

October 16, 2017 Worksheet 4 Solutions.

1. $x =$ time to paint wall \Rightarrow ratio of $\frac{1}{x}$ is the fraction of wall painted.

2. Scores on midterms: 86, 75, 73. Final exam counts 2x as much as one midterm.
Final grade = 80.

Let x be the score on her final exam. We first need to determine the weight of the midterm and the final. Let y be the weight of the midterm.

$$\text{Then, } \underbrace{y + y + y}_{\text{Midterms}} + \underbrace{2y}_{\text{final}} = 1. \Rightarrow 5y = 1 \Rightarrow y = \frac{1}{5} = 20\%$$

Therefore, the final is worth $\frac{2}{5} = 40\%$ of the grade.

$$\begin{aligned} \text{So, the score she needs is: } & 0.2(86) + 0.2(75) + 0.2(73) + 0.4x = 80 \\ & 17.2 + 15 + 14.6 + 0.4x = 80 \\ & 0.4x = 33.2 \\ & x = \frac{33.2}{0.4} = 83. \end{aligned}$$

Thus she needs a score of 83 on her final.

3. Plumber = \$50/hour; Assistant = \$20/hour. Plumber works 2x as long.

Let x be the amount of time the plumber works. Then the assistant works $\frac{x}{2}$ hours.

$$\text{The labour bill: } 5400 = 50x + 20\left(\frac{x}{2}\right) = 50x + 10x = 60x$$

$$\Rightarrow x = \frac{5400}{60} = 90.$$

So, the plumber works 90 hours, and the assistant $\frac{90}{2} = 45$ hours.

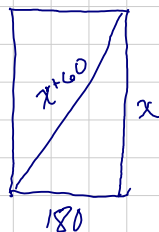
$$\text{We can check: } 90(50) + 45(20) = 5400 \checkmark.$$

4. Rectangle: 180 ft wide. Length of diagonal = 60 ft more than the length.

We need to use the Pythagorean Theorem.

Let x be the length of the parcel.

The diagonal is $x + 60$ ft long.



$$\begin{aligned} \text{Therefore } & 180^2 + x^2 = (x + 60)^2 \\ & 180^2 + x^2 = x^2 + 2(x)(60) + 60^2 \\ & 32400 + x^2 = x^2 + 120x + 3600 \end{aligned}$$

$$\Rightarrow 120x = 28800$$

$$x = \frac{28800}{120} = 240.$$

So the length is 240 ft.

We can check by using the Pythagorean theorem. The diagonal should be $240 + 60 = 300$ ft

$$240^2 + 180^2 = 57600 + 32400 = 90000. \quad \sqrt{90000} = 300, \text{ just as we wanted.}$$

5. Want 200 mL of 50% = 0.5 acid solution.

Mix 75% solution with 25% solution.
= 0.75 = 0.25.

Let x be the amount of 75% solution we need to mix. Since we need 200 mL, we need $200 - x$ of the 25% solution

$$0.75x + 0.25(200 - x) = 0.5(200)$$

$$0.75x + 50 - 0.25x = 100$$

$$0.5x = 50$$

$$x = 100 \text{ mL.}$$

6. Candy = 55 min, Tim = 95 min.

Rate of Candy = $\frac{1}{55}$; Rate of Time = $\frac{1}{95}$

$$\text{Rate together: } \frac{1}{55} + \frac{1}{95} = \frac{95}{5225} + \frac{55}{5225} = \frac{150}{5225}$$

Thus, they will complete the route in $1/\text{rate together} = \frac{5225}{150} = 34.83 \text{ min} \approx 35 \text{ min.}$