Year 8 Maths – Homework Booklet

Autumn 1 Booklet 3

Algebra – Algebraic manipulation

Maths
@Brixham

Name: _____

Class: _____

Due Date: _____

MATHSBOX

Name :

1) $9 \times 6 =$ ☐

2) $10 \times 10 =$ ☐

3) $5 \times 7 =$ ☐

4) $1 \times 7 =$ ☐

5) $5 \times 9 =$ ☐

6) $5 \times 4 =$ ☐

7) $11 \times 3 =$ ☐

8) $10 \times 11 =$ ☐

9) $12 \times 12 =$ ☐

10) $9 \div 3 =$ ☐

11) $7 \times 6 =$ ☐

12) $36 \div 3 =$ ☐

13) $3 \times 9 =$ ☐

14) $32 \div 8 =$ ☐

15) $20 \div 4 =$ ☐

16) $9 \times 3 =$ ☐

17) $4 \times 12 =$ ☐

18) $8 \times 7 =$ ☐

19) $8 \times 9 =$ ☐

20) $99 \div 11 =$ ☐

21) $50 \div 5 =$ ☐

22) $11 \times 10 =$ ☐

23) $1 \times 4 =$ ☐

24) $5 \times 10 =$ ☐

@2026 Mathsbox Ltd

Version B

Algebraic manipulation

Name: _____

1 Simplify the expressions.

a) $11a - 6a$ _____ 1 mark

b) $7b - 2c + 3c + b$ _____ 1 mark

c) $4d \times 5d$ _____ 1 mark

d) $\frac{18f}{9}$ _____ 1 mark

2 Match the statements to the expressions.

z divided by 8	$8 - z$
8 divided by z	$z - 8$
8 less than z	$\frac{8}{z}$
z less than 8	$\frac{z}{8}$

2 marks

© White Rose Education 2025

3 **a)** Expand $2(w + 12)$.

_____

1 mark

b) Expand $5t(t - 1)$.

_____

1 mark

c) Factorise fully $30y - 24$

_____

1 mark

4 Work out the values of the expressions when $p = -4$ and $q = 5$

a) $6p + q$

1 mark

b) pq

1 mark

c) $3p^2$

1 mark

© White Rose Education 2025

MATHSBOX

Name :

1) $108 \div 9 =$ ☐

2) $12 \div 4 =$ ☐

3) $56 \div 7 =$ ☐

4) $14 \div 2 =$ ☐

5) $3 \times 2 =$ ☐

6) $4 \times 7 =$ ☐

7) $9 \times 11 =$ ☐

8) $2 \times 12 =$ ☐

9) $21 \div 7 =$ ☐

10) $11 \times 7 =$ ☐

11) $11 \times 12 =$ ☐

12) $3 \times 6 =$ ☐

13) $24 \div 3 =$ ☐

14) $12 \times 7 =$ ☐

15) $80 \div 10 =$ ☐

16) $12 \times 10 =$ ☐

17) $10 \times 5 =$ ☐

18) $60 \div 12 =$ ☐

19) $7 \times 4 =$ ☐

20) $2 \times 4 =$ ☐

21) $14 \div 7 =$ ☐

22) $11 \times 4 =$ ☐

23) $5 \times 5 =$ ☐

24) $45 \div 5 =$ ☐

@2026 Mathsbox Ltd

5 Expand and simplify the expression.

$8(5r - 2) - 3(2 + 5r)$

2 marks

6 Tick the expressions.

$A = \pi r^2$	$5(a + b) \equiv 5a + b$
$P = 5(a + b)$	πr^2
$5(a + b)$	$5a + b$

2 marks

© White Rose Education 2025

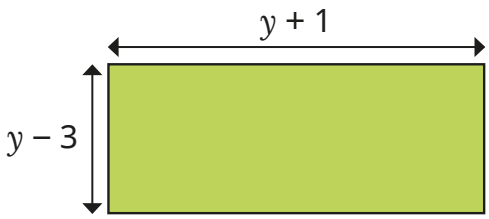
7 Factorise $x^2 + 3x - 40$

E

2 marks

8 Write an expression for the area of the rectangle, giving your answer in the form $x^2 + bx + c$.

E



2 marks

© White Rose Education 2025

NUMBER... Algebraic manipulation

What do I need to be able to do?

- Form algebraic expressions
- Identify and use formulae, expressions, identities and equations
- Simplify expressions
- Use directed number with algebra
- Substitution with directed number
- Expand a single bracket
- Factorise into a single bracket
- Expand single brackets and simplify
- Expand double brackets (E)
- Factorise quadratic expressions (E)

Keywords

Tier 2:

Variable: a symbol for a number we don't know yet

Expression: numbers, symbols and operators grouped together to show the value of something

Identity: An equation where both sides have variables that cause the same answer includes ≡

Substitute: replace one variable with a number or new variable

Equivalent: something of equal value

Coefficient: a number used to multiply a variable

Equation: a statement that the values of two mathematical expressions are equal (indicated by the sign =)

Formula: A mathematical relationship/ rule given in symbols

Tier 3:

Highest Common Factor (HCF): the biggest factor (or number that multiplies to give a term)

Using letters to represent numbers

5 + 5 + 5	y + y + y + y	20 ÷ h
3 x 5	y x 4	$\frac{20}{h}$
5 x 3	4 x y	
	4y	
Addition and multiplication can be done in any order	4 lots of 'y'	20 shared into 'h' number of groups

Commutative calculations

Substitution into expressions

4y ← 4 lots of 'y'

If y = 7 this means the expression is asking for 4 'lots of' 7

4 x 7 OR 7 + 7 + 7 +7 OR 7 x 4 = 28

e.g. y – 2
= 7 – 2 = 5

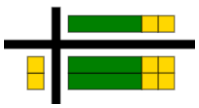
2(x + 3) Put the expression into a function machine

INPUT → + 3 → x 2 → OUTPUT

If x = 10 10 + 3 = 13.... 13 x 2 = 26

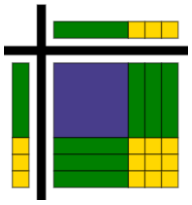
Expand double brackets

$2(x + 2) \equiv 2x + 4$



Algebra tiles can represent a binomial expansion
Has two terms

$(x + 3)(x + 3) \equiv x^2 + 6x + 9$



This is a quadratic
It has four terms which simplified to three terms

The order of the brackets has no impact on the outcome
e.g $(x + 3)(3 + x)$

Collecting like terms ≡ symbol

The ≡ symbol means equivalent to
It is used to identify equivalent expressions

Collecting like terms
Only **like terms** can be combined

4x +5b –2x +10b

4x +5b –2x +10b

2x + 15b

Common misconceptions

$2x + 3x^2 + 4x \equiv 6x + 3x^2$

Although they both have the x variable x2 and x terms are un-like terms so can not be collected

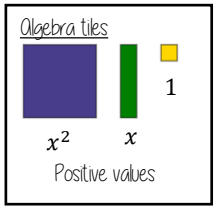
Factorising Quadratics

When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that **add to give b** and **multiply to give c**

$x^2+7x+10 = (x+5)(x+2)$

(because 5 and 2 add to give 7 and multiply to give 10)

Algebra tiles

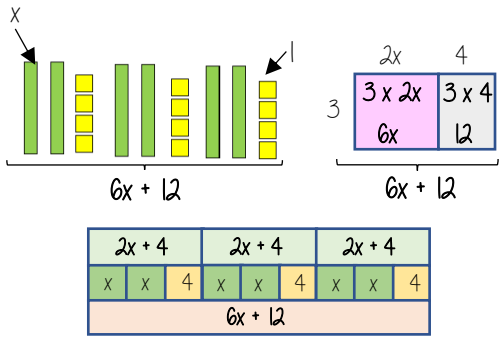


Positive values

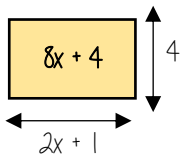
Expand single brackets

$3(2x + 4)$

Different representations of 3(2x+4) = 6x + 12



Factorise into a single bracket



Try and make this the **highest common factor**

The two values **multiply** together (also the area) of the rectangle

8x + 4 ≡ 4 (2x + 1)

Note:
8x + 4 ≡ 2(4x + 2)
This is factorised but the HCF has not been used

Directed numbers

+ + → +

– – → +

+ – → –

– + → –

e.g a = -5 and b = 2

a^2 = a x a = -5 x -5 = 25

b + a = 2 + - 5 = -3

Brackets around negative substitutions helps remove calculation errors

2a – b = 2 x 5 – (-4) = 10 + 4 = 14