GRADE 7 · UNIT 9 · LESSON 6–7

Rewriting Equivalent Numerical Expressions; Equivalent Linear Expressions

MA.7.AR.1.2

I can rewrite an expression with a named property, evaluate a linear expression, and use a test value to show two expressions are not equivalent.

Warm-Up

1. Is $-4\left(2-\frac{1}{4}\right)$ equivalent to $-8+1$?
2. Find the sum: $\left(\frac{2}{5}n-1\right)+\left(\frac{1}{5}n+4\right)$
3. Find the value: $-3\times(-2.5)$
4. Find the value: $6(10+3)$

Warm-Up

1. Is $-4\left(2-\frac{1}{4}\right)$ equivalent to $-8+1$? **Yes**
2. Find the sum: $\left(\frac{2}{5}n-1\right)+\left(\frac{1}{5}n+4\right)$ $\frac{3}{5}n+3$
3. Find the value: $-3\times(-2.5)$ **7.5**
4. Find the value: $6(10+3)$ **78**

Vocabulary

rewrite

write an expression another way that is equivalent: 6×4.15 as $6 \times 4 + 6 \times 0.15$

distributive

a factor outside reaches every term inside: $6 \times (4 + 0.15)$ is $6 \times 4 + 6 \times 0.15$

evaluate

find the value of an expression: $3x - 5$ at $x = 2$ is 1

substitute

put a number in place of the variable: $x = -2$ makes $3x - 5$ into $3(-2) - 5$

equivalent

the same value for every x, even if written differently: $3x + 4$ and $4 + 3x$

Notes

I. Rewrite first, then compute — and name the property

$$6 \times 4.15 = 6 \times (4 + 0.15) = 6 \times 4 + 6 \times 0.15 = 24 + 0.9 = 24.9$$

$$25 \times (-7) \times 4 = (25 \times 4) \times (-7) = 100 \times (-7) = -700$$

Distributive: break a number apart, the factor reaches every piece.
Commutative, then associative: move the friendly pair together, then multiply.

Notes

II. Evaluate: substitute, then multiply before adding

$$3x - 5 \text{ at } x = -2: \quad 3(-2) - 5 = -6 - 5 = -11$$

Put the number in parentheses where the x was. Multiply, then add or subtract.

Notes

III. One difference disproves; one match proves nothing

$2x + 3$ and $5x - 3$ at $x = 2$: 7 and 7

at $x = 0$: 3 and -3. Not equivalent.

One match proves nothing. One difference proves not equivalent. Agreeing at 0 proves least of all: it compares only the constants.

Example 1

$$8 \times 3.25$$

Rewrite it with a property, then find the value. Name the property.

Example 1

$$8 \times 3.25 = 8 \times (3 + 0.25)$$

$$= 8 \times 3 + 8 \times 0.25$$

$$= 24 + 2 = 26$$

Answer: 26 — the distributive property

Your Turn

$$4 \times 6.75$$

Rewrite it with a property, then find the value. Name the property.

Your Turn

$$4 \times 6.75$$

Rewrite it with a property, then find the value. Name the property.

$4 \times 6.75 = 4 \times 6 + 4 \times 0.75$: the distributive property

$24 + 3 = 27$

Answer: 27 — the distributive property

Example 2

Are $(x + 5) + (2x - 1)$ and $3x + 4$ equivalent?

Test a value. Then rewrite the first with the fewest terms.

Example 2

$x = -1$: 1 and 1; $x = 2$: 10 and 10

$(x + 5) + (2x - 1) = 3x + 4$

Yes — equivalent

Answer: Yes — the first rewrites as 3x + 4

Your Turn

Are $(4n - 1) + (n + 6)$ and $5n + 5$ equivalent?

Test a value. Then rewrite the first with the fewest terms.

Your Turn

Are $(4n - 1) + (n + 6)$ and $5n + 5$ equivalent?

Test a value. Then rewrite the first with the fewest terms.

$n = 1$: 10 and 10 — evidence only

$(4n - 1) + (n + 6) = 5n + 5$. Yes.

Answer: Yes — the first rewrites as 5n + 5

Whiteboards · Question 1 of 9

6×2.5

Rewrite it with a property, name it, and find the value.

Answer it.

Whiteboards · Question 1 of 9

6×2.5

Rewrite it with a property, name it, and find the value.

$6 \times 2.5 = 6 \times 2 + 6 \times 0.5$: distributive

$12 + 3 = 15$

Answer: 15 — distributive

Whiteboards · Question 2 of 9

$50 \times (-3) \times 2$

Rewrite it with properties, name them, and find the value.

Answer it.

Whiteboards · Question 2 of 9

$50 \times (-3) \times 2$

Rewrite it with properties, name them, and find the value.

$(50 \times 2) \times (-3)$: commutative, then associative

$100 \times (-3) = -300$

Answer: –300 — commutative and associative

Whiteboards · Question 3 of 9

$$5(2 + 0.4)$$

A. 10.2

B. 7.4

C. 10.4

D. 12

Answer it.

Whiteboards · Question 3 of 9

$$5(2 + 0.4)$$

$5 \times 2 = 10$ and $5 \times 0.4 = 2$

$10 + 2 = 12$

Answer: D — 12

Whiteboards · Question 4 of 9

Find the value of $2x - 7$ when $x = -4$.

Answer it.

Whiteboards · Question 4 of 9

Find the value of $2x - 7$ when $x = -4$.

$$2(-4) - 7 = -8 - 7$$
$$= -15$$

Answer: -15

Whiteboards · Question 5 of 9

Find the value of $-2x + 1$ when $x = -3$.

A. 5

B. 7

C. −5

D. −7

Answer it.

Whiteboards · Question 5 of 9

Find the value of $-2x + 1$ when $x = -3$.

$$-2(-3) + 1 = 6 + 1$$
$$= 7$$

Answer: B — 7

Whiteboards · Question 6 of 9

Dev, who is 13, needs the value of $\frac{1}{2}m + 4$ when $m = 6$.

Answer it.

Whiteboards · Question 6 of 9

Dev, who is 13, needs the value of $\frac{1}{2}m + 4$ when $m = 6$.

$$\frac{1}{2}(6) + 4 = 3 + 4$$

$$= 7$$

Answer: 7

Whiteboards · Question 7 of 9

Are $3x + 2$ and $5x - 2$ equivalent?

Test at x = 2, then at x = 0.

Answer it.

Whiteboards · Question 7 of 9

Are $3x + 2$ and $5x - 2$ equivalent?

Test at x = 2, then at x = 0.

$x = 2$: 8 and 8. $x = 0$: 2 and -2

No: one value where they differ.

Answer: No — 2 and –2 at x = 0

Whiteboards · Question 8 of 9

Find a value of x where $x + 3$ and $2x + 3$ agree.

Then find one where they don't.

Answer it.

Whiteboards · Question 8 of 9

Find a value of x where $x + 3$ and $2x + 3$ agree.

Then find one where they don't.

$x = 0$: 3 and 3 — they agree

$x = 1$: 4 and 5. Not equivalent.

Answer: x = 0 agrees; any other x does not

Whiteboards · Question 9 of 9

Priya says $6x - 2$ and $4x$ are equivalent: both give 4 at $x = 1$.

Why is one match not a proof? Give a value that shows it.

Write your answer in sentences.

Whiteboards · Question 9 of 9

Priya says $6x - 2$ and $4x$ are equivalent: both give 4 at $x = 1$.

Why is one match not a proof? Give a value that shows it.

$x = 0$: -2 and 0. Equivalent means every x.

Answer: One match is not every x. At x = 0 they give –2 and 0, so they are not equivalent.

Independent Practice

1. Rewrite and find: 4×3.5
2. Rewrite and find: $20 \times (-9) \times 5$
3. Find the value of $-3x + 2$ when $x = -2$.
4. Find the value of $\frac{1}{3}m - 1$ when $m = 9$.
5. Are $2x + 5$ and $4x + 1$ equivalent? Test at $x = 2$, then at $x = 0$.
6. Find a value of x where $x + 4$ and $3x + 4$ agree, then one where they don't.

Before You Go

Rewrite first, then compute — and name the property.

Substitute in parentheses. Multiply, then add.

One difference is a proof of not equivalent. One match is not a proof of anything. Tomorrow: the proof that two expressions ARE equivalent.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 60. Due by the Unit 9 test.

Today's skills — all required

Identify properties of addition and multiplication (JC2)

Evaluate linear expressions (UG6)