

Algebraic Notation and Vocabulary

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (5 marks)

Here are some words.

expression	equation	formula	identity	inequality	term	factor
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Choose the correct word from the box to describe each of the following.

(a) $3x - 4 = 11$

It has an equals sign.

It is true for only one value of x (here $x = 5$).

So it is an equation.

Answer: equation

(b) $v = u + at$

It is a rule connecting different quantities.

(velocity, starting velocity, acceleration and time)

So it is a formula.

Answer: formula

(c) $x + 4 > 7$

It uses the symbol $>$ ('is greater than').

So it is an inequality.

Answer: inequality

(d) $2(y + 3) \equiv 2y + 6$

It is true for every value of y .

The $\equiv$ sign shows this.

So it is an identity.

Answer: identity

Tip: The $\equiv$ symbol always means an identity: both sides are equal whatever the letter is.

(e) $5a^2 - 3b$

There is no equals sign (and no $<$ or $>$).

So it is an expression.

Answer: expression

2 (4 marks)

Simplify

(a) $m \times 6$

Write the number first.

Leave out the $\times$ sign.

Answer: $6m$

Tip: Your final answer should have no $\times$ signs. Write $6m$, not $6 \times m$ or $m6$.

(b) $a \times b \times c$

Letters multiplied together are written side by side.

Leave out the $\times$ signs.

Answer: abc

(c) $k \div 5$

In algebra, division is written as a fraction.

$k \div 5$ is k over 5.

Answer: $\frac{k}{5}$

(d) $y \times y \times y$

Three y 's are multiplied together.

This is y to the power 3.

Answer: y^3

Tip: $y \times y \times y = y^3$, but $y + y + y = 3y$. Do not mix these up.

3 (3 marks)

Write down an expression for

(a) 4 more than x

'More than' means add.

Add 4 to x .

Answer: $x + 4$

(b) 3 times y

Multiply y by 3.

Write the number in front: $3y$

Answer: $3y$

(c) half of p

Half of something means divide it by 2.

$$p \div 2 = \frac{p}{2}$$

Answer: $\frac{p}{2}$ (or $\frac{1}{2}p$)

4 (3 marks)

Here is an expression. $5a - 2b + 7 + a^2$

- (a) Write down the number of terms in the expression.

The terms are $5a$, $-2b$, $+7$ and $+a^2$.

That is 4 terms.

Answer: 4

- (b) Write down the coefficient of b .

The coefficient is the number multiplying the letter.

Include its sign: the term is $-2b$.

Answer: -2

Tip: The sign in front belongs to the term. The b term is $-2b$, so the coefficient is -2 , not 2.

- (c) Write down the constant term.

The constant term is the term with no letter.

Here that is 7.

Answer: 7

5 (2 marks)

Here is a formula. $P = 6k + 9$

expression	equation	formula	identity	inequality	term	factor
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Use words from the box to complete each sentence.

(a) In this formula, $6k$ is a

$P = 6k + 9$ is made of separate parts added together: $6k$ and 9.

Each part is a **term**.

Answer: term

(b) k is a of $6k$

$6k$ means $6 \times k$.

k divides exactly into $6k$ ($6k \div k = 6$).

So k is a **factor** of $6k$.

Answer: factor

Tip: A factor divides exactly into something. The parts that are multiplied together in $6k$ (6 and k) are factors of $6k$.

6 (2 marks)

Tick to show whether each is an expression, an equation or a formula.

	Expression	Equation	Formula
$3x + 2$	✓		
$3x + 2 = 8$		✓	
$A = \pi r^2$			✓
$V = lwh$			✓

$3x + 2$ has no equals sign, so it is an **expression**.

$3x + 2 = 8$ can be solved to find x , so it is an **equation**.

$A = \pi r^2$ and $V = lwh$ are rules connecting different quantities, so they are **formulae**.

Tip: An equation has one letter you can solve for. A formula links two or more letters that stand for real quantities, like area and radius.

Marks: 2 marks for all four correct. 1 mark for two or three correct.

7 (2 marks)

n is an integer.

(a) Explain why $2n$ is always an even number.

$2n$ means $2 \times n$.

n is an integer, so $2n$ is 2 times an integer.

So $2n$ is a multiple of 2, which means it is even.

Answer: $2n = 2 \times n$, which is a multiple of 2.

(b) Write down an expression, in terms of n , for an odd number.

$2n$ is always even.

One more (or one less) than an even number is odd.

Answer: $2n + 1$ (or $2n - 1$)

8 (2 marks)

Show that $4(x + 2) - 3 \equiv 4x + 5$

Expand the bracket: $4(x + 2) = 4x + 8$

Then subtract 3: $4x + 8 - 3 = 4x + 5$

This is the right-hand side, so $4(x + 2) - 3 \equiv 4x + 5$

Tip: Multiply *both* terms in the bracket by 4. A common mistake is $4x + 2$.

Marks: 1 mark for $4x + 8$. 1 mark for completing the working to reach $4x + 5$.

9 (1 mark)

Megan says,

' a^2 means $a \times 2$ '

Explain why Megan is wrong.

a^2 means $a \times a$, not $a \times 2$.

For example, when $a = 5$:

$$a^2 = 5 \times 5 = 25$$

$$\text{but } a \times 2 = 5 \times 2 = 10$$

Answer: a^2 means $a \times a$ (e.g. $5^2 = 25$, but $5 \times 2 = 10$).

10 (2 marks)

Which has the greater value when $x = 5$, $3x$ or x^3 ?

You must show your working.

$$3x \text{ means } 3 \times x: 3 \times 5 = 15$$

$$x^3 \text{ means } x \times x \times x: 5 \times 5 \times 5 = 125$$

125 is greater than 15.

Answer: x^3 (125 is greater than 15)

Tip: x^3 is not $3 \times x$. Cube means multiply the number by itself three times.

Marks: 1 mark for 15 or 125. 1 mark for x^3 with both values shown.

11 (2 marks)

Here are four cards.

$$3x$$

$$x^2$$

$$x + 10$$

$$\frac{x}{2}$$

When $x = 5$, two of the cards have the same value.

Which two cards?

You must show your working.

Put $x = 5$ into each card:

$$3x = 3 \times 5 = 15$$

$$x^2 = 5 \times 5 = 25$$

$$x + 10 = 5 + 10 = 15$$

$$\frac{x}{2} = 5 \div 2 = 2.5$$

$3x$ and $x + 10$ both equal 15.

Answer: $3x$ and $x + 10$ (both equal 15)

Marks: 1 mark for at least two correct values. 1 mark for $3x$ and $x + 10$.

12 (2 marks)

Tickets for a concert cost £8 each.

The total cost of n tickets is £ C .

(a) Write a formula for C in terms of n .

Each ticket costs £8.

So n tickets cost $8 \times n = 8n$ pounds.

A formula must start with ' $C =$ '.

Answer: $C = 8n$

Tip: The question asks for a formula, so you must write $C = 8n$, not just $8n$. Do not put a £ sign in the formula.

- (b) There is also a booking fee of £3 for each order.
Write an expression, in terms of n , for the total cost of an order of n tickets.

The tickets cost $8n$.

Add the booking fee of 3.

This asks for an expression, so no ' $C =$ ' is needed.

Answer: $8n + 3$

13 (2 marks)

n is an integer.

- (a) Write down, in terms of n , the next two integers after n .

Consecutive integers go up by 1 each time.

After n come $n + 1$, then $n + 2$.

Answer: $n + 1$ and $n + 2$

- (b) Show that the sum of n and the next two integers is $3n + 3$

Add the three integers: $n + (n + 1) + (n + 2)$

Collect the n terms: $n + n + n = 3n$

Collect the numbers: $1 + 2 = 3$

So the sum is $3n + 3$
