

## Warmup: Setting up Linear Systems | MPM2D

1) A chef is making dessert, and needs 100 mL of 12% cream (cream that contains 12% fat) for it to be perfect. However, she finds she only has some half-and-half cream (10% fat) and heavy cream (18% fat). How much of each type of cream she should she mix together?

Assign your variables:

Let  $x$  represent the mL of half-and-half

Let  $y$  represent the mL of heavy cream

Volume (mL)	10% Fat <del>5% Acid</del>	18% Fat <del>10% Acid</del>	12% <del>8% Mixture</del>
Liquid	$x$	$y$	100
Pure Fat	$0.1x$	$0.18y$	12
"She needs 100 mL in total"		"There would be 12% of 100 = <u>12</u> mL of pure <del>acid</del> fat in the final mixture."	
Equation:	$x + y = 100$ (1)		Equation: $0.1x + 0.18y = 12$ (2)

Solution: (1)  $\rightarrow y = 100 - x$

sub in (2)  $0.1x + 0.18(100 - x) = 12$

$$0.1x + 18 - 0.18x = 12$$

$$-0.08x + 18 = 12$$

$$-0.08x = -6$$

$$x = 75 \text{ mL}$$

$$y = 100 - 75$$

$$y = 25 \text{ mL}$$

Concluding Statement: She should mix 75 mL of half-and-half and 25 mL of heavy cream.

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2) Janelle traveled from Windsor to North Bay, a distance of 500 km. She went part of the way by train and the rest of the way by car. The train averaged 75 km/h and the car averaged 90 km/h. The entire trip took ~~10~~<sup>6</sup> hours. How many hours did she spend traveling by ~~bus~~<sup>train</sup>, and by car?

Assign your variables:

Let  $t$  be the hours travelled by train

Let  $c$  be the hours travelled by car.

→ distance = speed  $\times$  time

Vehicle	Distance (km)	Speed (km/h)	Time (h)
Train	$75t$	75	$t$
Car	$90c$	90	$c$
Total Time is <del>10</del> <sup>6</sup> hours		Total Distance is 500km	
Equation:	$t + c = 6$ (1)	Equation:	$75t + 90c = 500$ (2)

Solution:  $75t + 75c = 450$  (1)  $\times 75$

$75t + 90c = 500$  (2)

(2) - (1)  $15c = 50$

$c = 3.33 \text{ hours}$

sub in (1)  $t + 3.33 = 6$

$t = 2.67 \text{ hours}$

Concluding Statement: She travels 3.33 ( $3\frac{1}{3}$ ) hours by car and 2.67 ( $2\frac{2}{3}$ ) hours by train.