GRADE 7 ACCELERATED · UNIT 11 · LESSON 1

Equations with Like Terms and the Distributive Property

MA.8.AR.2.1

I can solve an equation that has like terms to collect or parentheses to distribute.

Warm-Up

1. Two angles of a triangle are 47° and 68°. Find the third angle.
2. Similar triangles: $\frac{6}{9} = \frac{x}{12}$. Find x.
3. A map's scale is 1 cm : 20 km. How far is 3 cm on the map?
4. Solve: $3x + 5 = 26$

Warm-Up

1. Two angles of a triangle are 47° and 68°. Find the third angle.

   65°

2. Similar triangles: $\frac{6}{9} = \frac{x}{12}$. Find x. **x = 8**

3. A map's scale is 1 cm : 20 km. How far is 3 cm on the map?

   60 km

4. Solve: $3x + 5 = 26$ **x = 7**

Vocabulary

like terms

terms with the same variable to the same power: $3x$ and $5x$ are like terms;

$3x$ and 5 are not

coefficient

the number that multiplies the variable: 3 in $3x$

constant

a term with no variable: the -4 in $8x - 4$

distributive property

$a(b + c) = ab + ac$ — the number outside the parentheses multiplies every term inside

Notes

I. Collect like terms first

$$3x + 5x - 4 = 28$$

$$8x - 4 = 28$$

$$8x = 32$$

$$x = 4$$

Collect the like terms. Then it is a two-step equation.

A $20 fee, then $9 a week, $83 in all: $9w + 20 = 83$

Notes

II. Distribute, then collect

$$3(2x - 5) + 4 = 25$$

$$6x - 15 + 4 = 25$$

$$6x - 11 = 25$$

$$6x = 36$$

$$x = 6$$

Both terms: $3(2x) = 6x$, $3(-5) = -15$. A decimal too: $0.5(10x - 4) = 5x - 2$

Notes

III. Subtracting a group: the minus goes in too

$$18 - 3(x - 2) = 9$$

$$18 - 3x + 6 = 9$$

$$24 - 3x = 9$$

$$-3x = -15$$

$$x = 5$$

$(-3)(-2) = 6$ Check: $18 - 3(5 - 2) = 18 - 9 = 9$

Example 1

$$5x + 9 - 2x = 30$$

Solve it, then check.

Example 1

$$5x + 9 - 2x = 30$$

$$3x + 9 = 30$$

$$3x = 21$$

$$x = 7$$

Check: $5(7) + 9 - 2(7) = 35 + 9 - 14 = 30$

Answer: $x = 7$

Your Turn

$$7x - 3 - 4x = 24$$

Solve it, then check.

Your Turn

$$7x - 3 - 4x = 24$$

Solve it, then check.

Collect: $3x - 3 = 24$

Add 3: $3x = 27$

Divide by 3: $x = 9$

Check: $7(9) - 3 - 4(9) = 63 - 3 - 36 = 24$

Answer: $x = 9$

Example 2

$$5(x - 3) + 2x = 41$$

Solve it, then check.

Example 2

$$5(x - 3) + 2x = 41$$

$$5x - 15 + 2x = 41$$

$$7x - 15 = 41$$

$$7x = 56$$

$$x = 8$$

Check: $5(8 - 3) + 2(8) = 25 + 16 = 41$

Answer: $x = 8$

Your Turn

$$4(x - 2) + 3x = 34$$

Solve it, then check.

Your Turn

$$4(x - 2) + 3x = 34$$

Solve it, then check.

Distribute: $4x - 8 + 3x = 34$

Collect: $7x - 8 = 34$

Add 8: $7x = 42$

Divide by 7: $x = 6$

Check: $4(6 - 2) + 3(6) = 16 + 18 = 34$

Answer: $x = 6$

Whiteboards · Question 1 of 9

$$2x + 6x = 56$$

Answer it.

Whiteboards · Question 1 of 9

$$2x + 6x = 56$$

Collect: $8x = 56$

Divide by 8: $x = 7$

Answer: $x = 7$

Whiteboards · Question 2 of 9

$$9y - 4y + 3 = 48$$

Answer it.

Whiteboards · Question 2 of 9

$$9y - 4y + 3 = 48$$

Collect: $5y + 3 = 48$

Subtract 3: $5y = 45$

Divide by 5: $y = 9$

Answer: $y = 9$

Whiteboards · Question 3 of 9

$$0.5(6n + 4) + 2n = 22$$

Answer it.

Whiteboards · Question 3 of 9

$$0.5(6n + 4) + 2n = 22$$

Distribute: $0.5(6n + 4) = 3n + 2$

Collect: $5n + 2 = 22$

Subtract 2: $5n = 20$

Divide by 5: $n = 4$

Answer: $n = 4$

Whiteboards · Question 4 of 9

$$2(2x - 5) + x = 20$$

A. $x = 5$

B. $x = 7.5$

C. $x = 2$

D. $x = 6$

Answer it.

Whiteboards · Question 4 of 9

$$2(2x - 5) + x = 20$$

Distribute: $4x - 10 + x = 20$

Collect: $5x - 10 = 20$

Add 10: $5x = 30$

Divide by 5: $x = 6$

Answer: D — x = 6

Whiteboards · Question 5 of 9

$12 - 3(x - 4) = 6$

Which equation is a correct next step?

A. $8 - 3x = 6$

B. $24 - 3x = 6$

C. $-3x = 6$

D. $9(x - 4) = 6$

Answer it.

Whiteboards · Question 5 of 9

$12 - 3(x - 4) = 6$

Which equation is a correct next step?

The –3 multiplies both terms: $(-3)(x) = -3x$ and $(-3)(-4) = 12$

Distribute: $12 - 3x + 12 = 6$

Collect: $24 - 3x = 6$

Answer: B — $24 - 3x = 6$

Whiteboards · Question 6 of 9

$$15 - 2(w + 1) = 5$$

Answer it.

Whiteboards · Question 6 of 9

$$15 - 2(w + 1) = 5$$

Distribute the −2: $15 - 2w - 2 = 5$

Collect: $13 - 2w = 5$

Subtract 13: $-2w = -8$

Divide by −2: $w = 4$

Answer: $w = 4$

Whiteboards · Question 7 of 9

A gym charges $25 to join and $12 a month.

Dana, who is 13, has paid $97 in all.

How many months has Dana paid for?

Answer it.

Whiteboards · Question 7 of 9

A gym charges $25 to join and $12 a month.

Dana, who is 13, has paid $97 in all.

How many months has Dana paid for?

The fee once, plus 12 a month: $12m + 25 = 97$

Subtract 25: $12m = 72$

Divide by 12: $m = 6$

Answer: 6 months

Whiteboards · Question 8 of 9

$x = 8$ is the solution of $3(x + \square) + 2x = 46$.

What number goes in the box?

Answer it.

Whiteboards · Question 8 of 9

$x = 8$ is the solution of $3(x + \square) + 2x = 46$.

What number goes in the box?

$2(8) = 16$, so $3(8 + \square) = 46 - 16 = 30$

$30 \div 3 = 10$, and $10 - 8 = 2$

Answer: 2

Whiteboards · Question 9 of 9

Sam solved $4(x - 2) + 3 = 23$ like this:

Line 1: $4x - 2 + 3 = 23$ Line 2: $4x = 22$ Line 3: $x = 5.5$

What is Sam's mistake? What is the correct solution?

Write your answer in sentences.

Whiteboards · Question 9 of 9

Sam solved $4(x - 2) + 3 = 23$ like this:

Line 1: $4x - 2 + 3 = 23$ Line 2: $4x = 22$ Line 3: $x = 5.5$

What is Sam's mistake? What is the correct solution?

The correct first line: $4x - 8 + 3 = 23$

Collect: $4x - 5 = 23$

Add 5: $4x = 28$

Divide by 4: $x = 7$

Answer: The 4 never reached the 2; x = 7

Independent Set

1. Solve: $9h - 2h + 4 = 60$
2. Solve: $4(2n + 3) - 5 = 47$
3. Solve: $30 - 4(v - 3) = 14$
4. Solve: $0.5(4x + 6) + x = 18$
5. A pottery class costs \$30 to sign up and \$15 a session. Maya has paid \$135 in all. How many sessions has she paid for?
6. Lee solved $20 - 2(x + 3) = 8$. Line 1: $20 - 2x + 6 = 8$. Line 2: $26 - 2x = 8$. Line 3: $x = 9$. Which line has the mistake? What is the correct solution?

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 67. Due by the Unit 11 test.

Today's skills — all required

Solve equations involving like terms — Q2B
Solve equations using the distributive property — QWE
Solve two-step equations: word problems — 8CZ