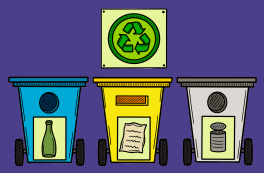
Name & Surname: _____ Class: _____ Date: _____

Simplifying Expressions

Collect like terms to keep it equivalent

About 50 minutes Level ★★★☆☆



Collecting Like Terms

An expression has no equals sign. To **simplify** it, collect **like terms** without changing its value.

- **Like terms** have the same letters and powers, e.g. 3x and 5x are like terms, but 3x and 3y are not.
- Add or subtract the numbers in front and keep the letters the same: 3x + 5x = 8x.
- Worked example: 2x + 5y + x - 3y = 3x + 2y.

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Simplifying Expressions

TASK A /4

Shade or name these fraction bars to warm up your eye for parts.

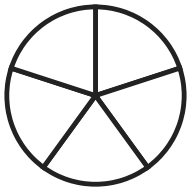
1



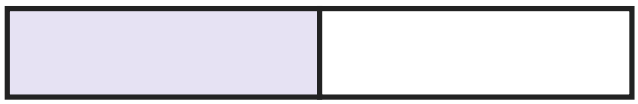
Fraction shaded: $\frac{\square}{\square}$

2

Shade $\frac{2}{5}$



3



$= \frac{1}{2}$



$= \frac{\square}{8}$

4



$\frac{2}{3}$



$\frac{3}{5}$

$\frac{2}{3}$ $\square$ $\frac{3}{5}$ Write <, > or =

Practise Collecting Terms

Practise simplifying one-step and two-variable expressions.

Key words

term: a single number, letter or mix, e.g. 3x

coefficient: the number in front of a letter, e.g. 3 in 3x

variable: a letter that stands for a number, e.g. x

like terms: terms with the same letters and powers

simplify: rewrite shorter without changing value

equivalent: equal in value for every choice of letter

TASK B /12

Simplify each expression by collecting like terms.

WARM UP

1 **Simplify** 3a + 5a

Answer: _____

2 **Simplify** 7y - 2y

Answer: _____

3 **Simplify** 4x + x

Answer: _____

4 **Simplify** 9f - 5f

Answer: _____

PRACTISE

5 **Simplify** 2x + 5y + x - 3y

Answer: _____

6 **Simplify** 5m + 3n - 2m + n

Answer: _____

7 **Simplify** 4p + 7 - 2p + 3

Answer: _____

8 **Simplify** 3m + n - m + 4n - 2m

Answer: _____

PROBLEM SOLVING

9 A shopkeeper packs 3 boxes with x pencils in each box, plus 2 loose pencils. Write the simplified **expression** for the total pencils.

Answer: _____

10 Ribbon is cut into 6t cm and 4t cm, with 5 cm left over. Write the simplified **expression** for the total length in cm.

Answer: _____

11 A student buys 3 packs with s pens in each pack, then 2 more packs with s pens, plus 4 rubbers. Write the simplified **expression** for the total.

Answer: _____

12 Explain how you know that 4x + 3 + 2x + 6 is **equivalent** to 6x + 9.

Answer: _____

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Spot the Mistakes

Find the wrong step in each pupil solution.

TASK C /4

Find the wrong step and explain the like terms mistake.



Student A

Simplify 3x + 2y + 4x

1. 3x + 2y + 4x
2. = 7x + 2y
3. = 9xy
4. So the answer is 9xy

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____



Student B

Simplify $2x + 3x^2 + 4x$

1. $2x + 3x^2 + 4x$
2. $= 6x + 3x^2$
3. $= 9x^3$
4. So the answer is $9x^3$

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____

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Go Further Now

Tackle trickier expressions with subtraction and reasoning.

TASK D /12

Collect like terms carefully, watching signs and powers.

WARM UP

1. **Simplify** 8k - 3k

Answer: _____

2. **Simplify** y + 6y

Answer: _____

3. **Simplify** 10d - 4d + d

Answer: _____

4. **Simplify** 2c + 5c - c

Answer: _____

PRACTISE

5. **Simplify** 7a + 4b - 3a - b

Answer: _____

6. **Simplify** 9x + 5 - 4x - 2

Answer: _____

7. **Simplify** 6y - 2y + y^2

Answer: _____

8. **Simplify** 5t + 2s - 3t + 4s

Answer: _____

PROBLEM SOLVING

9. A student walks a km to school 4 times in a week and b km to the shops 3 times, plus an extra 2 km. Write the simplified **expression** for the total distance in km.

Answer: _____

10. A pencil costs £m and a rubber costs £n. A student buys 5 pencils and 2 rubbers, then returns 2 pencils. Write the simplified **expression** for the total cost in £.

Answer: _____

11. A student says 5p - p = 4. Explain how you know this **mistake** is wrong.

Answer: _____

12. Explain how you know $2x^2 + 3x + x^2$ cannot **simplify** to $6x^2$.

Answer: _____

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Fractions and Truth

Convert fractions and decide what is always true.

TASK E

/12

Write each fraction, decimal and percentage.

Fraction	Decimal	Percentage
$\frac{1}{2}$		
	0.25	
		75%
$\frac{1}{5}$		
	0.6	
		40%

TASK F

/4

Decide if each statement is always, sometimes or never true.

Statement	Always	Sometimes	Never
x + x + x = 3x			
Convince me: _____			
3x + 4 = 7x			
Convince me: _____			
2x + 3x² simplifies to 5x³			
Convince me: _____			
4p + 2q - 2p + 3q simplifies to 2p + 5q			
Convince me: _____			

How did I do?

Circle a face for each line.

I can spot like terms and collect them. ☹ 😐 ☺

I can simplify expressions with letters and numbers. ☹ 😐 ☺

I can explain why my simplification is equivalent. ☹ 😐 ☺

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Answer sheet: Simplifying Expressions

Task A

1. $\frac{3}{4}$
2. Shade 2 of the 5 equal parts ($\frac{2}{5}$).
3. $\frac{1}{2} = \frac{4}{8}$ (shade 4 parts)
4. $\frac{2}{3} > \frac{3}{5}$

Task B

1. 8a
2. 5y
3. 5x
4. 4f
5. 3x + 2y
6. 3m + 4n
7. 2p + 10
8. 5n
9. 3x + 2
10. 10t + 5
11. 5s + 4
12. 4x and 2x are like terms giving 6x, and 3 and 6 give 9, so both sides match for any x.

Task C

1. Step 3 is wrong: They added unlike terms 7x and 2y. x terms and y terms cannot be combined, so 7x + 2y is already simplified. Correct answer: 7x + 2y
2. Step 3 is wrong: They added an x term to an x^2 term. x and x^2 have different powers so are not like terms. Leave as $6x + 3x^2$. Correct answer: $6x + 3x^2$

Task D

1. 5k
2. 7y
3. 7d
4. 6c
5. 4a + 3b
6. 5x + 3
7. $4y + y^2$
8. 2t + 6s
9. 4a + 3b + 2
10. 3m + 2n
11. 5p - p = 4p, not 4, because p means 1p so one lot is left in the answer.
12. Only the x^2 terms combine to $3x^2$, and 3x is not a like term so it stays separate.

Task E

1. $\frac{1}{2}$ = 0.5 = 50%
2. $\frac{1}{4}$ = 0.25 = 25%
3. $\frac{3}{4}$ = 0.75 = 75%
4. $\frac{1}{5}$ = 0.2 = 20%
5. $\frac{3}{5}$ = 0.6 = 60%
6. $\frac{2}{5}$ = 0.4 = 40%

Task F

1. Always (Three lots of x always make 3x. For example, if x = 2, 2 + 2 + 2 = 6 and 3 x 2 = 6.)
2. Sometimes (It is true when x = 1 because 3 + 4 = 7, but false when x = 2 because 6 + 4 = 10 and 7 x 2 = 14.)
3. Sometimes (x and x^2 have different powers so are not like terms and the expressions are not equivalent. They match when x = 1 because 2 + 3 = 5, but not when x = 2 because 4 + 12 = 16 but 5 x 8 = 40.)
4. Always (4p - 2p = 2p and 2q + 3q = 5q. For example, p = 1 and q = 1 gives 4 + 2 - 2 + 3 = 7 and 2 + 5 = 7.)

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