



Expressions with several variables

Year 8 About 70 minutes No calculator 49 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

Simplify $a \times a \times b$.

A2 Needed today [1 mark]

Simplify $3x \times 4y$.

Answer

Answer

- A3** Last lesson [1 mark]

Factorise $12m^2 - 8m$ as much as possible.

A4 Year 7 [1 mark]

Work out the value of $2a + 3b$ when $a = 4$ and $b = -2$.

Answer

Answer

B Example, then your turn

Year 8

Two letters are dealt with the same way as one. Multiply the numbers, then each letter: $ab \times a = a^2b$. To factorise, take out the biggest number and every letter that is in all the terms. xy and yx are like terms. Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Expand $3ab(2a - 5b)$.

Hint $3ab \times 2a = 6a^2b$. Then $3ab \times (-5b)$.

- B1** Expand (i) $4xy(3x + y)$ (ii) $2pq(5 - 3p)$. [2 marks]

Answer (i) (ii)

EXAMPLE 2

Expand $5x(x^2 - 3xy + 2y^2)$.

Hint Three terms in the bracket, so three terms in the answer.

- B2** Expand $2m(3m^2 + mn - 4n^2)$. [2 marks]

Answer

EXAMPLE 3

Factorise $3pq + pq^2$.

Hint p is in both terms, and so is q .

- B3** Factorise (i) $a^2b + 5ab$ (ii) $7xy - x^2y$. [2 marks]

Answer (i) (ii)

EXAMPLE 4

Factorise $10a^2b - 15ab^2 + 5ab$ as much as possible.

Hint The HCF of 10, 15 and 5 is 5. Every term has an a and a b . The last term becomes 1, not 0.

B4 Factorise $12x^2y + 8xy^2 - 4xy$ [2 marks]
as much as possible.

Answer

EXAMPLE 5

Expand and simplify $2x(x + 3y) - y(4x - y)$.

Hint $-y \times (-y) = +y^2$. Then $6xy$ and $-4xy$ are like terms.

B5 Expand and simplify [3 marks]
 $3a(a - 2b) + 2b(4a + b)$.

Answer

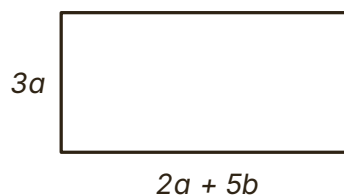
c Practice

Year 8

C1 A formula used in science is [2 marks]
 $E = \frac{1}{2}m(v^2 - u^2)$. Expand the
brackets in this formula.

Answer $E = \dots\dots\dots$

C2 A rectangle is $3a$ cm by $(2a + 5b)$ [2 marks]
cm. Write an expression for its
area, without brackets.



Not drawn accurately

Answer

C3 Find the missing term: [2 marks]
 $4ab(\square - 3b) = 8a^2b - 12ab^2$.

Answer

C4 Max says [2 marks]
 $3pq(2p - q) = 6p^2q - 3pq^2$.
Check this by working out both
sides when $p = 2$ and $q = 5$.

C5 Factorise $9x^3y - 6x^2y^2$ as much [2 marks]
as possible.

Answer

C6 Factorise $8\pi r^2 + 6\pi rh$ as much [2 marks]
as possible.

Answer

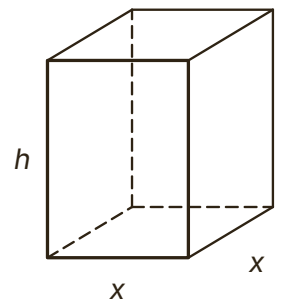
- D1** Mia factorises $20x^2y - 30xy^2$ and gets $10x(2xy - 3y^2)$. She says, "That is factorised as much as possible." [3 marks]

Mia is wrong. Explain why, and factorise the expression as much as possible.

Answer Correct answer

- D2** A cuboid has a square base, x cm by x cm. Its height is h cm.

- (a) Show that the total surface area of the cuboid is $2x^2 + 4xh$ cm². [2 marks]



- (b) Factorise $2x^2 + 4xh$ as much as possible. [2 marks]

Not drawn accurately

Answer

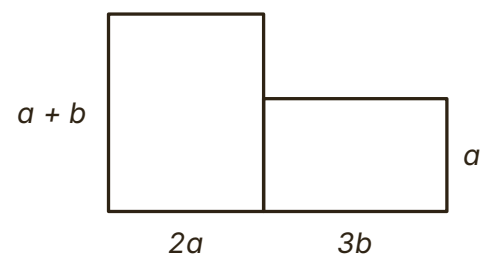
- (c) Use your answer to part (b) to work out the surface area when $x = 5$ and $h = 8$. [1 mark]

Answer

Total for D2: 5 marks

- D3** The shape is made from two rectangles. Rectangle A is $2a$ cm by $(a + b)$ cm. Rectangle B is $3b$ cm by a cm.

- (a) Write an expression for the area of the shape. Simplify it and factorise it as much as possible. [3 marks]



Not drawn accurately

Answer

- (b) Work out the area when $a = 4$ and $b = 3$. [1 mark]

Answer

Total for D3: 4 marks

- D4** Expand and simplify $4p(p + 3q) + 2q(p - 3q)$. Factorise your answer as much as possible. [3 marks]

Answer

- D5** Show that $3a(2a + b) - a(4a - 3b) = 2a(a + 3b)$. [3 marks]

E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** Work out the value of $x^2y - xy^2$ when $x = 8.3$ and $y = 3.3$. Do not use a calculator. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Factorise $x^2y - xy^2$ first.
Hint 2 $x^2y - xy^2 = xy(x - y)$, and $x - y = 8.3 - 3.3 = 5$.
Hint 3 Work out 8.3×3.3 , then multiply by 5.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can expand a bracket with two letters outside or inside. ☐ ☐ ☐
- I can factorise when two letters are common to every term. ☐ ☐ ☐
- I can expand and factorise formulae, including ones with a half or π . ☐ ☐ ☐
- I can use factorising to show two expressions are equal. ☐ ☐ ☐