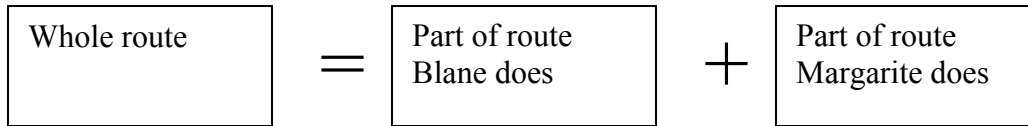


Remember to define your variable specifically. Write a verbal model before you attempt to form an equation. Then form the equation and solve it. Circle and label your final answer.

1. Blane has a paper route which he can finish in 3 hours. Margarite can finish the same paper route in 4 hours. Today, Margarite is going to help Blane with the paper route. If they work together, how long will it take them to finish the paper route?

Let x = the number of hours it takes them to complete route together.



$$1 = \frac{x}{3} + \frac{x}{4}$$

$$12 = 4x + 3x$$

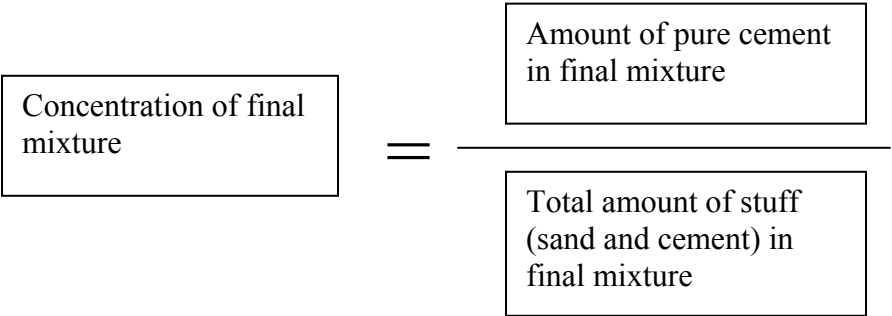
$$12 = 7x$$

$$1.71 = x$$

Blane can do one-third of the route in one hour. So, in x hours, he can do “ x thirds” of the route. Likewise, Margarite finishes “ x fourths” of the route in this time. Once we have the equation, multiplying all three terms by 12 eliminates the fractions. Do this and the x is easier to unbury. So it will take Blane and Margarite 1.71 hours to finish the route together.

2. A 30 gallon barrel of Economy brand cement contains 25% cement and 75% sand. How much pure cement should we add to this barrel so that the mixture is 35% cement?

Let x = number of gallons of pure cement we’re adding



$$.35 = \frac{7.5 + x}{30 + x}$$

$$.35(30 + x) = 7.5 + x$$

$$10.5 + .35x = 7.5 + x$$

$$3 = .65x$$

$$4.62 = x$$

The original barrel (30 gallons of 25% solution) contains 7.5 gallons of pure cement -- that’s 25% of 30 gallons. To this, we are adding x gallons of pure cement. So the final mixture has “ $7.5 + x$ ” gallons of pure cement. To figure the total amount of sand and cement, picture the 30 gallons and to it, we add x gallons. So the total amount of stuff is “ $30 + x$ ”. Multiply both sides by “ $30 + x$ ” to eliminate the fraction. Then distribute the .35 on the left. Solve by isolating the terms with x . So if we add 4.62 gallons of pure cement to the 30 gallon barrel, we’ll end up with a 35% cement solution.

3. A U.N. plane goes to and from a remote island using the same route. When the plane goes to the island, the wind is behind them pushing them along. When the plane returns from the island, it is flying into the wind and so is slowed down by it. The plane, in steady air, travels at 40 miles per hour. If the trip to the island takes 3 hours and the trip from the island takes 4 ½ hours, what is the wind speed?

Let x = wind speed

Distance to island	=	Distance from island
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$$(40 + x) * 3 = (40 - x) * 4.5$$

$$120 + 3x = 180 - 4.5x$$

$$7.5x = 60$$

$$x = 8$$

Distance equals rate times time. Multiply their rate (in miles per hour) by the time it took them (in hours). When they are flying toward the island, with the wind, their plane's speed of 40 mph is sped up by the wind. So they are going 40 mph plus whatever the wind contributes. When they are flying away from the island, they are flying into the wind. So the 40 mph their plane would be going is decreased by the wind speed. Their speed, returning from the island, is found by subtracting the wind speed from the 40 mph. Distribute on both sides and solve for x . The wind speed is 8 mph.

4. A bookstore sells their merchandise for what they paid plus 27%. If I bought a book there for \$38, how much did the bookstore pay for it?

Let x = price bookstore paid

My price	=	Bookstore's price	+	27 % of bookstore's price
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$$38 = x + .27x$$

$$38 = 1.27x$$

$$29.92 = x$$

First, "27% of the bookstore's price" means to find "27% of x ". We do this by multiplying .27 by x . The right side can be thought of as " $1x + .27x$ " which is $1.27x$. Then divide by 1.27 to find that the bookstore paid \$29.92 for the book.

An alternative verbal model could be

My price	=	127 % of bookstore's price
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This verbal model would lead directly to the line $38 = 1.27x$.

5. Stella and Maria are going into business together. They are each going to borrow money so that they end up with a total of \$5000. Stella borrows her money from her brother who charges 7% simple interest. Maria borrows the money from a bank which charges her 16% simple interest. If they end up paying a total of \$530 in interest, how much has each woman borrowed?

Let x = amount Stella borrowed.

So $5000 - x$ = amount Maria borrowed

Total interest	=	Interest from Stella's loan	+	Interest from Maria's loan
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$$530 = .07x + .16(5000 - x)$$

$$530 = .07x + 800 - .16x$$

$$-270 = -.09x$$

$$3000 = x$$

Simple interest is found by multiplying amount times rate (in decimal form). Since 7% is .07 and 16% is .16, we'll use these decimal forms. Stella's interest is .07 times x , rate times amount. Maria's interest is her rate times her amount. But she borrowed " $5000 - x$ " dollars. So her interest is .16 times " $5000 - x$ ". We solve to find Stella borrowed \$3000. This leaves the remainder, \$2000, to be borrowed by Maria.

6. A city is planning to build a park which is surrounded by a fence. They are going to put their park in a long, skinny dilapidated lot. So the length will be three times as long as the width. They have a total area available of 5,000 square feet and they want to use all of it. Find the dimensions of the park. Also, tell how much fencing they will need. (In other words, find the dimensions and then the perimeter.)

Let x = width

So $3x$ = length

Area	=	Width	*	Length
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$$5000 = x(3x)$$

$$5000 = 3x^2$$

$$1666.67 = x^2$$

$$\pm 40.82 = x$$

$$40.82 = x$$

The area should be 5000. So set that equal to the product of the width and the length. Then solve for x . Technically, you get ± 40.82 but because x is width and cannot be negative, we disregard the negative answer. So the width is 40.82 feet. The length is three times the width, or 122.46 feet. This makes the perimeter (2 times the width plus 2 times the length) equal to 326.56 feet. So the park will be 40.82 by 122.46 feet. The city will need a total of 326.56 feet of fencing.