

Algebra II

Worksheet: Word Problems 5.8 & 5.9

For each problem, complete the following steps.

- Define a variable.
- Organize the given information. You may need to create a table(*) or draw a diagram.
- Write an equation using your variable.
- Solve your equation.
- Check your solution using your calculator.
- Use a complete sentence to answer the question.

Chemistry/Solution Questions: Key formula is Concentration * amt solution = amt. stuff

Table Headings: Complete the three column headings. Circle the columns where you will be able to add the top rows to equal the third.

	Concentration	amt solution	amt stuff
Solution 1			
Solution 2			
Result			

Work Problems: Key formula is rate * time = Work. A completed job is work equal to 1.

Table Headings: Complete the three column headings.

	rate	time	Work
Thing 1			1
Thing 2			1

Distance Problems: Key formula is rate * time = distance

Table Headings: Complete the three column headings. Circle the columns where you will be able to add the first two rows to equal the third.

	rate	time	distance
Part 1			
Part 2			
Total Trip			

1. How much pure alcohol must be added to 15 ounces of a 60% solutions to make it a 70% solution?

Concentration * amt solution = amount stuff

	Concentration	amt solution	amount stuff	
start	.60	15 ounces	$(.60)(15) = 9$	$x = \text{amt alcohol}$
add	1.00	x ounces	1x	$9 + x = .7(15 + x)$
Result	.70	15 + x	$.70(15 + x)$	$9 + x = 10.5 + .7x$

$.3x = 1.5$
 $x = 5$

2. How many gallons of cream that is 23% fat should be added to milk that is 3% fat to make 30 gallons of milk that is 4% fat?

Concentration * amt milk = amount stuff

	Concentration	amt milk	amount stuff	
start	.03	30 - x	$.03(30 - x)$	$x = \text{amt}$
add	.23	x	$.23x$	23%
	.04	30	1.2	$.03(30 - x) + .23x = 1.2$

$.9 - .03x + .23x = 1.2$
 $.2x = .3$
 $x = 1.5$

Add
5oz.

Add
1.5 gal

3. Bonnie can complete her paper route in 45 minutes. When her sister Jean helps her, it takes the two of them 18 minutes to complete the work. How long would it take Jean working alone to complete the route?

30 min

	rate	time	work
Bonnie	$\frac{1}{45}$	45 min	1
Sis	$\frac{1}{x}$	x min	1

x = time for sis alone

$$\left(18 \cdot \frac{1}{45} + 18 \cdot \frac{1}{x} = 1\right)(45x)$$

$$18x + 810 = 45x$$

$$810 = 27x$$

$$30 = x$$

4. Lenny can paint a room in 3 hours, and Joe can paint the same room in 5 hours. How long will it take them to paint the room if they work together?

	rate	time	work
Lenny	$\frac{1}{3}$	3	1
Joe	$\frac{1}{5}$	5	1

x = time to work together

$$\left(\frac{1}{3} \cdot x + \frac{1}{5} \cdot x = 1\right)(15)$$

$$5x + 3x = 15$$

$$8x = 15$$

$$x = 1.875$$

1.875 hours

5. An express train travels 150 km in the same time that a freight train travels 100 km. The average speed of the freight train is 20 km/h less than that of the express train. Find the speed of each train.

	rate	time	distance
Express	x	$\frac{150}{x}$	150 km
Freight	x-20	$\frac{100}{x-20}$	100 km

x = Speed of Express

$$150(x-20) = 100x$$

$$150x - 3000 = 100x$$

$$50x = 3000$$

$$x = 60$$

Express: 600 km/hr
Freight: 400 km/hr

$$\left(\frac{150}{x} = \frac{100}{x-20}\right)(x)(x-20)$$

6. Helen can ride 15 km on her bicycle in the same time it takes her to walk 6 km. If her rate riding is 6 km/h faster than her rate walking, how fast does she walk?

	rate	time	distance
Ride	x+6	$\frac{15}{x+6}$	15 km
Walk	x	$\frac{6}{x}$	6 km

x = walking speed

$$15x = 6(x+6)$$

$$15x = 6x + 36$$

$$9x = 36$$

$$x = 4$$

$$\left(\frac{15}{x+6} = \frac{6}{x}\right)(x)(x+6)$$

She walks at 4 km/hr