

SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER 4: CALCULATOR PAPER

Tuesday 2 June 2009

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:

$$\frac{104 - 16.3}{2.1 \times 3.8}$$

Answer: $\frac{\dots\dots\dots - \dots\dots\dots}{\dots\dots\dots \times \dots\dots\dots}$ (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 decimal value of

$$\frac{104 - 16.3}{2.1 \times 3.8}$$

Answer: (2)

- (iv) Write your answer to part (iii)

- (a) correct to 2 decimal places

Answer: (1)

- (b) correct to 3 significant figures

Answer: (1)

2. (a)

$$1 \text{ mile} = 1.609 \text{ kilometres}$$

The distance from Glasgow to Norwich is 378 miles.

Convert this distance to kilometres, giving your answer correct to the nearest 10 kilometres.

Answer: km (2)

(b)

$$1 \text{ metre} = 1.094 \text{ yards}$$

A cricket pitch is exactly 22 yards long.

Convert this length to metres, giving your answer correct to the nearest centimetre.

Answer: m (2)

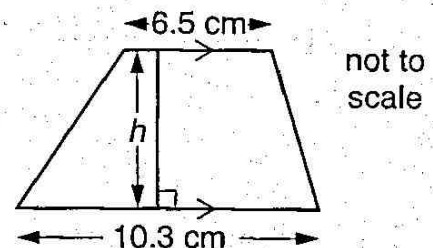
(c)

$$A = \frac{h(a+b)}{2}$$

is the formula to find the area A of a trapezium where a and b are the lengths of the parallel sides and h is the perpendicular height.

The area of this trapezium is 71.4 cm^2 .

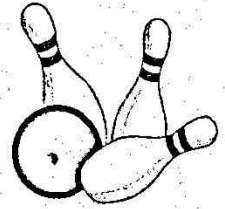
Calculate the height of the trapezium.



Answer: $h =$ cm (3)

3. Twenty-four children go tenpin bowling.
They bowl a ball each and count their score (the number of pins they knock down).
The scores are as follows:

5 8 7 6 6 9 10 6
6 5 8 6 7 6 2 7
9 3 8 7 8 5 7 6



- (a) Complete the tally chart below to show these figures.

score	tally	frequency
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
	total	

- (b) Using the chart to help you, or otherwise, write down

(i) the range of scores

Answer: (1)

(ii) the modal score

Answer: (1)

(iii) the median score

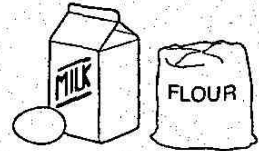
Answer: (2)

(iv) the mean score

Answer: (3)

4. (a) The recipe for making 8 pancakes is

1 egg
125 grams plain flour
300 millilitres milk



On Shrove Tuesday, the cook has to produce 160 pancakes for lunch.
What quantity of eggs, flour and milk does she need?

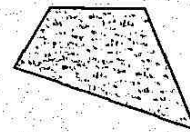
Answer: eggs
..... kilograms flour
..... litres milk (3)

(b) Rosie's lawn has 4 sides.

The lengths of the sides are in the ratio of 3 : 4 : 5 : 6

The total length of the perimeter is 72 metres.

What is the length of the shortest side of the lawn?

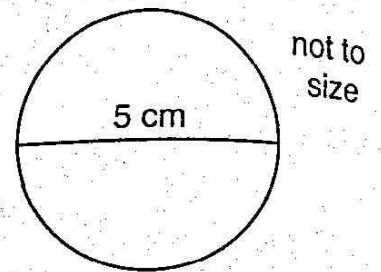


not to scale

Answer: m (2)

5. (a) A circle has diameter 5 centimetres.
Calculate

(i) the circumference of the circle

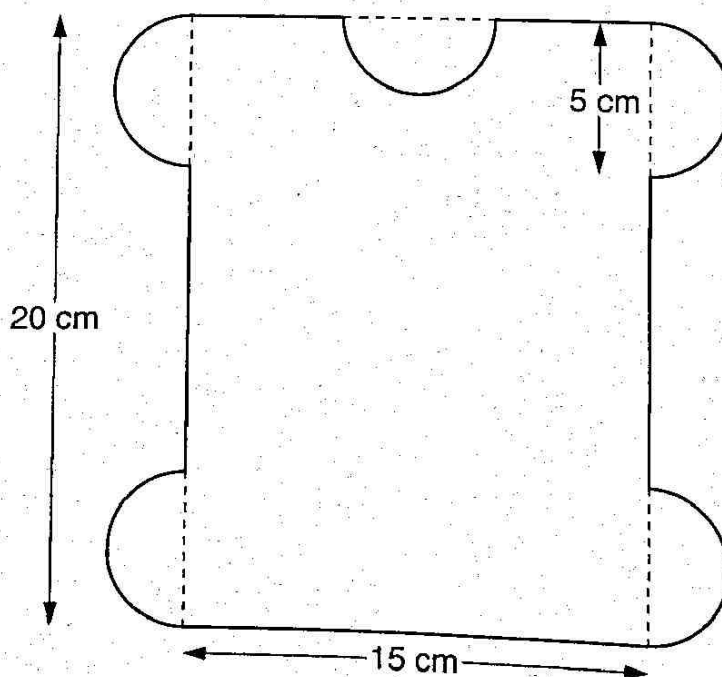


Answer: cm (2)

(ii) the area of the circle

Answer: cm² (2)

- (b) The diagram shows the template for making part of a cuddly toy.
It is made from a rectangular piece of felt measuring 15 cm by 20 cm.
Two semicircles, each of diameter 5 cm, are added to each vertical side and
another semicircle of diameter 5 cm is cut out at the top.



not to
scale

(i) Calculate the area of the design, giving your answer correct to the nearest 10 square centimetres.

Answer: cm² (3)

(ii) Calculate the perimeter of the design, giving your answer correct to the nearest centimetre.

Answer: cm (3)

6. (a) In January, train fares were increased by $7\frac{1}{2}\%$.
Up until then Mr Omar paid £13.60 for his train ticket to London.
How much does he pay for his ticket to London after the increase?

Answer: £ (3)

- (b) In April, Mr Brewer's council tax was increased from £970 to £1013.65

(i) How much was the increase?

Answer: £ (1)

(ii) What was the percentage increase?

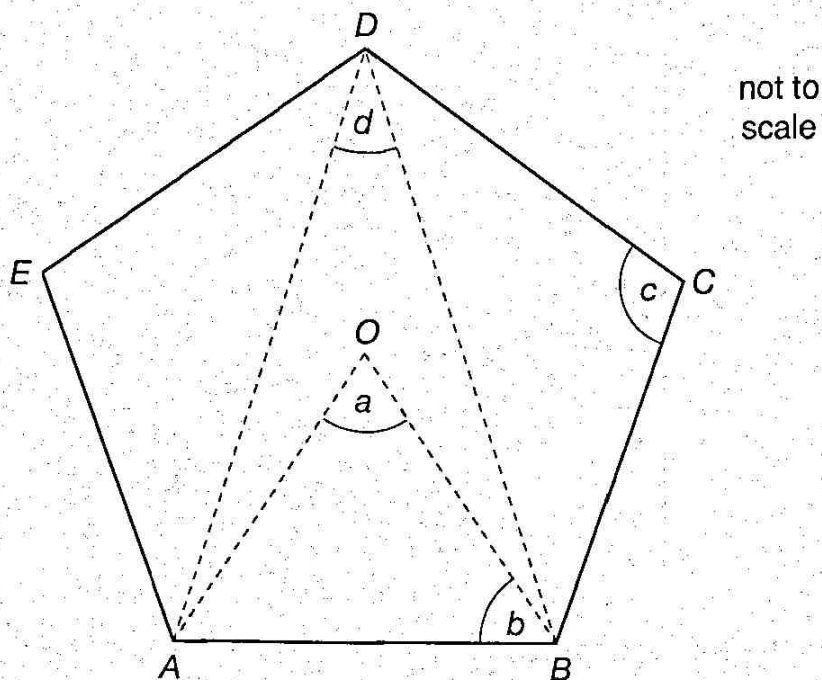
Answer:% (2)

- (c) In the sale at *Bambi's Boutique* there is a 35% discount off all original prices.
Pandora pays £52 for a silk shirt in the sale.
What was the original price of the shirt?



Answer: £ (3)

7.



(i) What name is given to the type of polygon $ABCDE$?

Answer: (1)

(ii) $ABCDE$ is a regular polygon, centre O .

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

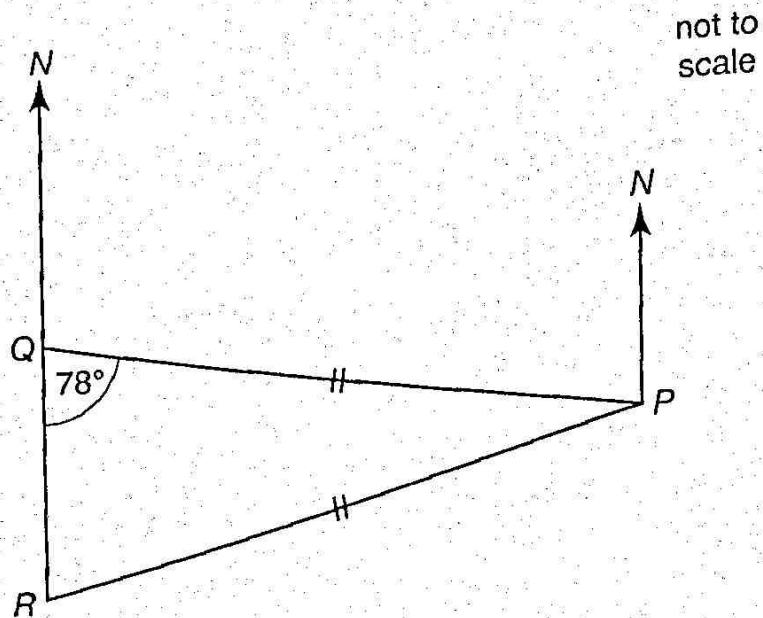
Answer: $a =$ (2)

$b =$ (2)

$c =$ (2)

$d =$ (2)

8.



(i) Calculate the size of angle QPR .

Answer: $\widehat{QPR} = \dots\dots\dots$ (2)

P , Q and R are three towns.
 Q is due north of R .

(ii) What is the bearing of R from P ?

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

9. Simplify

(i) $5a^2 + 4a^2$

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

(ii) $4b^2c \times 2b^4c$

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

(iii) $(3c^3)^3$

Answer: (2)

(iv) $\frac{6d^6 - 3d^6}{12}$

Answer: (2)

10. (a) Factorise completely
 $8x^8y - 16x^2$

Answer: (2)

- (b) Multiply out the bracket and simplify
 $7b - 3(3a - b) - 2a$

Answer: (3)

11. (i) The table below shows some of the values of y for the given values of x when $y = x^2 - 1$

x	-3	-2	-1	0	1	2	3
y		3			0		

(a) Fill in the missing values in the table above. (3)

(b) On the axes opposite, draw and label the graph of $y = x^2 - 1$ (2)

- (ii) When $y = \frac{1}{2}x + 1$

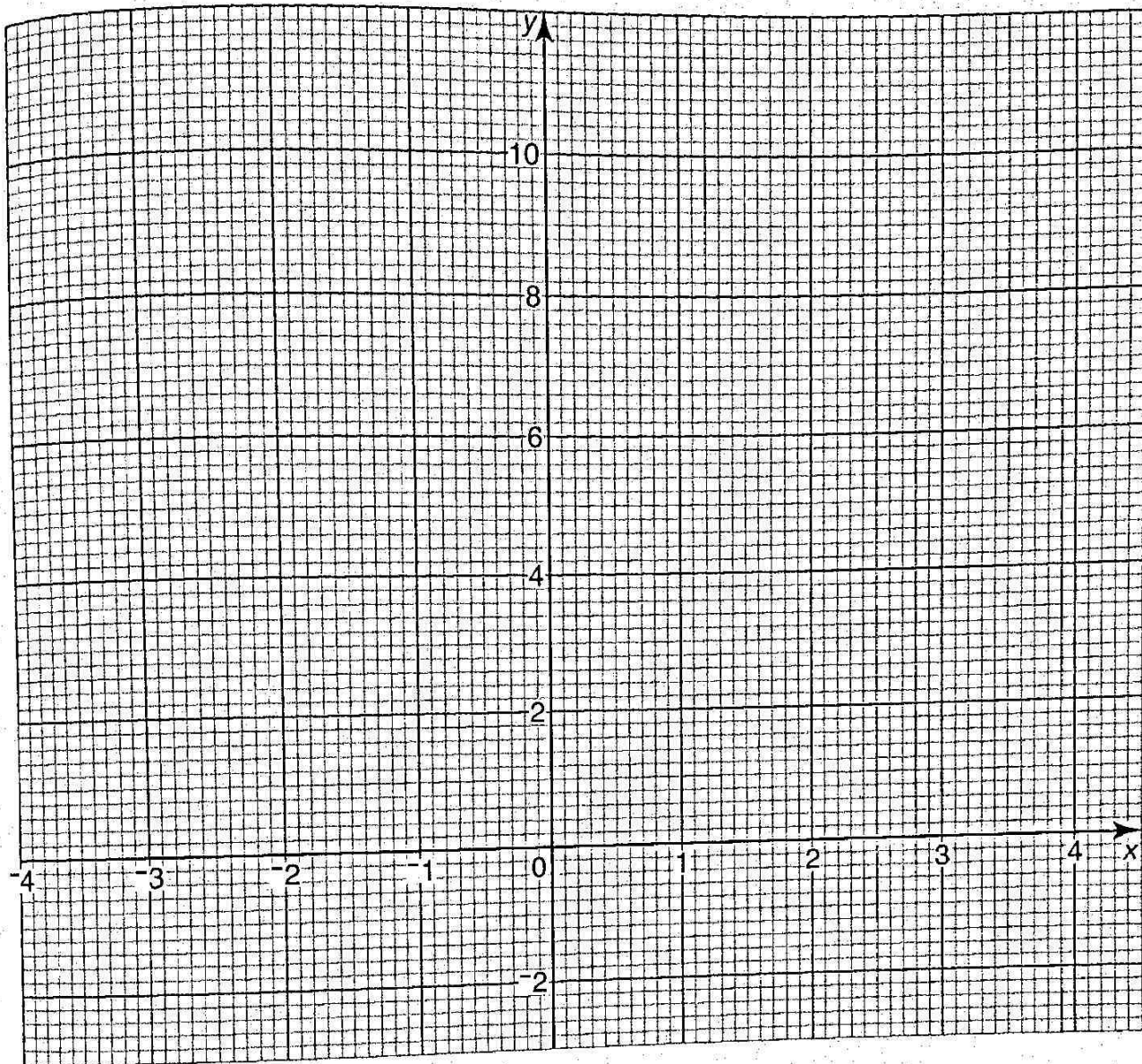
(a) complete the table of values

x	-4	0	3
y			

(b) on the axes opposite, draw and label the graph of $y = \frac{1}{2}x + 1$ (1)

- (iii) Write down the co-ordinates of the point where the graphs of $y = x^2 - 1$ and $y = \frac{1}{2}x + 1$ intersect in the first quadrant.

Answer: (.....,) (2)



12. A newsagent delivers these 120 newspapers each morning:

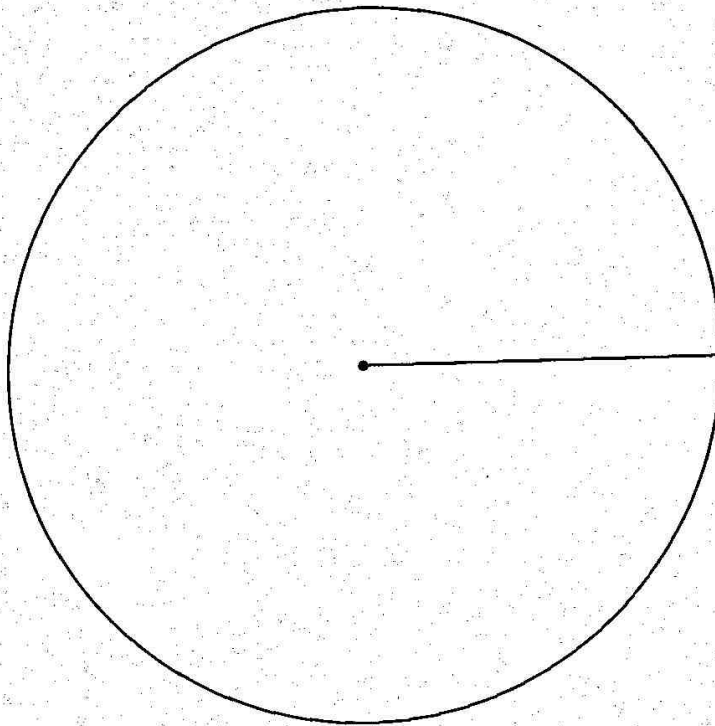
- 25 *Courier*
- 44 *Daily News*
- 30 *Globe*
- 21 *Journal*

The newsagent wants to draw a pie chart to show this information.

(i) How many degrees will represent 1 newspaper?

Answer: (1)

(ii) Draw the fully-labelled pie chart.



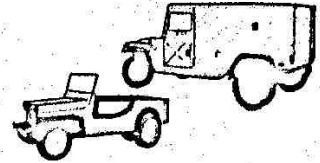
Last Tuesday, no copies of *Globe* were available, but the newsagent delivered the usual number of each of the other papers.

The newsagent then drew a pie chart to show the papers he had delivered.

(iii) What was the size of the angle for *Courier* this time?

Answer: (2)

13. The *Hippo* and the *Rhino* are two types of armoured personnel carriers. The *Hippo* can carry h soldiers and the *Rhino* can carry r soldiers.



- (a) (i) 14 soldiers fill 1 *Hippo* and 1 *Rhino*.

Write down this information in terms of h and r .

Answer: (1)

- (ii) Write down the value of $3h + 3r$

Answer: $3h + 3r = \dots\dots\dots$ (1)

- (iii) 54 soldiers fill 3 *Hippos* and 5 *Rhinos*.

Write down this information in terms of h and r .

Answer: (1)

- (iv) Showing your working, solve a pair of simultaneous equations to find the values of h and r .

Answer: $h = \dots\dots\dots$

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

TURN OVER FOR THE REST OF QUESTION 13

A *Hippo* travels at an average speed of 24 km/h.

A *Rhino* travels at an average speed of 30 km/h.

- (i) Write down, in simplest terms, the ratio of the average speed of a *Hippo* to the average speed of a *Rhino*.

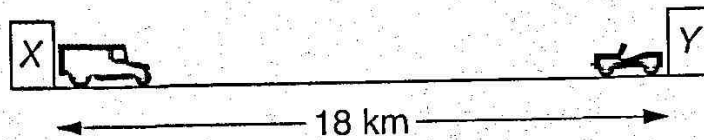
Answer: : (1)

Two outposts, X and Y, are 18 kilometres apart connected by a road.

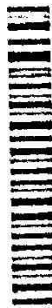
At 12 00 a *Hippo* sets out from X to travel to Y.

At the same time a *Rhino* sets out from Y to travel to X along the same road.

- (ii) At what time do the vehicles meet if both travel at their own average speed?



Answer: (3)



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