

Percent

PH: Chapter 3

November 3, 2021

1 Percent

Find 63% of the number 90.

↑ ↓ ↑ ↓ ↑ ↓ ↑ ↓

? = 63% X 90

15 is what percent of 16.

↑ ↓ ↑ ↓ ↑ ↓ ↑ ↓ ↑ ↓

15 = ?% X 16

How many (what) percent of 83 is 36.

↑ ↓ ↑ ↓ ↑ ↓ ↑ ↓

?% X 83 = 36

2 Percent Change - basic relationship formulas

$$\text{Change} = \text{Final Value} - \text{Initial Value} \quad (1)$$

1. $\text{Change} > 0$ if it is an increase such as tax;
2. $\text{Change} < 0$ if it is a decrease such as a discount

Definition of percent change

$$\% \text{ Change} = \frac{\text{Change}}{\text{Initial}} \times 100\% \quad (2)$$

Percent change first is a fraction, equals to $\frac{\text{Change}}{\text{Initial}}$; then $\times 100\%$ to make denominator 100

Math Facts

$$\text{Change} = \text{Initial} \times \% \text{ Change} \quad (3)$$

- To find change, you must know or find initial value first.
- Percent Increase: $\% \text{ Change} > 0$
- Percent Decrease: $\% \text{ Change} < 0$

$$\% \text{ Change} = \frac{Final - Initial}{Initial} \times 100\% \quad (4)$$

$$\% \text{ Change} = \left(\frac{Final}{Initial} - \frac{Initial}{Initial} \right) \times 100\%$$

$$\% \text{ Change} = \frac{Final}{Initial} - 1 \quad (5)$$

$$1 + \% \text{ Change} \iff \frac{Final}{Initial}$$

$$Final = Initial \times (1 + \% \text{ Change}) \quad (6)$$

$$Initial = Final \div (1 + \% \text{ Change}) \quad (7)$$

$$Final = Initial \times (1 + \% \text{ Increase}) \quad (8)$$

$$Initial = Final \div (1 + \% \text{ Increase}) \quad (9)$$

$$Final = Initial \times (1 - \% \text{ Decrease}) \quad (10)$$

$$Initial = Final \div (1 - \% \text{ Decrease}) \quad (11)$$

3 Words

- discount: % *decrease*
- tax: % *increase*
- mark up: % *increase* usually added to the wholesale price by the retail store.
- commission: % of total price sold for given to salesperson.

Remember: starting point is Initial value. We are talking about Final value's **change** comparing to (or based upon) the Initial value. Therefore, we subtract Initial Value or divide the absolute value of Change by Initial Value.

Percent change is to express the change out of 100. Percent is special fraction with denominator being 100. That is, percent is another way of talking about parts of the whole. With same denominator being 100, it is easy to compare any two percentage numbers or two change degrees. It is also easy to be converted into decimals. changing fractions into percent is like a standardizing process.

4 Practice

Q 1. If x is 160% of y , y is What percent of x ?

Q 2. 13 is 50% of what number?

Q 3. What is 150% of 32?

Q 4. A stadium can seat 16,000 people at full capacity.

a. If there are 13,920 people in the stadium, what percentage of the capacity is filled?

b. What percentage of the capacity is not filled?

Q 5. Fill the following table.

#	Initial Price	Final Price	Percentage Change
1		\$8	25 %increase
2		\$22	10 %increase
3		\$72.8	12 %increase
4		\$68.25	15 %decrease
5		\$2.09	5 %decrease
6		\$59.5	20 %decrease

Q 6. In a city in Ohio, the sales tax rate is 7.25%. Complete the table to show the sales tax and the total price including tax for each item.

Item	price before tax (\$)	sales tax (\$)	price including tax (\$)
pillow	8.00		
blanket	22.00		
trash can	14.5		

Q 7. At Dodger Stadium, a grilled Dodger Dog costs \$4.00. This includes the 8% sales tax. What is the price before tax?

Q 8. After a 25% discount, a music cd costs \$9.99. What was the original, retail price?

Q 9. After a 20% discount and 7% tax, an item sold for \$85.59. What was original, retail price?

Q 10. This season, Baron Davis is averaging 8.5 assists per game. This is a 5% decrease from last year. What was his assist per game average last season, to the nearest tenth of an assist?

Q 11. At Staples Center, a "skyscraper" hot dog costs \$4.75. This includes an 8% tax. How much of the \$4.75 price is tax?

Q 12. This season, Bryant's points per game average is down to 28.8. This is a 19% decrease from last season. What was Bryant's points per game average last season, to the nearest tenth?

Q 13. At Amazon.com, the Harry Potter and the Goblet of Fire DVD is being sold for \$15.98. This is after a 45% discount. What was the pre-discount price?

Q 14. A Palm Treo was purchased through Amazon.com. The final price, after 8.5% tax and 33% discount was \$162.74. What was the original price?

Q 15. A store buys a product at a wholesale price and marks it up 35%. Eventually they discount that retail price by 25%. The final sale price is \$19.99. What was the original wholesale price?

Q 16. Challenge: A store has a 30% discount on every item in stock. By how much is the 5% sales tax reduced on an item that regularly sells for \$10?

Q 17. Challenge: A bank offered two plans for a two-year investment. One was 5% the first year and 10% the second year. The other was 10% the first year and 5% the second year. Which investment plan was better?

Q 18. Challenge: Write a convincing argument: Here are seven different discount plans. List them in order from best to worst. Justify your listing.
Successive discounts

1. of 10% 10% 10% 10%
2. of 10% 10% 20%
3. of 20% 10% 10%
4. of 10% 30%
5. of 30% 10%
6. of 20% 20%
7. of 40% (one discount only)