SHREWSBURY SCHOOL

3RD FORM ENTRANCE EXAMINATION FOR ENTRY IN SEPTEMBER 2013

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:

3 5 10 16 24 49 81 160

a) Write down all the factors of 80 in the list.

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

[4 marks]

2) Dennis goes shopping and buys the following:

3 boomerangs at £4.99 each

5 water bombs at £2.50 each

1 fake moustache at £3.85

He pays for all this with two £20 notes. How much change does he receive?

[4 marks]

3) You are given that $x = 10$, $y = -3$, $z = 7$. Evaluate each of the following:

a) $4x + 5y$ b) $3z^2$ c) $\dfrac{\sqrt{x+2y}}{z-5}$

[5 marks]

4) a) Fred and Barney share 198 pebbles in the ratio $7:4$.
Calculate how many each one receives.

b) Fred and Barney also share some rocks in the same ratio.
If Fred gets 84 rocks, how many does Barney 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) $\dfrac{3}{10} + \dfrac{2}{10}$ c) $\dfrac{5}{16} \times \dfrac{4}{15}$

b) $\dfrac{8}{9} - \dfrac{2}{5}$ d) $\dfrac{3}{4} \div \dfrac{7}{8}$

[8 marks]

6) a) In a chemistry exam, Boris scores 56 out of 70. What is his score as a percentage?

b) The number of rabbits in a warren increases from 45 by 40%. How many rabbits are in the warren now?

c) A motorbike was bought some time ago for £3,200 and its value now is £2,000. What is the percentage decrease in the value of the motorbike?

d) The price of a tennis racket is reduced by 25% in a sale. If it now costs only £44.85, how much did it cost before the sale?

[8 marks]

7) A cube has edges of length 5 cm.

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

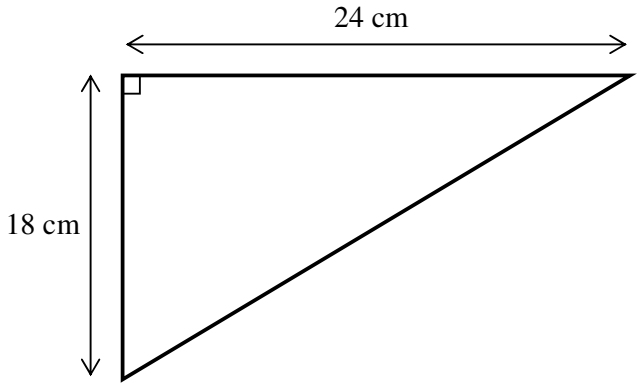
b) Calculate the surface area of the cube, again giving the correct units.

Another cube has a surface area of 294 cm^2.

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 third side of the triangle.

b) Calculate the area of the triangle, giving the correct units in your answer.

c) A square has the same perimeter as this triangle. How long is each side of the square?

[7 marks]

9) a) A circle has a **diameter** of 14 cm. Calculate the area of the circle to 3 significant figures, giving the correct units in your answer.

b) A **semicircle** has an area of 50 cm^2. Calculate the radius of the semicircle to 4 decimal places.

[6 marks]

10) Solve the following equations:

a) $5x + 3 = 48$

b) $7(x + 4) = 3x - 8$

c) $\frac{5x}{8} = 3$

d) $\frac{40}{x} = 80$

[9 marks]

11) Simplify the following expressions:

a) $9a + 4b - 2a + 3b$

b) $(7f - 2g) - (3f - 2g)$

c) $\frac{9x^2y^3}{24x^4y}$

[6 marks]

12) a) Expand the following expressions:

i) $4(x - 11)$

ii) $5c(2c + 3d)$

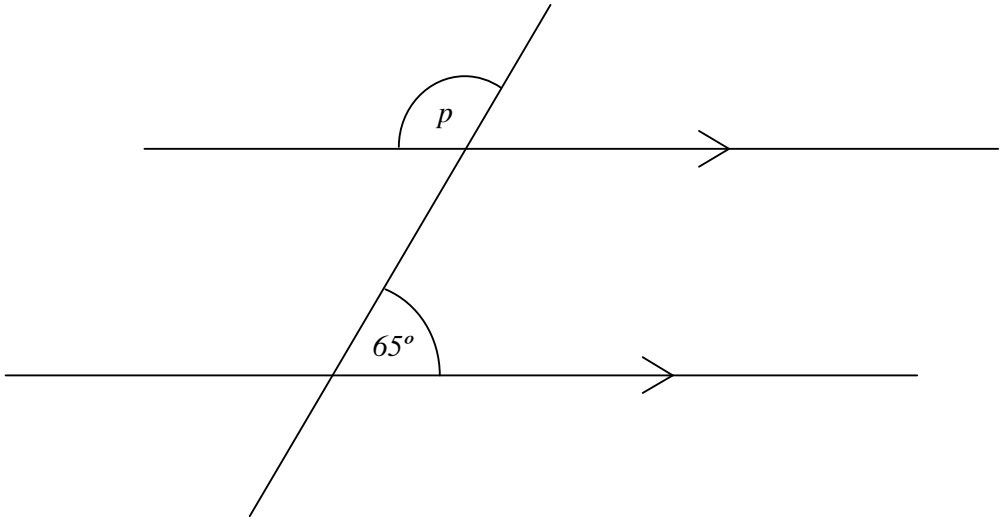
b) Factorise the following expressions:

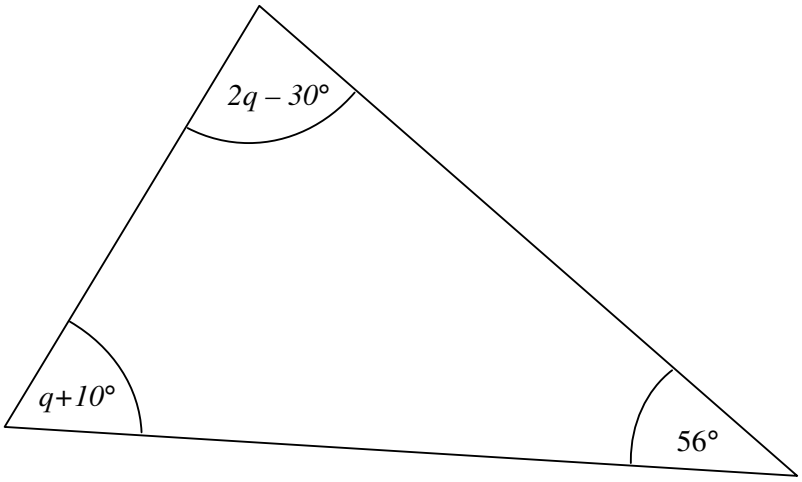
i) $15v - 20$

ii) $3pq + 9q^2$

[6 marks]

13) Calculate the values of ***p*** and ***q*** in the diagrams below:





[5 marks]

++++ END ++++