SURNAME .... FIRST NAME ....

JUNIOR SCHOOL .... SENIOR SCHOOL ....
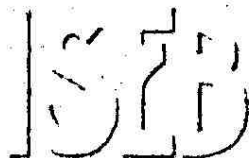
Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER 4: Calculator Paper

Tuesday 3 June 2008

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) Rewrite all the numbers in the following expression correct to 1 significant figure:

$$\frac{1682}{9.7 \times 0.413}$$

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

(ii) Calculate your answer to part (i).

O

Answer: .... (1)

(iii) Writing down all the figures shown on your calculator, find the value of

$$\frac{1682}{9.7 \times 0.413}$$

Answer: .... (2)

(iv) Write your answer to part (iii)

O

(a) correct to 2 significant figures

Answer: .... (1)

(b) correct to 2 decimal places

Answer: .... (1)

2. In this question you are told that

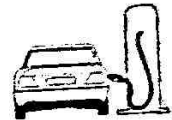$$1 \text{ gallon} = 4.55 \text{ litres}$$

(i) There are $4\frac{1}{2}$ gallons of beer in a barrel.

Calculate how many litres of beer there are in the barrel, giving your answer to the nearest litre.

Answer: .... litres (2)

(ii) (a) Robin fills up his car's petrol tank with 34.2 litres of unleaded petrol.

Write this quantity of petrol in gallons, giving your answer correct to the nearest tenth of a gallon.

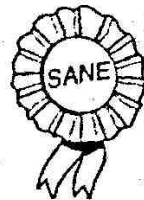Answer: .... gal (2)

(b) The petrol costs 98.7 pence per litre.

Calculate how much Robin pays for the petrol, giving your answer in pounds correct to the nearest penny.

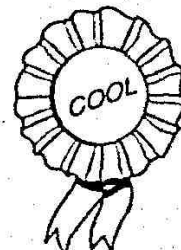Answer: £ .... (2)

3

Turn over

3. In Whitesea the total electorate (the people entitled to vote) is 82 450

    (i) 38% of the electorate voted for the Sane Party.
    How many people voted for the Sane Party?

    Answer: .... (2)

    (ii) 9671 more voted for the Sane Party than the Cool Party.
    How many people voted for the Cool Party?

    Answer: .... (1)

    (iii) What percentage of the total electorate voted for the Cool Party?

    Answer: .... % (2)

4. (a) Multiply out the bracket and simplify
    $4q - p - 2(2p + q)$

    Answer: .... (2)

    (b) Factorise completely
    $12x^2 + 18x$

    Answer: .... (2)

5. (a) Solve

    (i) $\dfrac{3a}{4} - 1 = 8$

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

    (ii) $2(3b + 1) = 6 - 2b$

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

(b) Solve

    (i) $3x + 5 > {}^{-}1$

                                   Answer: .... (2)

    (ii) $1 \leqslant 7 - 2x$

                                   Answer: .... (2)

    (iii) What are the smallest and largest integers which satisfy both the inequalities above?

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

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6.
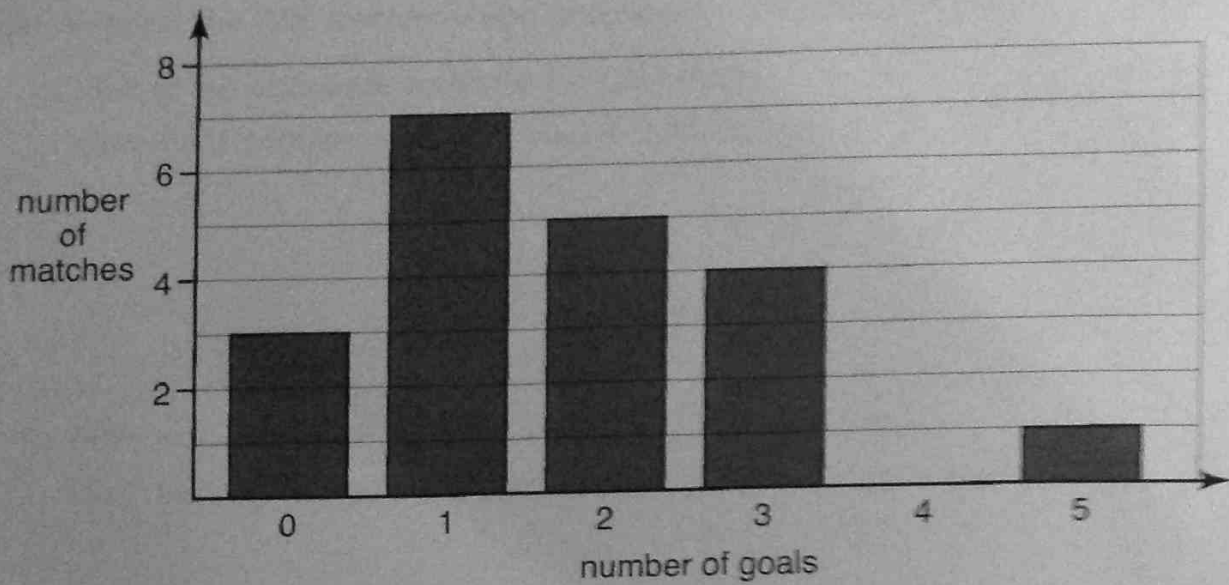
The graph shows how often Barrel Castle's hockey team scored a certain number of goals in matches last season.

(e.g. 0 goals were scored in 3 matches)

(i) What was the modal number of goals scored per match?

Answer: .... (1)

(ii) How many matches were played during the season?

Answer: .... (1)

(iii) How many goals were scored during the season?

Answer: .... (2)

(iv) What was the mean number of goals scored per match?

Answer: .... (1)

(v) What was the median number of goals scored per match?

Answer: .... (2)

7. Lady Bountiful and Lady Muck each owns 3 pairs of earrings.

Each Lady has one pair made of emeralds (E), another of rubies (R) and the last of sapphires (S).

The Ladies go to the Grand Duke's Ball each wearing a pair of earrings.

(i) Complete the table below to show all the possible combinations of earrings which the Ladies could wear. *(Some have been filled in for you.)*

Lady B	Lady M
E	E
E	R
	S

(2)

(ii) If each choice is equally likely, what is the probability that

(a) both Ladies wear earrings made of the same precious stone?

Answer: .... (1)

(b) neither Lady is wearing ruby earrings?

Answer: .... (1)

(iii) If one Lady wears ruby earrings, what is the probability that the other wears sapphire earrings?

Answer: .... (2)

Turn over

7

8. (a) A map is drawn with a scale of 1:10 000
   How many metres does 1 centimetre on the map represent?

   Answer: .... m   (1)

(b) At the Wildebeast Zoo the elephants (E) are 600 metres north-east of the gorillas (G).

   (i) Using a scale of 1:10 000, plot the position of the elephants.   (2)

   ❶)

   N
   ↑
   |
   |
   |
   ___
   G

   ❶)

   The lions (L) are 750 metres from the gorillas and on a bearing of 150° from the elephants.

   (ii) Plot the position of the lions.   (2)

   (iii) What is the distance, in metres, of the lions from the elephants?

   Answer: .... m   (1)

9. A group of holidaymakers stayed at Sunnybrae Hotel for a weekend.

Everyone ate a bowl of cereal for breakfast.

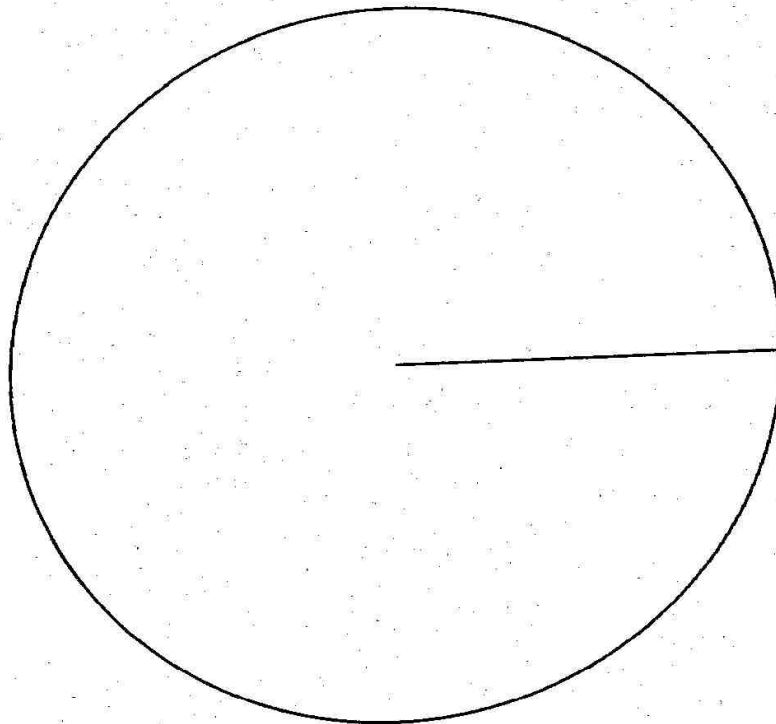On Saturday
27 chose Sugar Crisps
21 chose Honey Pops
16 chose Crackles
8 chose Bran Flakes

The manager drew a pie chart to show this information.

(i) How many degrees represented one guest?

Answer: .... ° (1)

(ii) Draw the fully-labelled pie chart.

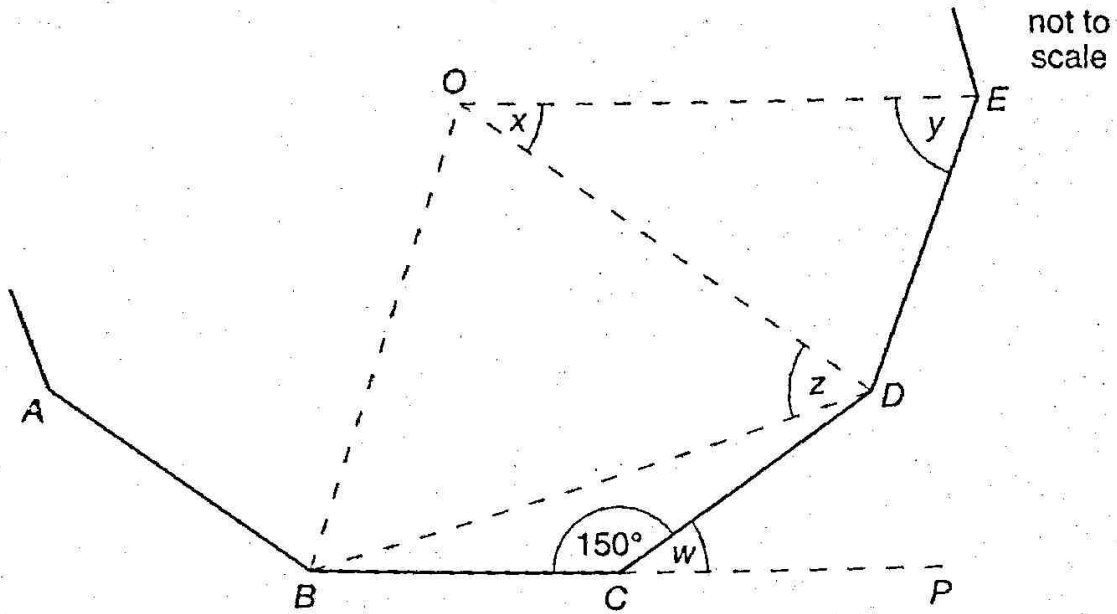(4)

(iii) On Sunday everyone again ate a bowl of cereal for breakfast but this time $\frac{4}{9}$ of them ate Sugar Crisps.

What angle represented Sugar Crisps on Sunday?

Answer: .... ° (1)

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10.

not to scale

A, B, C, D and E are corners of a regular polygon with centre O. BC is extended to P.

(i) Calculate the size of the angle marked w.

Answer: w = ... ° (1)

(ii) How many sides does the polygon have?

Answer: .... (1)

(iii) Calculate the size of each of the angles marked x, y and z.

Answer: x = ... ° (2)

y = ... ° (2)

z = ... ° (2)

(iv) Which type of triangle is OBD?

Answer: .... (1)

11. At Brockfield Farm there are *x* cows.

There are twice as many sheep as there are cows.

(i) How many sheep are there in terms of *x*?

Answer: .... (1)

The number of pigs is 6 less than the number of sheep.

(ii) How many pigs are there in terms of *x*?

Answer: .... (1)

(iii) Write down an expression, in terms of *x*, for the total number of cows, sheep and pigs.
Simplify your answer.

Answer: .... (2)

There are 54 animals on the farm, all either cows, sheep or pigs.

(iv) Form an equation, in terms of *x*, to show this and solve it.

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

(v) How many pigs are there on the farm?

Answer: .... (1)

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12. (i) Given that $y = x^2 - 2x - 3$ complete the table below:

x	-2	-1	0	1	2	3	4
x^2	4					9	
$-2x$	+4					-6	
-3	-3	-3	-3	-3	-3	-3	-3
y	5					0	

(3)

(ii) On the grid opposite, draw the graph of $y = x^2 - 2x - 3$ (2)

(iii) When $y = 2 - \frac{1}{2}x$
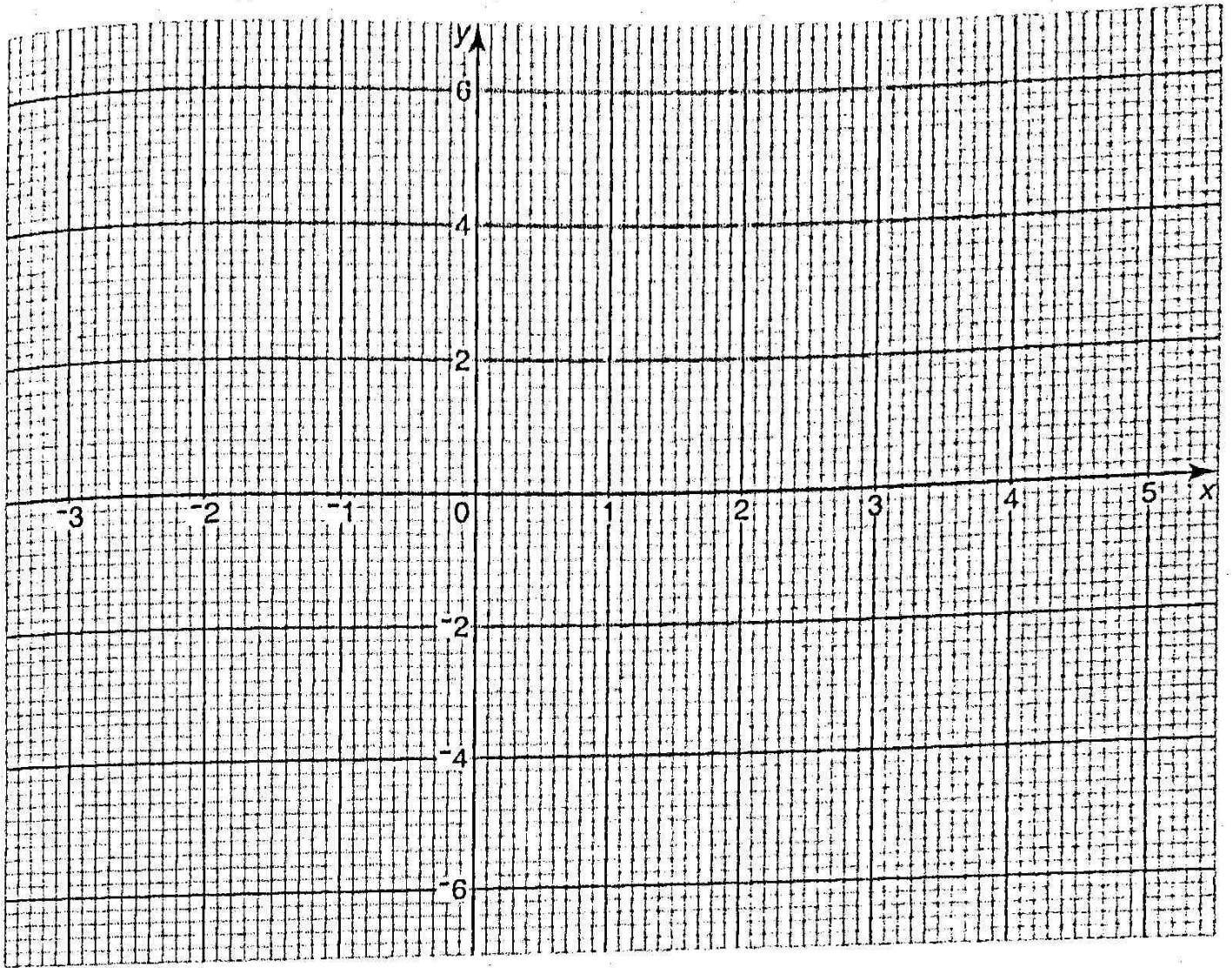
  (a) what is the value of y when $x = 0$?

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

  (b) what is the value of x when $y = 0$?

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

(iv) On the grid opposite, draw the graph of $y = 2 - \frac{1}{2}x$ (1)

S.A. 2838328   12

(v) The graphs meet at 2 points.

Write down the *y* value of the point whose *x* value is negative.

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

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13. (i) A circle has a radius of 4 metres.

Calculate

(a) the circumference of the circle

Answer: .... m (2)

(b) the area of the circle

Answer: .... m² (2)

(ii)

not to scale

4 m

O
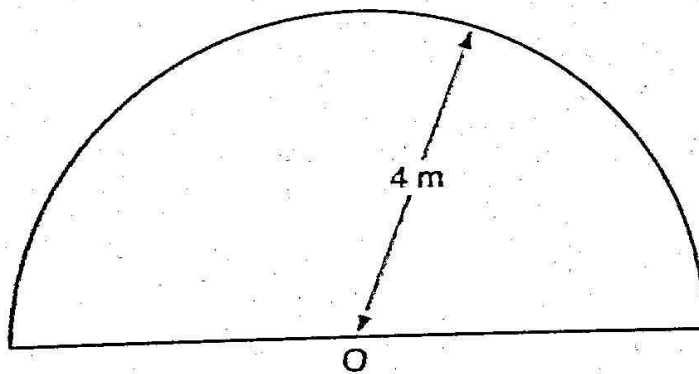
There is a semi-circular pond of radius 4 metres on the terrace of Twitty Hall.

(a) Calculate the perimeter of the pond.

Answer: .... m (2)

The pond has a level base and is filled with water to a depth of 35 centimetres.

(b) Calculate the volume of water in the pond in litres correct to the nearest 10 litres. (4)

(1 cubic metre = 1000 litres)

not to scale

35 cm
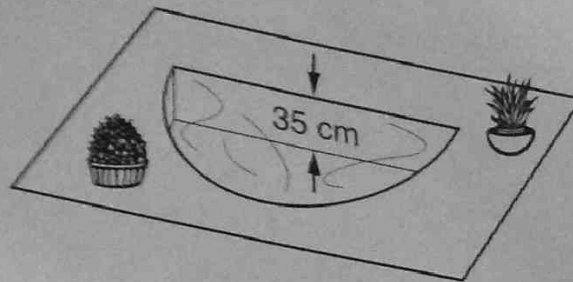
Answer: .... litres   (3)

14. Solve the equations

$$2x + 3y = 0$$
$$3x - 2y = 13$$

(Do show all your working.)

Answer: $x =$ ....

$y =$ .... (4)

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15.

not to scale

x cm

$(x + 3)$ cm
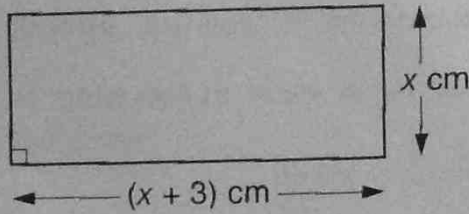
(i) Show that the area of the rectangle above is $(x^2 + 3x)$ cm^2.

Answer: ....

....

.... (1)

When the area is 15 cm^2, x has a value between 2 and 3

(ii) By trial and improvement, calculate the value of x correct to 1 decimal place. You should use the table below, extended if you wish.

x	x^2	$3x$	$x^2 + 3x$
2	4	6	10

Answer: $x =$ .... (4)

(Total marks: 100)