Name:

2016 Non Common Entrance
Fourth Form Entry

Mathematics

Time Allowed: 60 minutes

Instructions

- **Calculators are NOT permitted**
- Write ALL your working and answers on this paper. Show enough working on each question to make it clear how you reached your answer.
- Do not spend too long working on any particular question. Do not worry if you do not manage to complete every question.
- You may work in pen or pencil.

1. Work out the following

(a) The perimeter of a square is 13.2 cm.
What is the side length?

Answer ……

(b) It is estimated that 42 average sized houses could be built on a football pitch.
How many average sized houses could be built on 67 football pitches?

Answer ……

(c) The cost of a particular knee operation is £7,200.
This prices increases over a 5 year period by 20%.
Calculate the new price after the 5 year period.

Answer ……

(d) There are 0.00092 kg of chocolate in a chocolate button.
How many kg of chocolate are there in six tenths of one chocolate button?

Answer ……

(e) A large chocolate Easter egg has a mass of 816g (excluding the packaging).
If the chocolate egg is divided equally amongst 24 people, how many grams of chocolate will each person get?

Answer ……

(f) Work out $21 + 12 \div 2 - 7 - 12 \times 2$

Answer ……

2. Work out

(a) Two thirds plus seven ninths

Answer ……

(b) Six and a half divided by three fifths

Answer ……

3. If $a = 6$, $b = -7$ and $c = -3$, find the value of the following expressions

(a) $a - b$

Answer ……

(b) b^2

Answer ……

(c) $4a - b - 2c$

Answer ……

4. Find the value of x in the following equations

(a) $3x - 0.46 = 1.04$

Answer ……

(b) $6x + 4(2x + 3) = 2$

Answer ……

(c) $5x^2 = 180$

Answer ……

(d) $0.52x + 18 = 0.02x$

Answer ……

5. Simplify these expressions, removing the brackets where appropriate

(a) $17(x + 3)$

Answer ……

(b) $a^4bc^2 \times ab^4cd$

Answer ……

(c) $\dfrac{315y^9z^{21}}{35xy^4z^{17}}$

Answer ……

(d) $54 - 5(x - 13) - 7(2x + 3)$

Answer ……

6. Factorise these expressions completely

(a) $6x - 36x^2$

Answer .....

(b) $72y^2 + 18xy$

Answer .....

(c) $x^2 + 5x + 6$

Answer .....

(d) $x^3 - 4x^2 + 3x$

Answer .....

7. In the National Health Service there are 150 000 doctors.
The ratio of doctors to nurses is 2:5.
How many nurses are there working in the National Health Service?

Answer .....

8. (a) What is the average (mean) of the numbers below:

4.8 7.9 29.1 55 13.2

Answer ……

(b) Find five numbers that have a mean of 6, a median of 4 and a mode of 3.

Answer ……

9. Every minute, a 70kg human emits 14 600 gamma rays because of radioactive potassium in their bodies.
Estimate how many gamma rays are emitted by a person in their lifetime.
Write down any assumptions you make.

Answer ……

10. When a number is “knighted” it is squared and then has one subtracted from the result.
For example when 8 is “knighted” the result is 63.

(a) What is the result when 13 is “knighted”?

(b) What is the result when $\sqrt{14}$ is “knighted”?

(c) What is the result when 3 is “knighted” twice?

(d) How many positive whole numbers produce numbers less than 100 when they are “knighted”?

(e) How many one-digit numbers produce multiples of three when they are “knighted”?

(f) When a number was “knighted” the result is 224.
What was the number?

11. Peter has a three-digit code for a padlock. He has forgotten the code but he know that all three digits are different. He also knows that if you divide the first digit by the second digit and then square the result you get the third digit.
List all possible three digit codes that could work.

Answer(s) ……

12. How many ways are there of writing 100 as the sum of two or more consecutive positive integers written in increasing order?
Explain your answer carefully!

Answer ……