2-7 Percent of Change

State whether each percent of change is a percent of increase or a percent of decrease. Then find the percent of change. Round to the nearest whole percent.

1. original: 78
   new: 125

**SOLUTION:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: $125 - 78 = 47$. Substitute 47 for change and 78 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
\]

\[
\frac{47}{78} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
47(100) = 78r \quad \text{Find the cross products.}
\]

\[
4700 = 78r \quad \text{Multiply.}
\]

\[
\frac{4700}{78} = \frac{78r}{78} \quad \text{Divide each side by 78.}
\]

\[
60 \approx r \quad \text{Simplify}
\]

This is a percent of increase of 60%.

2. original: 41
   new: 24

**SOLUTION:**
Since the new amount is less than the original amount, this is a percent of decrease. Subtract the original from the new to find the change: $24 - 41 = -17$. Substitute $-17$ for change and 41 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
\]

\[
\frac{-17}{41} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
-17(100) = 41r \quad \text{Find the cross products.}
\]

\[-1700 = 41r \quad \text{Multiply.}
\]

\[
\frac{-1700}{41} = \frac{41r}{41} \quad \text{Divide each side by 41.}
\]

\[-41 \approx r \quad \text{Simplify.}
\]

This is a percent of decrease of 41%.
2-7 Percent of Change

3. original: 6 candles
   new: 8 candles

**SOLUTION:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(8 - 6 = 2\). Substitute 2 for change and 6 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
\]
\[
\frac{2}{6} = \frac{r}{100} \quad \text{Substitute.}
\]
\[
2(100) = 6r \quad \text{Find the cross products.}
\]
\[
200 = 6r \quad \text{Multiply.}
\]
\[
\frac{200}{6} = \frac{6r}{6} \quad \text{Divide each side by 6.}
\]
\[
33 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 33%.

4. original: 35 computers
   new: 32 computers

**SOLUTION:**
Since the new amount is less than the original amount, this is a percent of decrease. Subtract the original from the new to find the change: \(32 - 35 = -3\). Substitute \(-3\) for change and 32 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
\]
\[
\frac{-3}{32} = \frac{r}{100} \quad \text{Substitute.}
\]
\[
-3(100) = 32r \quad \text{Find the cross products.}
\]
\[
-300 = 32r \quad \text{Multiply.}
\]
\[
\frac{-300}{32} = \frac{32r}{32} \quad \text{Divide each side by 32.}
\]
\[
-9 \approx r \quad \text{Simplify.}
\]

This is a percent of decrease of 9%. 

2-7 Percent of Change

5. GEOGRAPHY The distance from Phoenix to Tucson is 120 miles. The distance from Phoenix to Flagstaff is about 21.7% longer. To the nearest mile, what is the distance from Phoenix to Flagstaff?

SOLUTION:
Let \( x \) be the distance from Phoenix to Flagstaff. Since 21.7% is a percent of increase, the distance from Phoenix to Tucson is less than the distance from Phoenix to Flagstaff.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{x - 120}{120} = \frac{21.7}{100} \quad \text{Substitute.}
\]

\[
100(x - 120) = 120(21.7) \quad \text{cross products}
\]

\[
100x - 12,000 = 2604 \quad \text{Distribute.}
\]

\[
100x - 12,000 + 12,000 = 2604 + 12,000 \quad \text{Add 12,000.}
\]

\[
100x = 14,604 \quad \text{Simplify.}
\]

\[
\frac{100x}{100} = \frac{14,604}{100} \quad \text{Divide by 100.}
\]

\[
x \approx 146 \quad \text{Simplify.}
\]

The distance from Phoenix to Flagstaff is about 146 miles.

Find the total price of each item.
6. dress: $22.50
   sales
tax: 7.5%

SOLUTION:
First, find the tax.
\(0.075 \times 22.50 = 1.6875\)
Rounded to the nearest cent, the tax is $1.69. Now add the tax and original amount to find the total cost.
\($1.69 + 22.50 = 24.19\)
So, the total cost of the dress is $24.19.

7. video game: $35.99
   sales
tax: 6.75%

SOLUTION:
First, find the tax.
\(0.0675 \times 35.99 = 2.429325\)
Rounded to the nearest cent, the tax is $2.43. Now add the tax and original amount to find the total cost.
\($2.43 + 35.99 = 38.42\)
So, the total cost of the video game is $38.42.
2-7 Percent of Change

8. **PROM** A limo costs $85 to rent for 3 hours plus a 7% sales tax. What is the total cost to rent a limo for 6 hours?

   **SOLUTION:**
   If it costs $85 to rent the limo for 3 hours, it will cost $85 \times 2$ or $170 to rent the limo for 6 hours. First, find the tax on $170.
   \[ \text{0.07} \times 170 = 11.9 \]
   The tax is $11.90. Now add the tax and original amount to find the total cost.
   \[ $11.90 + $170 = $181.90 \]
   So, the total cost to rent the limo for 6 hours is $181.90.

9. **GAMES** A computer game costs $49.95 plus a 6.25% sales tax. What is the total cost of the game?

   **SOLUTION:**
   First, find the tax.
   \[ 0.0625 \times 49.95 = 3.121875 \]
   Rounded to the nearest cent, the tax is $3.12. Now add the tax and original amount to find the total cost.
   \[ $3.12 + $49.95 = $53.07 \]
   So, the total cost of the computer game is $53.07.

**Find the discounted price of each item.**

10. **guitar:** $95.00  
    **discount:** 15%  
    **SOLUTION:**
    First, find the discount.
    \[ 0.15 \times 95.00 = 14.25 \]
    Now, subtract the discount of $14.25 from the original price.
    \[ $95.00 - $14.25 = $80.75 \]
    So, the discounted price of the guitar is $80.75.

11. **DVD:** $22.95  
    **discount:** 25%  
    **SOLUTION:**
    First, find the discount.
    \[ 0.25 \times 22.95 = 5.7375 \]
    Rounded to the nearest cent, the discount is $5.74. Now, subtract the discount from the original price.
    \[ $22.95 - $5.74 = $17.21 \]
    So, the discounted price of the DVD is $17.21.

12. **SKATEBOARD** A skateboard costs $99.99. If you have a coupon for 20% off, how much will you save?

    **SOLUTION:**
    The coupon offers a discount of 20%.
    \[ 0.20 \times 99.99 = 19.998 \]
    Rounded to the nearest cent, the discount or amount saved is $20.00.
2-7 Percent of Change

13. **CCSS MODELING** Tickets to the county fair are $8 for an adult and $5 for a child. If you have a 15% discount card, how much will 2 adult tickets and 2 child tickets cost?

**SOLUTION:**

The cost of two adult tickets is $8 × 2 or $16 and the cost of two child tickets is $5 × 2 or $10. The total original cost is $16 + $10 or $26. Find the discount of the total cost.

$0.15 × 26 = 3.9$

Now, subtract the discount, $3.90, from the original cost.

$26.00 − $3.90 = $22.10$

So, it will cost $22.10 for two adult tickets and two child tickets.

**State whether each percent of change is a percent of increase or a percent of decrease. Then find the percent of change. Round to the nearest whole percent.**

14. original: 35
   new: 40

**SOLUTION:**

Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: $40 − 35 = 5$. Substitute 5 for change and 35 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{5}{35} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
5(100) = 35r \quad \text{cross products}
\]

\[
500 = 35r \quad \text{Multiply.}
\]

\[
\frac{500}{35} = \frac{35r}{35} \quad \text{Divide by 35.}
\]

\[
14 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 14%.
2-7 Percent of Change

15. original: 16
new: 10

**SOLUTION:**
Since the new amount is less than the original amount, this is a percent of decrease. Subtract the original from the new to find the change: \(10 - 16 = -6\). Substitute \(-6\) for change and 16 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{-6}{16} = \frac{r}{100} \quad \text{Substitute.}
\]

\[-6(100) = 16r \quad \text{cross products}
\]

\[-600 = 16r \quad \text{Multiply.}
\]

\[-\frac{600}{16} = \frac{16r}{16} \quad \text{Divide by 16.}
\]

\[-\frac{37.5}{r} = \frac{10}{r} \quad \text{Simplify.}
\]

\[-38r \approx r \quad \text{Round.}
\]

This is a percent of decrease of 38%.

16. original: 27
new: 73

**SOLUTION:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(73 - 27 = 46\). Substitute 46 for change and 27 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{46}{27} = \frac{r}{100} \quad \text{Substitute.}
\]

\[46(100) = 27r \quad \text{cross products}
\]

\[4600 = 27r \quad \text{Multiply.}
\]

\[\frac{4600}{27} = \frac{27r}{27} \quad \text{Divide by 27.}
\]

\[170 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 170%.
2-7 Percent of Change

17. original: 92
   new: 21

**SOLUTION:**
Since the new amount is less than the original amount, this is a percent of decrease. Subtract the original from the new to find the change: $21 - 92 = -71$. Substitute $-71$ for change and $92$ for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{-71}{92} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
-71(100) = 92r \quad \text{cross products}
\]

\[
-7100 = 92r \quad \text{Multiply.}
\]

\[
\frac{-7100}{92} = \frac{92r}{92} \quad \text{Divide by 92.}
\]

\[
-77 \approx r \quad \text{Simplify.}
\]

This is a percent of decrease of $77\%$.

18. original: 21.2 grams
   new: 10.8 grams

**SOLUTION:**
Since the new amount is less than the original amount, this is a percent of decrease. Subtract the original from the new to find the change: $10.8 - 21.2 = -10.4$. Substitute $-10.4$ for change and $21.2$ for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{-10.4}{21.2} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
-10.4(100) = 21.2r \quad \text{cross products}
\]

\[
-1040 = 21.2r \quad \text{Multiply.}
\]

\[
\frac{-1040}{21.2} = \frac{21.2r}{21.2} \quad \text{Divide by 21.2.}
\]

\[
-49 \approx r \quad \text{Simplify.}
\]

This is a percent of decrease of $49\%$. 

2-7 Percent of Change

19. original: 11 feet
   new: 25 feet
   SOLUTION:
   Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: $25 - 11 = 14$. Substitute 14 for change and 11 for the original amount in the percent proportion.

   \[
   \frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
   \]

   \[
   \frac{14}{11} = \frac{r}{100} \quad \text{Substitute.}
   \]

   \[
   14(100) = 11r \quad \text{Find the cross products.}
   \]

   \[
   1400 = 11r \quad \text{Multiply.}
   \]

   \[
   \frac{1400}{11} = \frac{11r}{11} \quad \text{Divide each side by 11.}
   \]

   \[
   127 \approx r \quad \text{Simplify.}
   \]

   This is a percent of increase of 127%.

20. original: $68
   new: $76
   SOLUTION:
   Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: $76 - 68 = 8$. Substitute 8 for change and 68 for the original amount in the percent proportion.

   \[
   \frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
   \]

   \[
   \frac{8}{68} = \frac{r}{100} \quad \text{Substitute.}
   \]

   \[
   8(100) = 68r \quad \text{Find the cross products.}
   \]

   \[
   800 = 68r \quad \text{Multiply.}
   \]

   \[
   \frac{800}{68} = \frac{68r}{68} \quad \text{Divide by 68.}
   \]

   \[
   12 \approx r \quad \text{Simplify.}
   \]

   This is a percent of increase of 12%. 

---

In this problem, you will explore patterns in percentages.
2-7 Percent of Change

21. original: 21 hours
   new: 40 hours

   SOLUTION:
   Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(40 - 21 = 19\). Substitute 19 for change and 21 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100}
\]

Percent proportion

\[
\frac{19}{21} = \frac{r}{100}
\]

Substitute.

\[
19(100) = 21r
\]

Find the cross products.

\[
1900 = 21r
\]

Multiply.

\[
\frac{1900}{21} = \frac{21r}{21}
\]

Divide each side by 21.

\[
90 \approx r
\]

Simplify.

This is a percent of increase of 90%.

22. GASOLINE The average cost of regular gasoline in North Carolina increased by 73% from 2006 to 2007. If the average cost of a gallon of gas in 2006 was $2.069, what was the average cost in 2007? Round to the nearest cent.

   SOLUTION:
   Let \(x\) be the average cost of gasoline in North Carolina in 2007. Since 73% is a percent of increase, the average cost in 2006 is less than the average cost in 2007.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100}
\]

proportion

\[
\frac{x-2.069}{2.069} = \frac{73}{100}
\]

Substitute.

\[
100(x - 2.069) = 151.037
\]

cross products

\[
100x - 206.9 = 151.037
\]

Distribute.

\[
100x - 206.9 + 206.9 = 151.037 + 206.9
\]

Add 206.9.

\[
\frac{100x}{100} = \frac{357.937}{100}
\]

Divide by 100.

\[
x \approx 3.58
\]

Simplify.

The average cost of gasoline in North Carolina in 2007 was $3.58.
2-7 Percent of Change

23. **CARS** Beng is shopping for a car. The cost of a new car is $15,500. This is 25% greater than the cost of a used car. What is the cost of the used car?

**SOLUTION:**
Let $x$ be the cost of a used car. Since 25% is a percent of increase, the cost of a new car is more than the cost of a used car.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \hspace{1cm} \text{proportion}
\]

\[
\frac{15,500-x}{x} = \frac{25}{100} \hspace{1cm} \text{Substitute.}
\]

\[
100(15,500-x) = 25x \hspace{1cm} \text{cross products}
\]

\[
1,550,000 - 100x = 25x \hspace{1cm} \text{Distribute}
\]

\[
1,550,000 - 100x + 100x = 25x + 100x \hspace{1cm} \text{Add 100x.}
\]

\[
1,550,000 = 125x \hspace{1cm} \text{Simplify.}
\]

\[
\frac{1,550,000}{125} = 125x \hspace{1cm} \text{Divide by 125}
\]

\[
12,400 = x \hspace{1cm} \text{Simplify.}
\]

The cost of the used car is $12,400.

**Find the total price of each item.**

24. messenger bag: $28.00  
tax: 7.25%

**SOLUTION:**
First, find the tax.

\[
0.0725 \times 28.00 = 2.03
\]

The tax is $2.03. Now add the tax and original amount to find the total cost.

\[
2.03 + 28.00 = 30.03
\]

So, the total cost of the messenger bag is $30.03.

25. software: $45.00  
tax: 5.5%

**SOLUTION:**
First, find the tax.

\[
0.055 \times 45.00 = 2.475
\]

Rounded to the nearest cent, the tax is $2.48. Now add the tax and original amount to find the total cost.

\[
2.48 + 45.00 = 47.48
\]

So, the total cost of the software is $47.48.
2-7 Percent of Change

26. vase: $5.50
tax: 6.25%

**SOLUTION:**
First, find the tax.
0.0625 \times 5.50 = 0.34375
Rounded to the nearest cent, the tax is $0.34. Now add the tax and original amount to find the total cost.
$0.34 + $5.50 = $5.84
So, the total cost of the vase is $5.84.

27. book: $25.95
tax: 5.25%

**SOLUTION:**
First, find the tax.
0.0525 \times 25.95 = 1.362375
Rounded to the nearest cent, the tax is $1.36. Now add the tax and original amount to find the total cost.
$1.36 + $25.95 = $27.31
So, the total cost of the book is $27.31.

28. magazine: $3.50
tax: 5.75%

**SOLUTION:**
First, find the tax.
0.0575 \times 3.50 = 0.20125
Rounded to the nearest cent, the tax is $0.20. Now add the tax and original amount to find the total cost.
$0.20 + $3.50 = $3.70
So, the total cost of the magazine is $3.70.

29. pillow: $9.99
tax: 6.75%

**SOLUTION:**
First, find the tax.
0.0675 \times 9.99 = 0.674325
Rounded to the nearest cent, the tax is $0.67. Now add the tax and original amount to find the total cost.
$0.67 + $9.99 = $10.66
So, the total cost of the pillow is $10.66.

Find the discounted price of each item.

30. computer: $1099.00
discount: 25%

**SOLUTION:**
First, find the discount.
0.25 \times 1099.00 = 274.75
The discount is $274.75. Now, subtract the discount from the original price.
$1099.00 - $274.75 = $824.25
So, the discounted price of the computer is $824.25.
2-7 Percent of Change

31. CD player: $89.99
   discount: 15%
   **SOLUTION:**
   First, find the discount.
   \[0.15 \times 89.99 = 13.4985\]
   Rounded to the nearest cent, the discount is $13.50. Now, subtract the discount from the original price.
   \[89.99 - 13.50 = 76.49\]
   So, the discounted price of the CD player is $76.49.

32. athletic shoes: $59.99
   discount: 40%
   **SOLUTION:**
   First, find the discount.
   \[0.40 \times 59.99 = 23.996\]
   Rounded to the nearest cent, the discount is $24.00. Now, subtract the discount from the original price.
   \[59.99 - 24.00 = 35.99\]
   So, the discounted price of the athletic shoes is $35.99.

33. jeans: $24.50
   discount: 33%
   **SOLUTION:**
   First, find the discount.
   \[0.33 \times 24.50 = 8.085\]
   Rounded to the nearest cent, the discount is $8.09. Now, subtract the discount from the original price.
   \[24.50 - 8.09 = 16.41\]
   So, the discounted price of the jeans is $16.41.

34. jacket: $125.00
   discount: 25%
   **SOLUTION:**
   First, find the discount.
   \[0.25 \times 125.00 = 31.25\]
   The discount is $31.25. Now, subtract the discount from the original price.
   \[125.00 - 31.25 = 93.75\]
   So, the discounted price of the jacket is $93.75.

35. belt: $14.99
   discount: 20%
   **SOLUTION:**
   First, find the discount.
   \[0.20 \times 14.99 = 2.998\]
   Rounded to the nearest cent, the discount is $3.00. Now, subtract the discount from the original price.
   \[14.99 - 3.00 = 11.99\]
   So, the discounted price of the belt is $11.99.
2-7 Percent of Change

Find the final price of each item

36. sweater: $14.99
   discount: 12%
   tax: 6.25%

   **SOLUTION:**
   First, find the discounted price.
   \[0.12 \times 14.99 = 1.7988\]

   Now subtract the discount from the original price.
   \[14.99 - 1.7988 = 13.1912\]

   Then, find the tax on the discounted price.
   \[0.0625 \times 13.1912 = 0.82445\]

   Now add the tax and the discounted price to find the total cost.
   \[0.82445 + 13.1912 = 14.01565\]

   Rounded to the nearest cent, the total cost of the sweater is $14.02.

37. printer: $60.00
   discount: 25%
   tax: 6.75%

   **SOLUTION:**
   First, find the discounted price.
   \[0.25 \times 60.00 = 15\]
   The discount is $15.00. Now, subtract the discount from the original price.
   \[60.00 - 15.00 = 45.00\]
   Then, find the tax on the discounted price.
   \[0.0675 \times 45.00 = 3.0375\]
   Rounded to the nearest cent, the tax is $3.04. Now add the tax and the discounted price to find the total cost.
   \[3.04 + 45.00 = 48.04\]
   The total cost of the printer is $48.04.
2-7 Percent of Change

38. board game: $25.00
discount: 15%
tax: 7.5%

**SOLUTION:**
First, find the discounted price.
\[0.15 \times 25.00 = 3.75\]
The discount is $3.75.

Subtract the discount from the original price.
\[25.00 - 3.75 = 21.25\]

Find the tax on the discounted price.
\[0.075 \times 21.25 = 1.59375\]

Rounded to the nearest cent, the tax is $1.59. Now add the tax and the discounted price to find the total cost.
\[1.59 + 21.25 = 22.84\]

The total cost of the board game is $22.84.

39. **CONSUMER PRICE INDEX** An index measures the percent change of a value from a base year. An index of 115 means that there was a 15% increase from the base year. In 2000, the consumer price index of dairy products was 160.7. In 2007, it was 194.0. Determine the percent of change.

**SOLUTION:**
The price index increased by \[194.0 - 160.7 = 33.3\] points.

To calculate the percentage of change this is, divide the difference by the initial value.
\[
\frac{33.3}{160.7} \approx 0.207 \text{ or } 20.7\%
\]

The price index rose by 20.7%.
2-7 Percent of Change

40. **FINANCIAL LITERACY** The current price of each share of a technology company is $135. If this represents a 16.2% increase over the past year, what was the price per share a year ago?

**SOLUTION:**

Let \( x \) be the price per share. Since 15% is a percent of increase, the price per share last year is less than the price per share this year.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \\
\frac{135-x}{x} = \frac{16.2}{100} \\
100(135 - x) = 16.2x \\
13,500 - 100x = 16.2x \\
13,500 - 100x + 100x = 16.2x + 100x \\
13,500 = 116.2x \\
\frac{13,500}{116.2} = \frac{116.2x}{116.2} \\
116.18 \approx x
\]

The price per share last year was about $116.18.

41. **CCSS MODELING** A group of girls are shopping for dresses to wear to the spring dance. One finds a dress priced $75 with a 20% discount. A second girl finds a dress priced $85 with a 30% discount.

a. Find the amount of discount for each dress.

b. Which girl is getting the better price for the dress?

**SOLUTION:**

a. Find the discount of each girl’s dress.

\[
0.20 \times 75.00 = 15 \\
0.30 \times 85.00 = 25.5
\]

The discount for the first girl’s dress is $15.00. The discount for the second girl’s dress is $25.50.

b. Subtract the discount from the original price to find each girl’s discounted price.

\[
\begin{align*}
$75.00 - $15.00 &= $60.00 \\
$85.00 - $25.50 &= $59.50
\end{align*}
\]

The first girl is paying $60.00 and the second girl is paying $59.50. Since the second girl is paying $0.50 less than the first girl, she is getting the better price for the dress.
2-7 Percent of Change

42. RECREATIONAL SPORTS In 1995, there were 73,567 youth softball teams. By 2007, there were 86,049. Determine the percent of increase.

SOLUTION:
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: $86,049 - 73,567 = 12,482$. Substitute 12,482 for change and 73,567 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{12,482}{73,567} = \frac{r}{100} \quad \text{Substitute}
\]

\[
12,482(100) = 73,567r \quad \text{cross products}
\]

\[
12,48200 = 73,567r \quad \text{Multiply}
\]

\[
\frac{12,48200}{73,567} = \frac{73,567r}{73,567} \quad \text{Divide by 73,567}
\]

\[
16.97 \approx r \quad \text{Simplify}
\]

This is a percent of increase of approximately 17%.

43. CCSS TOOLS Which grocery item had the greatest percent increase in cost from 2000 to 2007?

<table>
<thead>
<tr>
<th>Grocery Item</th>
<th>Cost In 2000 ($ per pound)</th>
<th>Cost In 2007 ($ per pound)</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk (gallon)</td>
<td>2.79</td>
<td>3.87</td>
</tr>
<tr>
<td>turkey (whole)</td>
<td>0.99</td>
<td>1.01</td>
</tr>
<tr>
<td>chicken (whole)</td>
<td>1.08</td>
<td>1.17</td>
</tr>
<tr>
<td>ground beef</td>
<td>1.63</td>
<td>2.23</td>
</tr>
<tr>
<td>apples</td>
<td>0.82</td>
<td>1.12</td>
</tr>
<tr>
<td>iceberg lettuce</td>
<td>0.85</td>
<td>0.95</td>
</tr>
<tr>
<td>peanut butter</td>
<td>1.96</td>
<td>1.88</td>
</tr>
</tbody>
</table>

Source: Statistical Abstract of the United States

SOLUTION:
Find the percent of increase for each grocery item.

**Milk:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: $3.87 - 2.79 = 1.08$. Substitute 1.08 for change and 2.79 for the original amount in the percent proportion.
2-7 Percent of Change

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{1.08}{2.79} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
1.08(100) = 2.79r \quad \text{cross products}
\]

\[
108 = 2.79r \quad \text{Multiply.}
\]

\[
\frac{108}{2.79} = \frac{2.79r}{2.79} \quad \text{Divide by 2.79.}
\]

\[
38.7 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 38.7%.

**Turkey:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(1.01 - 0.99 = 0.02\). Substitute 0.02 for change and 0.99 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{Percent proportion}
\]

\[
\frac{0.02}{0.99} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
0.02(100) = 0.99r \quad \text{Find the cross products.}
\]

\[
2 = 0.99r \quad \text{Multiply.}
\]

\[
\frac{2}{0.99} = \frac{0.99r}{0.99} \quad \text{Divide each side by 0.99.}
\]

\[
2.02 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 2.0%.

**Chicken:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(1.17 - 1.08 = 0.09\). Substitute 0.09 for change and 1.08 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{0.09}{1.08} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
0.09(100) = 1.08r \quad \text{cross products}
\]

\[
9 = 1.08r \quad \text{Multiply.}
\]

\[
\frac{9}{1.08} = \frac{1.08r}{1.08} \quad \text{Divide by 1.08}
\]

\[
8.3 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 8.3%.

**Ground Beef:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(2.23 - 1.63 = 0.60\). Substitute 0.60 for change and 1.63 for the original amount in the percent proportion.
2-7 Percent of Change

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{0.60}{1.63} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
0.60(100) = 1.63r \quad \text{cross products}
\]

\[
60 = 1.63r \quad \text{Multiply.}
\]

\[
\frac{60}{1.63} = \frac{1.63r}{1.63} \quad \text{Divide by 1.63.}
\]

\[
36.8 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 36.8%.

**Apples:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(1.12 - 0.82 = 0.30\). Substitute 0.30 for change and 0.82 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{0.30}{0.82} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
0.30(100) = 0.82r \quad \text{cross products}
\]

\[
30 = 0.82r \quad \text{Multiply.}
\]

\[
\frac{30}{0.82} = \frac{0.82r}{0.82} \quad \text{Divide by 0.82.}
\]

\[
36.6 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 36.6%.

**Iceberg Lettuce:**
Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: \(0.95 - 0.85 = 0.10\). Substitute 0.10 for change and 0.85 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{0.10}{0.85} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
0.10(100) = 0.85r \quad \text{cross products}
\]

\[
10 = 0.85r \quad \text{Multiply.}
\]

\[
\frac{10}{0.85} = \frac{0.85r}{0.85} \quad \text{Divide each side by 0.85.}
\]

\[
11.8 \approx r \quad \text{Simplify.}
\]

This is a percent of increase of 11.8%.

**Peanut Butter:**
Since the new amount is less than the original amount, this is a percent of decrease. Subtract the original from the
new to find the change:
\[1.88 - 1.96 = -0.08.\]

Milk has the highest percent of increase.

44. MULTIPLE REPRESENTATIONS In this problem, you will explore patterns in percentages.
   a. TABULAR Copy and complete the following table.

<table>
<thead>
<tr>
<th>1% of</th>
<th>2% of</th>
<th>4% of</th>
<th>8% of</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>5.00</td>
<td>10.00</td>
<td>20.00</td>
</tr>
<tr>
<td>% of 80 is 20.</td>
<td>% of 40 is 20.</td>
<td>% of 20 is 20.</td>
<td>% of 10 is 20.</td>
</tr>
</tbody>
</table>

b. VERBAL Describe the patterns in the second and fifth columns.
c. ANALYTICAL Use the patterns to write the fifth row of the table

\[\text{SOLUTION:}\]
a. Define a percent equation to find the missing values.

Column 2:
\[0.1(x) = 5\]  
Percent equation

\[\frac{0.1(x)}{0.1} = \frac{5}{0.1}\]  
Divide each side by 0.1

\[x = 500\]  
Simplify.

Repeat for the remaining rows in column 2.

Column 5:
\[0.50(x) = 20\]  
Percent equation

\[\frac{0.50(x)}{0.50} = \frac{20}{0.50}\]  
Divide each side by 0.50

\[x = 40\]  
Simplify.

Repeat for the remaining rows in column 5.

Column 7:
\[x(40) = 20\]  
Percent equation

\[\frac{40x}{40} = \frac{20}{40}\]  
Divide each side by 40

\[x = 0.5\]  
Simplify.

\[x = 50\%\]  
Rewrite as a percent.

Repeat for the remaining rows in column 7.
2-7 Percent of Change

<table>
<thead>
<tr>
<th>1% of</th>
<th>500</th>
<th>is 5.</th>
<th>100% of</th>
<th>20</th>
<th>is 20.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2% of</td>
<td>250</td>
<td>is 5.</td>
<td>50% of</td>
<td>40</td>
<td>is 20.</td>
</tr>
<tr>
<td>4% of</td>
<td>125</td>
<td>is 5.</td>
<td>25% of</td>
<td>80</td>
<td>is 20.</td>
</tr>
<tr>
<td>8% of</td>
<td>62.5</td>
<td>is 5.</td>
<td>12.5% of</td>
<td>160</td>
<td>is 20.</td>
</tr>
</tbody>
</table>

b. In the second column, as the percent doubles the amount is cut in half.
In the fifth column, as the percent is cut in half the amount doubles.

Sample answer: In the second column, as the percent doubles the amount is cut in half.

c.
In column 1, multiply the percent in row 4 (8%) by 2 or 16%.
In column 2, take \( \frac{1}{2} \) of the amount in row 4 (62.5) or 31.25.
Column 3 is fixed at 5.

In column 4, divide the percent in row 4 (12.5%) by 2 or 6.25%.
In column 5, double the number from row 4 (160) or 320.
Column 6 is fixed at 20

In column 7, multiply the amount in row 4 (200) by 2 or 400.
In Column 8 divide the number from row 4 (10) by 2 or 5.

\[ 0.16 \times 31.25 = 5; \quad 0.0625 \times 320 = 20; \quad 4 \times 5 = 20 \]
So, the fifth row of the table would be: 16% of 31.25 is 5. 6.25% of 320 is 20. 400% of 5 is 20.

45. OPEN ENDED Write a real-world problem to find the total price of an item including sales tax.

SOLUTION:
Sample answer: A CD is on sale for $9.99. The tax is 6.5%.
First, find the tax.
\[ 0.065 \times 9.90 = 0.64935 \]
Rounded to the nearest cent, the tax is $0.65. Now add the tax and original amount to find the total cost.
\[ $0.65 + $9.99 = $10.64 \]
So, the total cost of the CD is $10.64.
2-7 Percent of Change

46. **REASONING** If you have 75% of a number \( n \), what percent of decrease is it from the number \( n \)? If you have 40% of a number \( a \), what percent of decrease do you have from the number \( a \)? What pattern do you notice? Is this always true?

**SOLUTION:**

If you have 75% of an original number, then the percent of decrease is \( 100 - 75 = 25\% \). If you have 40% of an original number, then the percent of decrease is \( 100 - 40 = 60\% \). The percentage of the number and the decrease add to 100%. This will always happen since the total percent is always 100.

47. **ERROR ANALYSIS** Maddie and Xavier are solving for the percent change if the original amount was $25 and the new amount is $28. Is either of them correct? Explain your reasoning.

**SOLUTION:**

Since the new amount is $28 and the original is $25, Maddie divided by the new amount instead of the original amount. She is incorrect. Xavier divided correctly.

48. **CHALLENGE** Determine whether the following statement is sometimes, always, or never true. The percent of change is less than 100%.

**SOLUTION:**

There are instances where the percent of change can be greater than or equal to 100%. An example of this could be the original amount of 20 and the new amount of 40. This would make a percent of change of 100%. So, the statement the percent of change is less than 100% is sometimes true.

49. **WRITING IN MATH** When is percent of change used in the real world? Explain how to find a percent of change between two values.

**SOLUTION:**

Retail stores use percents of decrease when the prices of items are discounted in a sale; salary increases are usually given as a percent of increase. For example, if a Jack receives an salary increase of 5%.

To find the percent of change, subtract the original from the new amount. Then write a proportion, comparing the change to the original amount. The answer should be written as a percent. If Jack’s salary was 24,500 last year and 26,750, this year, the percent of change is 9.2%.
2-7 Percent of Change

50. **GEOMETRY** The rectangle has a perimeter of $P$ centimeters. Which equation could be used to find the length $l$ of the rectangle?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.4 cm</td>
</tr>
</tbody>
</table>

\[ l \]

- **A** $P = 2.4l$
- **B** $P = 4.8 + l$
- **C** $P = 2.4 + 2l$
- **D** $P = 4.8 + 2l$

**SOLUTION:**

\[
P = 2l + 2w
\]

\[
= 2(l) + 2(2.4)
\]

\[
= 2l + 4.8
\]

So, the equation that can be used for the perimeter of the rectangle is $P = 4.8 + 2l$. Choice D is correct.

51. **SHORT RESPONSE** Henry is painting a room with four walls that are 12 feet by 14 feet. A gallon of paint costs $18 and covers 350 square feet. If he uses two coats of paint, how much will it cost him to paint the room?

**SOLUTION:**

First, find the area of each wall, $12 \text{ feet} \times 14 \text{ feet} = 168 \text{ square feet}$.

Next multiply the total area by the number of walls (4) and by the number of coats (2).

\[
168 \times 4 \times 2 = 1344 \text{ square feet}
\]

Next divide the number of square feet to be painted (1344) by the number of square feet covered by one gallon of paint (350).

\[
\frac{1344}{350} = 3.84
\]

Round up to find how many gallons Henry will need to buy (4) and multiply by the cost per gallon $18$

\[ 4 \times 18 = $72 \]

It will cost Henry $72 to paint the room.
52. The number of students at Franklin High School increased from 840 to 910 over a 5-year period. What was the percent of increase? 

F 8.3% 
G 14.0% 
H 18.5% 
J 92.3%

**SOLUTION:**

Since the new amount is greater than the original amount, this is a percent of increase. Subtract the original from the new to find the change: 910 – 840 = 70. Substitute 70 for change and 840 for the original amount in the percent proportion.

\[
\frac{\text{change}}{\text{original amount}} = \frac{r}{100} \quad \text{proportion}
\]

\[
\frac{70}{840} = \frac{r}{100} \quad \text{Substitute.}
\]

\[
70(100) = 840r \quad \text{cross products}
\]

\[
7000 = 840r \quad \text{Multiply.}
\]

\[
\frac{7000}{840} = \frac{840r}{840} \quad \text{Divide by 840.}
\]

\[
8.3 \approx r \quad \text{Simplify.}
\]

The percent of increase was 8.3%. Choice F is correct.

53. **PROBABILITY** Two dice are rolled. What is the probability that the sum is 10?

A \( \frac{1}{6} \)  
B \( \frac{1}{3} \)  
C \( \frac{1}{12} \)  
D \( \frac{1}{36} \)

**SOLUTION:**

\[
\text{probability} = \frac{\text{number of sums of 10}}{\text{total number of sums}}
\]

\[
= \frac{3}{36}
\]

\[
= \frac{1}{12}
\]

The probability of rolling a sum of 10 is \( \frac{1}{12} \). Choice C is correct.
2-7 Percent of Change

54. TRAVEL The Chan’s minivan requires 5 gallons of gasoline to travel 120 miles. How many gallons of gasoline will they need to travel 360 miles?

SOLUTION:
Let \( g \) represent the number of gallons of gasoline it will take to travel 360 miles. Write a proportion.

\[
\frac{\text{part gal}}{5} = \frac{\text{total gal}}{360} = \frac{120g}{120} \quad \text{proportion}
\]

\[
\begin{align*}
5(360) &= 120g \\
1800 &= 120g \\
\frac{1800}{120} &= \frac{120g}{120} \\
15 &= g
\end{align*}
\]

The Chan’s minivan will require 15 gallons of gasoline to travel 360 miles.

Evaluate each expression if \( x = -2, y = 6, \) and \( z = 4.\)

55. \(|3 - x| + 7\)

SOLUTION:
Replace \( x \) with \(-2.\)

\[
\begin{align*}
|3 - x| + 7 &= |3 - (-2)| + 7 \quad \text{Original expression} \\
&= |3 + 2| + 7 \quad \text{Substitute} \\
&= |5| + 7 \quad \text{Simplify} \\
&= 5 + 7 \quad |5| = 5 \\
&= 12 \quad \text{Add}
\end{align*}
\]

56. \(12 - |z + 9|\)

SOLUTION:
Replace \( z \) with 4.

\[
\begin{align*}
12 - |z + 9| &= 12 - |4 + 9| \quad \text{Original expression} \\
&= 12 - |13| \quad \text{Substitute} \\
&= 12 - 13 \quad |13| = 13 \\
&= -1 \quad \text{Subtract}
\end{align*}
\]
57. $|y + x| - z + 4$

**SOLUTION:**
Replace $y$ with 6, $x$ with $-2$, and $z$ with 4.

\[
|y + x| - z + 4 \quad \text{Original expression}
\]
\[
= |6 + (-2)| - 4 + 4 \quad \text{Substitute.}
\]
\[
= |4| - 4 + 4 \quad \text{Simplify.}
\]
\[
= 4 - 4 + 4 \quad |4| = 4
\]
\[
= 0 + 4 \quad \text{Subtract.}
\]
\[
= 4 \quad \text{Add.}
\]

**Solve each equation. Round to the nearest hundredth. Check your solution.**

58. $1.03p - 4 = -2.15p + 8.72$

**SOLUTION:**

\[
1.03p - 4 = -2.15p + 8.72 \quad \text{Original}
\]
\[
1.03p + 2.15p - 4 = -2.15p + 2.15p + 8.72 \quad \text{Add 2.15p.}
\]
\[
3.18p - 4 = 8.72 \quad \text{Simplify.}
\]
\[
3.18p - 4 + 4 = 8.72 + 4 \quad \text{Add 4.}
\]
\[
3.18p = 12.72 \quad \text{Simplify.}
\]
\[
\frac{3.18p}{3.18} = \frac{12.72}{3.18} \quad \text{Divide by 3.18}
\]
\[
p = 4 \quad \text{Simplify.}
\]

Check:
\[
1.03p - 4 = -2.15p + 8.72
\]
\[
1.03(4) - 4 = -2.15(4) + 8.72
\]
\[
4.12 - 4 = -8.6 + 8.72
\]
\[
0.12 = 0.12
\]
59. \(18 - 3.8t = 7.36 - 1.9t\)

**SOLUTION:**

\[
\begin{align*}
18 - 3.8t & = 7.36 - 1.9t \\
18 - 3.8t + 3.8t & = 7.36 - 1.9t + 3.8t \\
18 & = 7.36 + 1.9t \\
18 - 7.36 & = 7.36 - 7.36 + 1.9t \\
10.64 & = 1.9t \\
\frac{10.64}{1.9} & = \frac{1.9t}{1.9} \\
5.6 & = t
\end{align*}
\]

Check:

\[
\begin{align*}
18 - 3.8t & = 7.36 - 1.9t \\
18 - 3.8(5.6) & = 7.36 - 1.9(5.6) \\
18 - 21.28 & = 7.36 - 10.64 \\
-3.28 & = -3.28
\end{align*}
\]

60. \(5.4w + 8.2 = 9.8w - 2.8\)

**SOLUTION:**

\[
\begin{align*}
5.4w + 8.2 & = 9.8w - 2.8 \\
5.4w - 5.4w + 8.2 & = 9.8w - 5.4w - 2.8 \\
8.2 & = 4.4w - 2.8 \\
8.2 + 2.8 & = 4.4w - 2.8 + 2.8 \\
11 & = 4.4w \\
\frac{11}{4.4} & = \frac{4.4w}{4.4} \\
2.5 & = w
\end{align*}
\]

Check:

\[
\begin{align*}
5.4w + 8.2 & = 9.8w - 2.8 \\
5.4(2.5) + 8.2 & = 9.8(2.5) - 2.8 \\
13.5 + 8.2 & = 24.5 - 2.8 \\
21.7 & = 21.7
\end{align*}
\]
2-7 Percent of Change

61. \(2[d + 3(d - 1)] = 18\)

**SOLUTION:**

\[
\begin{align*}
2[d + 3(d - 1)] &= 18 & \text{Original} \\
2[d + 3d - 3] &= 18 & \text{Distribute} \\
2[4d - 3] &= 18 & \text{Simplify} \\
8d - 6 &= 18 & \text{Distribute} \\
8d - 6 + 6 &= 18 + 6 & \text{Add 6} \\
8d &= 24 & \text{Simplify} \\
\frac{8d}{8} &= \frac{24}{8} & \text{Divide by 8} \\
d &= 3 & \text{Simplify}
\end{align*}
\]

Check:

\[
\begin{align*}
2[d + 3(d - 1)] &= 18 \\
2[3 + 3(3 - 1)] &= 18 \\
2[3 + 6] &= 18 \\
2[9] &= 18 \\
18 &= 18
\end{align*}
\]

**Solve each equation. Check your solution.**

62. \(5n + 6 = -4\)

**SOLUTION:**

\[
\begin{align*}
5n + 6 &= -4 & \text{Original} \\
5n + 6 - 6 &= -4 - 6 & \text{Subtract 6} \\
5n &= -10 & \text{Simplify} \\
\frac{5n}{5} &= \frac{-10}{5} & \text{Divide by 5} \\
n &= -2 & \text{Simplify}
\end{align*}
\]

Check:

\[
\begin{align*}
5n + 6 &= -4 \\
5(-2) + 6 &= -4 \\
-10 + 6 &= -4 \\
-4 &= -4
\end{align*}
\]
2-7 Percent of Change

63. \(-11 = 7 + 3c\)

**SOLUTION:**

\[-11 = 7 + 3c \quad \text{Original}\]

\[-11 - 7 = 7 - 7 + 3c \quad \text{Subtract 7}.\]

\[-18 = 3c \quad \text{Simplify}.\]

\[-\frac{18}{3} = \frac{3c}{3} \quad \text{Divide by 3}.\]

\[-6 = c \quad \text{Simplify}.\]

**Check:**

\[-11 = 7 + 3c\]

\[
\begin{align*}
-11 & = 7 + 3(-6) \\
-11 & = 7 + (-18) \\
-11 & = -11
\end{align*}
\]

64. \(15 = 4a - 5\)

**SOLUTION:**

\[15 = 4a - 5 \quad \text{Original}\]

\[15 + 5 = 4a - 5 + 5 \quad \text{Add 5}.\]

\[20 = 4a \quad \text{Simplify}.\]

\[\frac{20}{4} = \frac{4a}{4} \quad \text{Divide by 4}.\]

\[5 = a \quad \text{Simplify}.\]

**Check:**

\[15 = 4a - 5\]

\[
\begin{align*}
15 & = 4(5) - 5 \\
15 & = 20 - 5 \\
15 & = 15
\end{align*}
\]
2-7 Percent of Change

65. \(-14 + 7g = -63\)

\textbf{SOLUTION:}
\[
\begin{align*}
-14 + 7g &= -63 & \text{Original} \\
-14 + 14 + 7g &= -63 + 14 & \text{Add 14.} \\
7g &= -49 & \text{Simplify.} \\
\frac{7g}{7} &= \frac{-49}{7} & \text{Divide by 7.} \\
g &= -7 & \text{Simplify.}
\end{align*}
\]

Check:
\[
\begin{align*}
-14 + 7g &= -63 \\
-14 + 7(-7) &= -63 \\
-14 + (-49) &= -63 \\
-63 &= -63
\end{align*}
\]

66. **RIVERS** The Congo River in Africa is 2900 miles long. That is 310 miles longer than the Niger River, which is also in Africa.

\textbf{a.} Write an equation you could use to find the length of the Niger River.

\textbf{b.} What is the length of the Niger River?

\textbf{SOLUTION:}
\[
\begin{align*}
\text{a.} & \quad \text{Let } n \text{ be the length of the Niger River. Since the Congo river is 310 miles longer than the Niger river, addition must be used. The equation is } n + 310 = 2900. \\
\text{b.} & \quad n + 310 - 310 = 2900 - 310 \\
& \quad n = 2590 \\
\end{align*}
\]

So, the Niger River is 2590 miles long.

67. **FOOD** Cameron purchased \(x\) pounds of apples for $0.99 per pound and \(y\) pounds of oranges for $1.29 per pound. Write an algebraic expression that represents the cost of the purchase.

\textbf{SOLUTION:}

The total cost equal the cost for the apples and the cost for the oranges. Since \(x\) is the pounds of apples. The the cost of apples is \(x \times 0.99\), \(y\) is pounds of oranges. The cost of oranges is \(y \times 1.29\). Then the total cost for both fruits is \(0.99x + 1.29y\).

\textbf{Translate each equation into a sentence.}

68. \(d - 14 = 5\)

\textbf{SOLUTION:}

Sample answer: A number \(d\) minus fourteen is five.

69. \(2f + 6 = 19\)

\textbf{SOLUTION:}

Sample answer: Six more than twice a number \(f\) equals nineteen.
2-7 Percent of Change

70. \(y - 12 = y + 8\)

**SOLUTION:**
Sample answer: Twelve less than \(y\) is the same as eight more than \(y\).

71. \(3a + 5 = 27 - 2a\)

**SOLUTION:**
Sample answer: The product of three and a number \(a\) when added to 5 is equal to the difference of 27 and two times \(a\).

72. \(-6c^2 - 4c = 25\)

**SOLUTION:**
Sample answer: Negative six times a number \(c\) squared minus four times \(c\) is the same as twenty-five.

73. \(d^4 + 64 = 3d^3 + 77\)

**SOLUTION:**
Sample answer: The fourth power of a number \(d\) increased by sixty-four is three times that number \(d\) to the third power plus seventy-seven.