

Warm-up: Translate the verbal phrase into an inequality or equation.

1. Five minus the quantity of a number  $x$  plus 2 is at most 16.

$$5 - (x + 2) \leq 16$$

2. Evaluate when  $x = 3$

$$4x^2 - 3x$$

$$4(3)^2 - 3(3)$$

$$4(9) - 9$$

$$36 - 9 = 27$$

## Section 1.4 Precision and Significant Digits

### Goal

Compare measurements for precision.

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### Precision

The level of detail that an instrument can measure.

For instance... Which watch is more precise?



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### Length

Kilometer  
Meter  
Centimeter  
Millimeters

Mile  
Yards  
Feet  
Inches

### Volume

Gallon  
Quart  
Pint  
Cup  
Ounces

### Time

Year  
Month  
Week  
Day  
Hour  
Minute  
Seconds

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**Example 1:** Choose the more precise measurement

a. 7cm; 7.3 cm

b. 5yd; 16ft

c. 1 pint; 16 ounces

**Checkpoint:** Choose the more precise measurement.

1. 14mm; 2cm

2. 2.5hr; 90 minutes

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**Significant Digits**

The digits in a measurement that carries meaning contributing to the precision of the measurement.

**Determining Significant Digits**

Rule	Example	Significant Digits	Number of Significant Digits
All nonzero digits	<u>281.39</u>	<u>281.39</u>	<u>5</u>
Zeros that are to the right of both the last nonzero digit and the decimal point	<u>0.0070</u>	<u>0.0070</u>	<u>2</u>
Zeros between significant digits	<u>500.7</u>	<u>500.7</u>	<u>4</u>
Zeros at the end of a whole number	<u>220</u>	<u>220</u>	<u>2</u>

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**Example 2:** Determine the number of significant digits in each measurement.

- a. 290.01g      b. 0.8500 km      c. 4000 mi
- 5                      4                      1

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**Checkpoint:** Determine the number of significant digits in each measurement.

3. 800.20 ft      4. 0.005 cm      5. 36,900 mi
- 5                      1                      3

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**Significant Digits in Calculations**

When you perform calculations involving measurements, the number of significant digits that you write in your result depends on the number of significant digits in the given measurements.

Operations	Rule	Example
Addition and Subtraction	Round the sum or difference to the <b>same place</b> as the last significant digit of the <b>least precise measurement</b>	$\begin{array}{r} 3.24 \leftarrow \text{hundredths} \\ + 7.3 \leftarrow \text{tenths} \\ \hline 10.5 \leftarrow \text{tenths} \end{array}$
Multiplication and Division	The product or quotient must have the <b>same number</b> of significant digits as the <b>least precise measurement</b>	$\begin{array}{r} 4 \leftarrow 1 \text{ sig digit} \\ \times 31 \leftarrow 2 \text{ sig digits} \\ \hline 1240 \leftarrow \text{exact answer} \\ 1000 \leftarrow 1 \text{ sig digit} \end{array}$

**Adding/Subtracting: LEAST number of decimal places**  
**Multiplying/Dividing: LEAST number of significant digits**

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**Example 3:** Perform the indicated operation. Write the answer with the correct number of significant digits.

- a. 45.1 cm + 19.45 cm      b. <sup>2</sup>6.4 ft x <sup>3</sup>2.15 ft

64.55 cm

64.6 cm

137.6 ft

14

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**Checkpoint:** Perform the indicated operation. Write the answer with the correct number of significant digits.

6. 27.23 m - 12.7 m      7. <sup>4</sup>45.16 yd<sup>2</sup> ÷ <sup>3</sup>4.25 yd

14.53

14.5 m

10.6388 ...

10.6 yd<sup>2</sup>

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