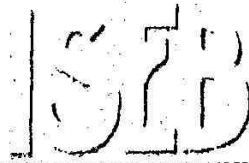


SURNAME: .....  
(Block capitals please)  
REGISTRATION NUMBER: .....

FIRST NAME: .....

SENIOR SCHOOL: .....



Independent Schools  
Examinations Board

## COMMON ENTRANCE EXAMINATION AT 13+

# MATHEMATICS

## PAPER 4: Calculator Paper

Practice Paper 2007–2008

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

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

$$\frac{29.49}{1.46 + 3.025^2}$$

Answer: ..... (2)

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

$$\frac{29.49}{1.46 + 3.025^2}$$

Answer: ..... (2)

- (iii) Write your answer to part (ii) correct to

(a) 3 decimal places

Answer: ..... (1)

(b) 3 significant figures.

Answer: ..... (1)

2. Cherry pies cost £2.24 each.



(i) Oliver buys as many cherry pies as he can with a £20 note.

(a) How many cherry pies does Oliver buy?

Answer: ..... (1)

(b) How much change does he receive from his £20 note?

Answer: £ ..... (1)

(ii) Alastair is having a cherry pie party.

He buys 25 cherry pies and the shop assistant is so surprised that she gives him  $\frac{1}{8}$  off the total price.



How much change does Alastair receive from a £50 note?

Answer: £ ..... (2)

3. (a) Simplify

(i)  $2n + 3m - 4n$

Answer: ..... (1)

(ii)  $2n^2 - 3n + 4n - 5n^2$

Answer: ..... (1)

(iii)  $6n^2 \times 3n^3$

Answer: ..... (2)

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

Answer: ..... (2)

(b) Multiply out the bracket and simplify

$2(a + 3) + 3(2a - 5)$

Answer: ..... (2)

(c) Factorise completely

$14cd - 21c^3d$

Answer: ..... (2)

4. (a) Solve the following equations:

(i)  $2a - 0.5 = 17$

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

(ii)  $\frac{1}{4}b + 1 = 4$

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

(iii)  $7c + 1 = 57 - 2(1 - c)$

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

(b) (i) Solve the following inequality:

$$10 - 3d < 9d + 16$$

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

(ii) Write down the smallest integer which satisfies the inequality in part (b) (i).

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

5. (i) Construct a rhombus,  $ABCD$ , in which each side is  $6.6$  cm long.  
The diagonal  $AC$ , which is  $10$  cm long, is drawn for you.



- (ii) Measure the length of the diagonal  $BD$ .

Answer: ..... cm (1)

- (iii) Calculate the area of the rhombus  $ABCD$ .

Answer: .....  $\text{cm}^2$  (2)

- (iv) The diagonals of another rhombus are  $8.4$  cm and  $3.5$  cm long. Calculate the area of this rhombus.

Answer: .....  $\text{cm}^2$  (2)

6. (i) If  $y = 1 - \frac{1}{2}x$  complete the table of values below.

$x$	-2	0	2
$y$			

(2)

(ii) On the grid below, draw and label the line  $y = 1 - \frac{1}{2}x$

(1)

(iii) If  $y = 3 - \frac{1}{2}x^2$  complete the table of values below.

$x$	-3	-2	-1	0	1	2	3
$y$	$-1\frac{1}{2}$		$2\frac{1}{2}$			1	

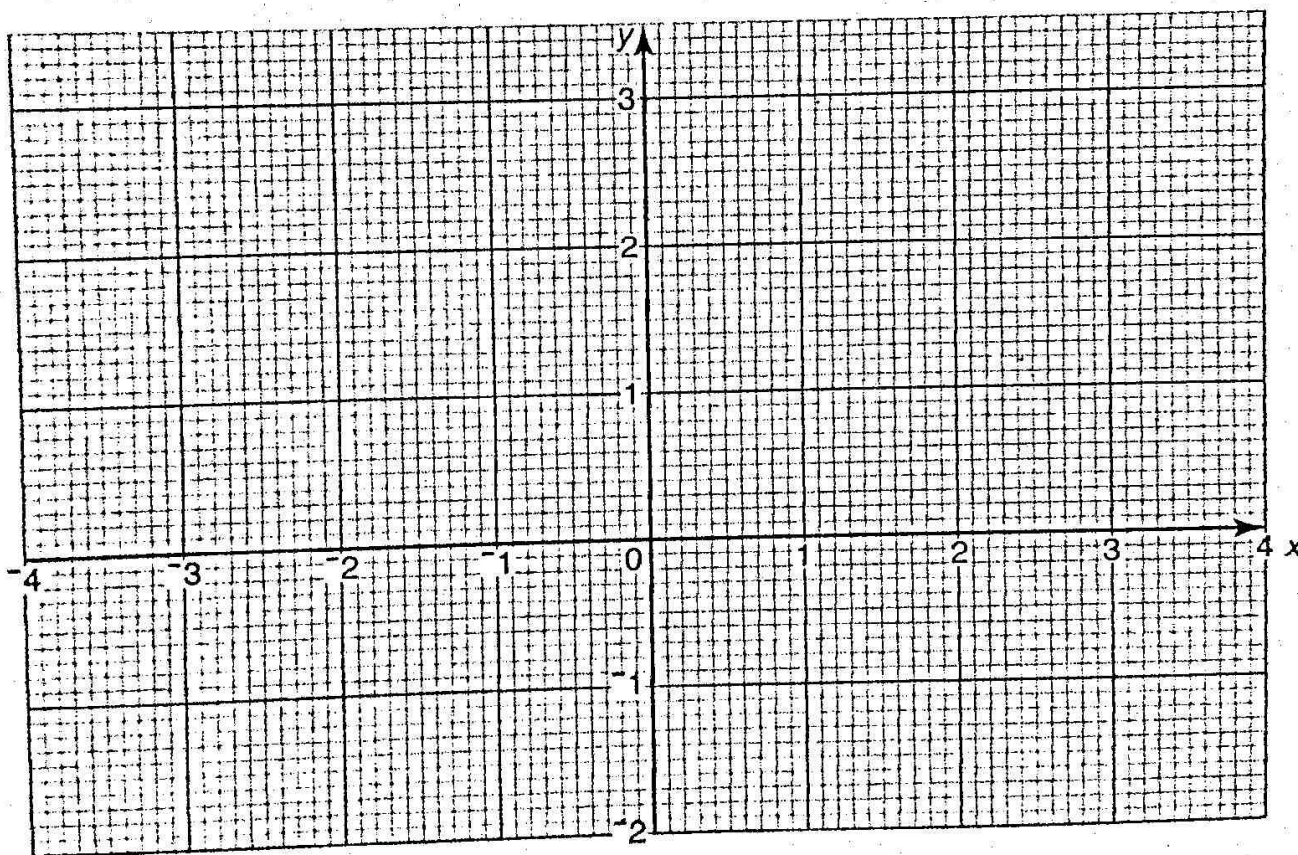
(2)

(iv) On the grid below, draw and label the curve  $y = 3 - \frac{1}{2}x^2$

(2)

(v) Write down the  $x$ -coordinate of each point of intersection of the line and the curve.

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



7. (i) Write 225 as a product of prime factors using indices.

Answer: ..... (2)

(ii) 3, 5 and 9 are one-digit factors of 225

Write down all the two-digit factors of 225

Answer: ..... (3)

8. John cycles 6 kilometres to get to work. It takes him 25 minutes.

What is his average speed

(i) in km/h



Answer: ..... km/h (2)

(ii) in m/s?

Answer: ..... m/s (2)

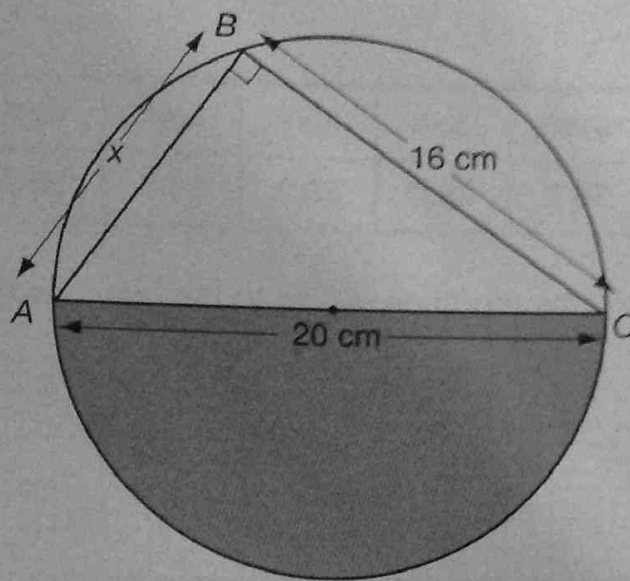
If 5 miles is the same as 8 kilometres, what is John's average speed

(iii) in miles per hour?

Answer ..... mph (1)



9. The diagram shows a logo made up of a right-angled triangle  $ABC$  inside a circle.  $A$ ,  $B$  and  $C$  are points on the circumference of the circle.



$AC$  is the diameter of the circle and is 20 cm long.

- (i) What is the area of the circle?

Answer: .....  $\text{cm}^2$  (2)

$BC = 16$  cm

- (ii) Use Pythagoras' Theorem to calculate the value of  $x$ .

Answer:  $x =$  ..... cm (3)

- (iii) What is the perimeter of triangle  $ABC$ ?

Answer: ..... cm (1)

- (iv) Calculate the perimeter of the shaded part of the circle.

Answer: ..... cm (2)

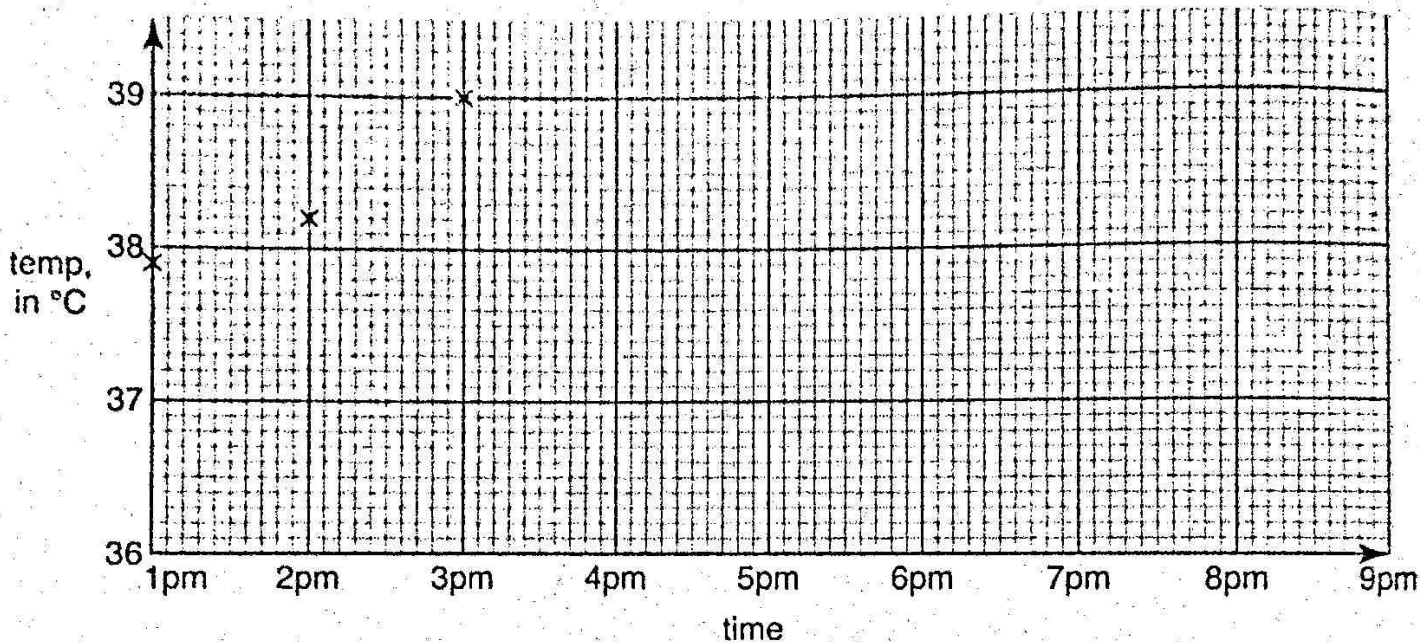
10. Mathematical Max has measles.

His temperature is taken every hour and the results are shown in the table below.



time	1pm	2pm	3pm	4pm	5pm	6pm	7pm
temperature (°C)	37.9	38.2	39.0	39.2	38.8	38.3	37.8

Luckily, Max is well enough to plot the first three results on the graph paper below.



From 4pm onwards, Max's temperature falls steadily.

- (i) Plot the remaining results on the graph and join the points to form a line graph. (2)
- (ii) During which hour did Max's temperature rise the fastest? (1)

Answer: from ..... to ..... (1)

- (iii) At what time between 1pm and 5pm is Max's temperature 39 °C and falling?

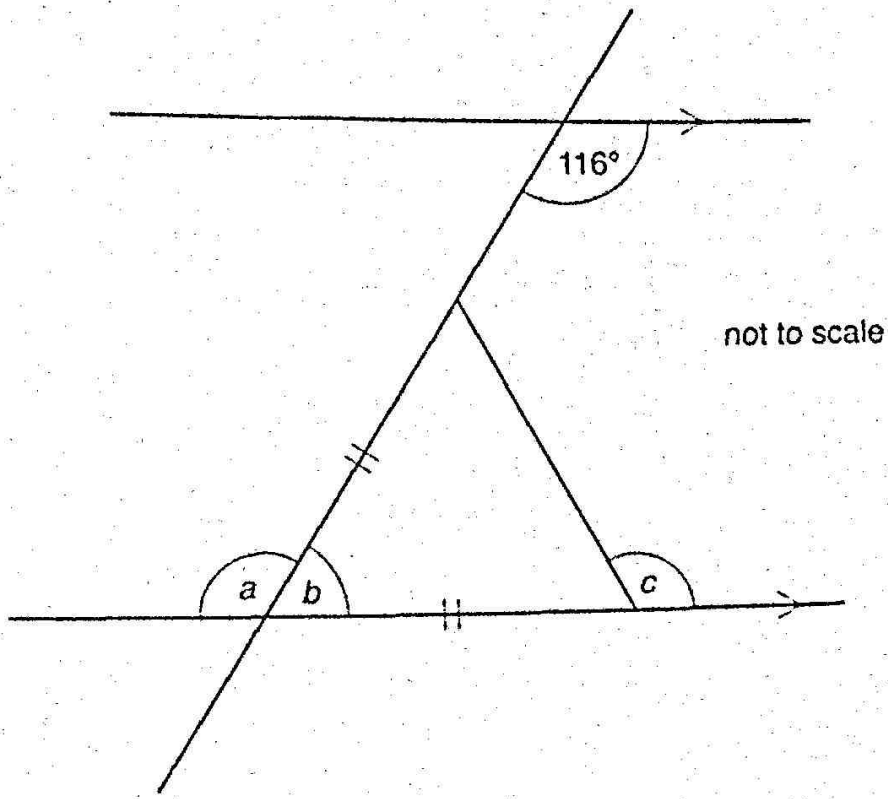
Answer: ..... (1)

Max's temperature continues to fall steadily.

- (iv) By extending the graph line, work out the time to the nearest minute, at which Max's temperature reaches 36.9 °C. Mark this point clearly on the graph.

Answer: ..... (2)

11. Calculate the size of each of the angles marked  $a$ ,  $b$  and  $c$ .



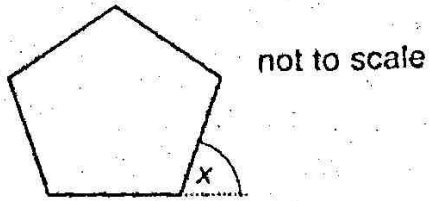
Answer:  $a = \dots\dots\dots$  (1)

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

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

Turn over

12. (i) (a) Calculate the size of the exterior angle,  $x$ , of a regular pentagon.

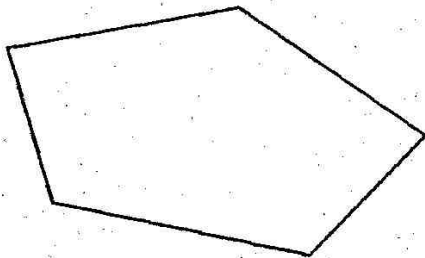


Answer:  $x = \dots\dots\dots$  (1)

(b) Calculate the size of the interior angle of a regular pentagon.

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

(ii) (a) Calculate the sum of the interior angles of any pentagon.



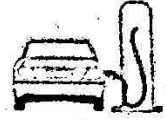
Answer:  $\dots\dots\dots$  (2)

(b) Three of the angles of a pentagon are  $140^\circ$ ,  $148^\circ$  and  $156^\circ$   
The remaining two angles,  $a$  and  $b$ , are such that  $a = 2b$   
Calculate the size of each of the remaining two angles.

Answer:  $a = \dots\dots\dots$  and  $b = \dots\dots\dots$  (2)

13. Petrol cost 92.0 pence per litre.

Jack always bought 24 litres of petrol each week.



(i) How much did Jack spend on petrol each week?

Answer: £ ..... (1)

The price of petrol increases by 7.5%.

(ii) What is the new price of one litre of petrol?

Give your answer correct to 1 decimal place.

Answer: ..... p (2)

Because of the price increase, Jack decides to reduce the amount of petrol he buys each week by 12.5%.

(iii) How much does Jack now spend on petrol each week?

Answer: £ ..... (2)

(iv) Find the reduction in Jack's weekly petrol bill as a percentage of his original weekly bill. Give your answer correct to the nearest whole number.

Answer: ..... % (2)

14. Farmer George has only goats and chickens on his farm.

He has  $g$  goats and  $c$  chickens.

Each goat has four legs and each chicken has two legs.

Farmer George counts the animals' legs and arrives at a total of 88 legs.



- (i) Write this information as an equation, in terms of  $g$  and  $c$ , and simplify the equation.

Answer: ..... (2)

Farmer George's son, William, is only three years old. He is good at maths but muddles his animal names. He knows how many of each animal are on the farm but he thinks that goats have two legs each and chickens have four!

William works out that the animals on the farm will have a total of 68 legs.

- (ii) Write this information as an equation, in terms of  $g$  and  $c$ , and simplify the equation.

Answer: ..... (2)

- (iii) Solve these equations simultaneously to find the values of  $g$  and  $c$ .

Answer:  $g =$  .....

$c =$  .....

15. Your calculator shows that  $\frac{4}{11} = 0.363636 \dots$  which is written  $0.\dot{3}\dot{6}$ .  $0.\dot{3}\dot{6}$  is called a recurring decimal because it repeats.

(i) Use your calculator to help you write  $\frac{7}{11}$  as a recurring decimal.

Answer:  $\frac{7}{11} = \dots\dots\dots$  (1)

Lily is an expert on her multiplication tables.

She notices that there is a connection between these recurring decimals and one of her multiplication tables.

(ii) Using this connection, or otherwise, write the following recurring decimals as fractions in their lowest terms:

(a)  $0.\dot{2}\dot{7}$

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

(b)  $0.\dot{7}\dot{2}$

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

(iii) Use a similar method to write the following recurring decimals as fractions in their lowest terms:

(a)  $0.0\dot{5}$

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

(b)  $0.0\dot{4}\dot{5}$

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

(Total marks: 100)