FACTORISE INTO A SINGLE BRACKET

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

Factorising is the reverse of expanding.

$2(x + 4)$ ⟶ (expand) $2x + 8$

$2x + 8$ ⟵ (factorise) $2(x + 4)$



2x + 8 makes 2 equal rows of x + 4

Find factors in pairs: $10 = 1 \times 10$ $10 = 2 \times 5$ so the factors of 10 are 1, 2, 5, 10.

1 Write all the factors of each number.

a) 20 ☐ ☐ ☐ ☐ ☐ ☐

b) 28 ☐ ☐ ☐ ☐ ☐ ☐

2 Find the highest common factor (HCF) of each pair.

The HCF is the biggest number that is a factor of both.

a) 8 and 12 ☐ b) 15 and 20 ☐ c) 6 and 9 ☐

3 The tiles have been put into equal rows. Fill in the bracket.

a)

x	1	1	1
x	1	1	1

$2x + 6 = 2($ ☐ $)$

b)

y	1	1	1	1
y	1	1	1	1
y	1	1	1	1

$3y + 12 = 3($ ☐ $)$

4 Work backwards: what goes at the top of each grid? Then fill in the bracket.

a)

×	☐	☐
4	4x	+ 8

$4x + 8 = 4($ ☐ $)$

b)

×	☐	☐
5	5a	+ 15

$5a + 15 = 5($ ☐ $)$

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SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

1 Find the HCF of the terms.
2 Write the HCF outside the bracket.
3 Divide each term by the HCF.
4 Check by expanding.

$6x + 9 = 3(2x + 3)$

×	2x	+ 3
3	6x	+ 9

1 Find the highest common factor (HCF) of each pair of terms.

a) **4x and 10** ☐ b) **12y and 18** ☐

c) **7a and 21** ☐ d) **8p and 20** ☐

2 Complete each grid. Then write the factorised expression.

a)

×	☐	☐
6	6x	+ 30

6x + 30 = ☐

b)

×	☐	☐
☐	10y	– 15

10y – 15 = ☐

3 Factorise.

a) **3x + 12** ☐ b) **5y – 20** ☐ c) **8a + 6** ☐

d) **14 – 7b** ☐ e) **9m + 9** ☐ f) **16n – 24** ☐

4 Lily writes 12x + 18 = 2(6x + 9).

a) Why is this not fully factorised?

.....

b) Factorise 12x + 18 fully. ☐

FACTORISE INTO A SINGLE BRACKET

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

To factorise fully, take out the highest common factor of all the terms, including letters.

$15y^2 + 10y \equiv 5y(3y + 2)$ Expand your answer to check it.

FLUENCY

1 Factorise fully.

a) $20k + 35$ ☐

b) $x^2 + 5x$ ☐

c) $6y^2 - 4y$ ☐

d) $9ab + 12a$ ☐

e) $10pq - 15q$ ☐

f) $18t - 30t^2$ ☐

2 Fill in the missing terms.

a) $24m + 16 \equiv 8(\square + \square)$

b) $15h^2 - 10h \equiv \square(3h - 2)$

c) $7x - 7 \equiv 7(\square)$

d) $4a + 8b \equiv \square(a + 2b)$

REASONING

3 Is each expression fully factorised? Circle YES or NO.

a) $4(6a + 2)$ YES NO

b) $3c(2c + 5)$ YES NO

c) $2y(4y - 2)$ YES NO

d) $5(x + 3)$ YES NO

Correct any that are not fully factorised: .....

4 Can $6x + 7$ be factorised? Explain how you know.

.....

.....

FACTORISE INTO A SINGLE BRACKET

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) An expression with two terms can be factorised. ALWAYS SOMETIMES NEVER

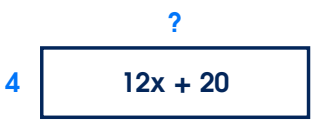
b) x is a factor of $x^2 + 3x$. ALWAYS SOMETIMES NEVER

c) $12x + 8$ factorises to $4(3x + 8)$. ALWAYS SOMETIMES NEVER

d) When fully factorised, the term outside the bracket is a number. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 The area of this rectangle is $12x + 20$. One side is 4.



a) Find the length of the other side. ☐

b) Give another possible pair of sides. ☐ and ☐

3 Common factors with letters.

a) Write an expression with two terms whose HCF is 6x. ☐

Factorise your expression. ☐

b) Factorise fully $6y^3 - 9y^2$. ☐

★ CHALLENGE FOR ALL

4 Use factorising to prove these facts.

a) Show that the sum of any three consecutive whole numbers is a multiple of 3.

Hint: call the numbers n, n + 1 and n + 2.

b) Is the sum of four consecutive whole numbers always a multiple of 4? Explain.

STEP 7 · FACTORISE INTO A SINGLE BRACKET

ANSWERS

BUILDING BLOCKS

1 a) 1, 2, 4, 5, 10, 20 · b) 1, 2, 4, 7, 14, 28
2 a) 4 · b) 5 · c) 3
3 a) 2(x + 3) · b) 3(y + 4)
4 a) x and + 2, so 4(x + 2) · b) a and + 3, so 5(a + 3)

SUPPORT

1 a) 2 · b) 6 · c) 7 · d) 4
2 a) x, + 5, so 6(x + 5) · b) 5 outside; 2y, – 3, so 5(2y – 3)
3 a) 3(x + 4) · b) 5(y – 4) · c) 2(4a + 3) · d) 7(2 – b) · e) 9(m + 1) · f) 8(2n – 3)
4 a) 6x and 9 still have a common factor of 3; 2 is not the highest common factor (6 is) · b) 6(2x + 3)

CORE

1 a) 5(4k + 7) · b) x(x + 5) · c) 2y(3y – 2) · d) 3a(3b + 4) · e) 5q(2p – 3) · f) 6t(3 – 5t)
2 a) 3m, 2 · b) 5h · c) x – 1 · d) 4
3 a) No: 4(6a + 2) ≡ 8(3a + 1) · b) Yes · c) No: 2y(4y – 2) ≡ 4y(2y – 1) · d) Yes
4 No: the only common factor of 6x and 7 is 1 (7 is prime and is not a factor of 6x)

GREATER DEPTH

1 a) Sometimes: 4x + 6 ≡ 2(2x + 3), but 4x + 7 has no common factor · b) Always · c) Never (it is 4(3x + 2)) · d) Sometimes: 3(x + 2) has a number, x(x + 3) and 2x(x + 1) do not
2 a) 3x + 5 · b) e.g. 2 and 6x + 10 (or 1 and 12x + 20)
3 a) e.g. $12x^2 + 18x \equiv 6x(2x + 3)$ (any two terms with HCF 6x) · b) $3y^2(2y – 3)$
4 a) n + (n + 1) + (n + 2) ≡ 3n + 3 ≡ 3(n + 1), a multiple of 3 · b) No: n + (n + 1) + (n + 2) + (n + 3) ≡ 4n + 6 ≡ 2(2n + 3); 4n + 6 is 2 more than a multiple of 4, so it is never a multiple of 4