

SURNAME .....  
(Block capitals, please)  
JUNIOR SCHOOL .....

FIRST NAME .....  
SENIOR SCHOOL .....



Independent Schools  
Examinations Board

## COMMON ENTRANCE EXAMINATION AT 13+

# MATHEMATICS

## PAPER 4

### Calculator Paper

Tuesday 6 June 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  $\pi$  button on your calculator should be used for calculations involving  $\pi$ .

1. (a) (i) Writing down all the figures shown on your calculator, find the value of

$$\frac{14.2 + 1.75}{6.31}$$

Answer: ..... (2)

(ii) Write your answer to part (a) (i) correct to 2 significant figures.

Answer: ..... (1)

(iii) Write your answer to part (a) (i) correct to 3 decimal places.

Answer: ..... (1) ○

(b) Consider the expression

$$\frac{6128}{9.7 \times 18.3}$$

(i) (a) Write each number of the expression correct to 1 significant figure.

Answer: ..... (2)

..... × .....

(b) Calculate your answer to part (b) (i) (a). ○

Answer: ..... (1)

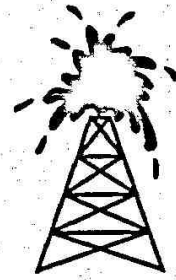
(ii) Giving your answer correct to the nearest whole number, evaluate

$$\frac{6128}{9.7 \times 18.3}$$

Answer: ..... (2)

2. Shares in *Mollusc Oil* are priced at  $371\frac{1}{2}$  pence each.

(i) How much does Peter pay for 750 shares?



Answer: £ ..... (2)

(ii) Peter sells the shares for £3186

(a) How much profit does he make?

Answer: £ ..... (1)

(b) By how much has each share increased in value?  
Give your answer correct to the nearest penny.

Answer: ..... p (1)

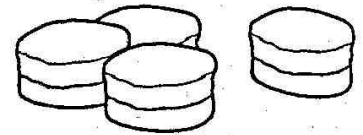
(iii) Helen spends £1783.20 buying *Mollusc Oil* shares when they cost  $371\frac{1}{2}$  pence each.

How many shares does she buy?

Answer: ..... (2)

3. (a) The ingredients needed to make 12 scones are

- 250 g flour
- 30 g butter
- 180 ml milk



Find the ingredients needed to make 18 scones.

Answer: flour ..... g (1)

butter ..... g (1)

milk ..... ml (1)

(b) Farmer Archer keeps pigs and hens in the ratio of 2:35

(i) What is the number of pigs on the farm if there are 175 hens?

Answer: ..... (2)

(ii) Farmer Archer sells 4 pigs.

How many hens must be sold to keep to the original ratio of 2:35?

Answer: ..... (2)

(c) In triangle  $ABC$ , the angles  $A$ ,  $B$  and  $C$  are in the ratio of 4:5:6

What is the size of the largest angle?

Answer: .....<sup>o</sup> (2)

4. (a) This term there are 675 pupils at Upton Middle School.  
Next term the number of pupils will be 4% more than this term.  
How many more pupils will there be next term?

Answer: ..... (2)

- (b) By next term the number of staff will have decreased from 80 to 76  
By what percentage will the number of staff have decreased?

Answer: .....% (2)

5. How long does it take to travel 1800 metres at 30 kilometres per hour?  
Give your answer in minutes and seconds.



Answer: ..... min ..... sec (3)

6. Ali stands outside his school to record the number of people in the cars which pass him during a 20-minute period.

His results show the total number of people in each car.

1 2 1 1 2 3 4 1 1 2  
 3 4 5 5 2 1 4 3 1 1  
 2 2 1 2 1 3 1 1 2 1

Ali records his results on a tally chart.

- (i) Fill in the chart.

number of people in a car	tally	frequency
1		
2		
3		
4		
5		
	total	

(2)

Use the chart to find

- (ii) the modal number of people in each car

Answer: ..... (1)

- (iii) the mean number of people in each car

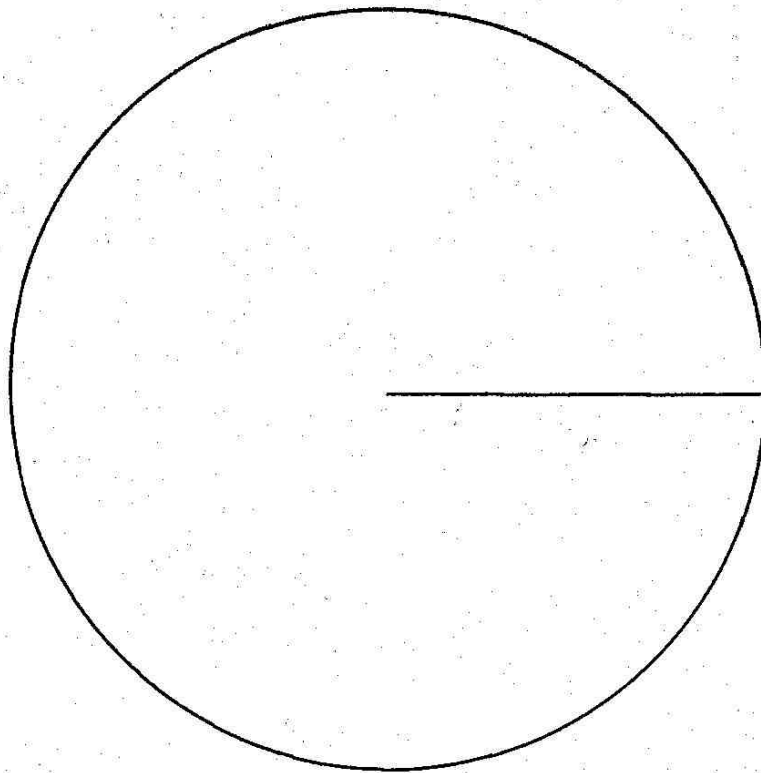
Answer: ..... (2)

- (iv) the median number of people in each car.

Answer: ..... (1)

Ali wants to display the information shown in the tally chart.  
He decides to use a pie chart.

(v) Draw the fully-labelled pie chart.



(4)

(vi) Using the data from the tally chart, estimate the number of cars, each containing 2 people, which would pass Ali during a 2-hour period.

Answer: ..... (1)

7. (a) Solve

(i)  $\frac{p}{4} = 4$

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

(ii)  $5q - 3 = 3q - 9$

Answer:  $q = \dots\dots\dots$  (2)

(iii)  $\frac{2}{3}(2r - 3) = 6$

Answer:  $r = \dots\dots\dots$  (3)

(b) Solve the inequalities

(i)  $3x - 4 \leq 26$

Answer:  $\dots\dots\dots$  (2)

(ii)  $17 - 2x < 2$

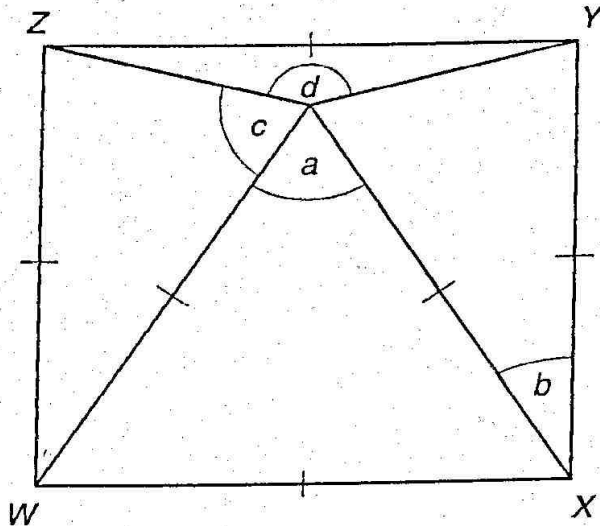
Answer:  $\dots\dots\dots$  (2)

(iii) What are the integer values that satisfy both the inequalities in parts (b) (i) and (ii)?

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



8.



not to scale

WXYZ is a square.

Calculate the size of each of the angles marked *a*, *b*, *c* and *d*.

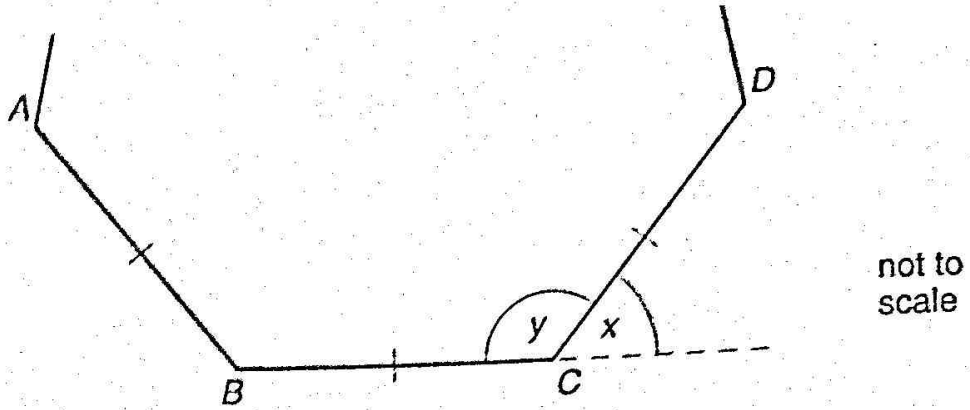
Answer: *a* = .....<sup>o</sup> (1)

Answer: *b* = .....<sup>o</sup> (1)

Answer: *c* = .....<sup>o</sup> (2)

Answer: *d* = .....<sup>o</sup> (2)

9.



$A$ ,  $B$ ,  $C$  and  $D$  are vertices of a regular polygon.

The size of an interior angle,  $y$ , is three times the size of an exterior angle,  $x$ .

(i) Calculate the size of an exterior angle.

Answer: .....<sup>o</sup> (2)

(ii) How many sides does the regular polygon have?

Answer: ..... (1)

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

Answer: .....<sup>o</sup> (1)

10. (a) A map has a scale of 1:50 000

How many centimetres represent 1 kilometre?

Answer: ..... cm (2)

(D)



Adam runs a triangular orienteering course. He sets off from school (S) and runs north-east for 4 km to a monument (M).

(i) Using a scale of 1:50 000 find and mark the position of M. (2)

On the second leg he travels 2.5 km from M on a bearing of  $125^\circ$  to a telephone box (T).

(ii) Find and mark the position of T. (2)

Adam then returns directly to school.

(iii) How far is it from the telephone box to school?

Answer: ..... km (2)

(iv) What is the bearing of S from T?

Answer: ..... (2)

11. (i) A circle has a diameter of length 7 centimetres.

Calculate

(a) the circumference of the circle

Answer: ..... cm (1)

(b) the area of the circle.

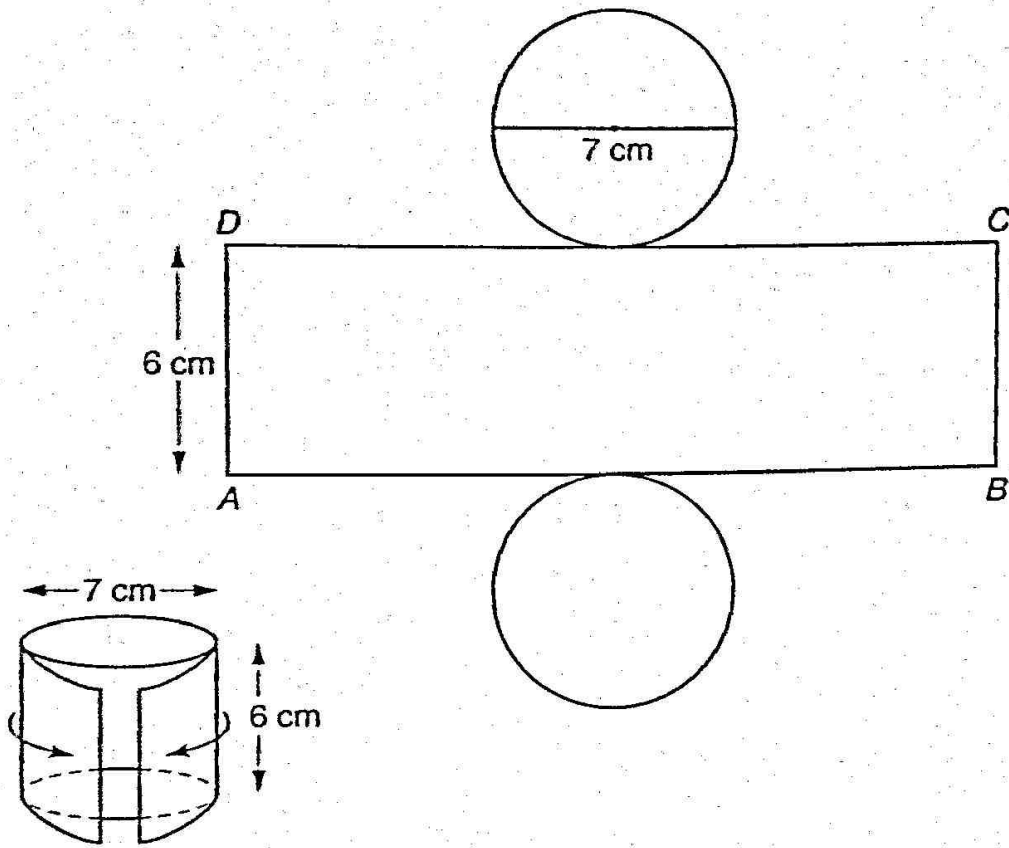
Answer: ..... cm<sup>2</sup> (2)

(ii) The diagram opposite shows a net for making a small cylindrical tin of diameter 7 centimetres and height 6 centimetres.

Rectangle *ABCD* folds round to make the curved surface between the circular ends.

(a) Write down the length of *AB*.

Answer: ..... cm (1)



not to scale

(b) Calculate the area of metal needed to make this tin.

Answer: ..... cm<sup>2</sup> (2)

(c) Calculate the volume of this tin.

Answer: ..... cm<sup>3</sup> (2)

Turn over

12. (i) When  $y = x^2 - 2x$  complete the table of values

$x$	-2	-1	0	1	2	3
$x^2$				1		
$-2x$		2			-4	
$y$					0	

(3)

(ii) On the grid opposite draw and label the curve  $y = x^2 - 2x$

(2)

(iii) When  $y = 4 - \frac{1}{2}x$  complete the table of values

$x$	-2	0	2
$y$			

(1)

(iv) On the grid opposite draw and label the line  $y = 4 - \frac{1}{2}x$

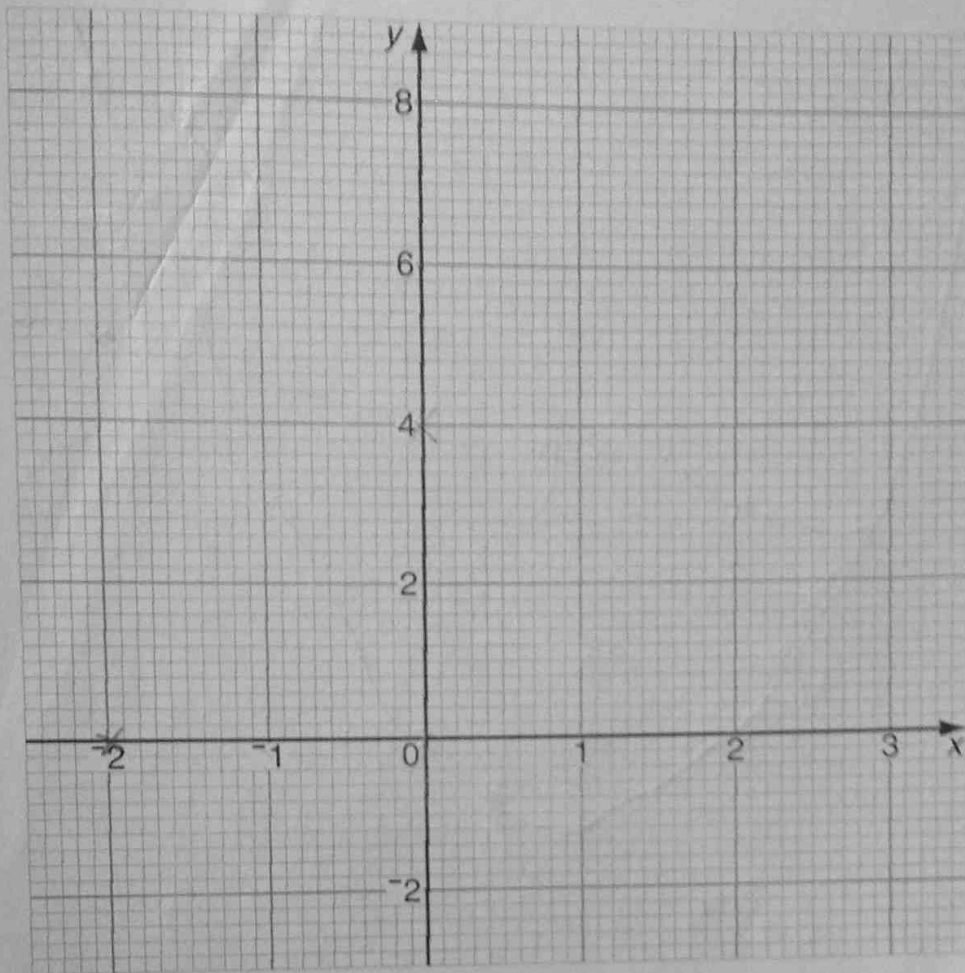
(1)

(v) Where the graphs cross,  $x^2 - 2x = 4 - \frac{1}{2}x$

(a) Show this equation can be written

$$2x^2 - 3x - 8 = 0$$

(2)

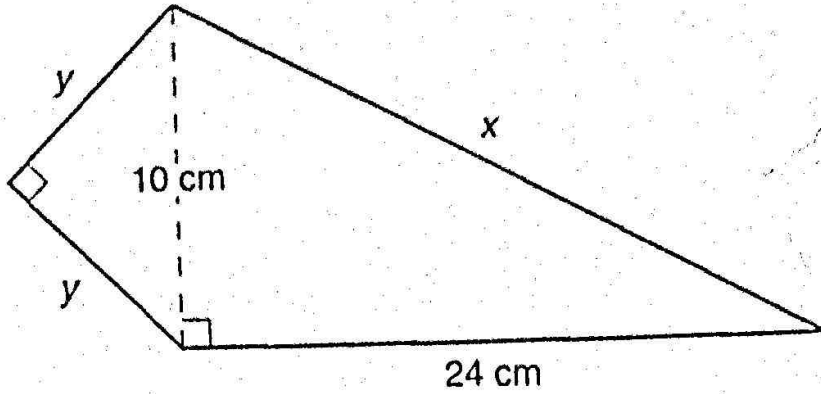


(b) From your graph, read off the negative value of  $x$  which satisfies

$$2x^2 - 3x - 8 = 0$$

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

13.



not to scale

A company logo is formed of two right-angled triangles as shown in the diagram.

(All measurements are in centimetres.)

(i) Calculate the length  $x$ .

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

(ii) Calculate the length  $y$ .

Answer:  $y = \dots\dots\dots$  cm (2)

(iii) Calculate the perimeter of the logo.

Answer:  $\dots\dots\dots$  cm (2)

(iv) Calculate the area of the logo.

Answer:  $\dots\dots\dots$  cm<sup>2</sup> (3)

(Total marks: 100)