



Algebraic notation

Year 7 About 60 minutes No calculator 52 marks

Date _____

A Do Now

Quick questions to start.

A1 Needed today [1 mark]
Work out $3 \times 7 - 12 \div 4$.

Answer

A2 Needed today [1 mark]
Work out $\frac{18 + 6}{4}$.

Answer

A3 Last lesson [1 mark]
As the temperature goes up,
sales of hot drinks go down.
What type of correlation is this?

Answer

A4 From chapter 8 [1 mark]
Write 3.9×10^4 as an ordinary number.

Answer

B Example, then your turn

Year 7

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Write each expression as simply as possible.

(a) $5 + a \times b \times 3$

(b) $m \div 4 - 2$

(c) $3 \times (y - 2) \div 5$

Hint Leave out the $\times$ sign and write the number first.
Write a division as a fraction.**B1** Write each expression as simply as possible. [3 marks]

(a) $7 + p \times 2 \times q$

(b) $6 - k \div 3$

(c) $4 \times (n + 1) \div 7$

Answer (a) (b) (c)

EXAMPLE 2

Simplify each expression.

(a) $n \times n \times 5$

(b) $3x \times 2x$

(c) $2 \times t \times t \div 3$

Hint A letter multiplied by itself is a square:
 $n \times n = n^2$. Multiply the numbers, then the letters.**B2** Simplify each expression. [3 marks]

(a) $w \times 4 \times w$

(b) $5y \times 3y$

(c) $a \times a \times a \times 2$

Answer (a) (b) (c)

EXAMPLE 3

Work out the value of each expression when $x = 8$ and $y = 2$.

(a) $3(x + y)$ (b) $\frac{x}{y} + 4$

(c) $\frac{x + 4}{y}$ (d) xy^2

Hint Put the numbers in place of the letters. Brackets first; a fraction line works like brackets round the top and the bottom.

EXAMPLE 4

Which two of these expressions are equivalent?

- A $\frac{n}{3} + 5 - y$
 B $5 + y - \frac{1}{3}n$
 C $\frac{1}{3}n - y + 5$
 D $y - 5 + \frac{n}{3}$

Hint Write each one in the same order: the n term, then the y term, then the number. Keep each sign with the term after it.

EXAMPLE 5

Zoe thinks of a number, n . She subtracts 3, multiplies the answer by 5 and then divides by 2.

- (a) Write an expression for her answer.
 (b) Work out her answer when $n = 11$.

Hint Do the steps in order. The subtraction is done first, so it goes in a bracket.

B3 Work out the value of each expression when $a = 10$ and $b = 5$. [4 marks]

(a) $2(a - b)$ (b) $\frac{a}{b} + 7$

(c) $\frac{a + 5}{b}$ (d) ab^2

Answer (a) ... (b) ... (c) ... (d) ...

B4 Which two of these expressions are equivalent? [2 marks]

- A $3k - \frac{m}{2} + 1$
 B $1 + \frac{1}{2}m - 3k$
 C $\frac{m}{2} + 3k - 1$
 D $1 - \frac{1}{2}m + 3k$

Answer and

B5 Raj thinks of a number, x . He multiplies it by 4, adds 6 and then divides the answer by 3. [3 marks]

(a) Write an expression for his answer.

(b) Work out his answer when $x = 9$.

Answer (a) (b)

C Practice

Year 7

C1 Write $7 \times (a + 2) \div 3$ in two different ways. [2 marks]

Answer and

C2 Write $(k - 1) \div (k + 4)$ as simply as possible. [1 mark]

Answer

C3 Work out the value of $r^s + s^r$ when $r = 2$ and $s = 5$. [2 marks]

Answer

C4 Simplify $0.4d \times 15d \div 2$. [2 marks]

Answer

C5 Ella thinks of a number, y . She adds 5, multiplies by 4 and then divides by 3. Which two of these expressions give her answer? [2 marks]

- A $\frac{4(y + 5)}{3}$ B $\frac{4y + 5}{3}$
C $\frac{4}{3}(y + 5)$ D $4y + \frac{5}{3}$

Answer and

C6 A tin holds b biscuits. Zak eats 3 of them and shares the rest equally between 4 friends. Write an expression for the number of biscuits each friend gets. [2 marks]

Answer

D Exam-style questions

GCSE Foundation

D1 Sam says, " $4n \times 3n = 12n$." [2 marks]

Sam is wrong. Explain why, and write down the correct simplified answer.

D2 $a = 4$ and $b = -3$.

(a) Work out the value of $5a + 2b$. [1 mark]

Answer

(b) Work out the value of $a^2 - 4b$. [1 mark]

Answer

- (c) Work out the value of $\frac{a-b}{7}$.

[1 mark]

Answer

Total for D2: 3 marks

D3 A taxi charges £3 plus £2 for each mile.

- (a) Write an expression for the cost, in pounds, of a journey of m miles.

[1 mark]

Answer

- (b) Four friends share the cost of a journey of m miles equally. Write an expression for the amount, in pounds, each friend pays.

[2 marks]

Answer

- (c) The journey is 9 miles. Work out the amount each friend pays.

[2 marks]

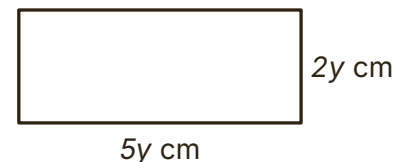
Answer £

Total for D3: 5 marks

D4 Here is a rectangle. All lengths are in centimetres.

- (a) Write an expression for the area of the rectangle. Give your answer as simply as possible.

[2 marks]



Not drawn accurately

Answer

- (b) Work out the area of the rectangle when $y = 3$.

[2 marks]

Answer

- (c) A square has sides of length $3y \text{ cm}$. Show that the area of the rectangle is $y^2 \text{ cm}^2$ more than the area of the square.

[2 marks]

Total for D4: 6 marks

D5 Here are four expressions.

[3 marks]

$$3n \quad n^2 \quad 2(n+5) \quad \frac{n^3}{10}$$

Write the expressions in order of size when $n = 6$. Start with the smallest. You must show your working.

Answer

E Extension

Stretch

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

E1 x and y are whole numbers, and x is smaller than y .

[3 marks]

$$\sqrt{x} + \sqrt{y} = 7 \quad \text{and} \quad \sqrt{x+y} = 5$$

Work out the values of x and y .

Answer $x = \dots\dots$ $y = \dots\dots$

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** $\sqrt{x+y} = 5$ tells you what $x+y$ is. Then try square numbers for x and y .
- Hint 2** $x+y = 25$. If $\sqrt{x} = 3$ then $\sqrt{y}$ must be 4.
- Hint 3** $\sqrt{x} = 3$ and $\sqrt{y} = 4$ give $3+4 = 7$, and $x+y = 9+16 = 25$, whose square root is 5. So $x = 9$ and $y = 16$.

How did it go?

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

I can write an algebraic expression as simply as possible. ☐ ☐ ☐

I can use square and cube notation, such as n^2 and $2a^3$. ☐ ☐ ☐

I can work out the value of an expression by substituting numbers. ☐ ☐ ☐

I can write an expression from a description in words. ☐ ☐ ☐