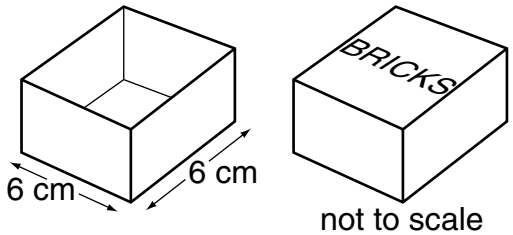
The bricks are to be painted.

(iii) What is the total surface area of one brick?

Answer: ..... cm^2 (3)

A set of 24 bricks completely fills a box with a square base of side 6 cm.

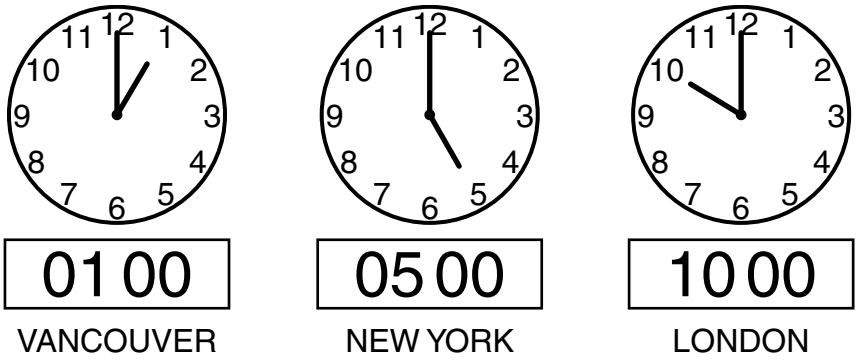
(iv) What is the height of the box?



not to scale

Answer: ..... cm (3)

11. The international airport clocks show the following information simultaneously:



Mr M E Grant flies from London to New York. The flight time is $6\frac{1}{2}$ hours.

(i) If the aircraft leaves London at 10 00, at what time (local time) does he arrive in New York?

Answer: ..... (2)

After a 3 hour wait in New York, Mr Grant travels on to Vancouver where the time is 4 hours behind the time in New York.

(ii) Mr Grant lands in Vancouver at 15 30 local time.

(a) How long is the flight from New York to Vancouver?

Answer: ..... hours (2)

(b) What is the time in London when Mr Grant lands in Vancouver?

Answer: ..... (2)

(iii) How long after leaving London does Mr Grant arrive in Vancouver?

Answer: ..... h..... min (1)

12. (i) (a) Calculate the area of a circle of radius 8 centimetres.

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

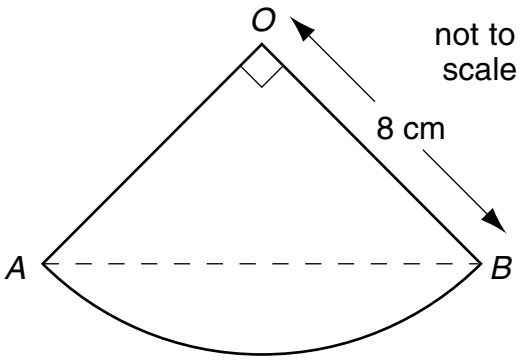
(b) Calculate the circumference of a circle of radius 8 centimetres.

Answer: ..... cm (2)

(ii) Sector *OAB* is a quarter of a circle with centre *O* and radius 8 cm.

Calculate

(a) the area of the sector *OAB*



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

(b) (i) the length of the arc *AB*

Answer: ..... cm (1)

(ii) the perimeter of the sector *OAB*

Answer: ..... cm (1)

(c) the area of the triangle *OAB*.

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

13. The number y is 3 bigger than the number x.

(i) Form an equation, in terms of x and y, to show this information.

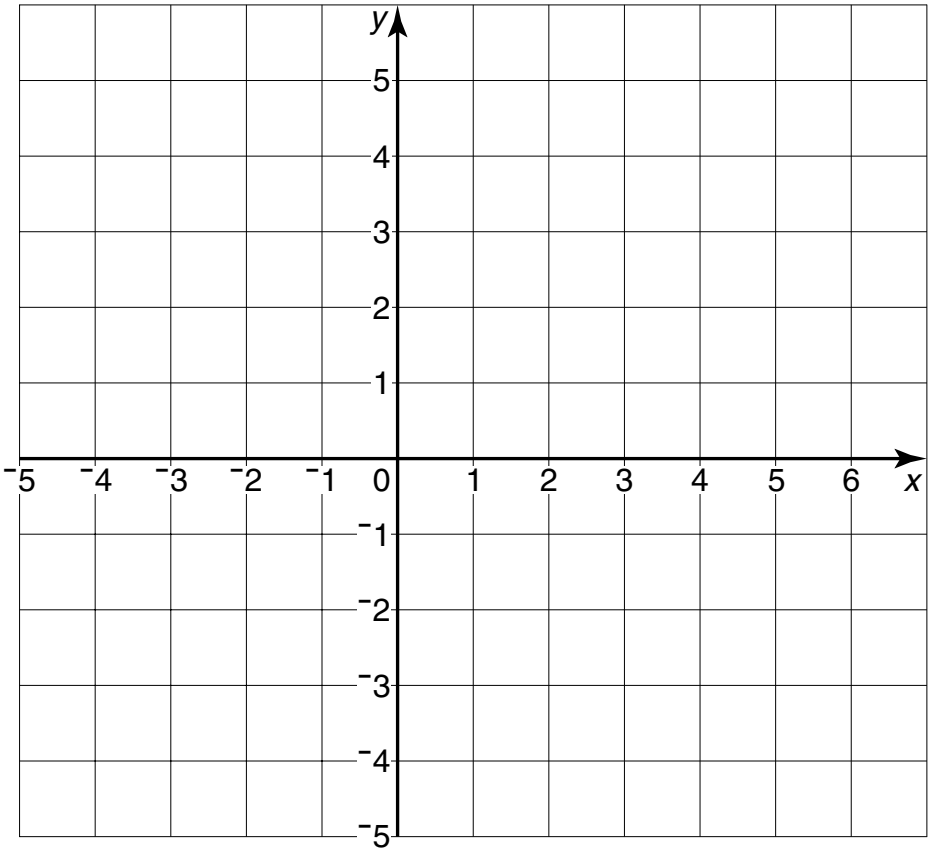
Answer: ..... (1)

(ii) Complete the table of values for your equation in part (i).

x	-3	0	2
y			5

(2)

(iii) Using the table in part (ii), plot points onto the grid below and draw a line through them. (2)



The sum of the numbers x and y is 2

(iv) Form an equation, in terms of x and y, to show this information.

Answer: ..... (1)

(v) Complete the table of values for your equation in part (iv).

x	0	2	4
y			

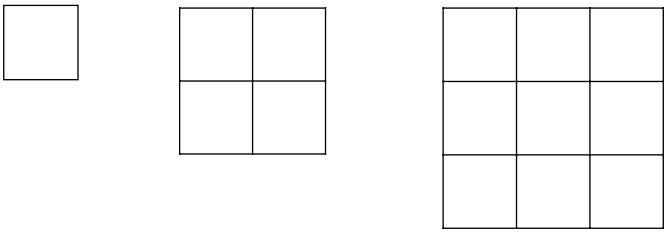
(2)

(vi) Using the table in part (v), plot points onto the grid opposite and draw a straight line through them. (1)

(vii) Write down the co-ordinates of the point of intersection of the two lines.

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

14. pattern 1 pattern 2 pattern 3 pattern 4



(i) Sketch pattern 4 in the space provided. (1)

(ii) Complete the table below to find the total number of squares in each of the patterns.

	pattern 1	pattern 2	pattern 3	pattern 4	pattern 5
number of 1 × 1 squares	1	4	9	.....	.....
number of 2 × 2 squares	0	1	4	.....	.....
number of 3 × 3 squares	0	0	.....	.....	.....
number of 4 × 4 squares	0	0	.....	.....	.....
number of 5 × 5 squares	0	0	.....	.....	.....
total number of squares	1	5	.....	.....	.....

(5)

(iii) By considering the sequence of numbers in the table above, calculate the total number of squares in an 8 × 8 square (pattern 8).

Answer: ..... (2)

(Total marks: 100)