

Geometry Prerequisite Skills Practice Worksheet

Name: Key

Date: _____

The following problems represent many of the algebraic skills that are needed throughout your geometry course.

I. Solving Quadratic Equations

Solve. Check your solutions. Simplify your answer whenever possible.

$$\begin{aligned} 1. \quad x^2 &= 500 \\ \sqrt{x^2} &= \sqrt{500} \\ x &= \pm\sqrt{500} \\ x &= 10\sqrt{5}, x = -10\sqrt{5} \end{aligned}$$

$$\begin{aligned} 2. \quad x^2 + 3x - 28 &= 0 \\ (x+7)(x-4) &= 0 \\ x+7 = 0, x-4 &= 0 \\ x &= -7, x=4 \end{aligned}$$

$$\begin{aligned} 3. \quad x^2 &= 5x \\ x^2 - 5x &= 0 \\ x(x-5) &= 0 \\ x = 0, x-5 &= 0 \\ x &= 0, x = 5 \end{aligned}$$

$$\begin{aligned} 4. \quad x^2 - 9x &= -18 \\ x^2 - 9x + 18 &= 0 \\ (x-6)(x-3) &= 0 \\ x-6 = 0, x-3 &= 0 \\ x &= 6, x = 3 \end{aligned}$$

$$\begin{aligned} 5. \quad 2x^2 + 11x - 21 &= 0 \\ (2x-3)(x+7) &= 0 \\ 2x-3 = 0, x+7 &= 0 \\ x = \frac{3}{2}, x &= -7 \end{aligned}$$

$$\begin{aligned} 6. \quad 2x^2 + 4x - 7 &= 0 \\ \text{Discriminant is } 72 \\ \text{Use Quadratic Formula } x &= \frac{-4 \pm \sqrt{16 - 4(2)(-7)}}{4} \\ x &= \frac{-4 \pm \sqrt{72}}{4} \\ x &= \frac{-4 \pm 6\sqrt{2}}{4} = \frac{-2 \pm 3\sqrt{2}}{2} \end{aligned}$$

II. Systems of Equations –

Solve the following systems of equations. Check your solutions.

$$\begin{aligned} 7. \quad \begin{cases} 3x - 2y = 16 \\ 5x + 2y = 8 \end{cases} \\ 8x = 24 \\ x = 3 \end{aligned}$$

$$3(3)-2y = 16$$

$$9-2y = 16$$

$$-2y = 7$$

$$y = -\frac{7}{2}$$

Check

$$5(3)+2(-\frac{7}{2}) = 8$$

$$15-7 = 8$$

$$8 = 8$$

Answer is $(3, -\frac{7}{2})$

$$8. \begin{cases} x + 2y = 6 \\ 3x + 4y = 10 \end{cases}$$

$$(x+2y = 6)(-2)$$

$$3x+4y = 10$$

$$-2x-4y = -12$$

$$\underline{3x+4y = 10}$$

$$x = -2$$

$$-2+2y = 6$$

$$2y = 8$$

$$y = 4$$

Check

$$3(-2)+4(4) = 10$$

$$-6+16 = 10$$

$$10 = 10$$

Answer is $(-2,4)$

$$9. \begin{cases} y = 2x + 7 \\ y = -3x - 13 \end{cases}$$

$$(y = -3x-13)(-1)$$

$$2x+7 = y$$

$$\underline{3x+13 = -y}$$

$$5x+20 = 0$$

$$5x = -20$$

$$x = -4$$

$$y = 2(-4)+7$$

$$y = -8+7$$

$$y = -1$$

Check

$$-1 = -3(-4)-13$$

$$-1 = 12-13$$

$$-1 = -1$$

Answer is $(-4, -1)$

$$10. \begin{cases} \frac{1}{2}x + \frac{1}{3}y = -4 \\ \frac{1}{5}x + \frac{1}{5}y = -2 \end{cases}$$

$$6\left(\frac{1}{2}x + \frac{1}{3}y = -4\right)$$

$$5\left(\frac{1}{5}x + \frac{1}{5}y = -2\right)$$

$$3x+2y = -24$$

$$(x+y = -10)(-2)$$

$$3x+2y = -24$$

$$\underline{-2x-2y = 20}$$

$$x = -4$$

$$x+y = -10$$

$$-4+y = -10$$

$$y = -6$$

Check

$$3(-4)+2(-6) = -24$$

$$-12+(-12) = -24$$

$$-24 = -24$$

Answer is $(-4, -6)$

III. Determining the Slope and Equation of a Line, and Plotting Points

11. Plot the following points on the coordinate plane:

a. $A(3, -5)$

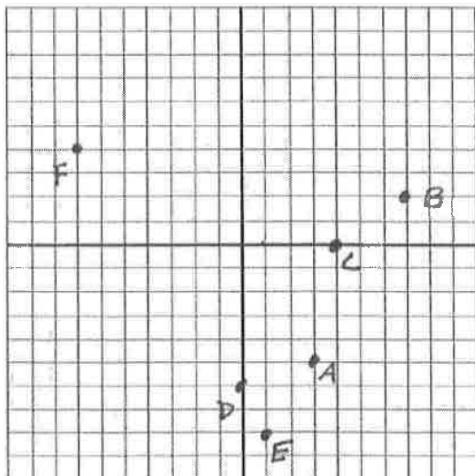
b. $B(7, 2)$

c. $C(4, 0)$

d. $D(0, -6)$

e. $E(2, -8)$

f. $F(-7, 4)$



Questions 12 – 15 refer to the points in Question 11.

12. Find the slope of the line passing through A and B.

A(3, -5) B(7, 2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-5)}{7 - 3} = \frac{7}{4}$$

13. Find an equation of the line passing through D with a slope of $-\frac{4}{3}$.

D(0, -6)

Point-Slope Form

$$(y - y_1) = m(x - x_1)$$

$$y + 6 = -\frac{4}{3}(x - 0)$$

14. Find an equation of the line passing through E that is parallel to the graph of $y = 3x + 5$.

Parallel lines have the same slope

Line passes through E(2, -8) with $m = 3$

$$y + 8 = 3(x - 2)$$

15. Find an equation of the line passing through E that is perpendicular to the graph of $y = \frac{2}{3}x + 1$.

Perpendicular lines have slopes that are opposite reciprocals of each other

Line passes through E(2, -8) with $m = -\frac{3}{2}$

$$y + 8 = -\frac{3}{2}(x - 2)$$

16. Graph the equation $y = -\frac{1}{2}x + 3$. Identify the slope, the y-intercept, and the x-intercept.

slope: $-\frac{1}{2}$

y-intercept: (0,3)

x-intercept: (6,0)

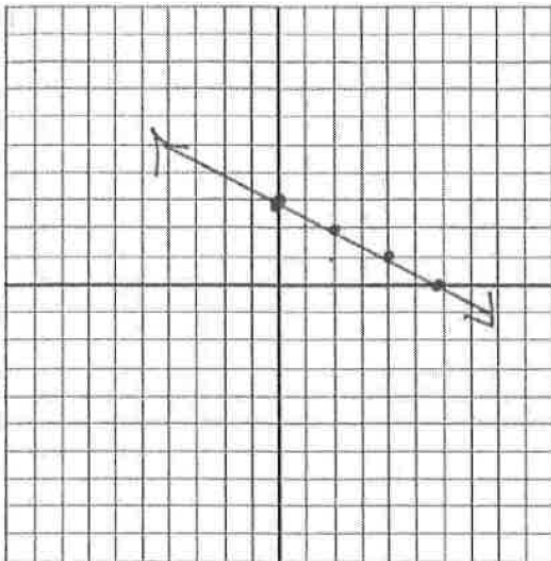
value of x when $y = 0$

$$0 = -\frac{1}{2}x + 3$$

$$-3 = -\frac{1}{2}x$$

$$-2(-3) = x$$

$$6 = x$$



IV. Simplifying Rational Expressions

Simplify. Rationalize denominators.

$$17. \sqrt{50} = \sqrt{2 \cdot 25} = 5\sqrt{2}$$

$$18. 2\sqrt{27} = 2\sqrt{3 \cdot 9} = 2 \cdot 3\sqrt{3} = 6\sqrt{3}$$

$$19. \sqrt{\frac{2}{3}} = \sqrt{\frac{2}{3}} \cdot \sqrt{\frac{3}{3}} = \sqrt{\frac{6}{9}} = \frac{\sqrt{6}}{3}$$

$$20. \frac{8}{\sqrt{2}} = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$$

V. Solving Linear Equations

Solve. Check your solutions.

$$21. 5x - 7 = -10x + 8$$

$$15x - 7 = 8$$

$$15x = 15$$

$$x = 1$$

$$22. 7y + 3 = 4y - 18$$

$$3y + 3 = -18$$

$$3y = -21$$

$$y = -7$$

$$23. -3(y + 3) = 2y + 3$$

$$-3y - 9 = 2y + 3$$

$$-9 = 5y + 3$$

$$-12 = 5y$$

$$-\frac{12}{5} = y$$

$$24. 2(-3a + 5) = -4(a + 4)$$

$$-6a + 10 = -4a - 16$$

$$10 = 2a - 16$$

$$26 = 2a$$

$$a = 13$$

$$25. 6x - 4 = 2(3x - 2)$$

$$6x - 4 = 6x - 4$$

$$-4 = -4$$

All real numbers

$$26. -6x + 9 = 4(5 - x)$$

$$-6x + 9 = 20 - 4x$$

$$9 = 20 + 2x$$

$$-11 = 2x$$

$$x = -\frac{11}{2}$$

$$27. 3(x + 2) = -5 - 2(x - 3)$$

$$3x + 6 = -5 - 2x + 6$$

$$3x + 6 = 1 - 2x$$

$$5x + 6 = 1$$

$$5x = -5$$

$$x = -1$$

$$28. 2(x - 3) = \frac{1}{2}(4x + 12)$$

$$2x - 6 = 2x + 6$$

$$-6 = 6$$

No Solution

$$29. 2(x - 3) = (x - 1) + 7$$

$$2x - 6 = x - 1 + 7$$

$$2x - 6 = x + 6$$

$$x - 6 = 6$$

$$x = 12$$

$$30. -(x + 7) = -6x + 8$$

$$-x - 7 = -6x + 8$$

$$5x - 7 = 8$$

$$5x = 15$$

$$x = 3$$

$$31. \frac{2}{x} = 7$$

$$x\left(\frac{2}{x}\right) = 7x$$

$$2 = 7x$$

$$x = \frac{2}{7}$$

$$32. \frac{3}{x} = \frac{4}{5}$$

$$4x = 15$$

$$x = \frac{15}{4}$$

$$33. \frac{3}{x} = \frac{x+8}{-5}$$

$$x(x+8) = 3(-5)$$

$$x^2 + 8x = -15$$

$$x^2 + 8x + 15 = 0$$

$$(x+3)(x+5) = 0$$

$$x = -3, x = -5$$

34. Solve for a .

$$ax + by = c$$

$$ax = c - by$$

$$a = \frac{c - by}{x}$$