

Word problems with variables on both sides

Name:

For each word problem, write an algebraic equation using the given variable. Solve showing algebraic steps.

1. Container A and container B have leaks. Container A has 800 ml of water, and is leaking 6 ml per minute. Container B has 1000 ml, and is leaking 10 ml per minute. How many minutes, m , will it take for the two containers to have the same amount of water? $x = \text{minutes}$, $y = \text{ml of water}$

<u>A</u>	<u>B</u>
$y = -6x + 800$	$y = -10x + 1000$
$-6x + 800 = -10x + 1000$	
$+10x$	$+10x$
$4x + 800 = 1000$	
-800	-800
$4x = 200$	
$\frac{4x}{4} = \frac{200}{4}$	
$x = 50$	

<u>A</u>	<u>B</u>
$-6(50) + 800$	$-10(50) + 1000$
$-300 + 800$	$-500 + 1000$
<u>500</u>	<u>500</u>
50 minutes	500 ml

2. Tim is choosing between two cell phone plans that offer the same amount of free minutes. Cingular's plan charges \$39.99 per month with additional minutes costing \$0.45. Verizon's plan costs \$44.99 with additional minutes at \$0.40. How many additional minutes, a , will it take for the two plans to cost the same? $x = \text{minutes}$, $y = \text{bill}$

<u>C</u>	<u>V</u>
$y = .45x + 39.99$	$y = .40x + 44.99$
$.45x + 39.99 = .40x + 44.99$	
$-.40x$	$-.40x$
$.05x + 39.99 = 44.99$	
-39.99	-39.99
$.05x = 5$	$x = 100$
$\frac{.05x}{.05} = \frac{5}{.05}$	

<u>C</u>
$.45(100) + 39.99$
$45 + 39.99 = 84.99$
<u>V</u>
$.40(100) + 44.99$
$40 + 44.99 = 84.99$

3. The cost to purchase a song from iTunes is \$0.99 per song. To purchase a song from Napster, you must be a member. The Napster membership fee is \$10. In addition, each purchased song costs \$0.89. How many downloaded songs, d , must be purchased for the monthly price of Napster to be the same as iTunes? $x = \text{songs}$, $y = \text{cost}$

<u>I</u>	<u>N</u>
$y = .99x$	$y = .89x + 10$
$.99x = .89x + 10$	
$-.89x$	$-.89x$
$.10x = 10$	
$\frac{.10x}{.10} = \frac{10}{.10}$	
$x = 100$	

<u>I</u>	<u>N</u>
$.99(100)$	$.89(100) + 10$
$\$99$	$89 + 10$
$\$99$	$\$99$

4. Container A has 200 L of water, and is being filled at a rate of 6 liters per minute. Container B has 500 L of water, and is being drained at 6 liters per minute. How many minutes, m , will it take for the two containers to have the same amount of water? $x = \text{minutes}$, $y = \text{ml of water}$

<u>A</u>	<u>B</u>
$y = 6x + 200$	$y = -6x + 500$
$6x + 200 = -6x + 500$	
$+6x$	$+6x$
$12x + 200 = 500$	
-200	-200
$12x = 300$	
$\frac{12x}{12} = \frac{300}{12}$	
<u>$x = 25$</u>	

<u>A</u>
$6(25) + 200 = 150 + 200$
$= 350$
<u>B</u>
$-6(25) + 500 = -150 + 500$
$= 350$

5. UPS charges \$7 for the first pound, and \$0.20 for each additional pound. FedEx charges \$5 for the first pound and \$0.30 for each additional pound. How many pounds, p , will it take for UPS and FedEx to cost the same? $x = \text{pounds}$, $y = \text{cost}$

<u>U</u>	<u>F</u>
$y = .20x + 7$	$y = .30x + 5$
$.20x + 7 = .30x + 5$	
$-.30x$	$-.30x$
$-.10x + 7 = 5$	
-7	-7
$-.10x = -2$	
$\frac{-.10x}{-.10} = \frac{-2}{-.10}$	
$x = 20$	

<u>U</u>	<u>F</u>
$.20(20) + 7 = 4 + 7 = 11$	$.30(20) + 5 = 6 + 5 = 11$
$20 \text{ pounds } \& \$11$	

6. A twelve inch candle and an 18 inch candle are lit at 6pm. The 12-in. candle burns 0.5 inches every hour. The 18 inch candle burns two inches every hour. At what time will the two candles be the same height? Let h represent the number of hours. $x = \text{hours}$, $y = \text{inches}$

<u>12-in</u>	<u>18-in</u>
$y = -.5x + 12$	$y = -2x + 18$
$-.5x + 12 = -2x + 18$	
$+2x$	$+2x$
$1.5x + 12 = 18$	
-12	-12
$1.5x = 6$	
$\frac{1.5x}{1.5} = \frac{6}{1.5}$	
$x = 4$	

<u>12-in</u>
$-.5(4) + 12 = -2 + 12 = 10$
<u>18-in</u>
$-2(4) + 18 = -8 + 18 = 10$
4 hours after 6pm, 10 inches.