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

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER I

Non-Calculator Paper

Monday 27 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.
- 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.

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1. (a) John paid a total of £4.33 for a jar of coffee and a bag of sugar.

The jar of coffee cost £3.69

How much did the bag of sugar cost?



Answer: ..... p (2)

(b) What is the total cost of 25 stamps at 28 p each?



Answer: £ ..... (2)

(c) Jane shares 84 jelly beans equally between herself and two friends.

How many jelly beans does each person receive?

Answer: ..... (2)

2. Calculate

(i) the sum of 5 and ¯4

Answer: ..... (1)

(ii) the product of 5 and ¯4

Answer: ..... (1)

(iii) the difference between 5 and ¯4

Answer: ..... (1)

(iv) the result of dividing 5 by ¯4

Answer: ..... (2)

3. A sum of money is shared between Peter, James and Mary where Peter receives 40% of the sum, James receives $\frac{1}{2}$ of the sum and Mary receives the rest.

(i) What percentage does Mary receive?

Answer: .....% (2)

James receives £200

(ii) How much does Peter receive?

Answer: £..... (2)

James spends £40 of his share.

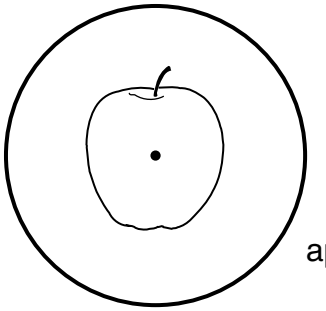
(iii) What percentage of his share does James spend?

Answer: .....% (2)

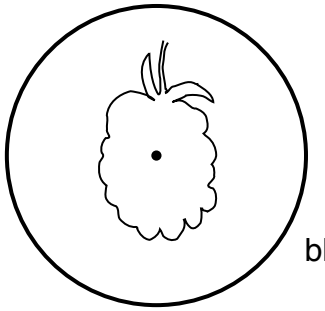
(iv) How much must Peter give to Mary so that Peter and Mary have the same amount of money?

Answer: £..... (2)

4. Adam buys an apple pie and Bella buys a blackberry pie from the local baker.
The pies are the same size.



apple



blackberry

Adam cuts up his apple pie. He takes $\frac{1}{2}$ of the pie and Bella takes $\frac{1}{3}$ of the pie.

(i) What fraction of the apple pie is taken altogether?

Answer: ..... (2)

Bella cuts up her blackberry pie. She takes $\frac{1}{4}$ of the pie and then Adam takes $\frac{1}{3}$ of what is left.

(ii) What fraction of the blackberry pie remains?

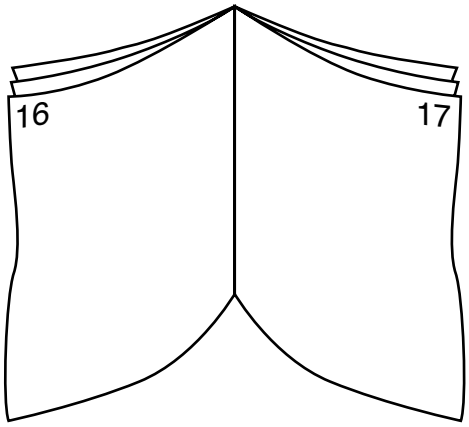
Answer: ..... (3)

Skip, the dog, eats the remaining pieces of the pies.

(iii) Find the ratio of apple pie to blackberry pie that Skip eats.
Give your answer in its simplest form.

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

5. The middle pages of a newspaper are shown below.



(i) How many pages are there in the newspaper altogether?

Answer: ..... (1)

The mean (average) number of words on each single page is 2000

(ii) Estimate the number of words in the newspaper.

Answer: ..... (1)

The sports section takes up 25% of the paper.

(iii) How many pages are there in the sports section?

Answer: ..... (1)

The Sunday issue of the newspaper contained 56 pages.

(iv) What were the numbers of the middle pages?

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

6. (i) Write each of the following numbers as the product of its prime factors:

(a) 30

Answer: ..... (1)

(b) 18

Answer: ..... (1)

(ii) Using your answers to part (i), or otherwise, write down

(a) the largest factor of both 30 and 18

Answer: ..... (1)

(b) the smallest multiple of 30 and 18

Answer: ..... (2)

7. (a) Tommy cycles for $3\frac{1}{2}$ hours at 24 kilometres per hour.



(i) What is the distance that Tommy cycles?

Answer: ..... km (2)

He then cycles a further 60 kilometres at 15 kilometres per hour.

(ii) What is the total time that Tommy spends cycling?

Answer: ..... hours (2)

(b) Bikila ran a distance of 36 kilometres in 2 hours 15 minutes.
What was his average speed?



Answer: ..... km/h (3)

8. If $x = 3$ and $y = -2$ find the value of

(i) $x + 2y$

Answer: ..... (2)

(ii) y^2

Answer: ..... (1)

(iii) $2x^2$

Answer: ..... (1)

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

Answer: ..... (2)

9. Solve the following equations:

(i) $16 - a = 9$

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

(ii) $\frac{1}{3}b = 12$

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

(iii) $3c - 2 = 10$

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

(iv) $2d + 2(3d - 1) = 18$

Answer: $d =$ ..... (3)

10. (i) Make an accurate drawing of triangle ABC with $AB = 10$ cm, $AC = 8$ cm and angle $BAC = 44°$. The point A is drawn for you.



(3)

(ii) Measure and write down the length of BC.

Answer: ..... cm (1)

(iii) (a) Draw the perpendicular from C to the line AB. (1)

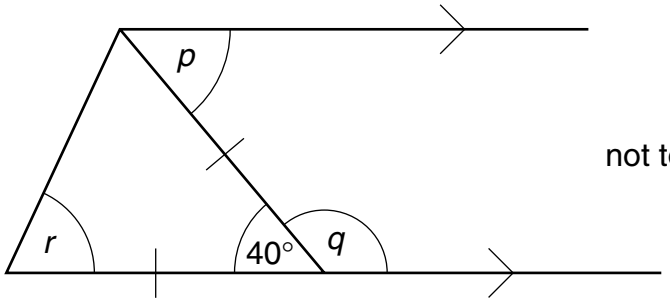
(b) Measure and write down the length of this perpendicular.

Answer: ..... cm (1)

(iv) Use your answer to part (iii)(b) to calculate the area of triangle ABC.

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

11. (a)



not to scale

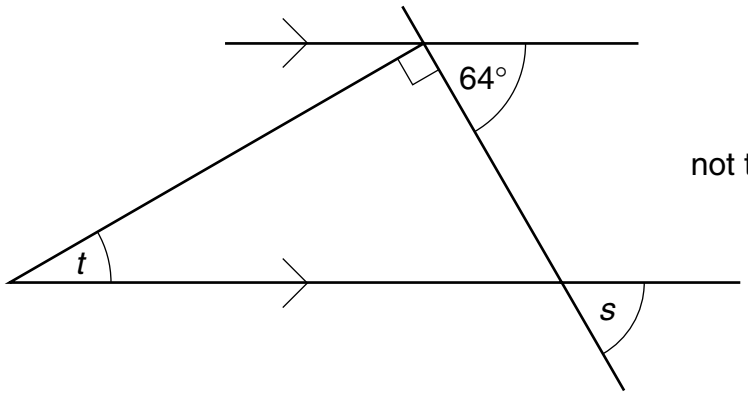
Calculate the size of each of the angles marked *p*, *q* and *r*.

Answer: *p* = ... ° (1)

q = ... ° (1)

r = ... ° (2)

(b)



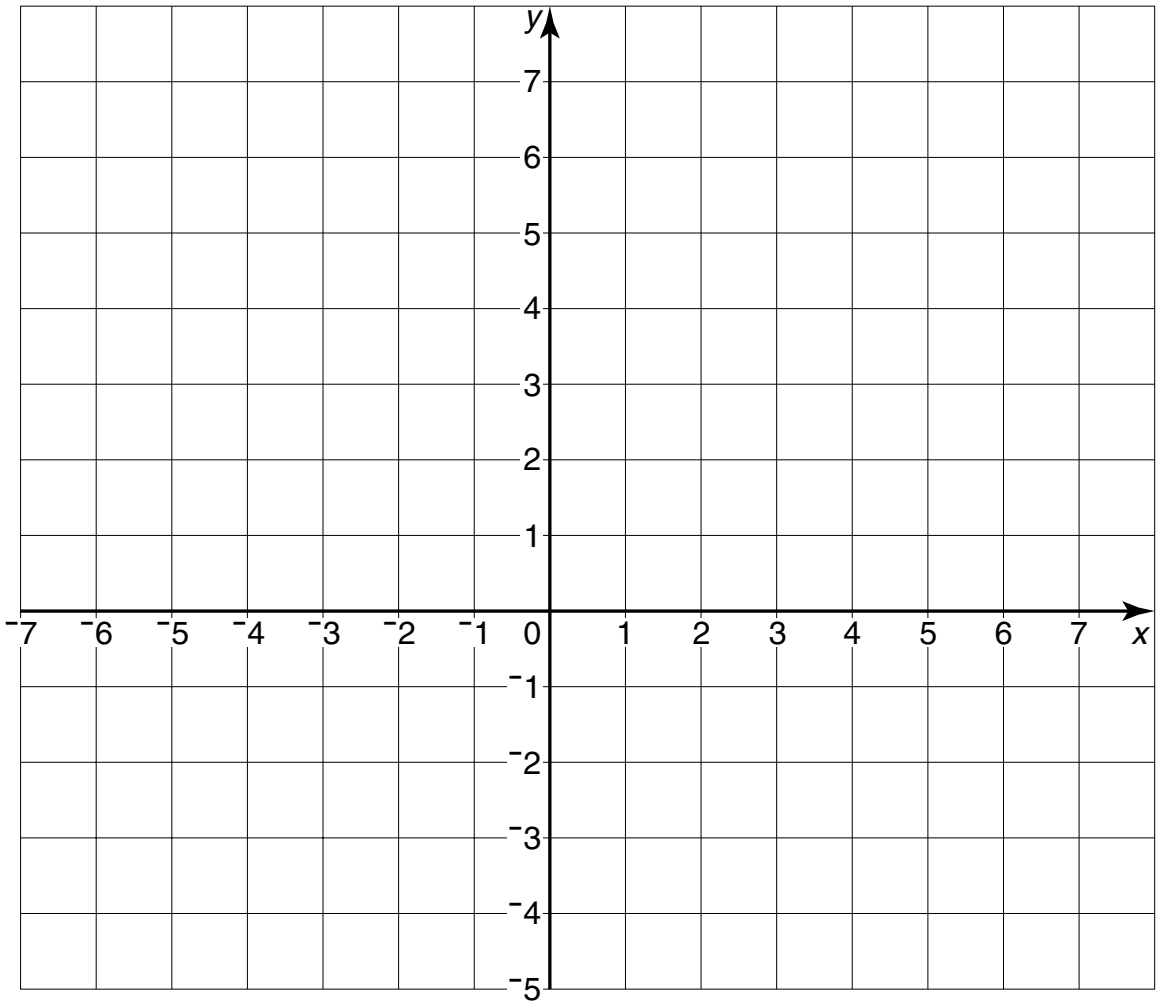
not to scale

Calculate the size of each of the angles marked *s* and *t*.

Answer: *s* = ... ° (1)

t = ... ° (2)

12. (i) On the co-ordinate grid, plot the points (0, 2), (3, 5) and (−2, 4).
Join the points to form a triangle. Label the triangle A. (2)



(ii) Rotate triangle A 90° anti-clockwise about the point (0, 0).
Label the image B. (2)

(iii) (a) Draw and label the line $y = x$ (1)

(b) Reflect triangle A in the line $y = x$ and label the image C. (2)

(iv) Describe the single transformation that maps triangle B onto triangle C.

Answer: ..... (2)

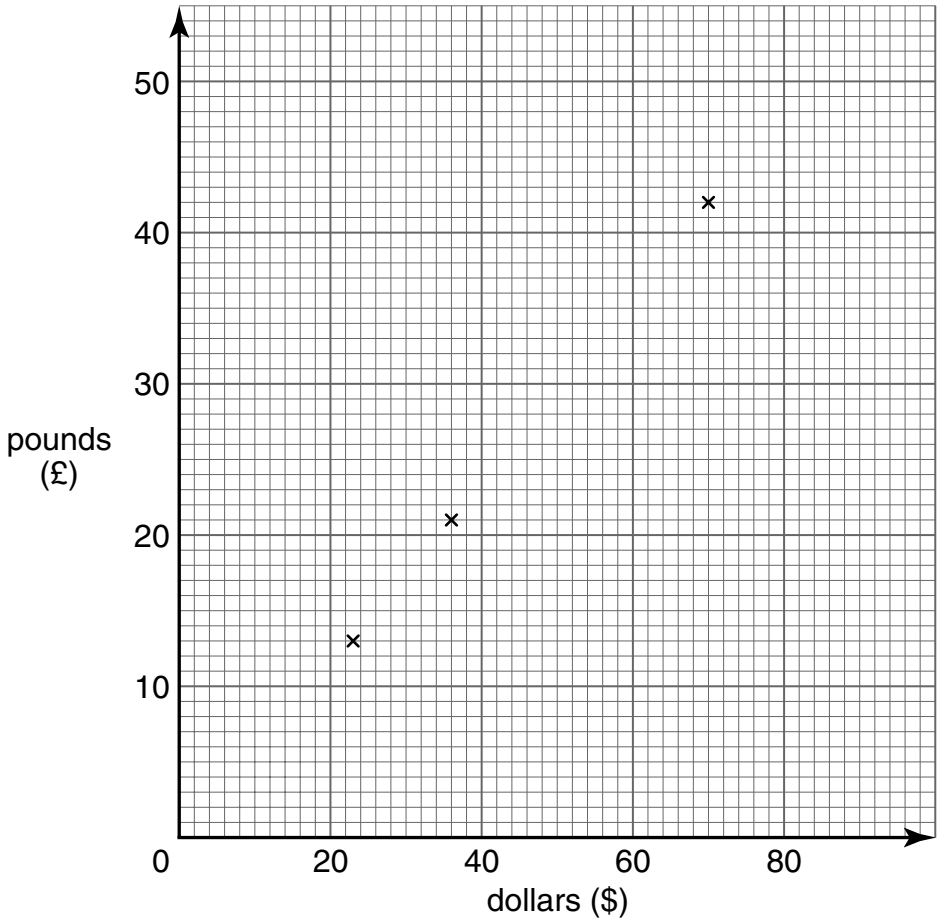
13. On a recent visit to the USA, I used my credit card to pay for several items in American dollars ($).

When I received my bill in England the items were charged in pounds (£).

The table below shows some of the amounts in dollars and in pounds.

dollars ($)	36	23	70	10	40	26	50	75
pounds (£)	21	13	42	6	23	15	29	45

(i) Plot the points on the grid below. The first three points are plotted for you. (3)



(ii) On your graph, draw the line of best fit. (1)

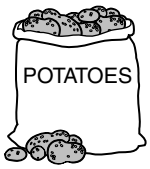
(iii) Showing clearly where you take your reading, use your graph to estimate the value of £10 in dollars.

Answer: $ ..... (2)

(iv) Use your answer to part (iii) to calculate the value of £200 in dollars.

Answer: $ ..... (1)

14. 1 kg of potatoes costs x pence.



(i) Write down an expression, in terms of x, for the cost of 3 kg of potatoes.

Answer: ..... pence (1)

1 kg of carrots costs 10 p more than 1 kg of potatoes.



(ii) Write down an expression, in terms of x, for the cost of 1 kg of carrots.

Answer: ..... pence (1)

3 kg of potatoes cost 46 p more than 1 kg of carrots.

(iii) Write down an equation, in terms of x, to show this fact.

Answer: ..... (1)

(iv) Solve the equation in part (iii) and find the cost of 1 kg of carrots.

Answer: 1 kg of carrots costs ..... pence (3)

15. Study the pattern of the sum of positive even numbers below.

$2 + 4 = 6 = 2 \times 3$

$2 + 4 + 6 = 12 = 3 \times 4$

$2 + 4 + 6 + 8 = 20 = 4 \times 5$

(i) Write down the next two lines of the pattern.

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

..... = ... = ... (1)

(ii) Find the sum of all the positive even numbers up to and including

(a) 20

Answer: ..... (2)

(b) 100

Answer: ..... (2)

(iii) When the sum of all the positive even numbers is 420, find the largest even number in the sequence.

Answer: ..... (2)

(Total marks: 100)

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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)

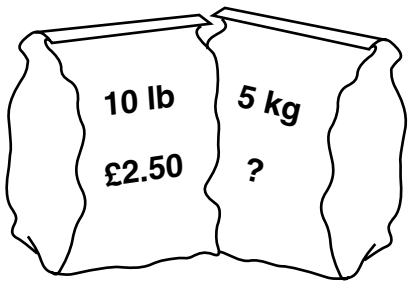
(ii) (a) Write your answer to part (i) (a) correct to the nearest pound.

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?



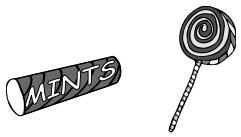
Answer: ..... mm (1)

(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

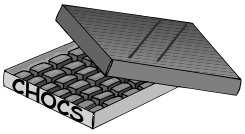
(i) What is the cost of a lollipop?



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)

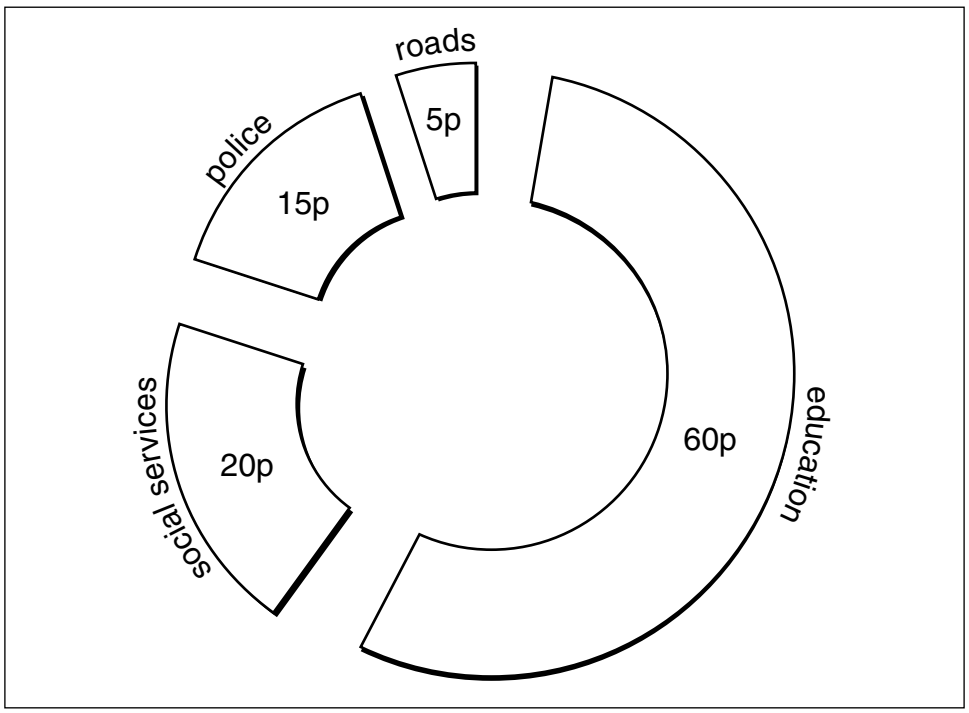
(b) Find the total amount if £3.50 is increased by 28%.

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?

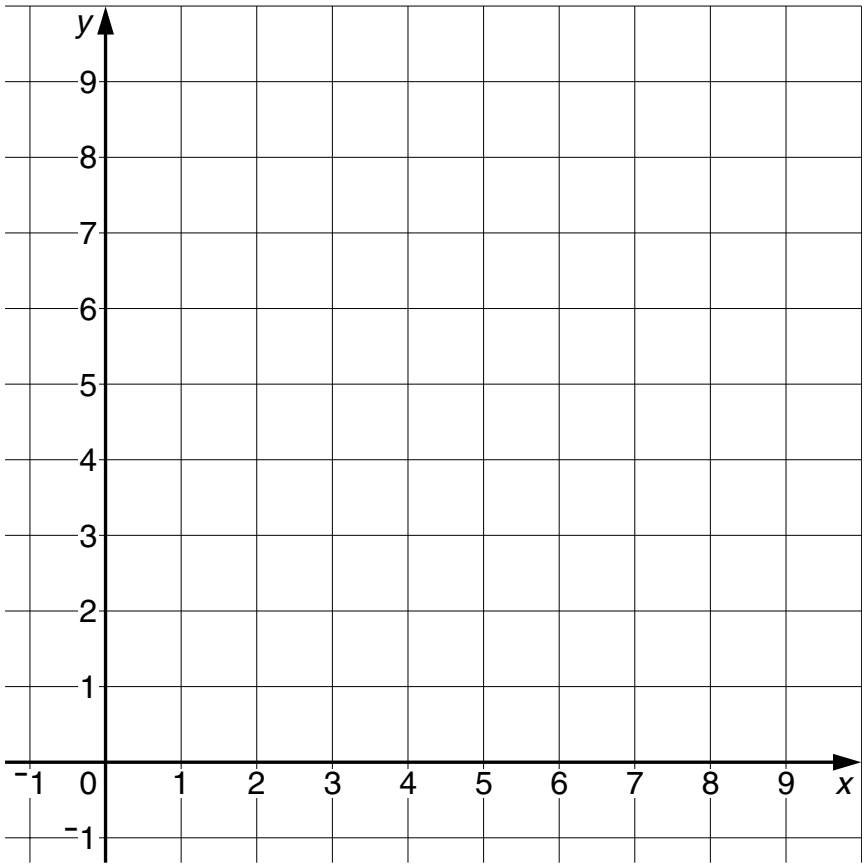
Answer: ..... (1)

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*.

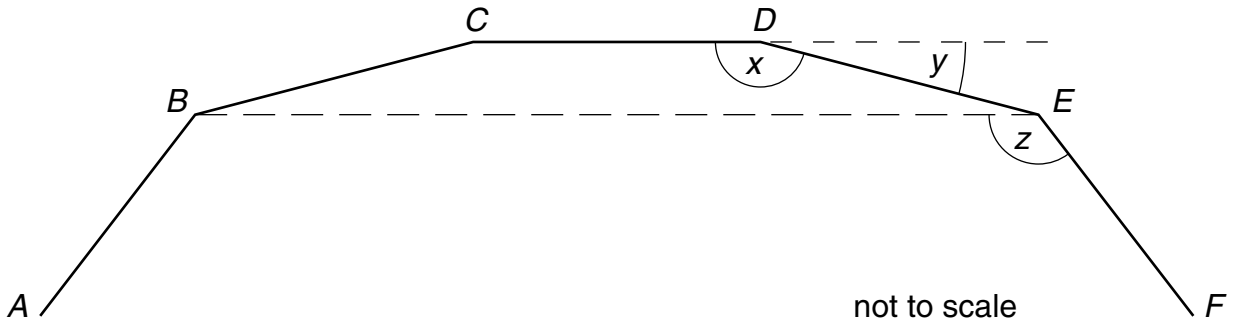
(iii) Draw the course of the boats to the harbour, *O*. (2)

(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*?

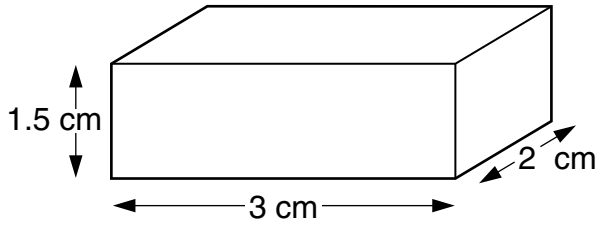
Answer: ..... (1)

(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)

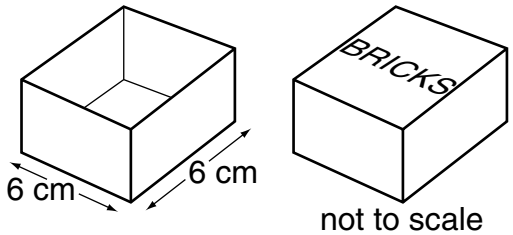
The bricks are to be painted.

(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.

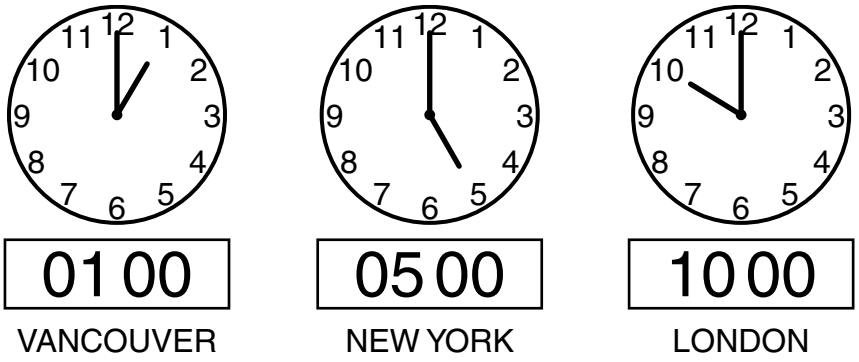
(iv) What is the height of the box?



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)

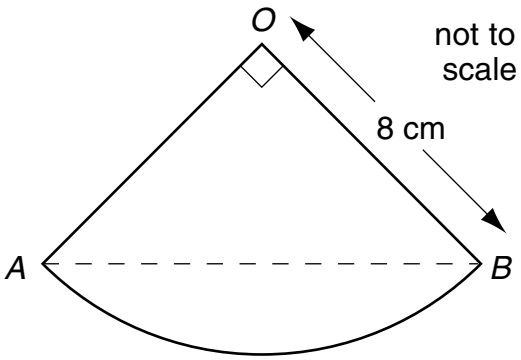
(b) Calculate the circumference of a circle of radius 8 centimetres.

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.

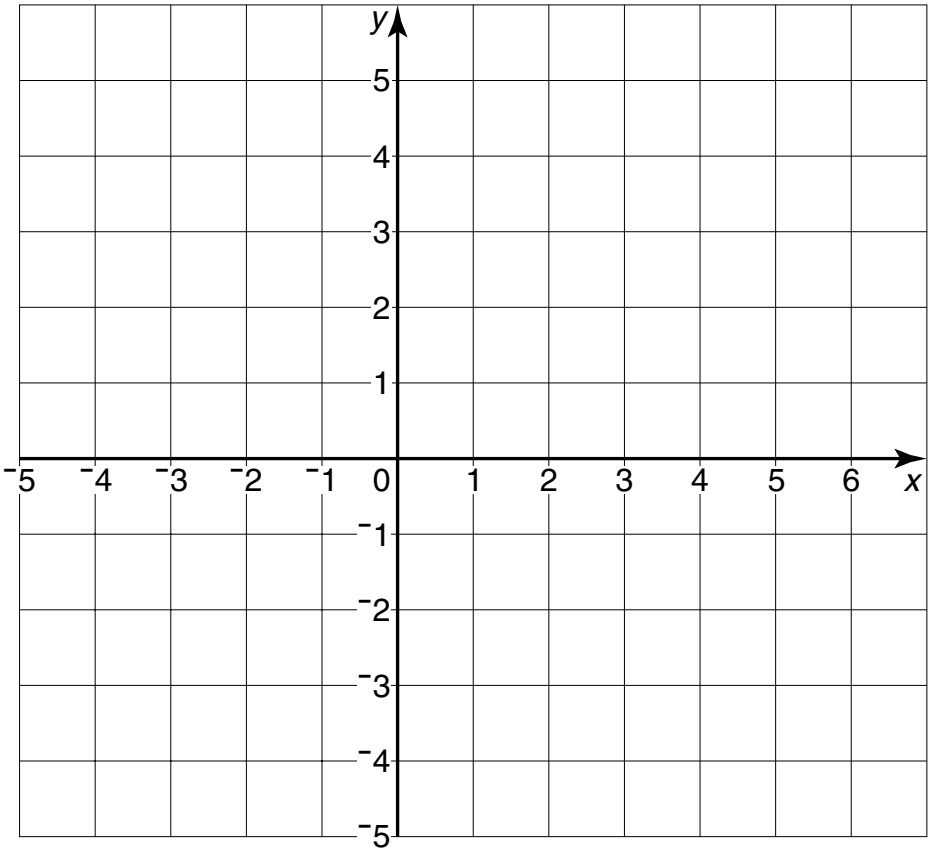
Answer: ..... (1)

(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			

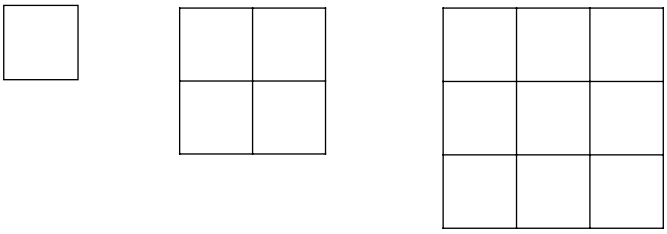
(2)

(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)

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COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

MENTAL ARITHMETIC TEST

27, 28 February, 1 or 2 March 2006

Please read this information before the examination starts.

- Answers are to be written in the spaces provided on the answer sheet.
- You may use a pen or pencil.
- You may not use calculators, rulers, geometrical instruments etc.
- Erasers and correcting fluid are not permitted. If you wish to change an answer, you should cross it through and write the correction beside it.
- Write your name, the name of your junior school and the senior school for which you are entered at the top of the answer sheet.

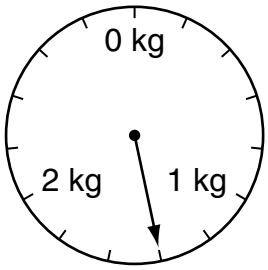
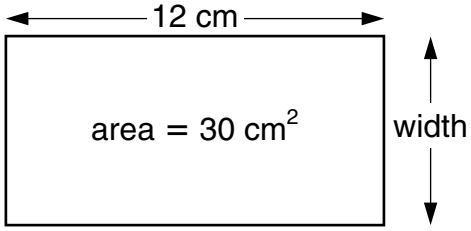
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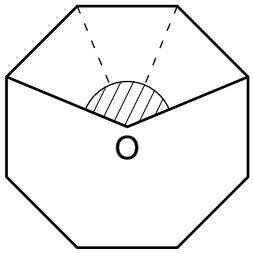
ANSWER	ROUGH JOTTINGS

Practice question

	38

1.		
2.		20
3.	£	31 5
4.	litres	9 72
5.		hexagon
6.		29 90

	ANSWER	ROUGH JOTTINGS
7.	minutes	19 30 21 10
8.	£	£2.20 10%
9.	grams	
10.		2 5
11.	goats : pigs	45 30
12.	kg	6 5.5 9.5
13.	cm	 not to scale

	ANSWER	ROUGH JOTTINGS
14.	days	$\frac{2}{3}$ 8
15.	°	
16.	pets	number of pets: 0, 1, 2, 3, 4 — frequency: 3, 4, 5, 2, 1
17.	pence	4 80 27
18.	x = °	x $2x$ $x + 20$°
19.		0.05 0.2
20.		24 $\frac{1}{4}$ $\frac{1}{3}$