

Chapter 4 Sixth Grade

Properties of Equality

Equation – A sentence that uses an equal sign = to show that two expressions have the same value.
Think of an equation as a balance beam with an = in the center.

5 + 7 = 12

Properties of Equality

You can add or subtract the same amount to/from both sides of an equation.
 $5 + 7 + 10 = 12 + 10$ or $5 + 7 - 11 = 12 - 11$

You can multiply or divide both sides of an equation by the same non-zero amount.
 $(5 + 7) \times 4 = 12 \times 4$ or $(5 + 7) \div 2 = 12 \div 2$

Solving Equations

Use the inverse operation to isolate the variable.
Inverse Operation – Opposite operation with *the same number*.
Isolate the Variable – Get the variable alone on one side of the equal sign.

<p style="text-align: center;"><u>Example 1</u></p> $6 + x = 20$ The variable x is with + 6. The inverse operation is - 6. Subtract 6 from <i>both sides</i> . $6 + x - 6 = 20 - 6$ The 6s on the left disappear. $x = 14$.	<p style="text-align: center;"><u>Example 2</u></p> $g - 11 = 20$ The variable g is with - 11. The inverse operation is + 11. Add 11 to <i>both sides</i> . $g - 11 + 11 = 20 + 11$ The 11s on the left disappear. $g = 31$.
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Writing Equations

Addition and subtraction equations have 3 numbers, 1 operation, and an equal sign. Think of a fact family:

$10 + 5 = 15$ $15 - 5 = 10$
 $5 + 10 = 15$ $15 - 10 = 5$

Determine which of the 3 numbers is unknown; make that the variable.
 Draw diagrams to help.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">16 games in the NFL season</td> </tr> <tr> <td style="width: 50%; text-align: center;">4 games played</td> <td style="width: 50%; text-align: center;">Games remaining = g</td> </tr> </table>	16 games in the NFL season		4 games played	Games remaining = g	$4 + g = 16$ or $16 - 4 = g$ $g = 12$ games remaining.
16 games in the NFL season					
4 games played	Games remaining = g				

Solving Equations

Use the inverse operation to isolate the variable.
Inverse Operation – Opposite operation with *the same number*.
Isolate the Variable – Get the variable alone on one side of the equal sign.

<p style="text-align: center;"><u>Example 1</u></p> $5y = 20$ The variable y is with $\times 5$. The inverse operation is $\div 5$. Divide by 5 on <i>both sides</i> . $5y \div 5 = 20 \div 5$ The 5s on the left disappear. $y = 4$	<p style="text-align: center;"><u>Example 2</u></p> $m \div 8 = 3$ The variable m is with $\div 8$. The inverse operation is $\times 8$. Multiply <i>both sides</i> by 8. $m \div 8 \times 8 = 3 \times 8$ The 8s on the left disappear. $m = 24$
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Writing Equations

Multiplication and division equations have 3 numbers, 1 operation, and an equal sign. Think of a fact family:

$10 \times 5 = 50$ $50 \div 5 = 10$
 $5 \times 10 = 50$ $50 \div 10 = 5$

Determine which of the 3 numbers is unknown; make that the variable.
 Draw diagrams to help.

Example: 180 days in the school year.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="4" style="text-align: center;">180 days in the school year</td> </tr> <tr> <td style="width: 25%; text-align: center;">q</td> <td style="width: 25%; text-align: center;">q</td> <td style="width: 25%; text-align: center;">q</td> <td style="width: 25%; text-align: center;">q</td> </tr> </table>	180 days in the school year				q	q	q	q	4 quarters. $4q = 180$ $4q \div 4 = 180 \div 4$ $q = 45$ days
180 days in the school year									
q	q	q	q						