SHREWSBURY SCHOOL

3RD FORM ENTRANCE EXAMINATION FOR ENTRY IN SEPTEMBER 2014

MATHEMATICS

1 HOUR

Attempt **all** questions.

Answer on lined or squared paper. **Do <u>not</u> write directly onto this question paper.**

You may use a calculator.

There are 80 marks available in total.

Relevant working must be shown in order to gain high marks.

1) Here is a list of numbers:

2 4 12 16 17 48 53 68

a) Write down all the multiples of 8 in the list.

b) Write down all the prime numbers in the list.

[4 marks]

2) Fred goes shopping and buys the following:

3 loaves of bread at £1.25 each

4 jars of raspberry jam at £2.69 each

1 tub of butter at £1.39

He pays for all this with two £10 notes. How much change does he receive?

[4 marks]

3) You are given that $a = 6$, $b = -4$, $c = 9$. Evaluate each of the following:

a) $2a - 3b$ b) $5\sqrt{c}$ c) $\dfrac{4a - c}{b + 1}$

[5 marks]

4) a) Mary and Elizabeth share 63 cupcakes in the ratio $5 : 4$.
Calculate how many each one receives.

b) Mary and Elizabeth also share some smarties in the same ratio.
If Mary gets 65 smarties, how many does Elizabeth receive?

[4 marks]

5) You must show **full working** in order to obtain any marks in this question.

Evaluate the following, giving your answers as **simplified fractions**:

a) $\dfrac{1}{8} + \dfrac{5}{8}$ c) $\dfrac{5}{12} \times \dfrac{6}{15}$

b) $\dfrac{7}{10} - \dfrac{2}{3}$ d) $\dfrac{3}{5} \div \dfrac{9}{10}$

[8 marks]

6) a) In a French vocab test, Victor scores 12 out of 30. What is his score as a percentage?

b) In a German listening test, Heidi scores 95%. If the test was out of 120, how many marks did Heidi get?

c) The number of pupils in a school increases from 720 one year to 765 the next year. What is the percentage increase in the number of pupils?

d) The price of a box of Coco Pops is reduced by 30% in a sale. If it now costs only £2.03, how much did it cost before the sale?

[8 marks]

7) A cuboid has edges of length 3 cm, 5 cm and 8 cm.

a) Calculate the volume of the cuboid, giving the correct units in your answer.

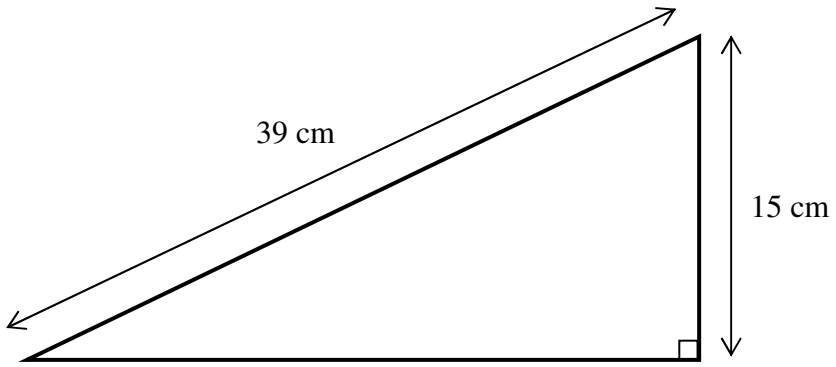
b) Calculate the total surface area of the cuboid, again giving the correct units.

A cube has the same volume as the cuboid above.

c) Calculate the length of one edge of this cube.

[8 marks]

8) The diagram below shows a right-angled triangle.



a) Calculate the length of the base of the triangle.

b) Find the perimeter of the triangle.

c) The triangle is enlarged so that the height is now 25 cm.
Calculate the new length of the longest side.

[7 marks]

9) a) A circle has a radius of 20 cm. Calculate the area of the circle to 3 significant figures, giving the correct units in your answer.

b) A **semicircle** has radius r.

Show carefully why the perimeter P of the semicircle is given by the formula:

$$P = (\pi + 2)r .$$

[6 marks]

10) Solve the following equations:

a) $4x - 5 = 23$

b) $3(x + 2) = 5x - 8$

c) $\frac{5x}{7} = 6$

d) $\frac{3}{x} = 12$

[9 marks]

11) Simplify the following expressions:

a) $5x - 7y - 6x + 9y$

b) $(4d - 3h) - (2d - 7h)$

c) $\frac{8x^3y^2}{20xy^4}$

[6 marks]

12) a) Expand the following expressions:

i) $3(x + 7)$

ii) $4v(5v - 6w)$

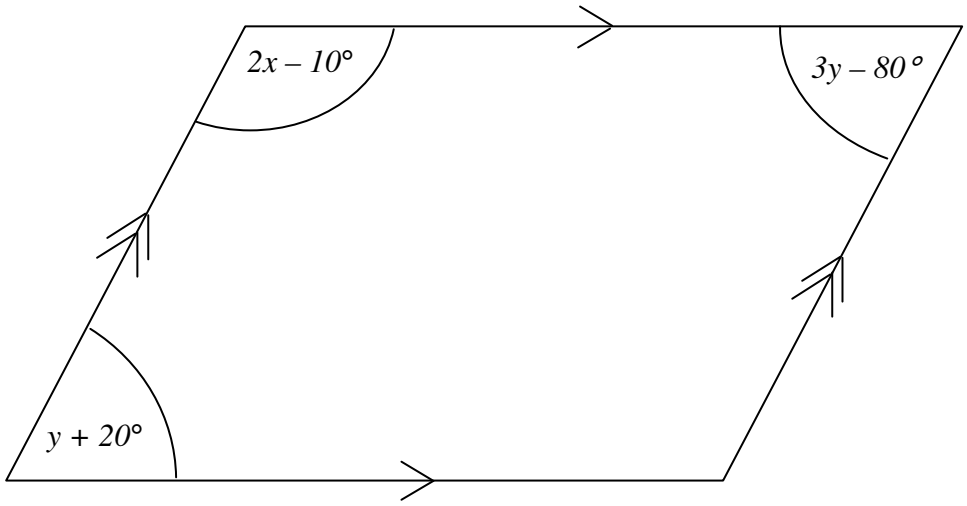
b) Factorise the following expressions:

i) $7y - 14$

ii) $4ef + 20f^2$

[6 marks]

13) Calculate the values of x and y in the parallelogram below:



[5 marks]

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