EXPRESSION, EQUATION, FORMULA OR IDENTITY?

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

Algebra statements come in four types. Look for the = sign.

EXPRESSION	EQUATION	FORMULA	IDENTITY
no = sign	true for one value	a rule linking letters	true for every value
3a + 2	**a + 2 = 9**	**P = 4s**	**a + a ≡ 2a**

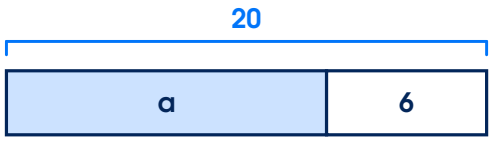
1 Circle every expression.

4m + 1 **4m + 1 = 9** **y – 2** **5 = p + 2** **6k**

Hint: an expression has no = sign.

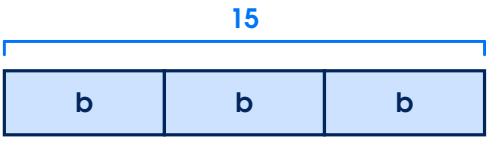
2 Each bar model shows an equation. Find the value of each letter.

a)



a = ☐

b)

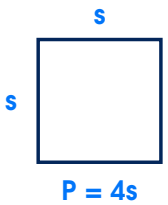


b = ☐

3 The formula P = 4s gives the perimeter, P, of a square with sides of length s.

a) Find P when s = 3. ☐

b) Find P when s = 10. ☐



P = 4s

4 Use the formula.

Cost of pens: C = 2n (C is the cost in £, n is the number of pens)

a) Find C when n = 5. ☐

b) Find C when n = 8. ☐

EXPRESSION, EQUATION, FORMULA OR IDENTITY?

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

EXPRESSION	EQUATION	FORMULA	IDENTITY
no = sign	true for one value	a rule linking letters	true for every value
3a + 2	**a + 2 = 9**	**P = 4s**	**a + a ≡ 2a**

The symbol ≡ means "is identical to": both sides are equal whatever the letter is.

1 Sort each statement A to H into the table. Write its letter.

A 5t – 2 **B** 5t – 2 = 13 **C** A = lw **D** t + t ≡ 2t

E 3t **F** 2t + 1 = 9 **G** v = u + at **H** 4t + 4 ≡ 4(t + 1)

EXPRESSION	EQUATION	FORMULA	IDENTITY

2 Hiring a bike costs C pounds for h hours, where C = 5h + 3.

a) Find C when h = 2. ☐ **b)** Find C when h = 6. ☐

c) Lena paid £28. Write an equation and solve it to find h.

☐ h = ☐

3 Check that a + a + a ≡ 3a by substituting.

	a + a + a	3a
a = 4	☐	☐
a = 10	☐	☐

Is it an identity? ☐

4 This rectangle has length a and width 3. Its perimeter is P.



a) Write a formula for the perimeter. P = ☐

b) Find P when a = 5. ☐ **c)** P = 26. Find a. ☐

EXPRESSION, EQUATION, FORMULA OR IDENTITY?

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

An expression has no = sign. An equation is true for particular values only. A formula is a rule connecting different variables, such as P = 2l + 2w. An identity (≡) is true for every value of its variables.

FLUENCY

1 Write whether each is an expression, equation, formula or identity.

a) $7p - q$ ____

b) $7p = 21$ ____

c) $s = \frac{d}{t}$ ____

d) $3(p + 2) \equiv 3p + 6$ ____

e) $p^2 = 49$ ____

f) $F = 1.8C + 32$ ____

2 Use each formula.

a) $v = u + at$. Find v when u = 5, a = 3 and t = 4. ____

b) $A = \frac{1}{2}bh$. Find A when b = 9 and h = 6. ____

c) P = 2l + 2w. P = 30 and w = 4. Write an equation and solve it to find l.

____ l = ____

REASONING

3 Write = or ≡ in each box to make a correct statement. Use ≡ where you can.

a) $5y + 2y$ ☐ $7y$

b) $5y + 2$ ☐ 17

c) $y \times y$ ☐ y^2

d) $2y + 3$ ☐ $3y$

4 Tom says, "Anything with an equals sign is an equation that you solve."

a) Use an example to explain why Tom is not quite right.

b) Ella writes the perimeter of an isosceles triangle as 2a + b. Make it into a formula.

____

EXPRESSION, EQUATION, FORMULA OR IDENTITY?

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) An equation has exactly one solution. ALWAYS SOMETIMES NEVER

b) An expression contains an = sign. ALWAYS SOMETIMES NEVER

c) A statement with letters on both sides is an identity. ALWAYS SOMETIMES NEVER

d) A formula can be used to make an equation. ALWAYS SOMETIMES NEVER

2 Fill in each box so that the statement is an identity.

a) $4(n + \square) \equiv 4n + 12$

b) $6n - \square + 2n \equiv 8n - 5$

c) $n \times \square \equiv 7n^2$

PROBLEM SOLVING

3 A taxi fare costs C pounds for m miles, where C = 2.5 + 1.2m.

a) Find C when m = 10. ☐

b) A journey costs £8.50. Find m. ☐

c) Explain why C = 1.2m + 2.5 is the same formula.

★ CHALLENGE FOR ALL

4 Use these cards (you can use a card more than once) to make:

2(x + 3) | 2x + 6 | 2x + 3 | 14 | y | = | ≡

an expression ☐ an equation ☐

an identity ☐ a formula ☐

STEP 2 · EXPRESSION, EQUATION, FORMULA OR IDENTITY?

ANSWERS

BUILDING BLOCKS

1. Expressions: 4m + 1, y – 2 and 6k
2. a) a = 14 · b) b = 5
3. a) P = 12 · b) P = 40
4. a) C = £10 · b) C = £16

SUPPORT

1. Expression: A, E · Equation: B, F · Formula: C, G · Identity: D, H
2. a) £13 · b) £33 · c) 5h + 3 = 28, h = 5 hours
3. a = 4: 12 and 12 · a = 10: 30 and 30 · Yes, it is an identity (true for every value of a)
4. a) P = 2a + 6 (or P = a + a + 3 + 3) · b) P = 16 · c) a = 10

CORE

1. a) expression · b) equation · c) formula · d) identity · e) equation · f) formula
2. a) v = 17 · b) A = 27 · c) 30 = 2l + 8, l = 11
3. a) ≡ · b) = (only true when y = 3) · c) ≡ · d) = (only true when y = 3)
4. a) e.g. a + a = 2a is an identity (true for every a) and P = 4s is a formula; neither is an equation solved for one value · b) P = 2a + b

GREATER DEPTH

1. a) Sometimes: x + 1 = 4 has one solution, $x^2 = 9$ has two (3 and –3) · b) Never · c) Sometimes: 2x + x ≡ 3x is an identity, 2x = x + 3 is not · d) Always
2. a) 3 · b) 5 · c) 7n
3. a) £14.50 · b) m = 5 · c) Addition can be done in any order, so 2.5 + 1.2m ≡ 1.2m + 2.5
4. e.g. expression 2x + 3 · equation 2x + 6 = 14 · identity 2(x + 3) ≡ 2x + 6 · formula y = 2x + 3 (other correct answers accepted)