

Name:

Worksheet 2

1. If there are 5280 feet in a mile, how many inches are there in a mile?

$$\frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = \boxed{\frac{63360 \text{ in}}{1 \text{ mile}}}$$

2. Senator Herb Kohl (D-WI) recently demanded that telecommunications companies appear before Congress and explain the high price of text messaging. Let's figure out why he was so mad.
- (a) The average price for a text message is \$0.20 per message. Suppose a text message is 160 bytes (i.e. letters). What is the price per byte for a text message? What is the price per megabyte?

$$\begin{aligned} & \$0.20 \text{ per message} \\ & 160 \text{ B per message} \\ & \frac{\$0.20}{160 \text{ B}} = \boxed{0.00125 \frac{\$}{\text{B}}} \\ & 0.00125 \frac{\$}{\text{B}} \cdot \frac{1,000,000 \text{ Bytes}}{1 \text{ mega B}} = \boxed{1250 \frac{\$}{\text{mega B}}} \end{aligned}$$

- (b) Flash videos (like on Youtube) transfer to your computer at a rate of about 40 kilobytes per second. How many megabytes per minute is that?

$$40 \frac{\text{KiloB}}{1 \text{ sec}} \cdot \frac{1000 \text{ B}}{1 \text{ KiloB}} \cdot \frac{1 \text{ MegaB}}{1,000,000 \text{ B}} \cdot \frac{60 \text{ sec}}{1 \text{ minute}} = \boxed{2.4 \frac{\text{MegaB}}{\text{min}}}$$

- (c) Suppose you decided to watch an episode of the Daily Show online. That's about 22 minutes long. Use the quantities you computed in 2a and 2b to figure out how much it would cost, if companies charged the same rate that is charged for text messaging.

$$22 \text{ minutes} \cdot \frac{2.4 \text{ megabytes}}{1 \text{ minute}} \cdot \frac{\$1250}{1 \text{ megabyte}} = \boxed{\$66,000}$$