

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Notes: Writing and Solving Equations

Do Now: Solve for  $y_2$  in terms of  $m, y_1, x_1,$  and  $x_2$  the equation

get alone  $(x_2 - x_1)m = \frac{y_2 - y_1}{x_2 - x_1} (x_2 - x_1)$

$$m(x_2 - x_1) = y_2 - y_1$$

$+y_1$                        $+y_1$

$$mx_2 - mx_1 + y_1 = y_2$$

## What Should I Be Able to Do?

- I can define a variable within context of a question using a "let" statement.
- I can write a one or two variable equation within a given context.
- I can solve a one variable equation within a given context.

1) Devlin's baseball team is purchasing jerseys. The company charges \$300 for a onetime set-up fee and \$34 for each printed jersey. If the baseball team spends a total of \$1,014, write an equation to represent the given situation.

let  $x =$  number of jerseys ordered

$$34x + 300 = 1014$$

2) Kai and Brett are brothers. Kai is 5 years less than twice Brett's age,  $x$ . The sum of Kai's age and Brett's age is 68. Write an equation that represents this relationship and solve to find each brother's age.

let  $x =$  Brett's age  
 $2x - 5 =$  Kai's age

$$x + (2x - 5) = 68$$

3) Jim is a furniture salesman. His weekly pay is \$300 plus 3.5% of his total sales for the week. Jim sells  $x$  dollars' worth of furniture during the week. Write an equation which can be used to determine his pay for the week,  $y$ .

$$y = 300 + 0.035x$$

Use this equation to determine Jim's pay to the nearest cent for a week when his sales total \$8250.

$$y = 300 + 0.035(8250)$$

$$y = \$588.75$$

Ian is borrowing \$1000 from his parents to buy a notebook computer. He plans to pay them back at the rate of \$60 per month. Ken is borrowing \$600 from his parents to purchase a snowboard. He plans to pay his parents back at the rate of \$20 per month.

Write an equation that can be used to determine after how many months the boys will owe the same amount.

$$1000 - 60x = 600 - 20x$$

same means =  
Ian = Ken

Determine algebraically and state in how many months the two boys will owe the same amount. State the amount they will owe at this time.

$$\begin{aligned} 1000 - 60x &= 600 - 20x \\ -600 + 60x &-600 + 60x \end{aligned}$$

$$\frac{400}{40} = \frac{40x}{40}$$

$$x = 10$$

10 weeks

Ian claims that he will have his loan paid off 6 months after he and Ken owe the same amount. Determine and state if Ian is correct. Explain your reasoning.

When Ken and Ian owe the same amount, they both owe \$400.

$$\frac{400}{60} = \frac{60x}{60} \quad x = 6.\bar{6} \text{ months}$$

Ian will **NOT** have his loan paid off 6 months after he and Ken owe the same amount as he will have it paid off 6. $\bar{6}$  months after.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Classwork: Solving Equations

1) Nicci's sister is 7 years less than twice Nicci's age,  $a$ . The sum of Nicci's age and her sister's age is 41. Write and solve an equation to find the age of both Nicci and her sister.

let  $a$  = Nicci's age  
Nicci's sister =  $2x - 7$

$$x = 16$$

$$(2x - 7) + x = 41$$
$$3x - 7 = 41$$
$$3x = 48$$

Nicci is 16  
Nicci's sister is 15

$$2(16) - 7 = 15$$

2) Alex is selling tickets to a school play. An adult ticket costs \$6.50 and a student ticket costs \$4.00. Alex sells  $x$  adult tickets and 12 student tickets. Write an equation to represent how much money,  $y$ , Alex collected from selling tickets.

$$6.5x + 4(12) = y$$

3) Kendal bought  $x$  boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes,  $x$ , Kendal bought?

(1)  $2x - 12 = 60$

(3)  $12x - 24 = 60$

(2)  $12x - 2 = 60$

(4)  $24 - 12x = 60$

let  $x$  = number of boxes Kendal bought

$$12x - 24 = 60$$

cookies bought  
cookies kept

cookies at party

4) To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is \$3.00 and the cost of a student ticket is \$1.50. If the number of adult tickets sold is represented by  $a$  and student tickets sold by  $s$ , which expression represents the amount of money collected at the door from the ticket sales?

(1)  $4.50as$

(3)  $(3.00a)(1.50s)$

(2)  $4.50(a + s)$

(4)  $3.00a + 1.50s$

the first 3 are  
not counted  
into T  
↳

5) Julie averaged 85 on the first three tests of the semester in her mathematics class. If she scores 93 on each of the remaining tests, her average will be 90. Which equation could be used to determine how many tests,  $T$ , are left in the semester?

- (1)  $\frac{255 + 93T}{3T} = 90$       (3)  $\frac{255 + 93T}{T + 3} = 90$   
~~(2)  $\frac{255 + 90T}{3T} = 93$~~       ~~(4)  $\frac{255 + 90T}{T + 3} = 93$~~

$$\frac{85(3) + 93T}{T + 3} = 90$$

6) Donna wants to make trail mix made up of almonds, walnuts and raisins. She wants to mix one part almonds, two parts walnuts, and three parts raisins. Almonds cost \$12 per pound, walnuts cost \$9 per pound, and raisins cost \$5 per pound.

Donna has \$15 to spend on the trail mix. Determine how many pounds of trail mix she can make. [Only an algebraic solution can receive full credit.]

let  $p$  = number of pounds

$$1(12)p + 2(9)p + 3(5)p = 15$$

$$12p + 18p + 15p = 15$$

$$45p = 15$$

$$p = \frac{1}{3}$$

$\frac{1}{3}$  pounds

7) John has four more nickels than dimes in his pocket, for a total of \$1.25. Which equation could be used to determine the number of dimes,  $x$ , in his pocket?

- (1)  $0.10(x + 4) + 0.05(x) = \$1.25$   
 (2)  $0.05(x + 4) + 0.10(x) = \$1.25$   
 (3)  $0.10(4x) + 0.05(x) = \$1.25$   
 (4)  $0.05(4x) + 0.10(x) = \$1.25$

$x \rightarrow 0.10$

4 more nickels than dimes  
 $x + 4 \rightarrow$  nickels  $\rightarrow 0.05$

8) Caitlin has a movie rental card worth \$250. Each movie costs \$6.00 to rent. Caitlin plans on renting one movie every week. Write and solve an equation to find how many weeks in a row Caitlin can afford to rent a movie, using her rental card only.

let  $x$  = number of movies Caitlin rents

$$\frac{250}{6} = \frac{6x}{6} \quad x = 41.\bar{6}$$

$\therefore$  41 weeks

9) The amount Mike gets paid weekly can be represented by the expression  $2.50a + 290$ , where  $a$  is the number of cell phone accessories he sells that week. What is the constant term in this expression and what does it represent?

- (1)  $2.50a$ , the amount he is guaranteed to be paid each week
- (2)  $2.50a$ , the amount he earns when he sells  $a$  accessories
- (3) 290, the amount he is guaranteed to be paid each week
- (4) 290, the amount he earns when he sells  $a$  accessories

10) Mallory wants to buy a new window air conditioning unit. The cost for the unit is \$329.99. If she plans to run the unit three months out of the year for an annual operating cost of \$108.78, which equation models the cost per year over the lifetime of the unit,  $y$ , in terms of the number of years  $n$ , that she owns the air conditioner.

- (1)  $y = 329.99 + 108.78n$
- (2)  $y = 329.99 + 326.34n$
- (3)  $y = \frac{329.99 + 108.78n}{n}$
- (4)  $y = \frac{329.99 + 326.34n}{n}$

one time fee  $\rightarrow$   $329.99 + 108.78n$

Cost per year

$n$   $\uparrow$  to average the cost

11) Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min.

If  $t$  represents the number of minutes on the treadmill and  $b$  represents the number of minutes on the stationary bike, which expression represents the number of Calories that Konnor can burn on the stationary bike?

- (1)  $b$
- (2)  $5b$
- (3)  $45 - b$
- (4)  $250 - 5b$