Name:

2015 Non Common Entrance Examination
Fourth Form Entry

Mathematics

Time Allowed: 1 hour

No calculators allowed

Instructions

- 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) $7.09 + 48.92$

Answer ……

(b) 36×122

Answer ……

(c) 7100×1.6

Answer ……

(d) 0.6×0.003

Answer ……

(e) $482.4 \div 9$

Answer ……

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

Answer ……

(g) 31% of 49

Answer ……

2. Work out

(a) Two thirds plus seven ninths

Answer ……

(b) Six and a half divided by three fifths

Answer ……

3. If $a = 7$, $b = -9$ and $c = -5$, 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) $2x + 0.86 = 1.36$

Answer ……

(b) $7x - 4(x + 3) = 21$

Answer ……

(c) $3x^2 = 75$

Answer ……

(d) $0.5x + 18 = 0.4x$

Answer ……

5. Simplify these expressions, removing the brackets where appropriate

(a) $5(x + 6)$

Answer ……

(b) $a^4bc^2 \times b^4c$

Answer ……

(c) $\dfrac{90xy^7z^2}{15xy^5z}$

Answer ……

(d) $54 - 5(x - 13)$

Answer ……

6. Factorise these expressions completely

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

Answer ……

(b) $360y^2 + 40xy$

Answer ……

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

Answer ……

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

Answer ……

7. In a school there are 280 girls and 420 boys. There are 35 teachers.
What is the ratio of teachers to pupils? Express your ratio in the lowest terms.

Answer ……

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

5.2 8.9 23.8 55.8 16.3

Answer ……

(b) Find five numbers that have a mean of 3, a median of 4 and a mode of 5.

Answer ……

9. Platinum is a very rare metal, even rarer than gold. Its density is 21.45 g/cm^3. Assuming that the world production has been about 110 tonnes for each of the past 50 years, and negligible before that, which of the following has a comparable volume to that of the total amount of platinum ever produced? (*You should show estimated calculations to support your selection*).

A shoe box, a cupboard, a house, Buckingham Palace or the grand canyon

Answer ……

10. Place the numbers 4, 5, 7 and 9 in the gaps below to make the statement true.
(Each number should be used once *only)*

…… + …… × …… − …… = 40

11. Goldbach's Conjecture states that every even positive whole number greater than two can be written as the sum of two prime numbers.

Find two prime numbers that sum to the following numbers (note that 1 is *not* a prime number)

(a) 18

Answer ……

(b) 42

Answer ……

(c) 60

Answer ……

(d) 156

Answer ……

12. How many numbers are there between 0 and 500 that are divisible by five, or divisible by four, but not divisible by 20?

Answer ……

13. The "ceiling" of a number, x, is the smallest integer not less than x. It is written as $\lceil x \rceil$.
For example, $\lceil 7.2 \rceil = 8$, $\lceil -4.8 \rceil = -4$ and $\lceil 8 \rceil = 8$.

Find

(a) (i) $4\left(3 + \lceil 6.2 \rceil\right)$

Answer ……

(ii) $\lceil 8 \times 10 \div 6 \rceil$

Answer ……

(b) Find all possible solutions to the equation

$$\lceil x \rceil = 2x - 1$$

Answer ……