Diagnostic Review – College Algebra

The Math Diagnostic Sequence at the College of Western Idaho involves testing out of College Algebra. The diagnostic tests have between 10 and 20 questions. If you complete a test with a passing score, you can attempt the next test in the sequence.

College Algebra – Equations, Inequalities, Graphing, Functions

Topics and Examples

1. Topic: Solve a linear equation

   - Example: Solve $7 - (2x - 1) = 3(2 - x)$

2. Topic: Solve a quadratic equation by factoring

   - Example: Solve $3x^2 + 13x = 10$

3. Topic: Solve a rational equation

   - Example: Solve $\frac{4}{2x-2} - \frac{5}{x^2-x} = \frac{3}{x}$

4. Topic: Solve a radical equation with one solution

   - Example: Solve $\sqrt{4x + 5} = 10$

5. Topic: Solve a radical equation with no solution

   - Example: Solve $\sqrt{3x + 1} = -5$

6. Topic: Solve a radical equation with more than one radical

   - Example: Solve $\sqrt{4x + 5} - 2 = \sqrt{x + 4}$

7. Topic: Solve for the variable

   - Example: Solve for w $R = \frac{w - gw}{T}$

8. Topic: Solve a linear inequality

   - Example: Solve $4 - 3(2 - 3x) \leq -3(x - 8)$

9. Topic: Solve a quadratic inequality. Use interval notation.

   - Example: Solve $x^2 - 2x - 80 > 0$

10. Topic: Solve an absolute value inequality. Use interval notation.

    - Example: Solve $|5 - 8x| + 4 \geq -6$

11. Topic: Solve the compound inequality. Use interval notation.

    - Example: Solve $5x < 8x + 21$ and $2 - 3x \leq -13$

12. Topic: Graph a linear equation

    - Example: Graph $4x + 3y = 18$

13. Topic: Graph a quadratic equation
    - Example:
        a. Graph the quadratic equation $y = x^2 + 4$
        b. Is the graph the graph of a function?
        c. If yes, state the domain and range.

14. Topic: Graph a circle
    - Example:
        a. The graph of the equation is a circle. Sketch the circle. $(x - 5)^2 + (y + 4)^2 = 9$
        b. Is the graph the graph of a function?

15. Topic: Graph the function
    - Example:
        a. Graph the parabola $g(x) = (x - 4)^2 + 5$
        b. State the domain and range
        c. Identify the interval where the function is decreasing and increasing.

16. Topic: Graph the function
    - Example:
        a. Graph the absolute value function $f(x) = -|x + 5|$
        b. State the domain and range
        c. Identify the interval where the function is decreasing and increasing.

17. Topic: Graph a quadratic inequality
    - Example: Graph the quadratic inequality $y \geq x^2 + 3$

18. Topic: Graph the piecewise function
    - Example:
        a. Graph the piecewise defined function $g(x) = \begin{cases} x^2 - 3 \text{ if } x \leq -1 \\ -\frac{2}{5}x + 2 \text{ if } x > -1 \end{cases}$
        b. State the domain and range

19. Topic: Graph the inequality
    - Example: Graph the inequality $(x - 3)^2 + y^2 \leq 16$

20. Topic: Graph the solution of the system of inequalities
    - Example: Graph the system $4x + 3y < 18$; $2x - y \leq -5$

21. Topic: Write the equation of the line containing the given two points
    - Example: Given (2, 7) and (-4,10)

22. Topic: Write the equation of the line containing the given point and parallel to the given line

   - Example: Given (3, 7); 2x - 5y = 6

23. Topic: Write the equation of the circle in standard form

   - Example: Given center (9,-5), r = 3

24. Topic: Multiply polynomials

   - Example: Multiply $(4x - 5)(6x^2 + 3x - 2)$

25. Topic: Divide polynomials

   - Example: Divide $\frac{3x^2+19x-22}{x+9}$

26. Topic: Evaluate a function

   - Example: Given the function $g(x) = 14 - 2^x$, find g(4)

27. Topic: Find the difference quotient of the function f(x)

   - Example: Find $\frac{f(x+h)-f(x)}{h}$, h≠ 0, for the following function $f(x) = x^2 - 3$

28. Topic: Find the zeros of a polynomial function

   - Example: Find the zeros of the function $f(x) = 6x(x - 4)(x + 5)^2$

29. Topic: Simplify and write your answer in standard form a+bi

   - Example: Simplify $(3 - 4i)^2$

30. Topic: Simplify the imaginary number

   - Example: Simplify i^{49}

If you need Math 130 Discrete Math, Math 143 College Algebra, or Math 147 Precalculus (Math 143 and Math 147 are prerequisites to any Calculus courses)

Answers:

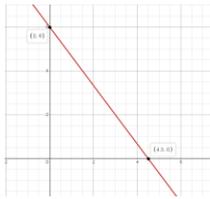**College Algebra – Equations, Inequalities, Graphing, Functions**

1. $x = -2$

2. $x = \frac{2}{3}, -5$

3. $x = -2$

4. $x = \frac{95}{4}$

5. no solution

6. x = 5

7. $w = \frac{RT}{1-g}$

8. $x \leq \frac{13}{6}$

9. $(-\infty, -8) \cup (10, \infty)$
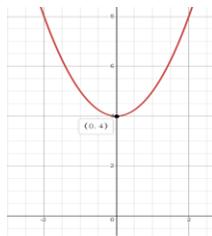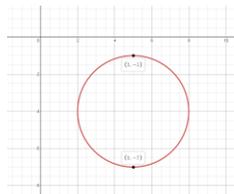
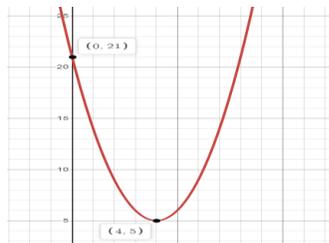10. $(-\infty, \infty)$

11. $[5, \infty)$

12.

13. Answers:

    a.

    b. Yes, it is a function

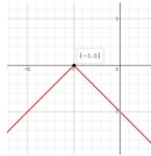   c. Domain: $(-\infty, \infty)$ Range: $[4, \infty)$

14. Answers:

    a.

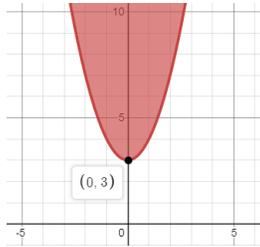   b. No, it is not a function

15. Answers:

    a.

    b. Domain: $(-\infty, \infty)$ Range: $[5, \infty)$

    c. Decreasing: $(-\infty, 4)$ Increasing: $(4, \infty)$

16. Answers:
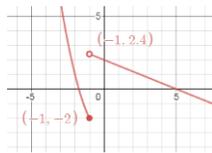
a.

b. Domain: $(-\infty, \infty)$ Range: $(-\infty, 0]$
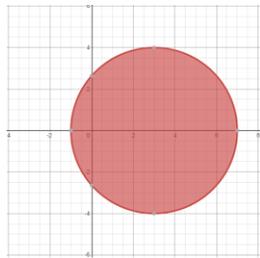
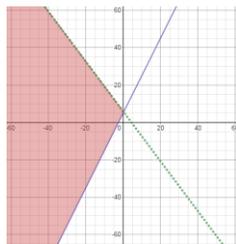c. Decreasing: $(-5, \infty)$ Increasing: $(-\infty, -5)$

17.

18. Answers:

a.

b. Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

19.

20.

21. $y = -\dfrac{1}{2}x + 8$

22. $y = \dfrac{2}{5}x + \dfrac{29}{5}$

23. $(x - 9)^2 + (y + 5)^2 = 9$

24. $24x^3 - 18x^2 - 23x + 10$

25. $3x - 8 + \dfrac{50}{x+9}$

26. $g(4) = -2$

27. $2x + h$

28. $x = -5, 0, 4$

29. $-7 - 24i$

30. i

Some websites to help you practice are:

- IXL   https://www.ixl.com/math/algebra-1

- S.O.S Math   http://www.sosmath.com/algebra/algebra.html

- Khan Academy   https://www.khanacademy.org/math/algebra?t=practice

- Purplemath   http://www.purplemath.com/