

HW #8 – ch. 2 problem #16-23 – SOLUTIONS

16. A baseball is on sale for 20% off. The regular price of the ball is \$6.75. Let x = sale price of the ball.

(a) Write a proportion relating 20, 6.75 and x . Solve for x .

$$\begin{aligned}\frac{100 - 20}{100} &= \frac{x}{6.75} \\ \frac{80}{100} &= \frac{x}{6.75} \\ 100x &= 80(6.75) \\ x &= 5.40\end{aligned}$$

(b) Using the fact that 20% = .20, write an equation (that is not a proportion) relating .20, 6.75 and x . Solve for x .

$$\begin{aligned}(1 - .20)6.75 &= x \\ .80(6.75) &= x \\ x &= 5.40\end{aligned}$$

(c) What is the sale price of the ball? \$5.40

17. A baseball is on sale for 20% off, which makes the sale price \$5.40. Let x = the regular price of the baseball.

(a) Write a proportion relating 20, 5.40 and x . Solve for x .

$$\begin{aligned}\frac{100 - 20}{100} &= \frac{5.40}{x} \\ \frac{80}{100} &= \frac{5.40}{x} \\ 100(5.40) &= 80x \\ x &= 6.75\end{aligned}$$

(b) Using the fact that 20% = .20, write an equation (that is not a proportion) relating .20, 5.40 and x . Solve for x .

$$\begin{aligned}(1 - .20)x &= 5.40 \\ .80x &= 5.40 \\ x &= 6.75\end{aligned}$$

(c) What is the regular price of the ball? \$6.75

18. The regular price of a baseball is \$6.75 and the sale price is \$5.40.

(a) Let x = the percentage off the regular price. Write a proportion relating 6.75, 5.40 and x . Solve for x .

$$\begin{aligned}\frac{100 - x}{100} &= \frac{5.40}{6.75} \\ \frac{100 - x}{100} &= \frac{5.40}{6.75} \\ 100(5.40) &= (100 - x)6.75 \\ 540 &= 675 - 6.75x \\ 6.75x &= 135 \\ x &= 20\end{aligned}$$

- (b) Let x = the decimal equivalent of the percentage off the regular price. Write an equation (that is not a proportion) relating 6.75, 5.40 and x . Solve for x .

$$\begin{aligned}(1 - x)6.75 &= 5.40 \\ 6.75 - 6.75x &= 5.40 \\ 6.75x &= 1.35 \\ x &= .20\end{aligned}$$

- (c) What is the percentage off? 20%

19. Sally's tuition went up 15% at the end of her first year. At the end of her second year, tuition went up 15% again. Sally says the total hike in tuition after two years is 30% of her original tuition. Is Sally correct? If so, prove it. If not, give a counterexample.

Let's say Sally's tuition is \$1000.

After first year her tuition is raised to $(1000)(1.15) = 1150$. After second year her tuition is raised to $(1150)(1.15) = 1322.5$. So her tuition raised \$322.50. If the raise were only 30%, the tuition would have been raised \$300. So Sally is incorrect.

Note that the reason you cannot add percents here is because the whole changes.

20. There are 40 students in Mr. Jones' class and 60 students in Ms. Frank's class. Max took a survey of the students to find out how popular peas are. He found that 20% of the students in Mr. Jones' class don't like peas and 25% of Ms. Frank's class don't like peas. Max told Mr. Jones' and Ms. Frank that 45% of the students don't like peas. Is Max correct? If yes, show it. If not, what percentage of the students do not like peas?

Number of students that don't like peas in Mr. Jones' class = $.20(40) = 8$

Number of students that don't like peas in Ms. Frank's class = $.25(60) = 15$

Total number of students that don't like peas = 23

So 23 out of 100 students don't like peas. In other words 23% of the students don't like peas.

21. Max also took a survey on favorite colors. He told the students they could only pick one favorite color. Max found that 20% of the students in Mr. Jones' class have favorite color red, while 35% have favorite color blue. Max concludes that 55% of Mr. Jones class have favorite color red or blue. Is Max correct? If yes, show it. If not, what percentage of the students have favorite color red or blue?

Number of students who like red = $.20(40) = 8$

Number of students who like blue = $.35(40) = 14$

Number of students who like red or blue = 22

Percentage of students who like red or blue = $22/40 = .55 = 55\%$.

So Max is correct, 55% of Mr. Jones' class likes red or blue.

22. Max surveyed residents in Snaketown. They found that 30% of the residents are employed in town, 50% are employed outside of town and 25% are unemployed. Max said the results cannot possibly be correct, but Molly said they look fine to her. Why would Max think these results don't make sense? Why would Molly think the results are fine?

Max doesn't think it makes sense because you can't have more than a 100% of Snaketown. However, Molly, realizes that perhaps some people work two jobs, so they are getting double counted which accounts for the percent adding up to more than 100.

23. In Coldtown, there are several fines residents must be prepared to pay. They are all based on your monthly salary. For example, the fine for leaving finger prints on store windows is 20% of your monthly salary, the fine for being noisy after 10PM is 50% of your monthly salary and the fine for not recycling is 40% of your monthly salary. If you are caught doing all three of these things in one month, then you would owe 110% of your monthly salary. Max says that this is not possible because 110% doesn't make sense. Is Max correct or not? Explain.

Max is incorrect. You can owe 110% of your salary, you might not have all the money right now, but it certainly makes sense to owe it.