



Creating and Manipulating Expressions

Age 14+ Level ★★ Worksheet 1

1. Divisible Expression

Show that $(1 + x + y)^2 - (1 - x - y)^2$ is divisible by 4 for all integer values of x and y .

2. Little Difference

Without using a calculator, or performing any long multiplication calculations, find the value of $2015 \times 2017 - 2016^2$

What about $2016 \times 2018 - 2017^2$?

3. Brian's Number

Brian chooses an integer, multiplies it by 4 then subtracts 30. He then multiplies his answer by 2 and finally subtracts 10. His answer is a two-digit number.

What is the largest integer he could have chosen?

4. Adding to 400

Find four integers whose sum is 400 such that the first integer is equal to twice the second integer, three times the third integer and four times the fourth integer.

5. Order the Products

Without calculating the five products below, put them in order of size, from smallest to largest.

$$210 \times 190 \quad 195 \times 205 \quad 198 \times 202 \quad 186 \times 214 \quad 200 \times 200$$

6. Square and Cube

The square of a positive number is twice as big as the cube of that number. What is the number?

These problems are adapted from UKMT (ukmt.org.uk) and SEAMC (seamc.asia) problems.

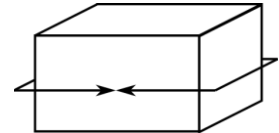


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Age 14+ Level ★★ Worksheet 2

1. Cuboid Perimeters

The 'perimeter' of a cuboid can be measured along three axes. One 'perimeter' of this cuboid is shown.



If the 'perimeters' of a cuboid are 12 cm, 16 cm and 24 cm, what is the volume of the cuboid?

2. Relative Powers

The square of a number is 12 more than the number itself.

The cube of the number is 9 times the number.

What is the number?

3. Clever Calculation

Without using a calculator, or performing any long multiplication calculations, find the value of

$$2017^2 - 2015 \times 2019$$

4. Big Fibonacci

In a sequence of positive integers, every term after the first two terms is the sum of the two previous terms in the sequence.

If the fifth term is 2004, what is the maximum possible value of the first term?

5. Granny's Age

Granny has calculated that she is four times as old as I am now, but remembers that 5 years ago she was five times as old as I was at that time.

What is the sum of our ages now?

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