Chapter 1.1 Check Your Understanding

Exercises 1–5 True or False. Give reasons.

1. If x is any real number, then x^2 is positive.

Answer:

False; try $x = 0$.

2. If x is a number such that $\frac{1}{x} < 1$, then x must be greater than 1.

Answer:

False; try any negative values of x.

3. For all nonnegative numbers x and y, $\sqrt{x+y} \geq \sqrt{x} + \sqrt{y}$.

Answer:

False; try $x = 2$, $y = 2$.

4. Without additional information, we must assume that the zeros in the numbers 45,000 and 0.0045 are not significant digits.

Answer:

True; only digits 4 and 5 are significant.

5. All of the zeros in the numbers 3.005 and 4.720 are significant digits.

Answer:

True; all four digits are significant.

Exercises 6–10 Fill in the blank so that the resulting statement is true.

6. In the decimal representation of the quotient $\frac{5}{7}$, the digit in the fourth decimal place is ______.

Answer:

Since $5/7 = 0.\overline{714285}$, the digit in the fourth decimal place is 2.

7. The number of significant digits in
(a) 10.2 is ______.   (b) 1200 is ______.
(c) 0.12 is ______.

Answer:

(a) All three digits are significant.

(b) Only 1 and 2 are significant.

(c) Digits 1 and 2 are significant.

8. If the dimensions (in inches) of a cereal box are measured to be $3.1 \times 7.2 \times 8.0$, then the diagonal of the box can be calculated and the number of meaningful significant digits is ______.

Answer:

The diagonal of the box is given by $D = \sqrt{3.1^2 + 7.2^2 + 8.0^2} \approx 11.2 \approx 11$ (2 significant digits).

9. Of the three numbers π, $\frac{333}{106}$, $\frac{355}{113}$, the largest one is ______.

Answer:

$\frac{355}{113}$

10. If the radius of a circle is doubled, then its area increases by a factor of ______.

Answer:

The area A of a circle is given by $A_1 = \pi r^2$. If the radius is doubled then $A_2 = \pi(2r)^2 = 4\pi r^2 = 4A_1$.
The area increases by a factor of 4.