

Equation or Identity?

ANSWERS

1 identity: equal for every value of x

Work out both sides for $x = 1, 2$ and 3 .
Equation or identity?

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

x	left side	right side	equal?
1	8	8	✓
2	10	10	✓
3	12	12	✓

equation

identity

2

Work out both sides for $x = 1, 2$ and 3 .
Equation or identity?

$$2x + 3 = x + 5$$

x	left side	right side	equal?
1	5	6	✗
2	7	7	✓
3	9	8	✗

equation

identity

3

Work out both sides for $x = 1, 2$ and 3 .
Equation or identity?

$$3(x - 1) \equiv 3x - 3$$

x	left side	right side	equal?
1	0	0	✓
2	3	3	✓
3	6	6	✓

equation

identity

4

Work out both sides for $x = 1, 2$ and 3 .
Equation or identity?

$$4x = x + 6$$

x	left side	right side	equal?
1	4	7	✗
2	8	8	✓
3	12	9	✗

equation

identity

5

Work out both sides for $x = 1, 2$ and 3 .
Equation or identity?

$$x + x + x \equiv 3x$$

x	left side	right side	equal?
1	3	3	✓
2	6	6	✓
3	9	9	✓

equation

identity

6

Work out both sides for $x = 1, 2$ and 3 .
Equation or identity?

$$2(x + 4) = 3x + 5$$

x	left side	right side	equal?
1	10	8	✗
2	12	11	✗
3	14	14	✓

equation

identity

7

Notice the change!

Show that the two sides are identical.

$$3(x + 2) + x \equiv 4x + 6$$

$$\text{Left side} = 3x + 6 + x$$

$$= 4x + 6$$

$$\text{which is the right side } \checkmark$$

8

Show that the two sides are identical.

$$2(x + 5) + 3(x - 1) \equiv 5x + 7$$

$$\text{Left side} = 2x + 10 + 3x - 3$$

$$= 5x + 7$$

$$\text{which is the right side } \checkmark$$

Equation or Identity? further practice

ANSWERS

9

Show that the two sides are identical.

$$4(x + 3) - x \equiv 3x + 12$$

$$\text{Left side} = 4x + 12 - x$$

$$= 3x + 12$$

$$\text{which is the right side } \checkmark$$

10

Is $2(x + 4) = 3x + 5$ an equation or an identity? If it is an equation, solve it.

$$2x + 8 \text{ is not the same as } 3x + 5$$

It is an equation

$$x = 3$$

11

Write = or $\equiv$ in each box.

$$x + x + x \equiv 3x$$

$$2x + 1 = 7$$

$$x \times x \equiv x^2$$

$$4x = x + 4$$

12

Find the value of a .

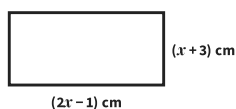
$$3(2x - 1) + a \equiv 6x + 4$$

$$6x - 3 + a \equiv 6x + 4, \text{ so } -3 + a = 4$$

$$\text{Answer } a = 7$$

13

Show that the perimeter of this rectangle is $6x + 4$ cm, whatever the value of x .



$$\text{Perimeter} = 2(x + 3) + 2(2x - 1)$$

$$= 2x + 6 + 4x - 2 = 6x + 4 \checkmark$$

14

Think of a number. Add 5. Double the answer. Subtract 10. Halve the answer. Show that you always end with the number you started with.

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

$$= 2n, \text{ and half of } 2n \text{ is } n \checkmark$$

15

Show that the sum of three whole numbers in a row is always 3 times the middle number.

$$n + (n + 1) + (n + 2) = 3n + 3$$

$$= 3(n + 1) \checkmark \text{ (the middle is } n + 1)$$

16

Ben puts $x = 0$ into both sides of $x^2 + 4 \equiv (x + 2)^2$ and gets 4 both times. He says it is an identity. Is Ben right? Explain.

$$\text{try } x = 1: 1 + 4 = 5, \text{ but } 3^2 = 9$$

$$\text{one value is not enough}$$

$$\text{Answer } \text{No}$$