Name & Surname: _____ Class: _____ Date: _____

Solving Word Equations

Turn stories into two-step equations

About 45 minutes Level ★★★☆☆



Writing and solving two-step equations

Many **word problems** lead to $px + q = r$ or $p(x + q) = r$.

- Pick **x** for the unknown and write its **units**.
- Write the **equation**: $px + q = r$ means multiply then add; $p(x + q) = r$ means add first then multiply.
- Solve by **undoing**: for $px + q = r$ undo + q then ÷ p; for $p(x + q) = r$ ÷ p first.
- Check in the **story**, not just the equation.

TASK A

/8

Find the missing inputs and outputs. Undo each step to go backwards.

1 IN → × 3 → + 4 → OUT

In	Out
2	
5	
	22
	13

2 IN → + 2.5 → × 4 → OUT

In	Out
1	
3	
	30
	18

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Practice Two-Step Equations

Solve px + q = r and p(x + q) = r equations.

TASK B /12

Solve each equation and check with the story.

WARM UP

1. Solve 2x + 3 = 11 for **x**.

Answer: _____

2. Solve 5x − 2 = 18 for **x**.

Answer: _____

3. Solve 3(x + 2) = 15 for **x**.

Answer: _____

4. Solve 2(x + 1.5) = 10 for **x**.

Answer: _____

PRACTICE

5. Solve $(\frac{3}{4})x + 2 = 8$ for **x**.

Answer: _____

6. Solve 0.5x + 1.5 = 4 for **x**.

Answer: _____

7. Solve 4(x + 0.5) = 12 for **x**.

Answer: _____

8. Is x = 6 a **solution** to 2(x + 3) = 20? **Explain** how you know.

Answer: _____

PROBLEM SOLVING

9. A student buys 3 **pencils** at the same price plus a $2 **eraser** for $11 in **total**. What is the **price** of one pencil?

Answer: _____

10. A bike rental charges $4 per **hour** plus a $7 **fee**. The **total** is $27. For how many **hours** was the rental?

Answer: _____

11. Six **bags** each have a $1.50 **box** plus the same **toy**. The **total** is $21. What is the **price** of one toy?

Answer: _____

12. Explain how you **check** your answer to the toy **problem** in the story.

Answer: _____

Key words

variable: a letter, like x, standing for an unknown number

solution: the value of x that makes the equation true

undo: do the opposite operation to isolate x

equation: two expressions set equal to each other

total: the final amount, equal to r

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Tougher Equation Problems

Work with fractions, decimals and perimeter problems.

TASK C

/12

Write or solve each equation and show your check.

WARM UP

1 Solve $(\frac{2}{3})x + 1 = 5$ for **x**.

Answer: _____

2 Solve $1.5x + 2.5 = 10$ for **x**.

Answer: _____

3 Solve $5(x - 2) = 15$ for **x**.

Answer: _____

4 Solve $(\frac{1}{2})(x + 4) = 6$ for **x**.

Answer: _____

PRACTICE

5 Solve $2.5x + 0.5 = 6$ for **x**.

Answer: _____

6 Solve $4x - 3 = 9$ for **x**.

Answer: _____

7 Solve $3(x + 2.5) = 18$ for **x**.

Answer: _____

8 A student says $x = 4$ solves $3x + 5 = 12$. Is the student **correct**? **Explain** how you know.

Answer: _____

PROBLEM SOLVING

9 A phone plan has a $15 **monthly fee** plus $0.25 per **text**. The **bill** is $20. How many **texts** were sent?

Answer: _____

10 A coach buys 5 **packs** at the same price for $60 in **total**. Each pack has a $2 **bottle** plus a **shirt**. What is the **price** of one shirt?

Answer: _____

11 A **rectangle** has length 7 in. and width w in. Its **perimeter** is 22 in., so $2(w + 7) = 22$. What is the **width**?

Answer: _____

12 Explain how you know which **equation** fits the rectangle **problem**: $2w + 7 = 22$ or $2(w + 7) = 22$?

Answer: _____

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See It With Bars

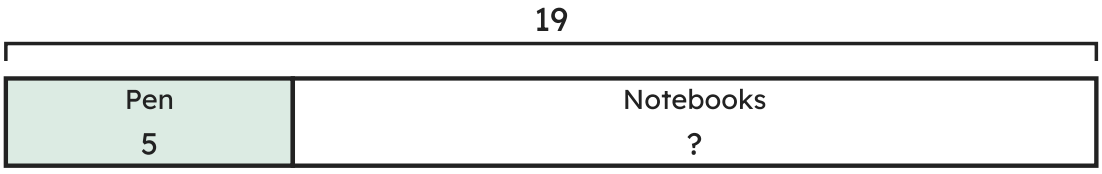
Use bar models and climb from recall to creating.

TASK D

/6

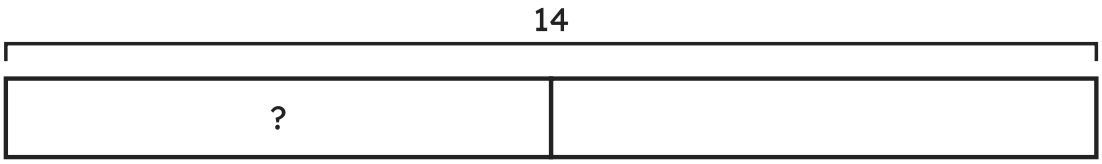
Use each bar model to find the missing amount.

1. A shopper spends $19 in **total**. A $5 **pen** plus notebooks together make the total. How much was spent on **notebooks** in total?



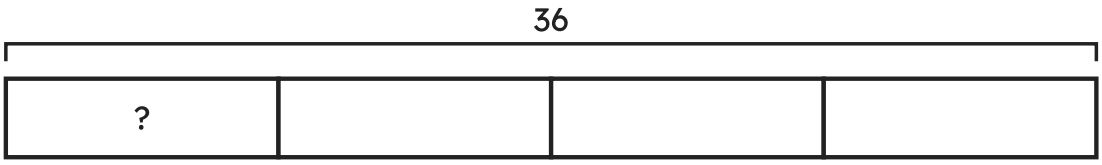
Answer: _____ **dollars**

2. Two **identical** notebooks cost $14 in **total**. How much is one **notebook**?



Answer: _____ **dollars**

3. Four **packs** cost $36 in **total**. Each pack costs the same **amount**. How much is one **pack**?



Answer: _____ **dollars**

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Solving Word Equations

TASK E

/6

Climb the ladder from recall to creating your own problem.

Remember What does **x** mean in the **equation** 3x + 4 = 19?

Remember Compare the **steps** to solve 3x + 2 = 14 and 3(x + 2) = 15. How are they **different**?

Understand Explain in **words** what 2(x + 3) = 16 **means**.

Apply Solve this **problem**: 5 notebooks at the same price plus $2 shipping totals $27. What is one **notebook** price?

Evaluate A student solves 4(x + 1) = 20 as x + 1 = 16 then x = 15. What is the **mistake** and what is **x**?

Create Write your own **word problem** that leads to 5x + 2 = 27. Show the **solution**.

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Check And Master

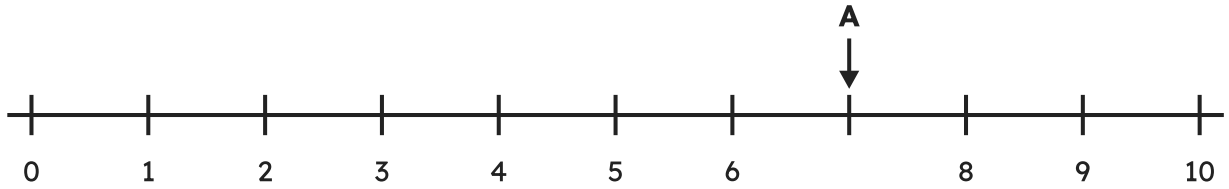
Place solutions on number lines and follow worked methods.

↑↓ TASK F

/4

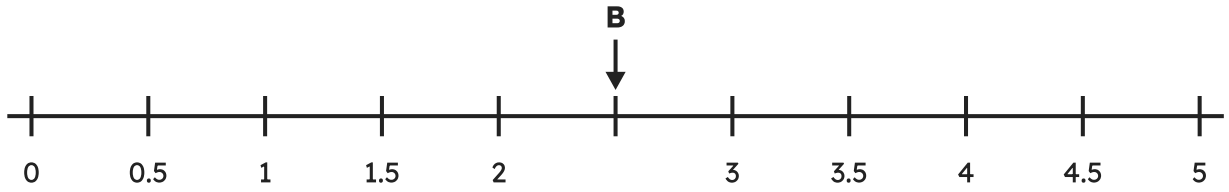
Read the arrows and mark the solutions on each line.

1



A = ☐ Draw an arrow to show: 5

2



B = ☐ Draw an arrow to show: 3.5

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Solving Word Equations

TASK G

/2

Study each example, then try the matching problem with the same steps.

WORKED EXAMPLE

A rental costs $4 per hour plus a $7 fee. Total is $27. How many hours?

1. Let x = hours
2. Write 4x + 7 = 27
3. Subtract 7: 4x = 20
4. Divide by 4: x = 5
5. Check: 4 × 5 + 7 = 27

Answer: 5 hours

YOUR TURN

A ride costs $3 per mile plus a $5 fee. Total is $20. How many miles?

Answer: _____

WORKED EXAMPLE

Four packs each have a $2 bottle plus the same toy. Total is $36. What is the toy price?

1. Let x = toy price in dollars
2. Write 4(x + 2) = 36
3. Divide by 4: x + 2 = 9
4. Subtract 2: x = 7
5. Check: 4 × (7 + 2) = 36

Answer: $7

YOUR TURN

Three boxes each have a $1.50 card plus the same book. Total is $15. What is the book price?

Answer: _____

How did I do?

Circle a face for each line.

I can write px + q = r and p(x + q) = r from a word problem	☹	😐	☺
I can solve two-step equations with whole numbers, fractions and decimals	☹	😐	☺
I can check my answer in the story	☹	😐	☺

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Answer sheet: Solving Word Equations

Task A

1. 2 → 10; 5 → 19; 6 → 22; 3 → 13
2. 1 → 14; 3 → 22; 5 → 30; 2 → 18

Task B

1. x = 4
2. x = 4
3. x = 3
4. x = 3.5
5. x = 8
6. x = 5
7. x = 2.5
8. No, 2 × (6 + 3) = 18, not 20. The solution is x = 7.
9. $3
10. 5 hours
11. $2
12. Substitute back: 6 × (2 + 1.50) = 21, which matches the total, so it makes sense.

Task C

1. x = 6
2. x = 5
3. x = 5
4. x = 8
5. x = 2.2
6. x = 3
7. x = 3.5
8. No, 3 × 4 + 5 = 17, not 12. The solution is x = $\frac{7}{3}$.
9. 20 texts
10. $10
11. 4 in.
12. 2(w + 7) = 22 fits because perimeter adds length and width first, then doubles. 2w + 7 would double only the width.

Task D

1. 14 dollars
2. 7 dollars
3. 9 dollars

Task E

1. x is the unknown number, such as the price of one item in dollars.
2. For 3x + 2 = 14 subtract 2 then divide by 3. For 3(x + 2) = 15 divide by 3 first then subtract 2.
3. Add 3 to a number first, then double the result to get 16.
4. Let x = notebook price. 5x + 2 = 27, so x = 5, or $5.
5. The mistake is subtracting 4 instead of dividing by 4. Divide first: x + 1 = 5, so x = 4.
6. Example: Five identical pens plus a $2 fee total $27. One pen costs $5 because 5 × 5 + 2 = 27.

Task F

1. A = 7; arrows at 5
2. B = 2.5; arrows at 3.5

Task G

1. 5 miles
2. $3.50

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