

### 3.7 - Percent Change

Vocabulary:

- Percent of Change
- Percent Error

the % by which something increases or decreases

$$\frac{\text{amount of change}}{\text{original amount}}$$

$$\frac{\text{greatest possible error}}{\text{original measurement}}$$

**1 EXAMPLE** The price of a skirt decreased from **\$32.95** to \$28.95. Find the percent of decrease.

percent of decrease =  $\frac{\text{amount of change}}{\text{original amount}}$

$$\frac{32.95 - 28.95}{32.95} = \frac{4}{32.95}$$

$$= 0.1213$$

$$= 12\%$$

Find each percent of change. Describe the percent of change as an increase or decrease.

1. \$2 to \$3 *increase*  $\frac{3-2}{2} = \frac{1}{2} = 50\%$

10. \$38 to \$65 *increase*

$$\frac{65-38}{38} = \frac{27}{38} = 0.71 \quad 71\%$$

**2 EXAMPLE** Between 1940 and 1980, the federal budget increased from \$9.5 billion to \$725.3 billion. What was the percent of increase in the federal budget?

$$\frac{725.3 - 9.5}{9.5} = 75.3473$$

7,534%  
increase

13. Physical therapists measure strength on a dynamometer, which uses a unit called a foot-pound. Suppose you increase the strength in your elbow joint from 90 foot-pounds to 125 foot-pounds. Find the percent of increase to the nearest percent.

$$\frac{125 - 90}{90} = \frac{35}{90} = 0.388\bar{8}$$

39%

**4 EXAMPLE** When a garden plot was measured, the dimensions were  
 → 156 in. × 84 in. Use the **greatest possible error** to find the minimum  
 and maximum possible areas.

\* Both measurements were made to the nearest whole inch, so the **greatest possible error** is 0.5 in.

both to nearest 1 inch  $\div 2$

$$\text{GPE} = 0.5 \text{ in}$$

minimum

$$155.5 \cdot 83.5$$

$$12,984.25 \text{ in}^2$$

actual

$$156 \cdot 84$$

maximum

$$156.5 \cdot 84.5$$

$$13,224.25 \text{ in}^2$$

Find the minimum and maximum possible areas for rectangles with the following measured areas.

19. 4 cm X 6 cm

GPE: rounded to nearest 1 cm

0.5cm

min.

$$3.5 \cdot 5.5$$

$$19.25 \text{ cm}^2$$

actual

$$4 \cdot 6$$

max.

$$4.5 \cdot 6.5$$

$$29.25 \text{ cm}^2$$

**5 EXAMPLE** Suppose you measure a library book and record its width as 17.6 cm. Find the percent of error in your measurement.

Since the measurement is to the nearest 0.1 cm, the greatest possible error is 0.05 cm.

Step 1) GPE: 0.05cm

Step 2) 

<u>min.</u>	<u>actual</u>	<u>max.</u>
17.55cm	17.6cm	17.65cm

Step 3) greatest difference between the actual & min. or max. & actual

$$\text{Step 4) } \frac{0.05\text{cm}}{17.6\text{cm}} = 0.00284$$

0.28% or 0.3%



Find the percent error of each measurement.

$$0.1 \div 2$$

25.2 cm

→ ① GPE: 0.5 cm

26.0.2 cm

↑

① GPE: 0.05 cm

② min.      actual.      max.

1.5 cm

2 cm

2.5 cm

② min.      actual      max.  
0.15 cm      0.2 cm      0.25 cm

③  $\frac{0.5 \text{ cm}}{2} = 0.25$

③  $\frac{0.05}{0.2} = 0.25$

④  $\frac{0.05}{0.2} = 0.25$   
25%

④  $\frac{0.5 \text{ cm}}{2} = 0.25$   
25%

**6 EXAMPLE** A small jewelry box measures 7.4 cm by 12.2 cm by 4.2 cm.  
Find the **percent error** in calculating its volume.

The measurements are to the nearest 0.1 cm. The greatest possible error is 0.05 cm.

$\div 2$

① GPE: 0.05 cm

② min.

$$7.35 \cdot 12.15 \cdot 4.15$$

$$370.61 \text{ cm}^3$$

actual  
7.40 12.20 4.20

$$7.4 \cdot 12.2 \cdot 4.2$$

$$379.18 \text{ cm}^3$$

max.

$$7.45 \cdot 12.25 \cdot 4.25$$

$$387.86 \text{ cm}^3$$

$$\begin{aligned} \textcircled{3} \quad 379.18 - 370.61 &= 8.57 \\ 387.86 - 379.18 &= 8.69 \end{aligned}$$

$$\textcircled{4} \quad \frac{8.69}{379.18} = 0.02291$$

$$2.3\%$$

Homework: pg. 171 #14, 20, 27, 28, 29, 34, 38, 49, 60, 64

