Algebra 1 Name:

1.4 Explain - Rewriting Equations and Formulas - Notes

Essential Question: How can you use a formula for one measurement to write a formula for a different measurement?

Main Idea/Questions	Notes/Examples
What You Will Learn	• Rewrite literal equations • Rewrite and use formulas for area • Rewrite and use other common formulas
Vocabulary	**Definition:** an equation that has two or more variables **Practice:** Determine if the following are literal equations. Explain your answer. 1. $A = \frac{1}{2}bh$ yes it has more than one variable 2. $3x + 14 = -21$ No. only variable is x. 3. $3x - 2y = -12$ yes. More than 1 variable (x & y)
Rewriting Literal Equations	**Practice:** Solve the following literal equations for the indicated variable. 4. $3y + 4x = 9$, solve for y ← Not like terms. Don't combine! $-4x \quad -4x$ $\frac{3y}{3} = \frac{-4x}{3} + \frac{9}{3}$ $y = -\frac{4}{3}x + 3$ 5. $20x + 5y = 15$, solve for y ← Not like terms. Don't combine $-20x \quad -20x$ $\frac{5y}{5} = \frac{-20x}{5} + \frac{15}{5}$ $y = -4x + 3$ 6. $6x - 3y = -6$, solve for y $-6x \quad -6x$ $\frac{-3y}{-3} = \frac{-6x}{-3} - \frac{6}{-3}$ $y = 2x + 2$ 7. $y = 3x + 5z$, solve for x ← Box x! $-5z \quad -5z$ $\frac{y - 5z}{3} = \frac{3x}{3}$ $\frac{1}{3}y - \frac{5}{3}z = x$
Rewriting and Using Formulas for Area	**Practice:** Solve the following area formulas for the indicated variable. 8. $S = \pi r^2 + \pi rl$, solve for l ← Box l. $-\pi r^2 \quad -\pi r^2$ $\frac{S - \pi r^2}{\pi r} = \frac{\pi rl}{\pi r}$ $\frac{S}{\pi r} - \frac{\pi r^2}{\pi r} = l$ 9. $A = \frac{1}{2}bh$ solve for h ← Box h (2) (2) ← Mult. by denominator $2A = bh$ $\frac{2A}{b} = \frac{bh}{b}$ ← ÷ by b (its inside box) $\frac{2A}{b} = h$

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10. The formula for a pitcher's earned run average, or ERA, is $a = \frac{9r}{p}$ where a is the earned runaverage, r is earned runs, and p is innings pitched.

a) Solve the formula for r.

$(p)a = \frac{9r}{p}(p)$

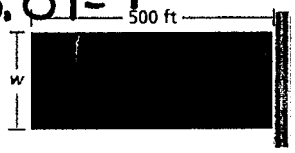
$ap = 9r \rightarrow \frac{ap}{9} = r$

b) Find the earned runs for a pitcher with an ERA of 2.63 who has pitched 89 innings.

$\frac{2.63(89)}{9} = r$

$26.01 = r$

11. You own a rectangular lot that is 500 feet deep. It has an area of 100,000 square feet. To pay for a new water system, you are assessed $5.50 per foot of lot frontage.



a) Find the frontage of your lot.

$A = l \cdot w$

$\frac{100{,}000}{500} = \frac{500w}{500}$

$200\text{ ft} = w$

b) How much are you assessed for the new water system?

$\$5.50(200\text{ ft}) = \$1100$

Rewriting and Using Other Common Formulas

Common Formulas:

Temperature:	Simple Interest:	Distance:
$C = \frac{5}{9}(F - 32)$	$I = Prt$	$d = rt$
C = degrees Celsius	I = interest	d = distance
F = degrees Farenheit	P = principal	r = rate
	r = annual interest rate	t = time
	t = time (years)	

12. A fever is generally considered to be a body temperature greater than 100°F. Your friend has a temperature of 37°C. Does your friend have a fever?

$(9)\ 37° = \frac{5}{9}(F-32)(9)$

$333 = 5(F-32)$

$333 = 5F - 160$

$+160 \quad +160$

$493 = 5F$

$\frac{493}{5} = \frac{5F}{5}$

$F = 98.6$

Not a fever! ($< 100°$)

13. You deposit $5000 in an account that earns simple interest. After 6 months, the account earns $162.50 in interest. What is the annual interest rate?

$\frac{I}{Pt} = \frac{Prt}{Pt}$

$\frac{I}{Pt} = r$

$\frac{162.50}{(5000)(.5)} = r \rightarrow .065 = r \rightarrow 6.5\%$

↳ 6 months = ½ year

14. A truck driver averages 60 miles per hour while delivering freight to a customer. On the return trip, the driver averages 50 miles per hour due to construction. The total driving time is 6.6 hours. How long does each trip take?

$\frac{d}{r} = \frac{rt}{r}$ $\quad \frac{d}{r} = t$ $\quad \frac{d}{60} + \frac{d}{50} = 6.6$

$(300)\frac{11d}{300} = 6.6(300)$

$\frac{11d}{11} = \frac{1980}{11}$

$d = 180$

deliv. $\frac{180}{60} = 3$

return $\frac{180}{50} = 3.6$

Name:_____ Class:_____Calc:_____

1.4 Assignment – Rewriting Equations and Formulas

Video Notes: https://www.youtube.com/watch?v=CMLhe36kAio

In Exercises 1–6, solve the literal equation for *y*.

1. $4x + y = 7$

2. $y - 5x = 9$

3. $3y - 15x = 12$

4. $8x + 2y = 18$

5. $7x - y = 35$

6. $4x + 1 = 9 + 4y$

7. $(y - 3) = \frac{1}{2}(6x + 4)$

In Exercises 8–10, solve the literal equation for *x*.

8. $y = 5x - 2x$

9. $r = x + 9x$

10. $b = 3x + 9xy$

In Exercises 11–13, solve the formula for the indicated variable.

11. Force: $f = ma$; Solve for m.

12. Volume of a cylinder: $V = \pi r^2 h$; Solve for r.

13. Perimeter of a triangle: $P = a + b + c$; Solve for b.

14. The total cost C (in dollars) to participate in a triathlon series is given by the literal equation $C = 90x + 35$, where x is the number of triathlons in which you participate.

a. Solve the equation for x.

b. In how many triathlons do you participate if you spend a total of:

$305?

$665?

c. If your maximum annual triathlon cost is $1000, what is the maximum number of triathlons in which you could participate?

15. You deposit $1500 in an account that earns simple interest at an annual rate of 3%.

a. How long must you leave the money in the account to earn $900 in interest?

b. The total amount (principle plus interest) in an account earning simple interest after t years is given by the formula $A = p + prt$. How much is in the account after 5 years?

c. Solve the equation in part (b) for p.

16. Solve: $2 - 3y < 14$

17. Solve: $-6(a + 2) > 6$