

# Worcester State University Placement Test Elementary Algebra Study Guide

**Disclaimer:** *This study guide is intended to assist in preparation for the Elementary Algebra Placement Test at Worcester State University by providing practice problems on the various topics covered on the test. Please note that problems on the test will be different than those presented here. Answers to all problems appear at the end of this packet. If you require any assistance, free drop-in tutoring is available at the Math Center (Sullivan 140) during the fall and spring semesters – stop by S-140 to see the current schedule. Remember there are NO CALCULATORS ALLOWED*

## Signed Numbers and Order of Operations

*In this section, you will simplify expressions that contain signed numbers. Remember to use order of operations.*

1.  $\frac{49}{7} - 2(3)$

2.  $\frac{4^2 - 5^2}{(4 - 5)^2}$

3.  $(6 - 3)(3 - 4) - 2^3$

4.  $-4^3(-5)^2$

## Scientific Notation

*In this section, you will write numbers using scientific notation, expanded form and simplify expressions with scientific notations.*

*Write the following using scientific notation.*

5. 280,000,000

6. 0.00000074

*Write the following using expanded form.*

7.  $7.4 \times 10^9$

8.  $3.47689 \times 10^{-8}$

*Simplify, then write the expression using scientific notation.*

9.  $(1.4 \times 10^9)(2.2 \times 10^3)$

10.  $(3.0 \times 10^3)(4.5 \times 10^6)$

11.  $\frac{5.4 \times 10^8}{2.0 \times 10^4}$

## Evaluating Algebraic Expressions

*In this section, you will review evaluating algebraic expressions through combining like terms and using the distributive property.*

12. If  $x = 4$ ,  $y = 0$ , and  $z = -5$ , then  $x - y + 3z$  equals

## Solving Equations

*Solve the following by combining like terms and using the distributive property.*

13.  $8y + 7(y - 3) = 54$

14.  $\frac{4y}{7} = 12$

15.  $16x = -2(x + 18)$

16. Solve  $4a - k = m$  for  $k$  in terms of  $a$  and  $m$ .

17.  $\frac{4}{x-4} + \frac{1}{4x-16} = \frac{17}{4}$

18.  $\sqrt{x+7} + 2 = 4$

19.  $\sqrt{8a-2} = \sqrt{2a+5}$

## Solving Inequalities

*Solve the following inequalities and graph each of them on a number line.*

20.  $-6x \geq 24$

21.  $4(2x - 3) > 3x - 2$

## Graph Basics

*Answer the following graphing related questions.*

22. Are the graphs of  $y = 9x + 8$  and  $y = 9x - 1$  parallel? Explain why or why not.

23. What is the slope and y-intercept of the graph  $y + 4x = -1$ ?

24. Find the equation of a line with slope  $-2$  that passes through point  $(0, -4)$ .

25. Identify the values for which the rational expression  $\frac{5m}{m+8}$  is undefined.

## Solving Systems of Equations

*Solve using either the elimination method or the substitution method.*

$$26. \begin{cases} x + y = -4 \\ y = 4x - 4 \end{cases}$$

## Operations with Algebraic Expressions

*Simplify the following expressions. Write all answers with positive exponents.*

$$27. 5x + 9 - 2(-5x - 9)$$

$$28. (3x^2 - 8x - 18) - (5x^2 - 16x - 17)$$

$$29. (5x + 2)(5x - 8)$$

$$30. \frac{12s^3 - 12s^2 + 12s}{-2s}$$

$$31. \frac{36a^6b^7}{81a^2b^{12}}$$

$$32. \frac{b^2 - 16}{b^2 - 10b + 24}$$

$$33. \frac{1 - \frac{2}{x}}{x - \frac{4}{x}}$$

$$34. \frac{d}{d^2 - 16} - \frac{6}{d^2 + 5d + 4}$$

$$35. \left(\frac{5x^4}{y}\right)^{-3}$$

## Factoring Expressions

*Factor each completely.*

$$36. 36 - 9s - 4t + st$$

$$37. x^2 - 4x - 21$$

$$38. x^2 + 5x - 6$$

$$39. x^2 - 5x - 6$$

$$40. x^2 + 9^2$$

41.  $169 - m^2$

## Solving Quadratic Equations

*Solve the following equations.*

42.  $(x - 7)(x + 6) = 0$

43.  $(x + 8)(x - 7) = -14$

44.  $4x^2 - 1 = 8$

45.  $x^2 - 3x - 4 = 0$

## Simplifying Radicals

*Simplify the following using the rules of radicals or by rationalizing the denominators. Assume all variables represent positive numbers.*

46.  $\sqrt{81}$

47.  $\sqrt{4} \times \sqrt{121}$

48.  $-5\sqrt{300}$

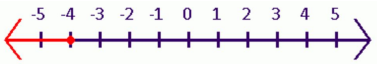
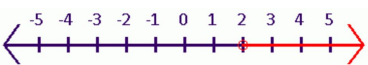
49.  $\sqrt{2} - 7\sqrt{72} - 5\sqrt{162}$

50.  $(\sqrt{2x^2y})(\sqrt{10x^7y^4})$

51.  $\sqrt{\frac{42p}{2}}$

## Answers

### Answers for all problems

1. 1
2.  $-9$
3.  $-11$
4.  $-1,600$
5.  $2.8 \times 10^8$
6.  $7.4 \times 10^{-7}$
7. 7,400,000,000
8. 0.0000000347689
9.  $3.08 \times 10^{12}$
10.  $1.35 \times 10^{10}$
11.  $2.7 \times 10^4$
12.  $-11$
13.  $y = 5$
14.  $y = 21$
15.  $x = -2$
16.  $k = 4a - m$
17.  $x = 5$
18.  $x = -3$
19.  $a = \frac{7}{6}$
20.  $x \leq -4$  A number line from -5 to 5 with tick marks at every integer. A red dot is placed at -4, and a red arrow points to the left from this dot. The numbers -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5 are written above the line.
21.  $x > 2$  A number line from -5 to 5 with tick marks at every integer. A red dot is placed at 2, and a red arrow points to the right from this dot. The numbers -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5 are written above the line.
22. parallel because the slopes are the same
23. the slope is  $-4$ , the y intercept is  $-1$
24.  $y = -2x - 4$
25. when  $m = -8$
26.  $(0, -4)$
27.  $15x + 27$
28.  $-2x^2 + 8x - 1$
29.  $25x^2 - 30x - 16$
30.  $-6(s^2 - s + 1)$  or  $6(s^2 + s - 1)$
31.  $\frac{4a^4}{9b^5}$
32.  $\frac{b+4}{b-6}$
33.  $\frac{1}{x+2}$
34. fully simplified
35.  $\frac{y^3}{125r^{12}}$
36.  $(9 - t)(4 - s)$
37.  $(x - 7)(x + 3)$
38.  $(x + 6)(x - 1)$
39.  $(x - 6)(x + 1)$
40. fully factored
41.  $(13 - m)(13 + m)$
42. 7,  $-6$
43. 6,  $-7$
44.  $\frac{3}{2}, -\frac{3}{2}$
45. 4,  $-1$
46. 9
47. 22
48.  $-50\sqrt{3}$
49.  $-86\sqrt{2}$
50.  $2x^4y^2\sqrt{5xy}$
51.  $\sqrt{21p}$