GCSE Maths – Algebra

Simplifying Expressions

Worksheet

WORKED SOLUTIONS

This worksheet will show you how to solve problems involving simplifying expressions. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Simplify the expression $82cd^2e + 5 - 17ce + 8e \times c - 2$.

Step 1: Identify the different terms that are present in the equation.

For these types of questions, it can be useful to make a mental note of the terms involved. These could be simplified further by re-arrangement and collecting like terms!

Step 2: Simplify the expression using BIDMAS.

$$82cd^2e + 5 - 17ce + 8e \times c - 2$$

$$= 82cd^2e + 5 - 17ce + (8e \times c) - 2$$

$$= 82cd^2e + 5 - 17ce + 8ce - 2$$

Note, it is standard to write algebraic terms in alphabetical order. For example, we write $8ce$ rather than $8ec$.

Step 3: Collect any like terms. Numerical constants can be collected, and variable terms represented by the same letter or combination of letters can be collected.

$$82cd^2e + 5 - 17ce + 8ce - 2 = 82cd^2e - 17ce + 8ce + 5 - 2 = 82cd^2e - 9ce + 3$$

Answer: $\mathbf{82cd^2e - 9ce + 3}$

Guided Example

Simplify the expression $52a^2b^3c^4 \times 18b + 5c - 11a^2b^4c^4 + 62 + 9d$.

Step 1: Identify the different terms that are present in the equation.

letters: a, b, c, d

constant: 62
↳ without any letters

Step 2: Simplify the expression using BIDMAS.

$52a^2b^3c^4 \times 18b + 5c - 11a^2b^4c^4 + 62 + 9d$

$= (52a^2b^3c^4 \times 18b) + 5c - 11a^2b^4c^4 + 62 + 9d$

$= 936a^2b^4c^4 + 5c - 11a^2b^4c^4 + 62 + 9d$

Step 3: Collect any like terms. Numerical constants can be collected, and variable terms represented by the same letter or combination of letters can be collected.

$= 936a^2b^4c^4 + 5c - 11a^2b^4c^4 + 62 + 9d$

$= 936a^2b^4c^4 - 11a^2b^4c^4 + 5c + 62 + 9d$

$= 925a^2b^4c^4 + 5c + 62 + 9d$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

1. Simplify the following expressions:

a) $34pq + 6 - 4p \times q + q^2$

$34pq + 6 - 4p \times q + q^2 = 34pq + 6 - (4p \times q) + q^2$
$= 34pq + 6 - 4pq + q^2$
$= 34pq - 4pq + 6 + q^2$
$= 30pq + 6 + q^2$

b) $79 + 97kl \times m + 5m^5 + 101klm$

$79 + 97kl \times m + 5m^5 + 101klm$
$= 79 + (97kl \times m) + 5m^5 + 101klm$
$= 79 + 97klm + 5m^5 + 101klm$
$= 79 + 198klm + 5m^5$

c) $62 + 22w - 82z - 113 + \left(\frac{16w^3}{4w^2}\right) + 51$

$62 + 22w - 82z - 113 + \left(\frac{16w^3}{4w^2}\right) + 51$
$= 62 + 22w - 82z - 113 + 4w + 51$
$= 62 - 113 + 51 + 22w + 4w - 82z$
$= 0 + 26w - 82z = 26w - 82z$

d) $50g^4 + 82efg + \left(\frac{39g^3 \times g^2}{13g}\right) - 16eg \times f - 85 + 17 + 6$

$50g^4 + 82efg + \left(\frac{39g^3 \times g^2}{13g}\right) - (16eg \times f) - 85 + 17 + 6$
$= 50g^4 + 82efg + 3g^4 - 16efg - 85 + 17 + 6$
$= 50g^4 + 3g^4 + 82efg - 16efg - 85 + 17 + 6$
$= 53g^4 + 66efg - 62$

e) $52s^4 + \left(\frac{16s^4t^3}{4t^3}\right) + 256s^3 + \left(\frac{84s^5z^6}{6z^6}\right) + 97s^5 - 91 + 12345s^2 \times s \times s + 1$

$52s^4 + \left(\frac{16s^4t^3}{4t^3}\right) + 256s^3 + \left(\frac{84s^5z^6}{6z^6}\right) + 97s^5 - 91 + (12345s^2 \times s \times s) + 1$
$= 52s^4 + 4s^4 + 256s^3 + 14s^5 + 97s^5 - 91 + 12345s^4 + 1$
$= 52s^4 + 4s^4 + 12345s^4 + 256s^3 + 14s^5 + 97s^5 - 91 + 1$
$= 12401s^4 + 256s^3 + 111s^5 - 90$