

The following problems are reflective of the types of questions you should be prepared to answer on the Algebra Skills Assessment exam.

**Directions:** Show all work in the space provided, simplify completely, and circle your final answer. Answers should contain only positive exponents and simplified radicals. You may use a calculator but WILL NOT receive full credit for just an answer.

**I. Evaluate.**

1)  $[2^3 + 4(7-3)] \div 8$

2)  $-2^3 - 6(-2) + 1$

3)  $\frac{3-5(1-2|3-6|)}{4 \div \left(-\frac{1}{2}\right)}$

4) Evaluate  $x^2 + 4x - 5$  when  $x = 3$

5) Evaluate  $\frac{5-2ax}{x^2+b}$  when  $a = 3, b = 1,$  and  $x = -2$

6) Solve  $s = -\frac{1}{2}gt^2 + vt$  for  $g$ .

**II. Simplify.**

7)  $y \cdot y \cdot x - x \cdot x \cdot x \cdot y$

8)  $3(x^2 - 2x + 4) + 2(5x^2 - 7)$

9)  $(2x^{-1}y^5z^2)(-5xy^{-2}z^3)$

10)  $\frac{a^{-3}s^3t}{a^{-6}s^5t^4}$

11)  $(2n^2 - 4cn) - (n^2 + cn + c^2)$

12) Multiply:  $(5x - 2)(3x + 5)$

13) Multiply:  $7y(5xy - 4x + 2)$

14) Multiply:  $(7t - 3)^2$

15)  $\frac{(24x^5 + 36x^4 - 6x^2)}{12x^3}$

16)  $\frac{4xy^2}{-10x^2y^4} \cdot \frac{15x^5y^3}{12y^2}$

17) Factor:  $18r^2s^3 + 12r^4s$

18) Factor:  $3z^2 - 75$

19) Factor:  $6x^2 + x - 5$

20) Factor:  $5a^3 - 30a^2 - 80a$

**Simplify.**

$$21) \frac{x^2 - 1}{1 - x}$$

$$22) \frac{x^2 - 9}{x^3 + 3x} \cdot \frac{x^3}{x^3 - 3x^2}$$

$$23) \frac{2x^2 + 5x + 2}{2x^2 + x - 6} \div \frac{6x + 3}{2x - 3}$$

$$24) \frac{4x - 5}{6} + \frac{2x + 3}{9}$$

$$25) \frac{2x - 36}{x^2 - 4x + 12} + \frac{3}{x - 6}$$

$$26) \text{ For what value of } x \text{ is } \frac{x - 6}{x - 7}$$

a. equal to zero?

b. undefined?

**Simplify.**

$$27) \sqrt{\frac{12}{49}}$$

$$28) \sqrt{\frac{9x^4y^6}{225}}$$

$$29) \sqrt{20} - 2\sqrt{45} + \sqrt{49}$$

$$30) (\sqrt{7} - \sqrt{2})(\sqrt{7} + \sqrt{2})$$

$$31) (\sqrt{3} - 7)^2$$

$$32) \frac{20}{\sqrt{6} + 2}$$

33) Given the functions  $f(x) = x^2 - 3$  and  $g(x) = 3x + 6$

a. Find  $f(-3)$

b. Find  $x$  if  $g(x) = 21$

### III. Solve.

$$34) 6x - 48 = 6$$

$$35) \frac{2}{3}x - 5 = x - 3$$

$$36) 8 - 4(x - 1) = 2 + 3(4 - x)$$

$$37) x^2 - 8x = 0$$

$$38) (3x + 2)^2 = 16$$

$$39) x^2 + 3x = 4$$

$$40) x^2 - 4x + 1 = 0$$

41)  $2x^2 - x + 9 = 0$

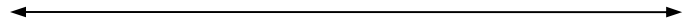
42)  $\frac{6}{x} + \frac{3}{2} = \frac{6}{4x}$

43)  $\frac{3}{x+1} = \frac{1}{x-7}$

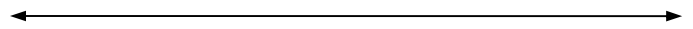
44)  $\sqrt{5x-9} = 4$

45)  $2\sqrt{x} + 3 = 11$

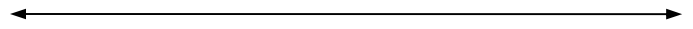
46) Solve and graph:  $4 - 3x \leq 13$



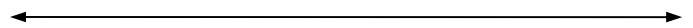
47) Solve and graph:  $x - 3 \leq 1$  or  $2x - 5 > 7$



48) Solve and graph:  $1 < x - 3 < 5$



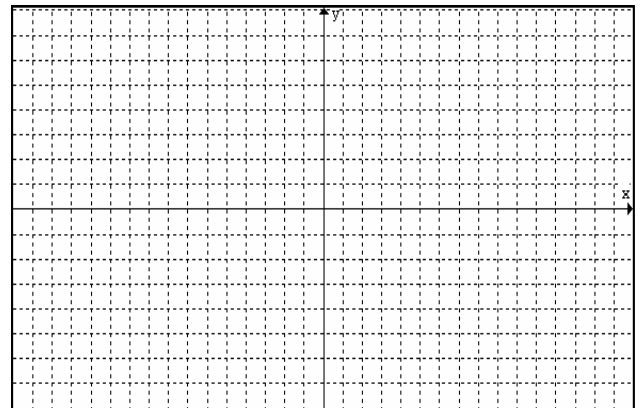
49) Solve and graph:  $|x + 3| \geq 2$



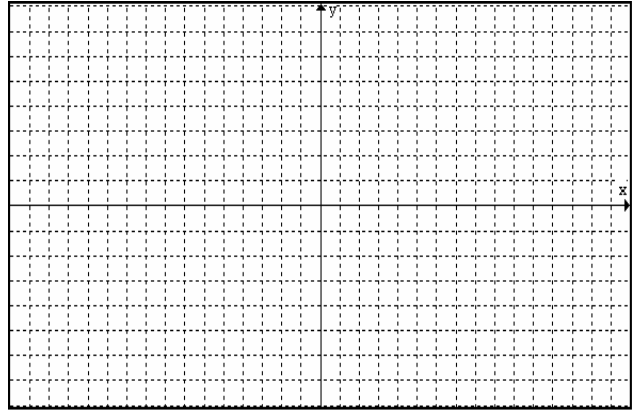
#### IV. Functions, Equations in two variables

48) Graph the linear equation  $3x + 5y = 15$

- a) Give the slope. \_\_\_\_\_
- b) Give the x-intercept. \_\_\_\_\_
- c) Give the coordinates of a point on the line \_\_\_\_\_



49) Graph the inequality  $2x - 3y \leq 12$



50) Write an equation, in any form, for the line that has a slope of 4 and passes through (5,-2).

51) Write an equation of the line that is perpendicular to  $y = \frac{2}{3}x + 1$  and contains (0,5)

52) Write an equation of the line which contains (-1,4) and (2,2)

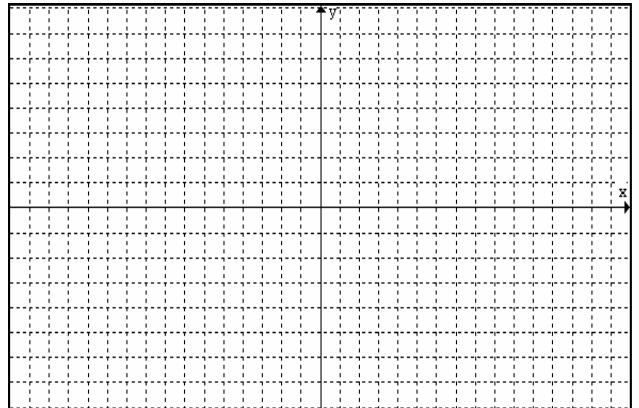
53) Write the equation for the line that has an x-intercept of 4 and a y-intercept of -2

54) Graph the function:  $y = x^2 - 4x + 3$

a) give the coordinates of the vertex \_\_\_\_\_

b) is the vertex a minimum or maximum \_\_\_\_\_

c) the graph is called a \_\_\_\_\_



55) Solve the given system by Substitution 
$$\begin{cases} x+3y=0 \\ 2x-y=7 \end{cases}$$

56) Solve the given system by Linear Combination 
$$\begin{cases} 2x-3y=13 \\ 5x+2y=4 \end{cases}$$

**V. Applications - for each problem:**

- 1) IDENTIFY VARIABLES OR MAKE A DIAGRAM OR CHART**
- 2) SHOW EQUATION OR EQUATIONS**
- 3) SOLVE**

- 57) It takes 6 hours for a plane to travel 720 km with a tail wind, and 8 hours to make the return trip with a head wind. Find the air speed of the plane and the speed of the wind.
- 58) Find three consecutive integers whose sum is 105.
- 59) Laura has an equal number of dimes, nickels, and quarters. If their total value is less than nine dollars, what is the maximum number of each that she could have?

60) The length of a rectangle is three more than twice the width. Find the dimensions if the area of the rectangle is 65 square centimeters.

61) If  $s$  varies directly as  $t$ , and  $s = 10$  when  $t = 4$ , find  $s$  when  $t = 6$ .

62) Would the sides  $\sqrt{2}$ ,  $3$ , and  $\sqrt{7}$  form a right triangle? Explain.

63) Given the right triangle below, with lengths as indicated, find the value of  $x$ .

