BROMSGROVE SCHOOL



ENTRANCE EXAMINATION PAPER

YEAR 9

MATHEMATICS

January 2011

Time allowed: 1 hour

Instructions

Answer as many questions as you can in the spaces provided.

Do not worry if you do not finish.

You should have a calculator; its use is expected.

Show your working clearly as credit will be given for this in the event of an incorrect answer.

1 mile = 1.609 kilometres

1. a) The distance from Glasgow to Norwich is 378 miles.
   Cover this distance to kilometres, giving your answer correct to the nearest 10 kilometres.

_ _

_ [2]

1 metre = 1.094 yards

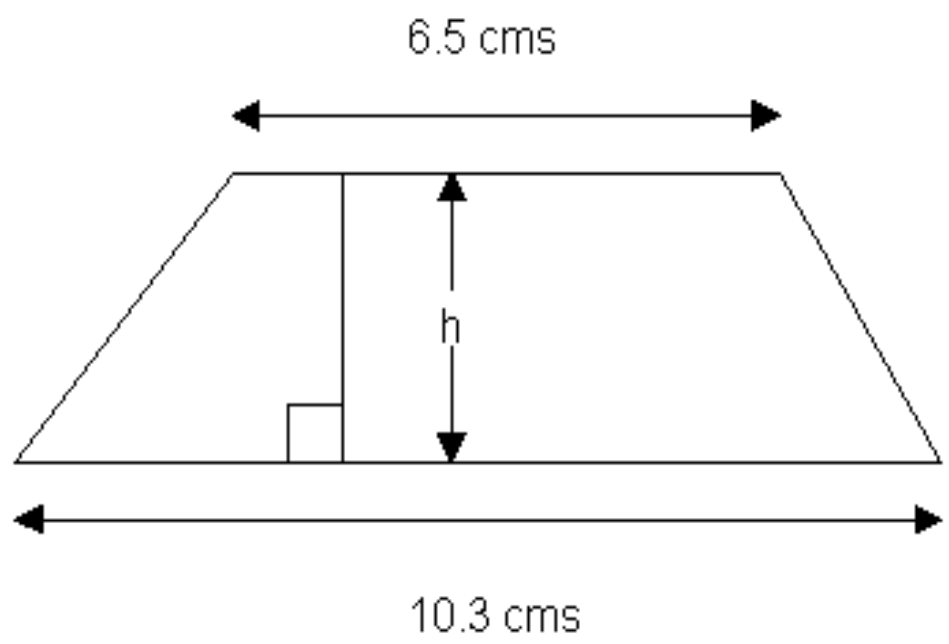
b) A cricket pitch is exactly 22 yards long.
   Convert this length to metres, giving your answer correct to the nearest centimetre.

_ _

_ [2]

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

c) The formula for the area, *A* of a trapezium is given above where *a* and *b* are 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.

_ _

_ _

_ [3]

0.3 $\mathbf{\frac{1}{4}}$ **28%**

2. a) Write the numbers above in order of size, smallest first.

____

____ [2]

b) Write 3 as a percentage of 20

____

____ [2]

c) Write $\frac{3}{5}$ of a metre in centimetres.

____

____ [2]

3. a) Write down the next term in each of the following sequences:

i) 1 2 4 8 ....

________________ [1]

ii) 7 5 3 1 ....

________________ [1]

b) The first term of a sequence is 2
The sequence follows the rule '*multiply by 3 and then add 1*'.
Write down the third and fourth terms of the sequence.

____

____ [2]

c) Write down the **sum** of the first ten terms of the sequence beginning:

1 -2 3 -4 5 ....

____

____ [2]

d) Write down the nth term of the sequence beginning:

2 5 8 11 14 …… ……

_ _

_ [2]

4. When $x = 3$ $y = -2$ $z = -4$

Find the value of

i) $x - y$

_ _ _ _ _ _ _ [1]

ii) xyz

_ _ _ _ _ _ _ [2]

iii) $y^3 - y^2$

_ _ _ _ _ _ _ [2]

iv) $\frac{xz^2}{y + z}$

_ _ _ _ _ _ _ [3]

5. a) Solve the following equations:

i) $2a - 3 = 4$

_ _

_ [2]

ii) $5b + 7 = 2b - 8$

_ _

_ _

_ [2]

iii) $\frac{2}{5}(2c + 1) = 10$

_ _

_ _

_ [3]

b) Solve the following inequalities:

i) $3d + 2 \geq 6 - d$

_ _

_ [2]

ii) $4(d - 2) < 28$

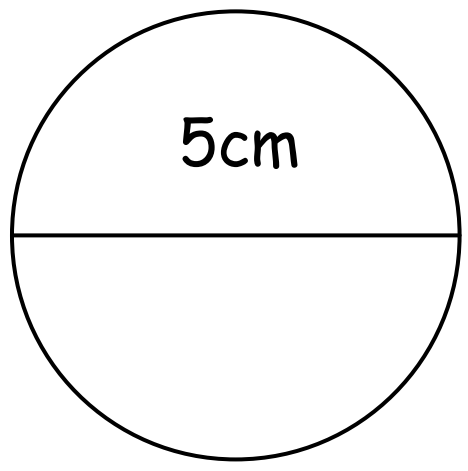
_ _

_ [2]

iii) Write down the square numbers which satisfy both of the inequalities above.

_ [1]

6. a) A circle has diameter 5 centimetres.



Calculate

i) the circumference of the circle

_ _

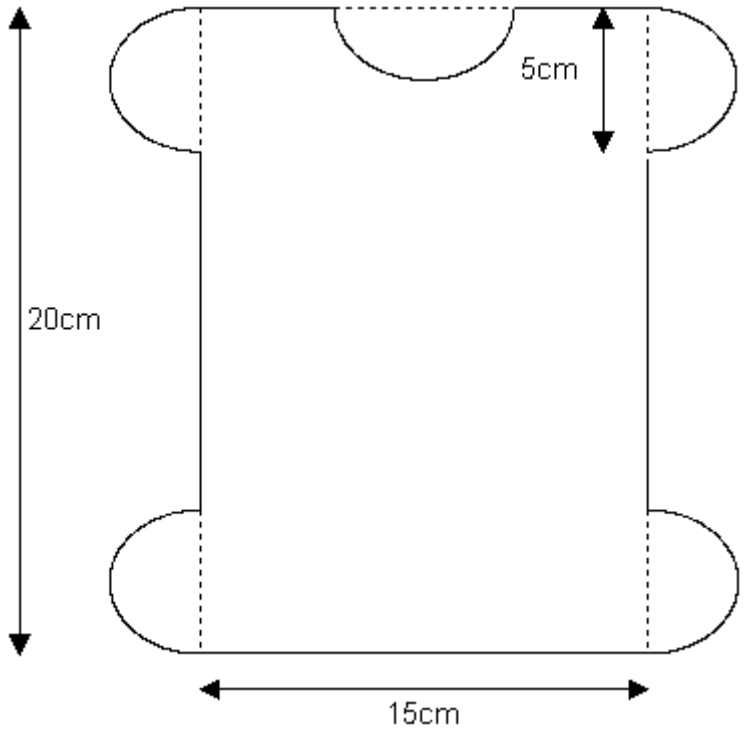
_ [2]

ii) the area of the circle

_ _

_ [2]

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



Not to scale

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

[3]

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

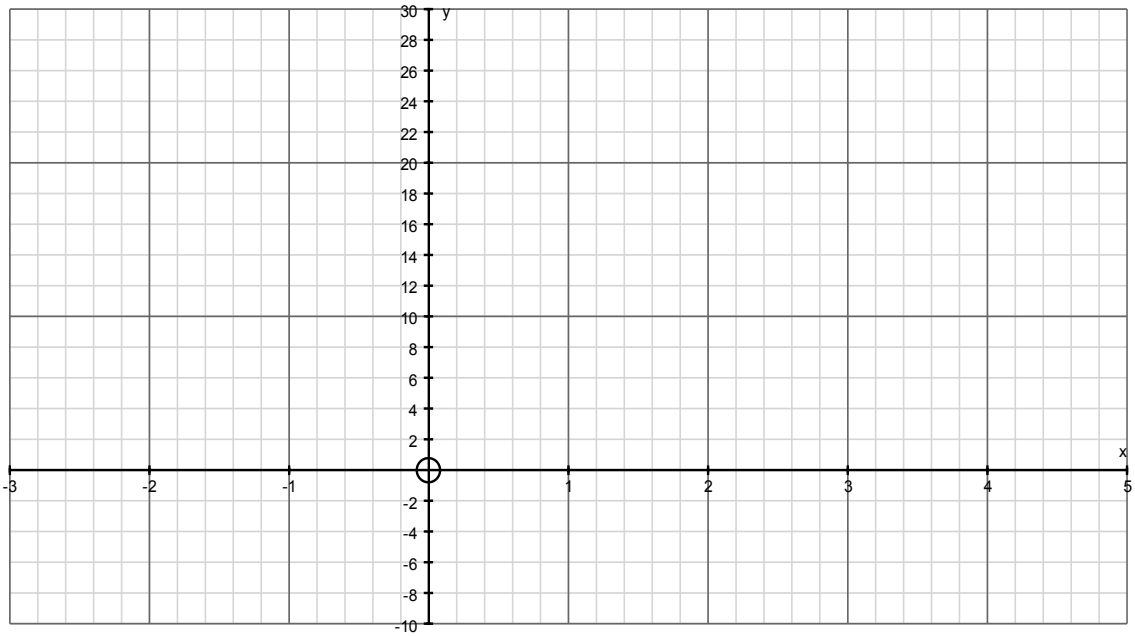
[3]

7. a) Complete the following table of values for the equation $y = x^2 - 3x$

x	-2	-1	0	1	2	3	4	5
y	10					0		

[2]

Draw the graph of $y = x^2 - 3x$ on the graph below



[2]

On the same axes draw the line y = 8

[2]

Write down the coordinates of the points of intersection of the two graphs.

_ [2]

8. Find the values of a and b if:

$$4a + 9b = 51$$
$$6a + 3b = 24$$

_ _

_ _

_ _

_ _

_ [5]

9. Simplify

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

_____ [1]

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

_____ [2]

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

_____ [2]

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

_____ [2]

10. a) A ferry leaves Weymouth at 22 45 and arrives in the Channel Islands at 03 20 the next day. How long does the journey last?

_____

_____ [2]

b) George runs 400 metres in 50 seconds at a steady pace. What is his average speed in kilometres per hour?

_____

_____ [3]

11. a) Increase £13.60 by $7\frac{1}{2}$%.

_____

_____ [3]

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

i) How much was the increase?

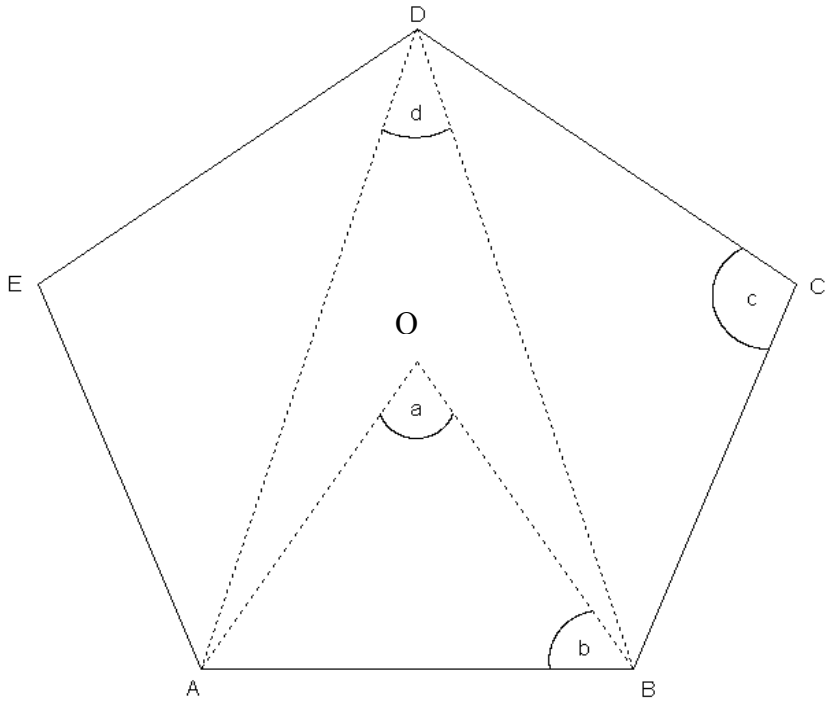
_____ [1]

ii) What was the percentage increase?

_____

_____ [2]

12.



Not to scale

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

_ [1]

ii) ABCDE is a regular polygon, centre O.
Calculate the size of each of the angles marked a, b, c and d.

_ _

_ _

_ _

_ _

a = _ _ _ _ b = _ _ _ _ c = _ _ _ _ d = _ _ _ _ [8]

13. On the planet Pooky, the currency is the Zarg (z).
There are 12 Parps (p) in 1 Zarg and 15 Krups (k) in a Parp.
For example, 3 Zargs, 5 Parps and 7 Krups is written 3z 5p 7k.

a) Add 3z 5p 7k to 7z 8p 9k

[2]

b) Subtract 15z 8p 6k from 30z 2k

[2]

c) A lottery win of 34z 8p 3k is shared equally between 9 Pookians.
How much did they each receive?

[3]

Now go back and check your answers.