

Name _____
Period _____

APPLICATION: TOLERANCE
TOPIC: INDUSTRY

Parts used in automobiles must have very precise measurements. Otherwise, they will not work properly. However, it is impossible to produce parts with exact dimensions. Thus, the dimensions of the parts must be between specified limits.

For example, a certain ball bearing that is 1 centimeter in diameter will only work if it is slightly larger or slightly smaller. The diameter may not differ from 1 centimeter or by more than 0.001 centimeter. The 0.001 centimeter is called the **tolerance** of the ball bearing. The diameter of the ball bearing must be 1 ± 0.001 centimeter. That is, the diameter can vary between $1 + 0.001$ centimeter and $1 - 0.001$ centimeter. The acceptable diameter can be represented by the following inequality.

$$1 - 0.001 \leq x \leq 1 + 0.001$$
$$0.999 \leq x \leq 1.001$$

That is, the least possible diameter is 0.999 cm, and the greatest possible diameter is 1.001 cm.

Write each expression as an inequality.

1. $x = 3 \pm 0.01$

2. $x = 5 \pm 0.003$

3. $x = 7 \pm 0.0002$

4. $y = 6 \pm 0.0015$

5. $y = 1 \pm 0.15$

6. $y = 2 \pm 0.003$

7. $r = 0.5 \pm 0.0001$

8. $r = 1.5 \pm 0.001$

9. $r = 1/2 \pm 0.0035$

Solve each problem.

10. A chemical supply company guarantees the precision weighing of its products. They advertise that a certain product weighs $8 \text{ oz} \pm 0.03 \text{ oz}$. What is the tolerance interval?

11. A pane of glass should be 26 inches wide by 32 inches long. The tolerance is $3/16$ inch. Find the tolerance interval for each dimension.