GCSE FOUNDATION · UNIT 2

Algebra

Expressions, substitution, formulae, expanding and factorising

Name: _____ Class: _____

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Keep this booklet in your folder. Write your notes and answers in it during each lesson. Each Maths Genie practice sheet comes straight after the lesson it goes with.

Algebra knowledge organiser

GCSE Foundation · expressions, substitution, formulae, expanding and factorising

Name _____

THE TEN LESSONS

	TOPIC	LEARNING QUESTION	KEY WORDS	HOW SURE AM I?
1	**The language of algebra**	How can you tell if a statement is true for every value, or only for some?	term, variable, coefficient, constant, expression, equation, formula, identity	○ ○ ○
2	**Collecting like terms**	Why can we add $3x$ and $4x$, but not $3x$ and $4y$?	like terms, unlike terms, simplify, collect	○ ○ ○
3	**Multiplying and dividing terms**	Why is $a \times a$ not the same as $2a$?	product, coefficient, simplify, cancel	○ ○ ○
4	**Index laws**	Why do we add the powers when we multiply, instead of multiplying them?	index, power, base, index notation	○ ○ ○
5	**Writing expressions**	Why is 5 less than x written as $x - 5$, not $5 - x$?	variable, expression, more than, less than, in terms of	○ ○ ○
6	**Substitution**	When $x = 4$, why is $3x$ equal to 12 and not 34?	substitute, value, order of operations	○ ○ ○
7	**Formulae**	What makes a formula more useful than an expression?	formula, subject, word formula, substitute	○ ○ ○
8	**Expanding brackets**	Why must everything inside the bracket be multiplied?	bracket, expand, term, multiply	○ ○ ○
9	**Expand and simplify**	Why do we expand before we collect like terms?	expand, simplify, like terms	○ ○ ○
10	**Factorising**	How can you check that a factorised answer is correct and complete?	factor, common factor, highest common factor (HCF), factorise, identity	○ ○ ○

How sure am I? Shade one circle after each lesson: 1 circle = not yet, 2 circles = getting there, 3 circles = I can explain it to someone else.

How to revise with this sheet

1. Cover the key words. Say what each one means, then check on the back.
2. Answer each learning question out loud or in writing. Use an example.
3. Copy an example from the back, cover the answer, and try it again from memory.
4. Go back to any lesson where you shaded fewer than 3 circles.

What I need to know

Key words, rules with examples, and mistakes to avoid

KEY WORDS

Variable
A letter that stands for a number. Its value can change.
x

Term
A number, a letter, or numbers and letters multiplied together.
$3x$, 7, ab

Coefficient
The number multiplying a letter.
In $3x$ it is 3

Expression
Terms joined by + or −. No equals sign.
$3x + 5$

Equation
Has an equals sign. Only true for some values.
$3x + 5 = 11$

Formula
A rule that links two or more variables.
$A = bh$

Identity
True for every value. Uses the ≡ sign.
$2n + 3n \equiv 5n$

Like terms
Same letter and same power.
$3x$ and $7x$

Substitute
Replace each letter with its number.
$x = 4$: $3x = 3 \times 4$

Expand
Multiply out the bracket.
$3(x + 2) = 3x + 6$

Factorise
Put the bracket back in. The reverse of expanding.
$3x + 6 = 3(x + 2)$

HCF
Highest common factor. The biggest factor the terms share.
HCF of 12 and 18 is 6

RULES AND EXAMPLES (THE NUMBER SHOWS THE LESSON)

2 Collect like terms

Add or subtract the like terms. Keep the sign with each term.

$3a + 6b - a - 9b = 2a - 3b$

3 Multiply and divide terms

Numbers first, then letters in alphabetical order.

$2a \times 3b = 6ab$

$a \times a = a^2$

$\frac{10x}{2} = 5x$

4 Index laws

Multiplying: add the powers.
Dividing: subtract the powers.

$x^2 \times x^4 = x^6$

$x^7 \div x^4 = x^3$

5 Write expressions

More than: add. Less than: subtract.
Lots of: multiply. Shared: divide.

6 more than x is $x + 6$

3 lots of m is $3m$

6 Substitute

Put the × back in. Replace the letters. Multiply before you add.

$a = 5, b = 2$

$4a - 2b = 4 \times 5 - 2 \times 2 = 16$

7 Use a formula

Write the formula. Replace the letters. Work it out.

$F = ma, m = 5, a = 3$

$F = 5 \times 3 = 15$

8 Expand a bracket

Multiply every term inside by the term outside.

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

$-2(a + 5) = -2a - 10$

9 Expand and simplify

Expand each bracket first. Then collect like terms.

$2(x + 1) + 3(x + 2)$

$= 2x + 2 + 3x + 6$

$= 5x + 8$

10 Factorise

Find the HCF. Divide each term by it. Check by expanding.

$10y + 25 = 5(2y + 5)$

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

MISTAKES TO AVOID

× $3x + 4y = 7xy$
✓ $3x + 4y$ cannot be simplified

× $a \times a = 2a$
✓ $a \times a = a^2$

× $x^2 \times x^3 = x^6$
✓ $x^2 \times x^3 = x^5$

× When $x = 4$, $3x = 34$
✓ $3x = 3 \times 4 = 12$

× $3(x + 2) = 3x + 2$
✓ $3(x + 2) = 3x + 6$

× $-2(x - 3) = -2x - 6$
✓ $-2(x - 3) = -2x + 6$

Name: Date:

Lesson 1: The language of algebra NOTES

Learning question: How can you tell if a statement is true for every value, or only for some?

Write the example from the board in the Example box. Then fill in each step as we work through it.

A. NAME THE PARTS OF AN EXPRESSION

Name the parts of this expression — ALL LEVELS

Example

1. Split it into **terms**. The sign in front stays with its term.
2. Find the **variables**. These are the letters.
3. Find the **coefficients**. A coefficient is the number multiplying a letter.
4. Find the **constant**. This is the number on its own.

B. ALGEBRA SHORTHAND

Multiplying — ALL LEVELS

Example

1. What is the operation?
2. Number first, then letters in alphabetical order.
3. Remove the × sign.

Dividing — LEVEL 2 AND 3

Example

1. What is the operation?
2. Write a division as a fraction. The first part goes on top.

C. WHAT TYPE IS IT?

An expression — LEVEL 1

Example

1. Look for an equals sign.
2. Decide what it is.

An equation — LEVEL 1

Example

1. Look for an equals sign.
2. Decide what it is.

A formula — LEVEL 2

Example

1. Look for an equals sign.
2. Count the different letters. Is it a rule linking them?
3. Decide what it is.

An identity — LEVEL 3

Example

1. Look for an equals sign.
2. Test it with numbers. Is it true every time?
3. Decide what it is.

Name: Date:

Lesson 1: The language of algebra

Learning question: How can you tell if a statement is true for every value, or only for some?

A. Name the parts

1. How many terms?

$5a + 2b - 9$

2. Write the coefficient of x.

$7x + 4$

3. Write the constant.

$3m - 8$

4. Write the variables.

$2p + 6q - 1$

B. Write using algebra shorthand

5. $5 \times n$

6. $k \times 3$

7. $d \times c$

8. $w \div 4$

C. Expression, equation, formula or identity?

9. $6t - 5$

10. $2x + 1 = 9$

11. $A = bh$

12. $2n + 3n = 5n$

Name: Date:

Lesson 2: Collecting like terms

Learning question: Why can we add 3x and 4x, but not 3x and 4y?

A. Like terms or unlike terms?

1. $3x$ and $7x$

2. $4a$ and $4b$

3. $5y$ and y

4. $2m$ and $2m^2$

B. Simplify

5. $4a + 3a$

6. $9t - 5t$

7. $6n + 2n - 3n$

8. $7p - p + 2p$

C. Simplify by collecting like terms

9. $3x + 5 + 4x + 2$

10. $5a + 2b + 3a + 6b$

11. $6m + 7n - 2m - 3n$

12. $4y^2 + 3y + 2y^2 - y$

Name: Date:

Lesson 3: Multiplying and dividing terms

Learning question: Why is a × a not the same as 2a?

A. Simplify: number × term

1. $3 \times 4m$

2. $5t \times 2$

3. $6 \times 3y$

4. $-2 \times 4k$

B. Simplify: term × term

5. $2a \times 5b$

6. $3p \times 4q$

7. $d \times 6c$

8. $4a \times 2a$

C. Simplify: dividing

9. $\frac{8x}{2}$

10. $\frac{15n}{5}$

11. $\frac{12b}{4}$

12. $\frac{4m}{8}$

Name: Date:

Lesson 4: Index laws

Learning question: Why do we add the powers when we multiply, instead of multiplying them?

A. Write using index notation

1. $a \times a \times a$

2. $y \times y \times y \times y \times y$

3. $4 \times 4 \times 4$

4. $m \times m \times n \times n \times n$

B. Simplify: multiplying powers

5. $x^2 \times x^3$

6. $a^4 \times a^2$

7. $y^5 \times y$

8. $2n^3 \times 4n^2$

C. Simplify: dividing powers

9. $t^6 \div t^2$

10. $b^8 \div b^3$

11. $\dfrac{x^7}{x^4}$

12. $\dfrac{10p^5}{2p^2}$

Name: Date:

Lesson 4: Index laws · Extension (page 2)

Learning question: Why do we add the powers when we multiply, instead of multiplying them?

D. Powers in brackets

13. Simplify.

$(x^2)^3$

14. Simplify.

$(y^4)^2$

15. Simplify.

$(a^5)^3$

16. Simplify.

$(2m^3)^2$

E. Use more than one law

17. Simplify.

$(x^2)^3 \times x^4$

18. Simplify.

$(p^3)^4 \div p^5$

19. Simplify.

$$\frac{x^4 \times x^5}{x^3}$$

20. Simplify.

$$\frac{12y^8}{4y^3}$$

F. Think deeper

21. Find the missing power.

$x^{\square} \times x^3 = x^9$

22. Find the missing power.

$(n^{\square})^4 = n^{12}$

23. Sam says $(x^3)^2 = x^5$. Explain his mistake.

24. Work out the value.

$7^0 + (2^2)^2$

1 (a) Simplify $x^8 \times x^3$ (1)

(b) Simplify $(5y)^3$ (1)

(c) Simplify $\frac{w^7}{w^4}$ (1)

(3 marks)

2 (a) Simplify $a^9 \times a^4$ (1)

(b) Simplify $(4b^2c)^3$ (1)

(c) Simplify $d^9 \div d^4$ (1)

(3 marks)

3 (a) Simplify $2m^2 \times 5n^6$ (1)

(b) Simplify $15p^3 \div 3p^4$ (2)

(3 marks)

4 (a) Simplify $(t^3)^4$ (1)

(b) Simplify $12m^2n^6 \div 3mn^4$ (2)

(3 marks)

5 Simplify $5m^2n^3 \times 3mn^4$

(2 marks)

6 (a) Write down the value of 5^{-3} (1)

(b) Write down the value of 5^0 (1)

(2 marks)

7 Work out the value of $5^2 \times 2^3$

(1 mark)

8 Write down the value of 2^{-3}

(1 mark)

9 $y^2 \times y^a = y^7$

(a) Find the value of a. (1)

$(y^4)^b = y^{12}$

(b) Find the value of b. (1)

(2 marks)

10 (a) Given $\frac{x^6}{x^a} = x^8$ (1)

Find the value of a.

(b) Simplify $(2m^2)^4$ (2)

(3 marks)

11 (a) Write $\frac{3^4 \times 3^5}{3^2}$ as a power of 3 (2)

(b) Write down the value of 3^{-3} (1)

(c) Write down the value of 3^0 (1)

(4 marks)

12 Work out the value of $\frac{2^9 \times 2^{-2}}{2^4}$

(2 marks)

13 Work out the value of $(2^2)^3$

(1 marks)

14 (a) Simplify $p^3 \times p^5$ (1)

(b) Simplify $(4ab^2)^3$ (2)

(c) Simplify $\frac{16m^7n^3}{4m^3n}$ (2)

(5 marks)

15 $1000^4 = 10^x$

Find the value of x.

(1 mark)

16 Work out the value of $\frac{2^3 \times 2}{2^5}$

(2 marks)

17 Write down the reciprocal of 8

(1 mark)

18 (a) Simplify $9p^3 \times 2p^{-2}$ (1)

(b) Simplify $(5x^3y^2)^3$ (2)

(c) $p^3 \times p^5 = p^{12} \times p^y$

Find the value of y (2)

(5 marks)

19 $10^x = 1$

Write down the value of x.

(1 mark)

20 Write $5^4 \times 5$ as a power of 5

(1 mark)

21 Write down the reciprocal of 2

(1 mark)

22 (a) Simplify $5c^2d^3 \times 2d$ (1)

(b) Write 64×4^5 as a power of 4 (2)

(c) Simplify $p^3 \times (p^5)^2$ (2)

(5 marks)

23 $p^9 \times p^5 = p^x$

Write down the value of x

(1 mark)

24 Write down the reciprocal of $\frac{1}{3}$

(1 mark)

25 Simplify $\frac{10p^3q^5r}{4p^3q^6}$

(2 marks)

Name: Date:

Lesson 5: Writing expressions

Learning question: Why is 5 less than x written as x – 5, not 5 – x?

A. Write as an expression

1. 5 more than x

2. 4 less than y

3. 6 lots of m

4. p divided by 3

B. I think of a number. Use n for the number.

5. I add 7.

6. I multiply it by 3.

7. I multiply it by 2, then add 5.

8. I divide it by 4, then subtract 1.

C. Write an expression for each situation

9. A pen costs c pence. What is the cost of 5 pens?

10. Mia is y years old. Her brother is 3 years older. How old is he?

11. A bag holds n sweets. 2 are eaten. How many are left?

12. A rectangle has sides b cm and h cm. What is its perimeter?

1 An adult cinema ticket costs £x
The price of a child's ticket is half the price of an adult ticket

Write an expression for the price, in pounds, of a child's ticket.

(1 mark)

---

2 Charles has m marbles.
Rosalind has 6 more marbles than Charles

Write an expression for the number of marbles Rosalind has.

(1 mark)

---

3 A cup of tea costs £t
A cup of coffee costs £c

Write an expression, in pounds, for the cost of 5 cups of tea and 4 cups of coffee.

(1 mark)

---

4 Albert is given n sweets.
He eats 5 of the sweets.
Write an expression for the number of sweets Albert now has.

(1 mark)

---

5 Michael is paid £x for each hour he works.
One week Michael works for 20 hours.

Write an expression for the total amount, in pounds, Michael is paid for this week.

(1 mark)

---

6 Alex has b bags of marbles.
Each bag contains m marbles.

Write an expression, in terms of b and m, for the total number of marbles Alex has.

(1 mark)

---

7 A train takes t minutes to get from London to Canterbury

The same journey by car takes 50 minutes longer.

Write an expression for the amount of time, in minutes, it takes to travel from London to Canterbury by car.

(1 mark)

---

8 A school charges £5 for tickets to a show.

The school raises £x in total from ticket sales.

Write an expression for the total number of tickets sold by the school.

(1 mark)

---

9 Isaac is x years old.
Marie is twice as old as Isaac.

Write an expression for Marie's age.

(1 mark)

---

10 Apples costs 30p each.

Write an expression for the cost of a apples.

(1 mark)

---

11 Stephen is n years old.

Rachel is 10 years older than Stephen

(a) Write an expression for Rachel's age. **(1)**

Tim is 13 years younger than Stephen.

(b) Write an expression for Tim's age. **(1)**

(c) Write an expression for the total age of Stephen, Rachel and Tim. **(2)**

(4 marks)

12 Tea bags are sold in small boxes and large boxes.
There are 100 tea bags in a small box.
There are 240 tea bags in a large box.

Mae buys x small boxes and y large boxes of tea bags.

Write an expression for the total number of tea bags Mae buys.

(2 marks)

13 In Rugby Union a team scores:
5 points for each try
2 points for each conversion
3 points for each penalty

A team scores t tries, c conversions and p penalties.

Write an expression for the total number of points the team scores.

(2 marks)

14 Apples cost 25p each.
Bananas cost 20p each.

The total cost of a apples and b bananas is C.

Write a **formula** for the total cost of a apples and b bananas.

(2 marks)

15 A child's ticket to see a show costs £x
An adult's ticket costs £5 more than a child's ticket.

(a) Write an expression for the price, in pounds, of an adults ticket.
(1)

(b) Write an expression for the cost of one adult's ticket and two child's tickets.
(2)

(3 marks)

16 A shop sells toilet rolls in small packs and big packs.
There a 4 toilet rolls in a small pack.
There are 9 toilet rolls in a big pack.

The shop has s small packs and b big packs of toilet roll.

(a) Write an expression for the **total number of packs** of toilet roll the shop has.
(1)

(b) Write an expression for the total number of toilet rolls the shop has.
(2)

(3 marks)

Name: Date:

Lesson 6: Substitution

Learning question: When x = 4, why is 3x equal to 12 and not 34?

A. Work out the value when $x = 4$

1. $3x$

2. $x + 9$

3. $5x - 2$

4. $\frac{x}{2}$

B. Work out the value when $a = 5$ and $b = 2$

5. $a + b$

6. ab

7. $4a - 2b$

8. $\frac{8a}{b}$

C. Work out the value when $p = 3$ and $q = -2$

9. p^2

10. $2p^2$

11. $3q$

12. q^2

1 $f = 7$
$g = 5$
Work out the value of $3f + 2g$
(2 marks)

2 $c = 4d - 7$
Find the value of c when $d = 6$
(2 marks)

3 $v = u + at$
$u = 3$
$a = 10$
$t = 6$
Work out the value of v.
(2 marks)

4 $x = 4$
$y = 6$
Work out the value of $3x - y$
(2 marks)

5 $L = 9m + 2n$
Work out the value of L when $m = 3$ and $n = -6$
(2 marks)

6 $q = 5p + 3r$
$p = 6$
$r = -4$
Work out the value of q.
(2 marks)

7 $H = 4f + g$
Work out the value of H when $f = 5$ and $g = -2$
(2 marks)

8 $A = 4p + 5q$
$p = 3$ and $q = -2$
Work out the value of A.
(2 marks)

9 $L = 9m + 2n$
Work out the value of L when $m = -3$ and $n = 4$
(2 marks)

10 $q = 6p - r$
$p = -4$ and $r = 5$
Work out the value of q.
(2 marks)

11 $H = f - 2g$
Work out the value of H when $f = 12$ and $g = -6$
(2 marks)

12 $A = 5p + 6q$
$p = 10$ and $q = -2$
Work out the value of A.
(2 marks)

13 $L = m(n - 2)$
Work out the value of L when $m = 9$ and $n = 5$
(2 marks)

14 $a = 5bc$
$b = -4$ and $c = -3$
Work out the value of a.
(2 marks)

15 $x = 4y^2 - 12$

Work out the value of x when $y = 5$

(2 marks)

---

16 $A = p - 2q$

$p = -4$
$q = -7$

Work out the value of A.

(2 marks)

---

17 $a = 8$
$b = -5$
$c = 2$

Work out the value of $b^2 - 4ac$

(2 marks)

---

18 $d = \frac{m}{v}$

Work out the value of d when $m = 32$ and $v = 8$

(2 marks)

---

19 $A = 2j - jk$

Work out the value of A when $j = 7$ and $k = 3$

(2 marks)

---

20 $w = 5x^2 + 3$

$x = -3$

Work out the value of w.

(2 marks)

---

21 $A = \frac{1}{2}bh$

Work out the value of A when $b = 3$ and $h = 8$

(2 marks)

---

22 $A = \frac{1}{2}(a + b)h$

Work out the value of A when $a = 7$, $b = 6$ and $h = 10$

(2 marks)

---

23 $v = u + at$

Work out the value of v when $u = 12$, $a = -6$ and $t = 5$

(2 marks)

---

24 $y = mx + c$

$m = -2$, $x = 12$ an d $c = -7$

Work out the value of y.

(2 marks)

---

25 $s = ut + \frac{1}{2}at^2$

$u = 3$, $a = 2$ and $t = 4$

Work out the value of s.

(2 marks)

---

26 $s = ut + \frac{1}{2}at^2$

$u = -5$, $a = 4$ and $t = 3$

Work out the value of s.

(2 marks)

---

27 $s = \frac{v^2 - u^2}{2a}$

$v = 7$, $u = 5$ and $a = 3$

Work out the value of s.

(2 marks)

Name: Date:

Lesson 7: Formulae

Learning question: What makes a formula more useful than an expression?

A. pay = hourly rate × hours worked. Work out the pay.

1. £6 an hour for 3 hours

2. £8 an hour for 5 hours

3. £10 an hour for 7 hours

4. £9 an hour for 4 hours

B. Use the formula

5. $A = bh$

$b = 6$, $h = 4$. Work out A.

6. $F = ma$

$m = 5$, $a = 3$. Work out F.

7. $v = u + at$

$u = 2$, $a = 3$, $t = 4$. Work out v.

8. $s = \frac{d}{t}$

$d = 40$, $t = 5$. Work out s.

C. Write a formula

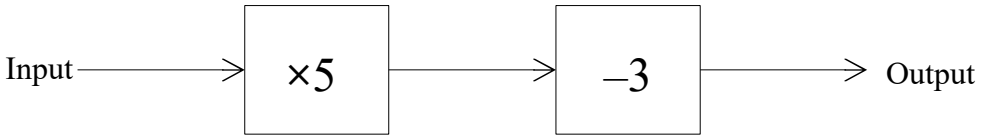
9. A ticket costs £t. Write a formula for the cost, C, of 4 tickets.

10. A pen costs p pence. A pencil costs 5 pence less. Write a formula for its cost, C.

11. A taxi charges £2 plus £3 per mile. Write a formula for the cost, C, of m miles.

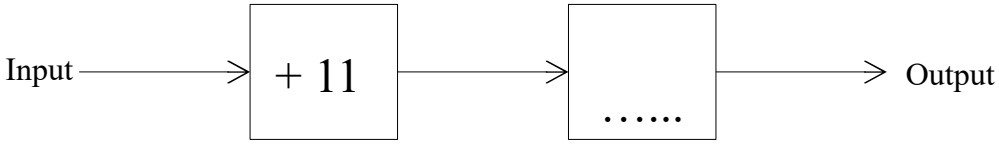
12. Zara works h hours at £r per hour. Write a formula for her pay, P.

1 Here is a number machine.



(a) What is the **output** when the **input** is 7?

Here is a different number machine.

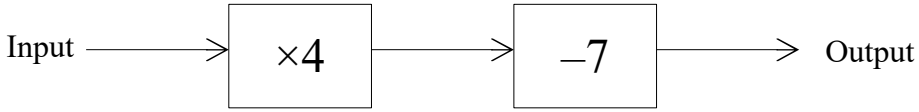


When the input is 9 the output is 2.

(b) Complete the number machine.

(2 marks)

2 Here is a number machine.

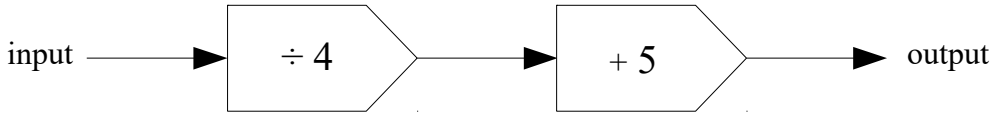


(a) What is the **output** when the **input** is 6?

(b) What is the **input** when the **output** is 25?

(3 marks)

3 Here is a number machine.

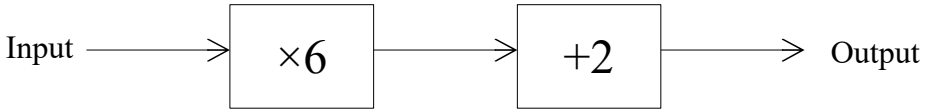


(a) Find the **output** when the **input** is 12

(b) Find the **input** when the **output** is 13

(3 marks)

4 Here is a number machine.

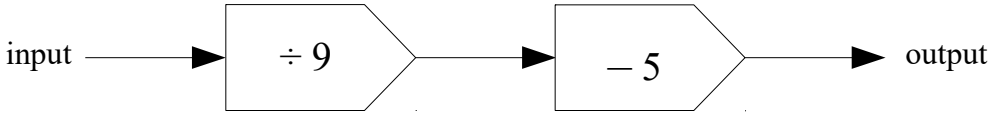


(a) What is the **output** when the **input** is 3?

(b) What is the **input** when the **output** is 44?

(3 marks)

5 Here is a number machine.

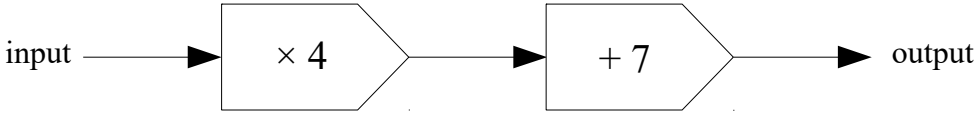


(a) Find the **output** when the **input** is 81

(b) Find the **input** when the **output** is 0

(3 marks)

6 Here is a number machine.



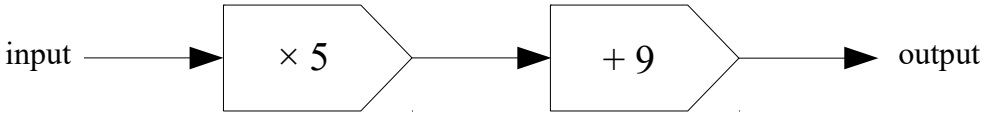
(a) Find the output when the input is 5

(b) Find the output when the input is –3

(c) Find the input when the output is 71

(4 marks)

7 Here is a number machine.



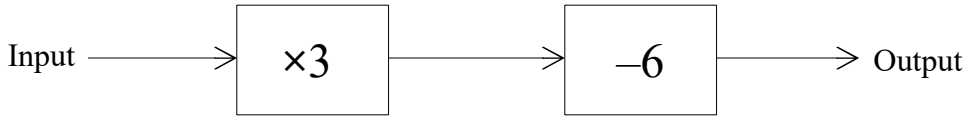
(a) Find the output when the input is 5

(b) Find the output when the input is –2

(c) Find the input when the output is 64

(4 marks)

8 Here is a number machine.



(a) What is the **output** when the **input** is 4?

(b) What is the **input** when the **output** is 15?

(c) Show that there is a value of the input for which the input and the output have the same value.

(4 marks)

9 A rule to change from temperate measured in degrees Celsius (°C) to degrees Fahrenheit (°F) is

Multiply the temperature in degrees Celsius by 1.8 then add 32

The temperature in London is 12°C.

(a) Work out the temperature, in London, in Fahrenheit (°F)

The temperature in New York is 54°F

(b) Work out the temperature, in New York, in Celsius (°C)

(4 marks)

10 A rule to calculate a taxi fare is

£2.50 plus £2.20 per mile

(a) Work how much a 10 mile taxi journey would cost.

A taxi journey costs £20.10

(b) Work out distance of the journey.

(3 marks)

Name: Date:

Lesson 8: Expanding brackets

Learning question: Why must everything inside the bracket be multiplied?

A. Expand

1. $3(x + 2)$

2. $5(a + 4)$

3. $2(y - 7)$

4. $4(2m + 3)$

B. Expand: negative outside

5. $-2(x + 5)$

6. $-3(a + 1)$

7. $-4(t - 2)$

8. $-(n + 6)$

C. Expand: letter outside

9. $x(x + 3)$

10. $a(a - 5)$

11. $p(2p + 1)$

12. $3y(y + 2)$

Name: Date:

Lesson 9: Expand and simplify

Learning question: Why do we expand before we collect like terms?

A. Expand and simplify

1. $3(t + 4) + 2$

2. $5(m - 2) + 6$

3. $2(x + 3) + 4x$

4. $a(a - 8) + 2a$

B. Expand and simplify: adding two brackets

5. $2(x + 1) + 3(x + 2)$

6. $4(a + 2) + 2(a + 5)$

7. $3(y + 4) + 2(y - 1)$

8. $5(n - 1) + 2(n + 3)$

C. Expand and simplify: subtracting a bracket

9. $5(x + 3) - 2(x + 1)$

10. $4(a + 3) - 3(a + 2)$

11. $6(p + 2) - 2(p - 1)$

12. $4(2a + 3) - 3(a + 2)$

Name: Date:

Lesson 10: Factorising

Learning question: How can you check that a factorised answer is correct and complete?

A. Find the highest common factor (HCF)

1. 12 and 18

2. 15 and 25

3. $8x$ and 12

4. a^2 and a

B. Factorise

5. $3x + 12$

6. $5a - 20$

7. $8y + 12$

8. $15 - 10t$

C. Factorise: letters

9. $x^2 + 5x$

10. $n^2 + n$

11. $4a^2 + 3a$

12. $3a^2 - 9a$

1 (a) Expand $7(2x + 7)$ (1)

(b) Factorise $3y + 12$ (1)

(2 marks)

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2 (a) Expand $5a(a - 6)$ (2)

(b) Solve $4(b + 2) = 24$ (2)

(4 marks)

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3 (a) Factorise fully $12m + 8m^2$ (2)

(b) Solve $3(n - 5) = 27$ (2)

(4 marks)

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4 (a) Expand $8(3s - 2)$ (1)

(b) Factorise $4t + 20$ (1)

(2 marks)

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5 (a) Factorise fully $5a^2b + 15ab^2$ (2)

(b) Solve $6(c - 8) = 42$ (2)

(4 marks)

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6 (a) Factorise $18x + 24$ (1)

(b) Expand $3(2y - 4)$ (1)

(2 marks)

---

7 (a) Expand $p(p - 3)$ (1)

(b) Factorise $16q + 8$ (1)

(2 marks)

---

8 (a) Factorise fully $6x^2 - 4xy$ (2)

(b) Solve $2(w - 4) = 13$ (2)

(4 marks)

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9 (a) Factorise $x^2 - 9x$ (1)

(b) Expand $6(5y + 1)$ (1)

(2 marks)

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10 (a) Expand $3(5x - 8)$ (1)

(b) Factorise $18y + 15$ (1)

(2 marks)

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11 (a) Expand $7(2h - 3)$ (1)

(b) Expand and Simplify $4(g + 5) + 3(g - 2)$ (2)

(3 marks)

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12 (a) Factorise fully $7xy + 21x$ (2)

(b) Solve $6(p + 3) = 42$ (2)

(4 marks)

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13 (a) Expand $a(a + b)$ (1)

(b) Factorise $15y - 6$ (1)

(2 marks)

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14 (a) Expand $9x(3y - 8)$ (2)

(b) Expand and Simplify $7(t - 4) + 5(t - 2)$ (2)

(4 marks)

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15 (a) Factorise fully $30x^3 + 12x$ (2)

(b) Solve $5(f - 2) = 22$ (2)

(4 marks)

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16 (a) Expand $x(8x + 1)$ (1)

(b) Factorise $18 + 63y$ (1)

(2 marks)

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17 (a) Expand $2x^2(4x - 9)$ (2)

(b) Expand and Simplify $6(y + 3) - 5(y - 4)$ (2)

(4 marks)

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18 (a) Factorise fully $30a^2 + 40ab$ (2)

(b) Solve $3(g + 9) = 21$ (2)

(4 marks)

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19 (a) Expand $n(5n + 1)$ (1)

(b) Factorise $18m + mn$ (1)

(2 marks)

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20 (a) Expand $3x(7x^2 - y)$ (2)

(b) Expand and Simplify $3(6y + 5) - 2(4y - 1)$ (2)

(4 marks)

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21 (a) Factorise fully $18a^2bc + 30abc^2$ (2)

(b) Expand and Simplify $4(2y - 7) - 3(5y - 3)$ (2)

(4 marks)
