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

$$\frac{51.7 + 29.8}{2.08 \times 4.85}$$

Answer: $\dfrac{\ldots\ldots\ldots + \ldots\ldots\ldots}{\ldots\ldots\ldots \times \ldots\ldots\ldots}$ (2)

(ii) Calculate the value of your answer to part (i).

Answer: ..... (1)

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

$$\frac{51.7 + 29.8}{2.08 \times 4.85}$$

Answer: ..... (2)

(iv) Write your answer to part (iii)

(a) correct to two significant figures

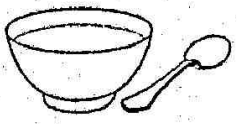
Answer: ..... (1)

(b) correct to two decimal places.

Answer: ..... (1)

2. (a) A recipe to make eight portions of Creamy Rice Pudding reads:

60 g	long grain rice
450 ml	milk
200 ml	whipping cream



(i) How much rice is needed for 12 portions of Creamy Rice Pudding?

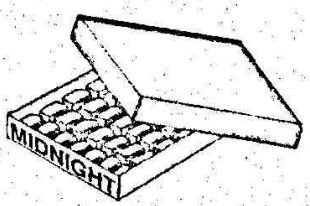
Answer: ..... g (2)

Chef has 1.5 litres of whipping cream.

(ii) If he has enough rice and milk, how many portions of Creamy Rice Pudding can he make?

Answer: ..... (2)

(b) A box of *Midnight* contains 72 chocolate flakes, either dark or milk.
The ratio of dark chocolate flakes to milk chocolate flakes is 7:5
How many milk chocolate flakes are there?



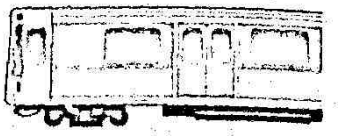
Answer: ..... (2)

3. (a) It is 340 kilometres by train between Ancaster and Boxton.

A train completes the journey from Ancaster to Boxton at an average speed of 80 km/h.

How long does the journey take?

Give your answer in hours and minutes.



Answer: ..... h ..... min (2)

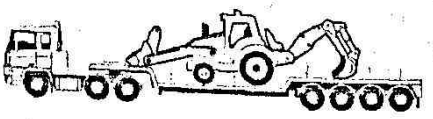
(b) A cyclist averages 36 kilometres per hour on a timed stage of a rally which takes 35 minutes to complete.

How long is the stage?

Answer: ..... km (2)

(c) A slow-moving transporter travels at a speed of 80 metres per minute.

What is this speed in kilometres per hour?



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

4. Natasha took part in an ice-skating competition.
The judges awarded her the following marks:

5.2 5.5 5.7 5.1 4.9 5.5 5.4 5.5 5.0

(i) What was her range of marks?

Answer: ..... marks (1)

(ii) What was her modal mark?

Answer: ..... (1)

(iii) What was her median mark?

Answer: ..... (2)

To obtain her final mark, the judges ignore the highest and lowest marks.
Then they find the mean of the remaining 7 marks.

(iv) What was Natasha's final mark?
Give your answer correct to 1 decimal place.

Answer: ..... (2)

5. Simplify

(i) $3a^3 + 2a^3$

Answer: ..... (1)

(ii) $3a^3 \times 2a^3$

Answer: ..... (2)

(iii) $(2a^2)^3$

Answer: ..... (2)

(iv) $\frac{16a^8}{12a^2}$

Answer: ..... (2)

6. (a) Factorise completely

$12a^3 + 8a$

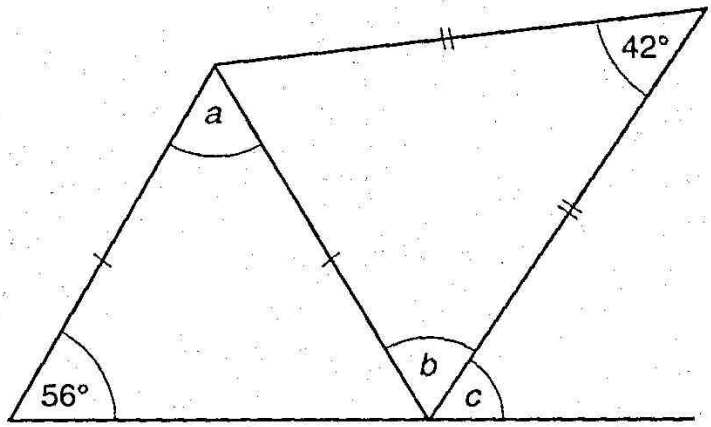
Answer: ..... (2)

(b) Multiply out the brackets and simplify

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

Answer: ..... (3)

7.



not to scale

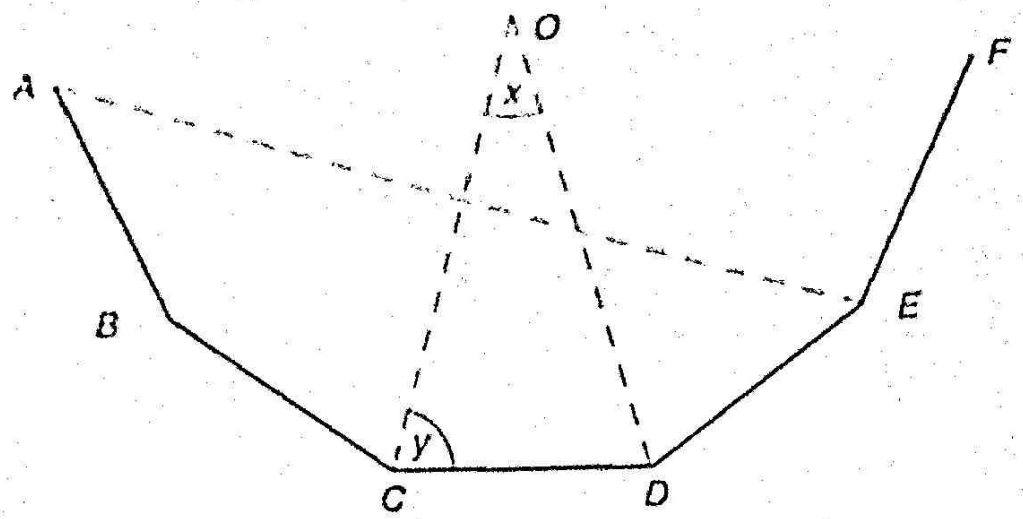
Calculate the size of each of the angles marked *a*, *b* and *c*.

Answer: a = ... ° (2)

b = ... ° (2)

c = ... ° (1)

8.



not to scale

ABCDEF is part of a regular polygon, centre *O*.

The size of angles *COD*, *x*, and *OCD*, *y*, are in the ratio 1:2

(i) Calculate the size of angle *COD*.

Answer: $x =$ ..... ° (2)

(ii) Hence calculate the size of angles

(a) *CDE*

Answer: angle *CDE* = ... ° (2)

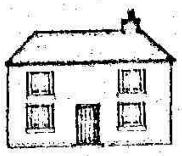
(b) *AED*.

Answer: angle *AED* = ... ° (2)

9. (a) *Smarty Pants* is a trendy clothes shop.
The shopkeeper buys a suit from a manufacturer for £220
He sells the suit for £495
Express his profit as a percentage of the buying price.

Answer: .....% (3)

(b) In January 2000 a house was valued at £150 000
By December 2000 the value of the house had dropped by 12%.



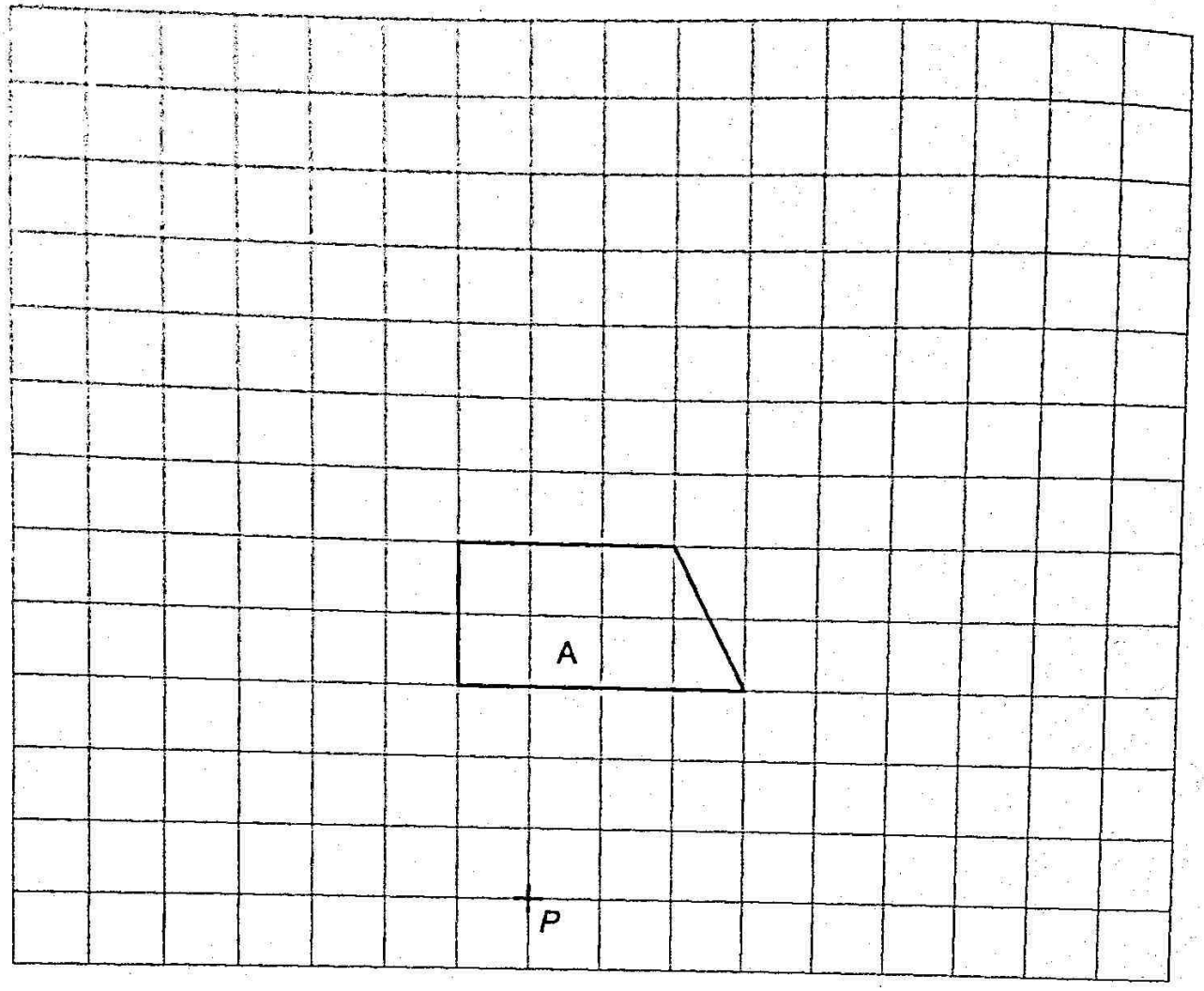
(i) What was the value of the house in December 2000?

Answer: £..... (2)

(ii) In August 2001 the house was again worth £150 000
What was the percentage increase in value between December 2000 and August 2001?

Answer: .....% (2)

10.



(i) On the centimetre square grid above, draw the enlargement of shape A with centre *P* and scale factor 2

Label the image B. (2)

(ii) Find the area of shape B.

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

(iii) If instead, shape A is enlarged by scale factor 3, what would be the area of the enlarged shape?

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

11. Barney runs a sandwich bar at the beach.

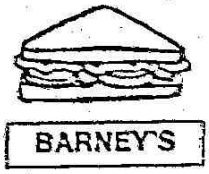
He starts the day with 120 sandwiches with these fillings:

48 are cheese

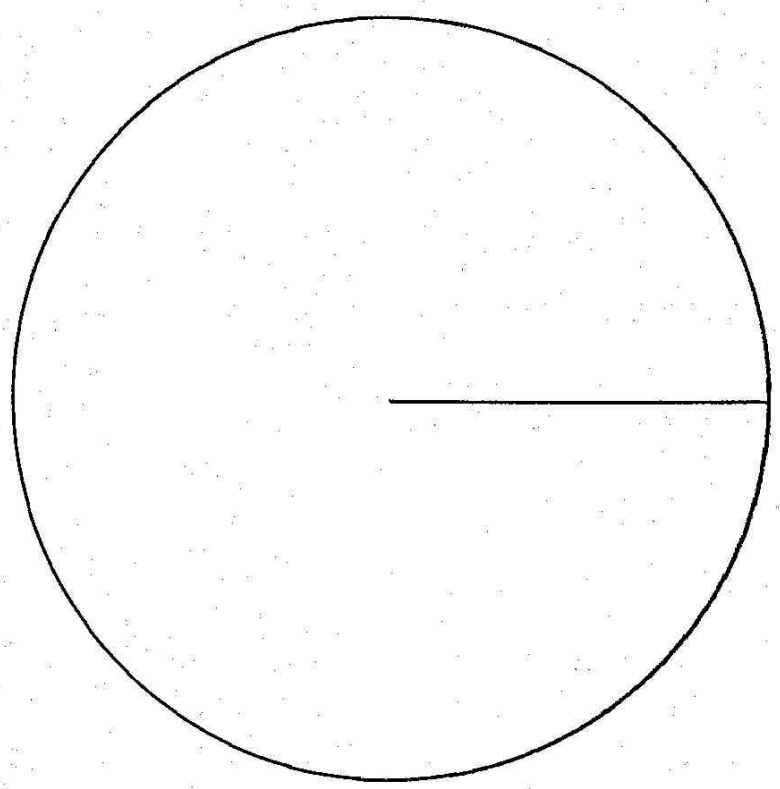
a quarter are ham

20% are egg

and the rest are tuna.



(i) Draw a fully-labelled pie chart to show this information.



(4)

(ii) Unfortunately Barney drops all the ham sandwiches in the sand so he cannot sell them.

He redraws the pie chart without the ham sandwiches.

What angle will now represent the egg sandwiches?

Answer: ..... ° (2)

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

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

(2)

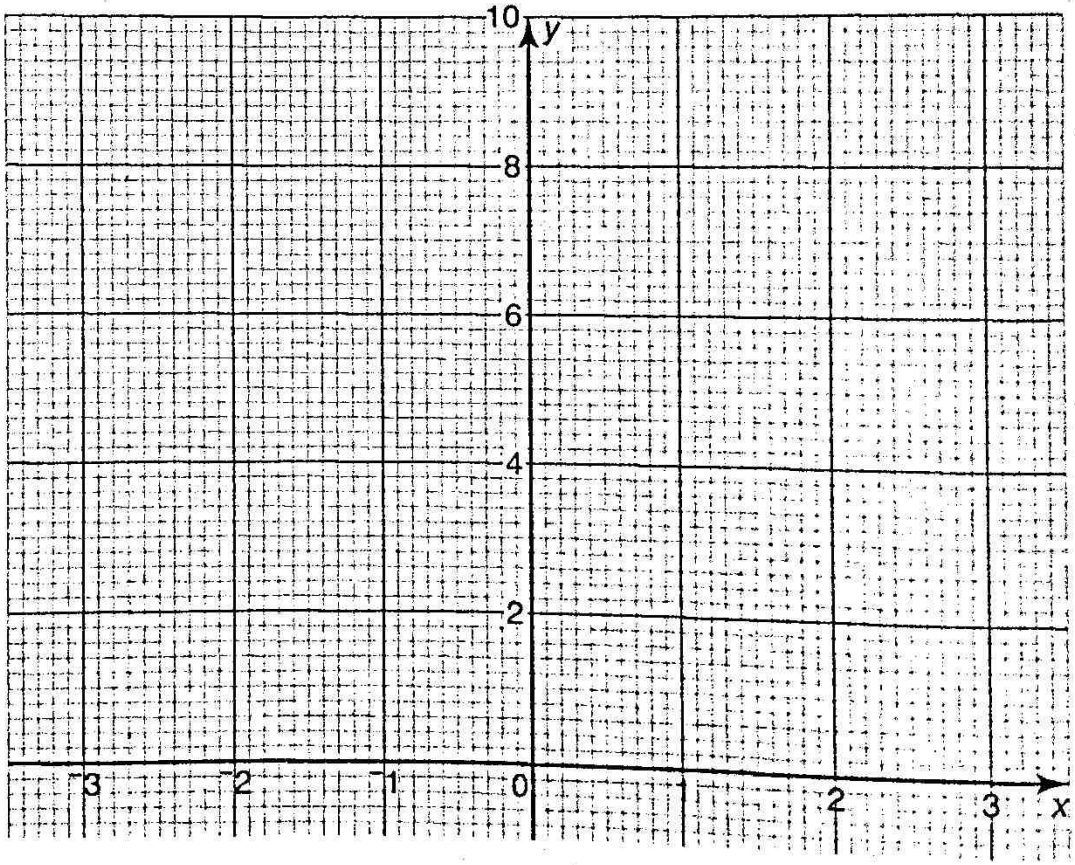
(ii) On the grid below draw the graph of $y = x^2$ (1)

(iii) When $y = \frac{1}{2}x + 2$ complete this table of values:

x	$^-2$	0	2
y			

(2)

(iv) On the grid below draw the line $y = \frac{1}{2}x + 2$

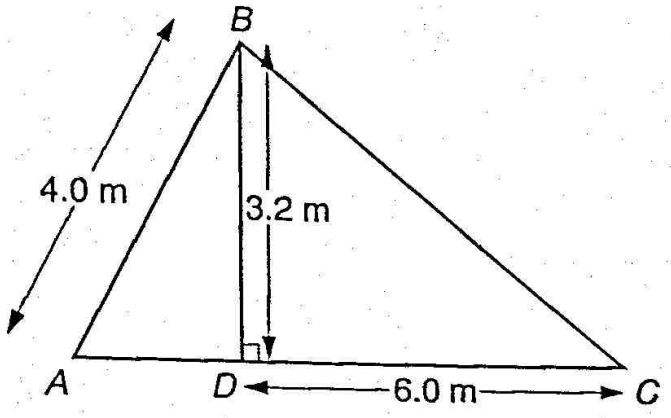


(1)

(v) Write down the x co-ordinate of each of the points where $y = x^2$ and $y = \frac{1}{2}x + 2$ intersect.

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

13.



not to scale

The diagram shows the cross-section of a wooden frame.
$AB = 4.0$ metres, $BD = 3.2$ metres and $CD = 6.0$ metres.

(i) Calculate the length of BC.

Answer: $BC =$ ..... m (2)

(ii) Calculate the length of AD.

Answer: $AD =$ ..... m (2)

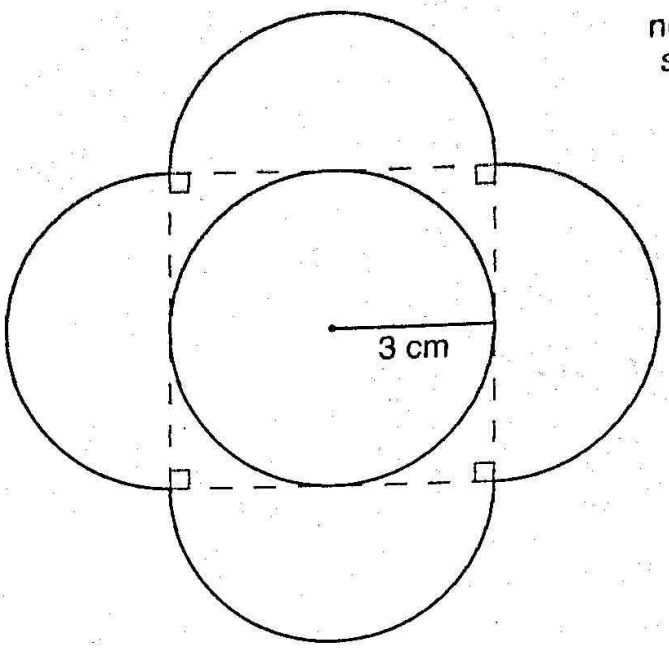
(iii) (a) Calculate the exact area of triangle ABD.

Answer: ..... m^2 (2)

(b) Calculate the perpendicular distance from D to AB.

Answer: ..... m (2)

14. *In this question you should use the π button on your calculator.*



The figure shows a 'flower' design made up of four semi-circles of radius 3 centimetres attached to a square.

A centre circle is drawn inside the square.

(i) Calculate the length of the outer edge of the design.

Answer: ..... cm (3)

The centre circle is painted red and the remainder of the 'flower' design is painted white.

(ii) Calculate the area which is painted white.

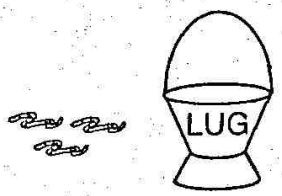
Answer: ..... cm^2 (3)

The length of the outer edge of a similar design is 100 centimetres.

(iii) Calculate the length of the radius of the centre circle of that design.

Answer: ..... cm (3)

15. Ray sells worms to fishermen for bait.
A lugworm costs n pence.



(i) Write down the cost of 20 lugworms in terms of n

Answer: ..... pence (1)

A ragworm costs 5 pence more than a lugworm.

(ii) (a) Write down the cost of a ragworm in terms of n

Answer: ..... pence (1)

(b) Write down the cost of 12 ragworms in terms of n

Answer: ..... pence (1)

(iii) Write down the total cost of 20 lugworms and 12 ragworms in terms of n

Answer: ..... pence (1)

Ray sells 20 lugworms and 12 ragworms for £4.44

(iv) Form an equation, in terms of n, and solve it.

Answer: n = ... (3)

(v) What is the cost of 6 ragworms?

Answer: £..... (1)

(Total marks: 100)