

SURNAME

FIRST NAME

(Block capitals, please)

JUNIOR SCHOOL

SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER 4

Calculator Paper

Tuesday 27 February 2007

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 .

1. (i) By writing the following calculation with each number correct to 1 significant figure, estimate the value of the calculation

$$\frac{9.89 + 5.39}{2.78}$$

Answer: (2)

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

$$\frac{9.89 + 5.39}{2.78}$$

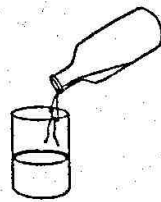
Answer: (2)

- (b) Write your answer to part (ii) (a) correct to 1 decimal place.

Answer: (1)

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

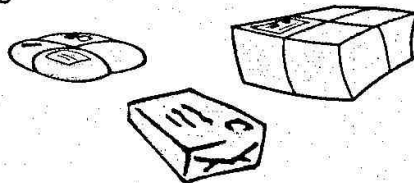
2. (a) Tim has a full 2-litre bottle of milk. He pours out $\frac{1}{4}$ of the milk.
How many millilitres of milk are left in the bottle?



Answer: ml (2)

- (b) A mailbag contains three parcels with a total mass of 2.95 kilograms.
Two of the parcels have masses of 250 grams and 1.73 kilograms
respectively.

Calculate the mass of the third parcel, in kilograms.

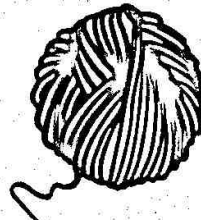


Answer: kg (2)

- (c) A ball of string contains $7\frac{1}{2}$ metres of string.

Jennie uses 36 pieces of string, each measuring 15 centimetres, when she
ties up her raspberry canes.

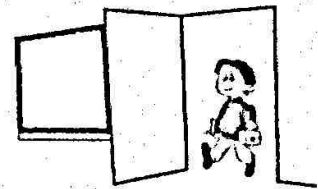
What length of string is left in the ball, in metres?



Answer: m (2)

3. The children in a class are equally likely to enter their classroom in any order.

There are 10 girls and 6 boys in the class.



(i) What is the probability that a boy enters the room first?

Answer: (1)

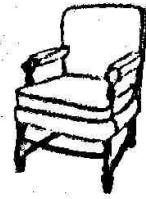
(ii) What is the probability that the youngest child enters the room first?

Answer: (1)

(iii) 5 girls and 5 boys enter the room.

What is the probability that the next child to enter the room is not a girl?

4. In an auction Mr Chambers successfully bid £35 for a chair.
The auction house charged Mr Chambers an extra 12% of the bid price as commission.



(i) (a) How much commission did the auction house charge?

Answer: £..... (1)

(b) How much did Mr Chambers pay in total for the chair?

Answer: £..... (1)

The auction house charges the seller, Mr Potts, 17% of the bid price before paying him.

(ii) How much does Mr Potts receive?

Answer: £..... (2)

(iii) How much money does the auction house receive, in total, from the sale of the chair?

Answer: £..... (1)

(iv) What percentage of the bid price does the auction house receive in total?

Answer:% (2)

5. (a) (i) What is the sum of $5m^5$ and $2m^5$?

Answer: (1)

(ii) How much greater is $5m^5$ than $2m^5$?

Answer: (1)

(iii) What is the product of $5n^5$ and $2n^3$?

Answer: (2)

(iv) What is the value of $5n^5$ divided by $2n^3$?

Answer: (2)

(b) Multiply out the brackets and simplify

$$x(x - 2y) - y(5y - x)$$

Answer: (3)

(c) Factorise completely

$$12p^2 + 9pq$$

Answer: (2)

6. (a) Harriet chooses a number which she calls h .
Write down an expression, in terms of h , for
- (i) six less than three times her number.



Answer: (2)

Harriet finds that twice her number added to half her number is equal to six less than three times her number.

- (ii) Form an equation and solve it to find the number Harriet chose.

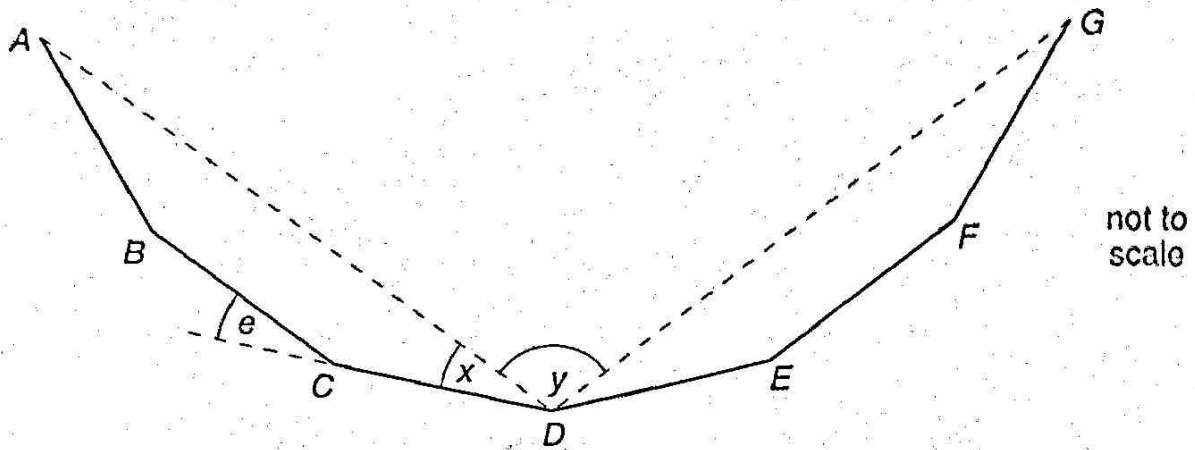
Answer: $h =$ (3)

- (b) It is known that the equation $5x^2 + 6x - 27 = 0$ has a positive solution which is less than 3. Use a trial and improvement method, and the table below, to find the solution.

x	$5x^2$	$6x$	$5x^2 + 6x - 27$

Answer: $x =$ (3)

7. (i) $ABCDEFGG$ is part of a regular 15-sided polygon.



Calculate

(a) the size of an exterior angle, e

Answer: $e = \dots\dots\dots^\circ$ (1)

(b) the size of an interior angle

Answer: $\dots\dots\dots^\circ$ (1)

(c) the size of the angle x

Answer: $x = \dots\dots\dots^\circ$ (1)

(d) the size of the angle y .

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

(ii) Sammy has a special pinball machine in the shape of the regular polygon.

(a) The ball goes from A to D , then to G missing out two corners each time and finally arriving back at A .

What is the special name of the polygon formed by the ball's path?

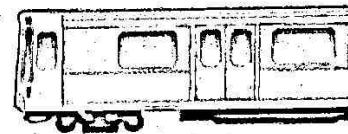
Answer: $\dots\dots\dots$ (1)

- (b) If instead the ball misses out four corners each time, what is the size of the interior angle of the polygon formed?

Answer:^o (2)

8. (a) Part of a railway timetable for travelling between North Park and South End is shown below.

station	arrive	depart
North Park		09 42
Middle Town	11 15	11 31
South End	13 02	



- (i) How long does it take from leaving North Park to arriving in South End?

Answer: h min (1)

- (ii) What percentage of this time is spent travelling?

Answer:% (3)

- (b) A car travelling from South End to North Park takes 5 hours 15 minutes to cover the 252 mile journey.

What is the average speed of the car?



Answer: mph (3)

9. On a recent visit to the USA, I found that there were two rates of exchange between pounds (£) and US dollars (\$).

Rate 1: £1 = \$1.75

Rate 2: \$1 = £0.64

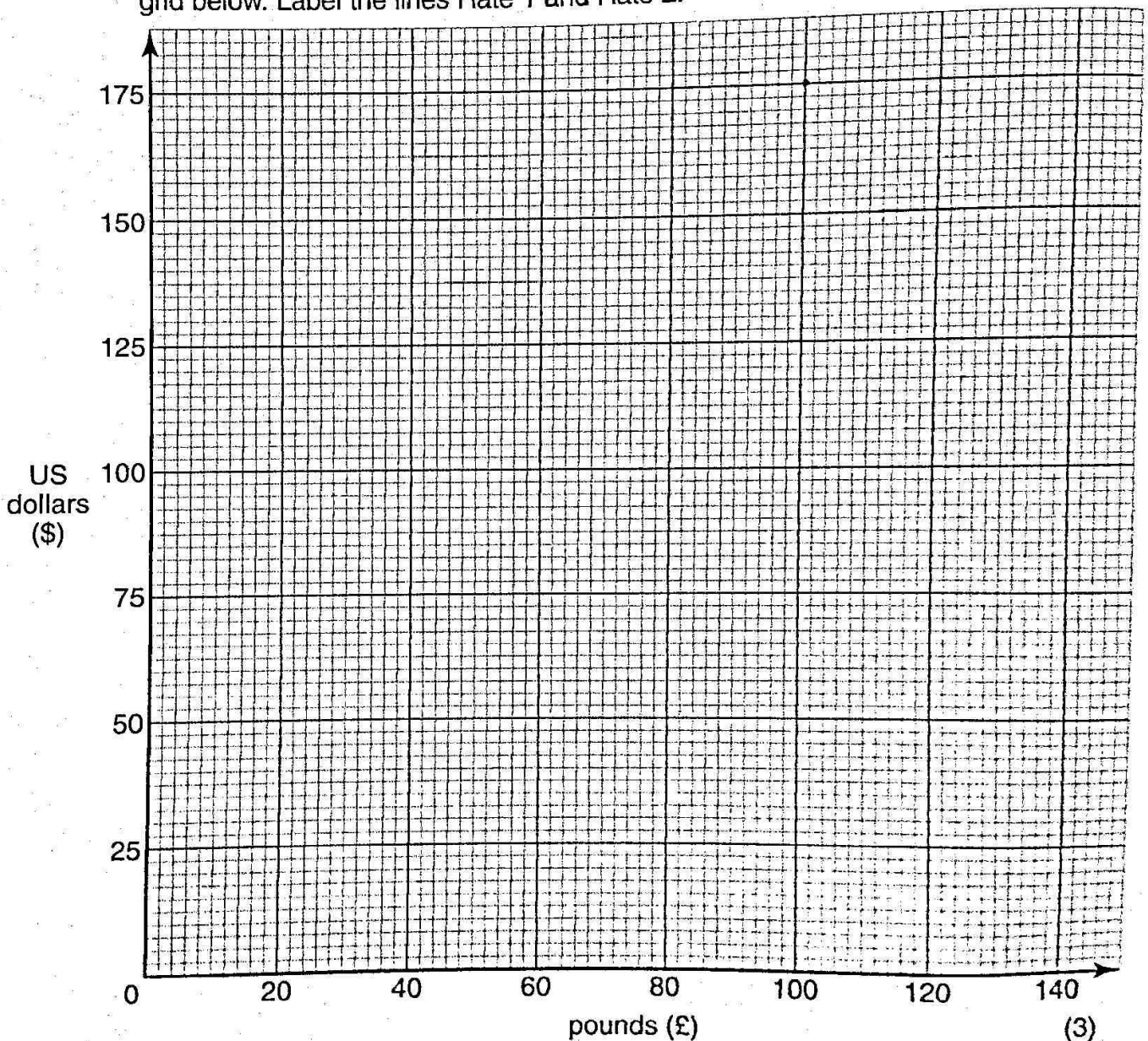
(i) Use Rate 1 to write down the value of £100 in US dollars.

Answer: \$ (1)

(ii) Use Rate 2 to calculate the value of \$150 in pounds.

Answer: £ (1)

(iii) Use your answers to parts (i) and (ii) to draw two conversion lines on the grid below. Label the lines Rate 1 and Rate 2.



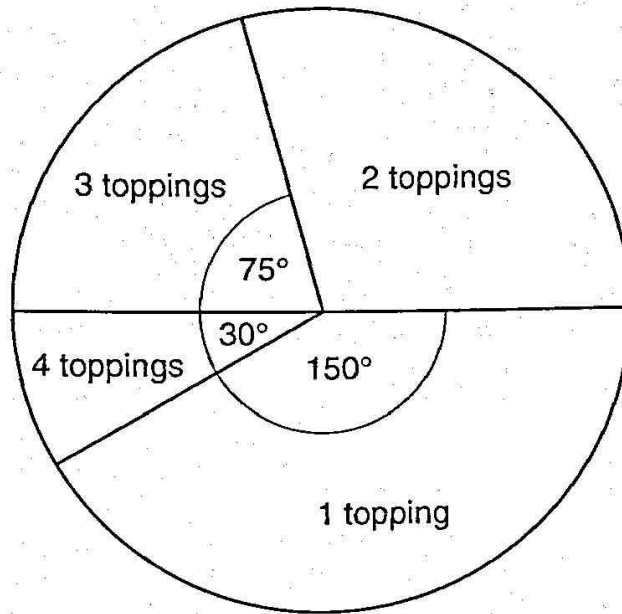
(iv) Use your graphs to find how many more dollars I receive using Rate 1 than Rate 2 when I exchange £70

Show clearly where you take your readings.

Answer: \$ (2)

10. Percy of the Pizza Palace counted the number of toppings customers chose for their pizzas.

He drew the pie chart below to show this information.



If Percy surveyed 72 pizzas,

(i) how many had

(a) two toppings

Answer: (2)

(b) fewer than four toppings?

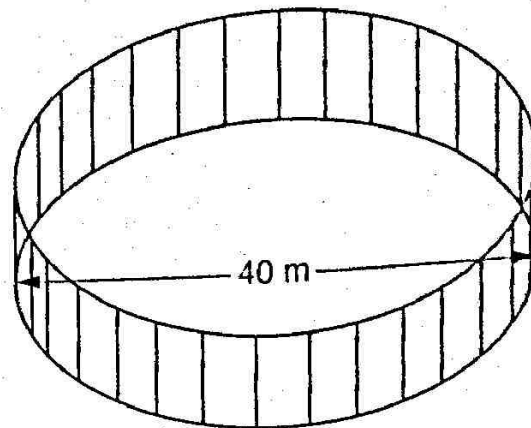
Answer: (1)

(ii) what was the total number of toppings on all the pizzas in the survey?

Answer: (2)

11. The circular arena surrounded by fencing, as shown below, has a diameter of 40 metres.

not to size



- (i) For the circular arena, calculate

- (a) the circumference

Answer: m (1)

- (b) the area.

Answer: m² (1)

There are 100 panels of fencing and each panel is 0.7 metres high.
All the fencing panels are to be painted on both sides.

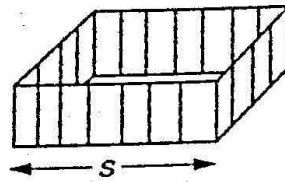
- (ii) What is the total area to be painted?

Answer: m² (2)

The fencing round the circular arena is now reshaped into a square.

(iii) Use your answers to part (i) to calculate

(a) the length of each side, s



not to size

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

(b) the area of the square giving your answer to the nearest 10 square metres

Answer: $\dots\dots\dots$ m² (2)

(c) by how much the area of the circle exceeds the area of the square.

Answer: $\dots\dots\dots$ m² (1)

Turn over

12. Sasha and Trina went orienteering.

Sasha (*S*) can see Trina (*T*) 60 metres away on a bearing of 325° .

(i) Use a scale of 1:1000 to plot the position of Trina.



(3)

They spot a marker on a bearing of 035° from Sasha and 065° from Trina.

(ii) Plot the position of the marker (*M*).

(2)

(iii) Find the distance of Trina from the marker, in metres.

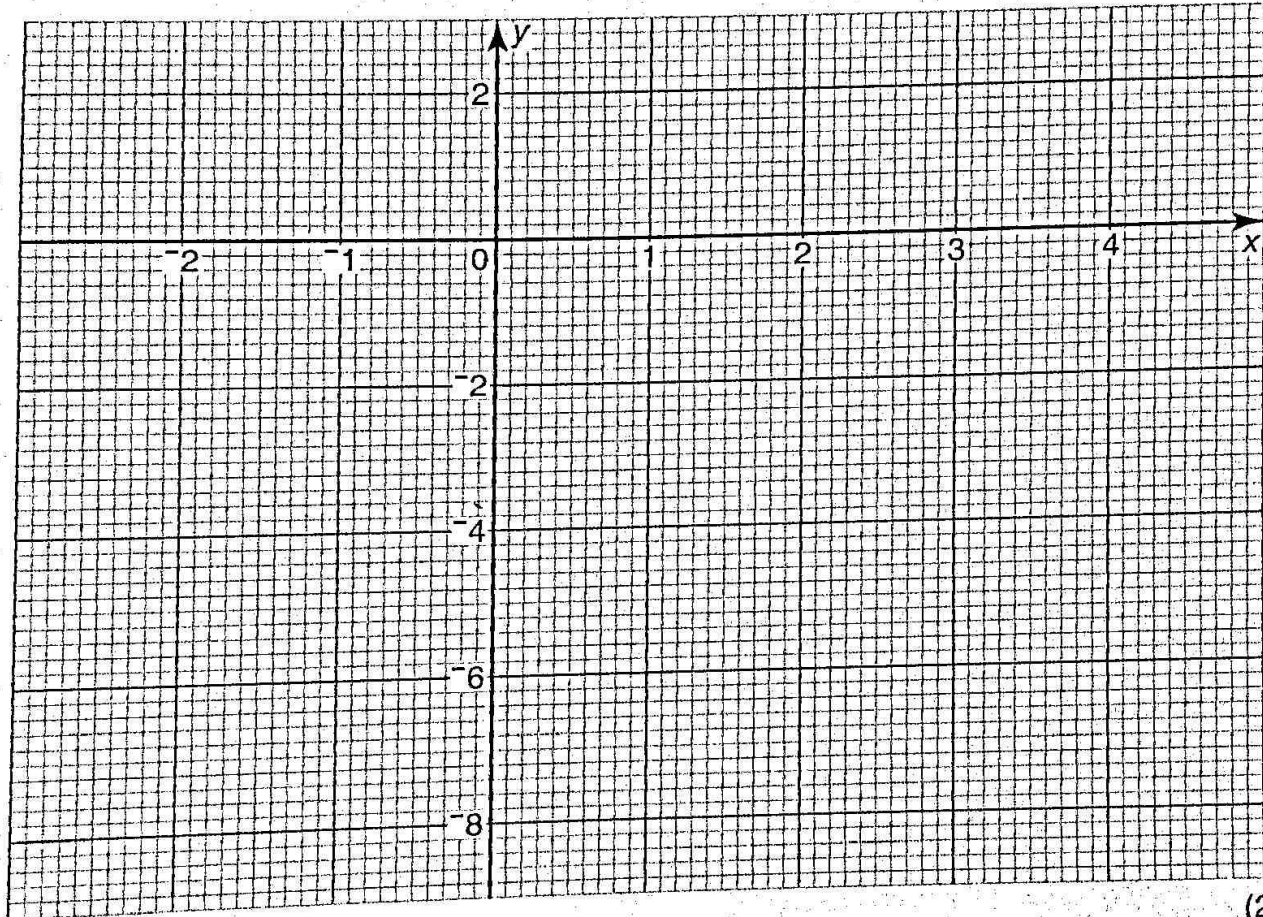
Answer: m (1)

13. (i) If $y = 2x - x^2$ complete the table of values below.

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

(2)

(ii) On the grid, draw the curve of $y = 2x - x^2$



(2)

(iii) If $y = 2x - 2$ complete the table of values below.

x	0	
y		0

(1)

(iv) On the grid draw the line $y = 2x - 2$

(1)

(v) From your graph, find the two values of x where $2x - x^2 = 2x - 2$

Answer: $x = \dots\dots\dots$ and $\dots\dots\dots$ (2)

Turn over

14. Jamie delivers meals to the elderly in and around his village.



(i) On Tuesday he delivered m main courses and p puddings, a total of 13 items.

(a) Write down an equation, in terms of m and p , to show this information.

Answer: (1)

On Thursday he delivered twice as many main courses and half as many puddings, a total of 17 items.

(b) Write down an equation, in terms of m and p , to show this information.

Answer: (1)

(ii) Solve the equations in part (i) simultaneously to find the values of m and p .

Answer: $m =$

$p =$ (4)

Main courses cost £1.75 each and puddings cost 45 pence each.

(iii) How much money did Jamie collect in total for all the items that he delivered on Tuesday and Thursday?

Answer: £ (2)

(Total marks: 100)