

Chapter Test

Take this test as you would take a test in class. After you are done, check your work against the answers in the back of the book.

In Exercises 1–4, solve the equation.

1. $6x - 5 = 19$

2. $5x - 6 = 7x - 12$

3. $15 - 7(1 - x) = 3(x + 8)$

4. $\frac{2x}{3} = \frac{x}{2} + 4$



Figure for 8

5. What is 125% of 3200?
6. 32 is what percent of 8000?
7. A store is offering a 20% discount on all items in its inventory. Find the list price on a tractor that has a sale price of \$6400.
8. Which of the packages at the left is a better buy? Explain your reasoning.
9. The tax on a property with an assessed value of \$90,000 is \$1200. Estimate the tax on a property with an assessed value of \$110,000.
10. The bill (including parts and labor) for the repair of a home appliance was \$165. The cost for parts was \$85. The labor rate is \$16 per half hour. How many hours were spent in repairing the appliance?
11. A pet store owner mixes two types of dog food costing \$1.50 per pound and \$3.05 per pound to make 25 pounds of a mixture costing \$2.12 per pound. How many pounds of each kind of dog food are in the mixture?
12. Two cars start at the same location and travel in the same direction at average speeds of 40 miles per hour and 55 miles per hour. How much time must elapse before the two cars are 10 miles apart?
13. The interest on a savings account is 7.5%. Find the principal required to earn \$300 in interest in 2 years.
14. Solve each equation.

(a) $|2x + 6| = 16$ (b) $|3x - 5| = |6x - 1|$ (c) $|9 - 4x| + 4 = 1$
15. Solve each inequality and sketch the solution on the real number line.

(a) $3x + 12 \geq -6$ (b) $1 + 2x > 7 - x$
 (c) $0 \leq \frac{1-x}{4} < 2$ (d) $-7 < 4(2 - 3x) \leq 20$
16. Rewrite the statement “ t is at least 8” using inequality notation.
17. Solve each inequality.

(a) $|x - 3| \leq 2$ (b) $|5x - 3| > 12$ (c) $\left| \frac{x}{4} + 2 \right| < 0.2$
18. A utility company has a fleet of vans. The annual operating cost per van is $C = 0.37m + 2700$ where m is the number of miles traveled by a van in a year. What is the maximum number of miles that will yield an annual operating cost that is less than or equal to \$11,950?

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- Determine the quadrant in which the point (x, y) lies if $x > 0$ and $y < 0$.
- Plot the points $(0, 5)$ and $(3, 1)$. Then find the distance between them and the coordinates of the midpoint of the line segment joining the two points.
- Find the x - and y -intercepts of the graph of the equation $y = -3(x + 1)$.
- Sketch the graph of the equation $y = |x - 2|$.
- Find the slope (if possible) of the line passing through each pair of points.
 - $(-4, 7), (2, 3)$
 - $(3, -2), (3, 6)$
- Sketch the graph of the line passing through the point $(0, -6)$ with slope $m = \frac{4}{3}$.
- Find the x - and y -intercepts of the graph of $2x + 5y - 10 = 0$. Use the results to sketch the graph.
- Find an equation of the line through the points $(25, -15)$ and $(75, 10)$.
- Find an equation of the vertical line through the point $(-2, 4)$.
- Write equations of the lines that pass through the point $(-2, 3)$ and are
 - parallel and
 - perpendicular to the line $3x - 5y = 4$.
- Sketch the graph of the inequality $2x - 3y \geq 9$.

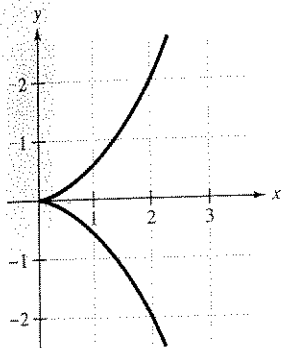


Figure for 12

- The graph of $y^2(4-x) = x^3$ is shown at the left. Does the graph represent y as a function of x ? Explain your reasoning.
- Determine whether the relation represents a function. Explain.
 - $\{(2, 4), (-6, 3), (3, 3), (1, -2)\}$
 - $\{(0, 0), (1, 5), (-2, 1), (0, -4)\}$
- Evaluate $g(x) = x/(x - 3)$ as indicated, and simplify.
 - $g(2)$
 - $g(\frac{7}{2})$
 - $g(x + 2)$
- Find the domain of each function.
 - $h(t) = \sqrt{9 - t}$
 - $f(x) = \frac{x + 1}{x - 4}$
- Sketch the graph of the function $g(x) = \sqrt{2 - x}$.
- Describe the transformation of the graph of $f(x) = x^2$ that would produce the graph of $g(x) = -(x - 2)^2 + 1$.
- After 4 years, the value of a \$26,000 car will have depreciated to \$10,000. Write the value V of the car as a linear function of t , the number of years since the car was purchased. When will the car be worth \$16,000?
- Use the graph of $f(x) = |x|$ to write a function that represents each graph.
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- Determine the degree and leading coefficient of $-5.2x^3 + 3x^2 - 8$.
- Explain why the following expression is not a polynomial.

$$\frac{4}{x^2 + 2}$$

In Exercises 3 and 4, rewrite each expression using only positive exponents, and simplify. (Assume that any variables in the expression are nonzero.)

- $\frac{4x^{-2}y^3}{5^{-1}x^3y^{-2}}$
 - $\left(\frac{-2x^2y}{z^{-3}}\right)^{-2}$
- $\left(-\frac{2u^2}{v^{-1}}\right)^3\left(\frac{3v^2}{u^{-3}}\right)$
 - $\frac{(-3x^2y^{-1})^4}{6x^2y^0}$

In Exercises 5–9, perform the indicated operations and simplify.

- $(5a^2 - 3a + 4) + (a^2 - 4)$
 - $(16 - y^2) - (16 + 2y + y^2)$
- $-2(2x^4 - 5) + 4x(x^3 + 2x - 1)$
 - $4t - [3t - (10t + 7)]$
- $-3x(x - 4)$
 - $(2x - 3y)(x + 5y)$
- $(x - 1)[2x + (x - 3)]$
 - $(2s - 3)(3s^2 - 4s + 7)$
- $(4x - 3)^2$
 - $[4 - (a + b)][4 + (a + b)]$

In Exercises 10–15, factor the expression completely.

- $18y^2 - 12y$
- $x^3 - 3x^2 - 4x + 12$
- $6x^2 - 26x - 20$
- $v^2 - \frac{16}{9}$
- $9u^2 - 6u + 1$
- $x^3 + 27$

In Exercises 16–19, solve the equation.

- $(x + 5)(x - 2) = 60$
- $12 + 5y - 3y^2 = 0$
- $(y + 2)^2 - 9 = 0$
- $2x^3 + 10x^2 + 8x = 0$

- Write an expression for the area of the shaded region in the figure. Then simplify the expression.
- The area of a rectangle is 54 square centimeters. The length of the rectangle is $1\frac{1}{2}$ times its width. Find the dimensions of the rectangle.
- The area of a triangle is 35 square feet. The height of the triangle is 4 feet more than twice its base. Find the base and height of the triangle.
- The revenue R from the sale of x computer desks is given by $R = x^2 - 35x$. The cost C of producing x computer desks is given by $C = 150 + 12x$. How many computer desks must be produced and sold in order to break even?

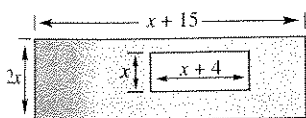


Figure for 20

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Take this test as you would take a test in class. After you are done, check your work against the answers in the back of the book.

1. Find the domain of $f(x) = \frac{2x}{x^2 - 5x + 6}$.

In Exercises 2 and 3, simplify the rational expression.

2. $\frac{2-x}{3x-6}$

3. $\frac{2a^2 - 5a - 12}{5a - 20}$

4. Find the least common multiple of x^2 , $3x^3$, and $(x+4)^2$.

In Exercises 5–18, perform the operation and simplify.

5. $\frac{4z^3}{5} \cdot \frac{25}{12z^2}$

6. $\frac{y^2 + 8y + 16}{2(y-2)} \cdot \frac{8y-16}{(y+4)^3}$

7. $(4x^2 - 9) \div \frac{2x+3}{2x^2 - x - 3}$

8. $\frac{(2xy^2)^3}{15} \div \frac{12x^3}{21}$

9. $2x + \frac{1-4x^2}{x+1}$

10. $\frac{5x}{x+2} - \frac{2}{x^2 - x - 6}$

11. $\frac{3}{x} - \frac{5}{x^2} + \frac{2x}{x^2 + 2x + 1}$

12. $\frac{4}{x+1} + \frac{4x}{x+1}$

13. $\frac{\left(\frac{3x}{x+2}\right)}{\left(\frac{12}{x^3 + 2x^2}\right)}$

14. $\frac{\left(9x - \frac{1}{x}\right)}{\left(\frac{1}{x} - 3\right)}$

15. $\frac{3x^{-2} + y^{-1}}{(x+y)^{-1}}$

16. $\frac{4x^2 + 2x - 7}{2x}$

17. $\frac{t^4 + t^2 - 6t}{t^2 - 2}$

18. $\frac{2x^4 - 15x^2 - 7}{x-3}$

In Exercises 19–21, solve the equation.

19. $\frac{3}{h+2} = \frac{1}{8}$

20. $\frac{2}{x+5} - \frac{3}{x+3} = \frac{1}{x}$

21. $\frac{1}{x+1} + \frac{1}{x-1} = \frac{2}{x^2-1}$

22. Find a mathematical model that relates u and v if v varies directly as the square root of u , and $v = \frac{3}{2}$ when $u = 36$.

23. If the temperature of a gas is not allowed to change, the absolute pressure P of the gas is inversely proportional to its volume V , according to Boyle's Law. A large balloon is filled with 180 cubic meters of helium at atmospheric pressure (1 atm) at sea level. What is the volume of the helium if the balloon rises to an altitude at which the atmospheric pressure is 0.75 atm? (Assume that the temperature does not change.)

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In Exercises 1 and 2, evaluate each expression without using a calculator.

- (a) $16^{3/2}$
(b) $\sqrt{5}\sqrt{20}$
- (a) $27^{-2/3}$
(b) $\sqrt{2}\sqrt{18}$
- For $f(x) = \sqrt{9 - 5x}$, find $f(-8)$ and $f(0)$.
- Find the domain of $g(x) = \sqrt{7x - 3}$.

In Exercises 5–7, simplify each expression.

- (a) $\left(\frac{x^{1/2}}{x^{1/3}}\right)^2$
(b) $5^{1/4} \cdot 5^{7/4}$
- (a) $\sqrt{\frac{32}{9}}$
(b) $\sqrt[3]{24}$
- (a) $\sqrt{24x^3}$
(b) $\sqrt[4]{16x^5y^8}$

In Exercises 8 and 9, rationalize the denominator of the expression and simplify.

- $\frac{2}{\sqrt[3]{9y}}$
- $\frac{10}{\sqrt{6} - \sqrt{2}}$
- Subtract: $5\sqrt{3x} - 3\sqrt{75x}$
- Multiply and simplify: $\sqrt{5}(\sqrt{15x} + 3)$
- Expand: $(4 - \sqrt{2x})^2$
- Factor: $7\sqrt{27} + 14y\sqrt{12} = 7\sqrt{3}(\quad)$

In Exercises 14–16, solve the equation.

- $\sqrt{3y} - 6 = 3$
- $\sqrt{x^2 - 1} = x - 2$
- $\sqrt{x} - x + 6 = 0$

In Exercises 17–20, perform the operation(s) and simplify.

- $(2 + 3i) - \sqrt{-25}$
- $(2 - 3i)^2$
- $\sqrt{-16}(1 + \sqrt{-4})$
- $(3 - 2i)(1 + 5i)$
- Write $\frac{5 - 2i}{3 + i}$ in standard form.
- The velocity v (in feet per second) of an object is given by $v = \sqrt{2gh}$, where $g = 32$ feet per second per second and h is the distance (in feet) the object has fallen. Find the height from which a rock has been dropped when it strikes the ground with a velocity of 80 feet per second.