Lesson 19: Rearranging Formulas

Classwork

Exercise 1

Solve each equation for $x$*.* For part (c), remember a variable symbol, like $a$, $b$, and $c,$ represents a number.

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| --- | --- | --- |
| * 1. $2x-6=10$
 | * 1. $-3x-3=-12$
 | * 1. $ax-b=c$
 |

Exercise 2

Compare your work in parts (a) through (c) above. Did you have to do anything differently to solve for $x$ in part (c)?

Exercise 3

Solve the equation $ax-b=c$ for $a$. The variable symbols $x$, $b$, and $c$ represent numbers.

Example 1: Rearranging Familiar Formulas

a. The formula for area is $A=lw$. Rearrange the area formula to solve for $l$.

b. The perimeter formula for a rectangle is $p=2(l+w)$ where $p$ represents the perimeter, $l$ represents the length, and $w$ represents the width. Rearrange the perimeter formula to solve for $l$.

c. The area formula for a triangle is $A=\frac{1}{2}bh$ , where $A$ represents the area; $b$ represents the length of the base, and $h$ represents the height. Rearrange the area formula to solve for *h*.

**Exercise 4**

Rearrange each formula to solve for the specified variable. Assume no variable is equal to $0$.

1. Given $ A=P(1+rt)$,
2. Solve for $P$. ii. Solve for $t$.
3. Given $K=\frac{1}{2}mv^{2}$,
4. Solve for $m$. Ii. Solve for $v$.

**Example 2: Comparing Equations with one Variable to those with more than one Variable**

|  |  |
| --- | --- |
| **Equation Containing More Than One Variable** | **Related Equation** |
| Solve $ax+b=d –cx$ for $x$. | Solve $3x+4=6-5x$ for $x$. |
| Solve for $x$.$$\frac{ax}{b}+\frac{cx}{d}=e$$ | Solve for $x$.$$\frac{2x}{5}+\frac{x}{7}=3$$ |

Lesson Summary

The properties and reasoning used to solve equations apply regardless of how many variables appear in an equation or formula. Rearranging formulas to solve for a specific variable can be useful when solving applied problems.

Problem Set

Solve each equation for $x$.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. $ax+3b=2f$
 | 1. $rx+h=sx-k$
 | 1. $3px=2q(r-5x)$
 | 1. $\frac{x+b}{4}=c$
 |
| 1. $\frac{x}{5}-7=2q$
 | 1. $\frac{x}{6}-\frac{x}{7}=ab$
 | 1. $\frac{x}{m}-\frac{x}{n}=p$
 | 1. $\frac{3ax+2b}{c}=4d$
 |
| 1. Solve for $m$.

$$t=\frac{ms}{m+n}$$ | 1. Solve for $u$.

$$\frac{1}{u}+\frac{1}{v}=\frac{1}{f}$$ | 1. Solve for $s$.

$$A=s^{2}$$ | 1. Solve for $h$.

$$V=πr^{2}h$$ |
| 1. Solve for $m$.

$$T=4\sqrt{m}$$ | 1. Solve for $d$.

$$F=G\frac{mn}{d^{2}}$$ | 1. Solve for $y$.

$$ax+by=c$$ | 1. Solve for $b\_{1}$

$$A=\frac{1}{2}h\left(b\_{1}+b\_{2}\right)$$ |

1. The science teacher wrote three equations on a board that relate velocity$, v$, distance traveled, $d$, and the time to travel the distance$, t,$ on the board.

|  |  |  |
| --- | --- | --- |
| $$v=\frac{d}{t}$$ | $$t=\frac{d}{v}$$ | $$d=vt$$ |

 Would you need to memorize all three equations or could you just memorize one? Explain your reasoning.