

and $y > 0$, determine the sign of the real number.

1. (a) $\frac{x}{y}$

(b) xy^2

(c) $\frac{x-y}{xy}$

(d) $y(y-x)$

negative

negative

positive

positive

Replace the ____ with either $<$, $>$, or $=$ to make the resulting statement true.

2. (a) -3 $>$ -5

(b) $\frac{\pi}{4}$ $<$ 0.8

(c) $\sqrt{289}$ $=$ 17

3. (a) $\frac{1}{7}$ $<$ 0.143

(b) $\frac{5}{6}$ $>$ 0.8333

(c) $\sqrt{2}$ $>$ 1.4

Express the statement as an inequality.

4. (a) b is positive. $b > 0$

(f) The negative of m is not less than -2 .

$-m \geq -2$

(b) s is nonpositive. $s \leq 0$

(g) The quotient of r and s is at least $\frac{1}{5}$.

$\frac{r}{s} \geq \frac{1}{5}$

(c) w is greater than or equal to -4 . $w \geq -4$

(h) The reciprocal of f is at most 14 .

$\frac{1}{f} \leq 14$

(d) c is between $\frac{1}{5}$ and $\frac{1}{3}$. $\frac{1}{5} < c < \frac{1}{3}$

(i) The absolute value of x is less than 4 .

$|x| < 4$

(e) p is not greater than -2 . $p \leq -2$

(j) The product of p and q is at most 7 .

$pq \leq 7$

Rewrite the number without using the absolute value symbol, and simplify the result.

5. (a) $|-11 + 1|$
 $= |-10| = 10$

(b) $|6| - |-3| = 6 - 3$
 $= 3$

(c) $|8| + |-9| = 8 + 9$
 $= 17$

6. (a) $(4)|6 - 7| = 4(1)$
 $= 4$

(b) $5 / |-2|$
 $= \frac{5}{2}$

(c) $|-1| + |-9| = 1 + 9$
 $= 10$

7. (a) $|\sqrt{3} - 1.7|$

$\sqrt{3} - 1.7$

(b) $|1.7 - \sqrt{3}|$

$\sqrt{3} - 1.7$

(c) $|\frac{1}{5} - \frac{1}{3}| = |\frac{3}{15} - \frac{5}{15}| = |-\frac{2}{15}|$
 $= \frac{2}{15}$

The given numbers are coordinates of points A, B, and C, respectively, on a coordinate line. Find the distance.

(a) $d(A,B)$

(b) $d(B,C)$

(c) $d(C,B)$

(d) $d(A,C)$

8. -6, -2, 4

9. 8, -4, -1

a) $|-2 - (-6)| = 4$
 b) $|4 - (-2)| = 6$
 c) $|-2 - (4)| = 6$
 d) $|4 - (-6)| = 10$

a) $|-4 - 8| = |-12| = 12$
 b) $|-1 - (-4)| = 3$
 c) $|-4 - (-1)| = |-3| = 3$
 d) $|-1 - 8| = |-9| = 9$

The two given numbers are coordinates of points A and B, respectively, on a coordinate line. Express the indicated statement as an inequality involving the absolute value symbol.

10. $x, -\sqrt{2}$; $d(A,B)$ is greater than 1

11. $x, 4$; $d(A,B)$ is at most 2

12. $-2, x$; $d(A,B)$ is not less than 2

-or- $|\sqrt{2} - x| > 1$
 $|x + \sqrt{2}| > 1$

or $|4 - x| \leq 2$
 $|x - 4| \leq 2$

or $|x + 2| \geq 2$
 $|-2 - x| \geq 2$

Rewrite the expression without using the absolute value symbol, and simplify the result.

13. $|5 - x|$ if $x > 5$

14. $|7 + x|$ if $x \geq -7$

15. $|a - b|$ if $a > b$

16. $|-x^2 - 1|$

PICK 6
 $|5 - 6| = |-1| = 1$
 so; $x - 5$

PICK -6
 $|7 + (-6)| = |1| = 1$
 so; $x + 7$ or $7 + x$

PICK
 $a = 5$
 $b = 3$
 $|5 - 3| = |2| = 2$
 so; $a - b$

PICK $x = 3$
 $|-3^2 - 1| = |-10| = 10$
 so; $x^2 + 1$

Replace the ____ with either = or \neq to make the resulting statement true for all real numbers a, b, c, and d, whenever the expressions are defined.

17. $\frac{ab+ac}{a} \equiv b+c$
 $\frac{a(b+c)}{a}$

18. $\frac{a+c}{b+a} \neq \frac{a}{b} + \frac{c}{d}$
 $\frac{ad+bc}{bd}$

19. $(a-b) - c \neq a - (b-c)$
 $a - b + c$

Approximate the real-number expressions. Express the answer in scientific notation accurate to four significant digits.

20. $\sqrt{|3.45 - 1.2 \times 10^4| + 10^5}$

Use calculator

3.347×10^2

Express the number in scientific form.

21. (a) 85,200

$$8.52 \times 10^4$$

(b) 0.0000055

$$5.5 \times 10^{-6}$$

(c) 24,900,000

$$2.49 \times 10^7$$

Express the number in decimal form.

22. (a) 2.3×10^7

$$23,000,000$$

(b) 7.01×10^{-9}

$$0.00000000701$$

(c) 1.23×10^{10}

$$12,300,000,000$$

23. The longest movie ever made is a 1970 British film that runs for 48 hours. Assuming that the film speed is 24 frames per second, approximate the total number of frames in this film. Express your answer in scientific form.

$$\frac{24 \text{ frames}}{\text{sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot 48 \text{ hr}$$

$$4.1472 \times 10^6 \text{ frames}$$

24. A person's intelligence quotient (IQ) is determined by multiplying the quotient of his or her mental age and chronological age by 100.

(a) Find the IQ of a 12-year-old child whose mental age is 15.

$$\frac{MA}{CA} \times 100 = \frac{15}{12} \times 100 = 125$$

(b) Find the mental age of a person 15 years old whose IQ is 140.

$$140 = \frac{MA}{15} \times 100 = 21$$

25. Water covers 70.8%, or about $361 \times 10^6 \text{ km}^2$ of the earth's surface. Approximate the total surface area of the earth.

$$\frac{.708 N}{.708} = \frac{361 \times 10^6}{.708}$$

$$N = 510 \times 10^6 \text{ km}^2$$