Algebra I Exam

Form A

Instructor: Omer

Name: _____ **Date:** _____

Instructions

- This is a closed-notes, closed-book exam.
- **No calculators or electronic devices** are allowed.
- Cheating or academic dishonesty will result in a zero.
- Show all your work for full credit.
- Use clear, legible handwriting. Label all answers.
- Raise your hand if you have a question. No talking.

Grading Table

Question #	Max Points	Points Earned
1	5	
2	5	
3	10	
4	5	
5	5	
6	5	
7	5	
8	10	
9	10	
10	5	
11	5	
12	5	
13	5	
14	5	
15	15	
Total	**100**	

1. (5 pts)

a) Solve for x:

$$2x - 13 = -12$$

b) Solve the inequality $4x - 7 > 13$ and graph the solution on a plot.

c) Solve for x:

$$\frac{1}{x+2} = 2$$

d) Solve for x:

$$|2x - 7| = 4$$

2. (5 pts)

A ride-sharing company charges a flat fee of \$4 per ride plus \$2.50 per mile. Mia has no more than \$59 to spend on a trip. **What is the maximum number of miles she can travel without exceeding her budget?** Show your work and solve using an inequality.

3. (10 pts)

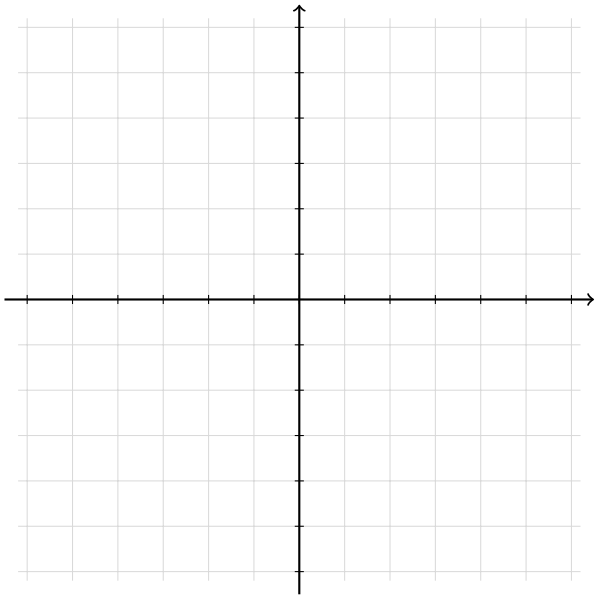
Solve each of the following equations or point-pairs by writing the equation in slope-intercept form: $y = mx + b$. Then, plot each line on the coordinate grid below.

a) $4y - 16x = 8$

b) Through the points $(-1, 0)$ and $(0, 4)$

c) Through the points $(0.5,\ 0)$ and $(1.5,\ 6)$

d) Slope $m = \frac{1}{2}$ through the point $(1, 2)$



4. (5 pts)

Two phone plans are available:

- **Plan A** charges a \$40 monthly fee plus \$0.10 per minute.
- **Plan B** charges a \$10 monthly fee plus \$0.25 per minute.

After how many minutes of calls in a month will both plans cost the same?
Solve using an equation and show all work.

5. (5 pts)

Solve each of the following systems of equations:

a)

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

b)

$$\begin{cases} 4y - 3x = -4 \\ y = \frac{3}{4}x - 3 \end{cases}$$

c)

$$\begin{cases} 4y - 3x = -4 \\ y = -\frac{3}{4}x - 3 \end{cases}$$

6. (5 pts)

A line passes through the points $(-8, 0)$ **and** $(10, 9)$**:**

a) Find the equation of a line **parallel** to this line.

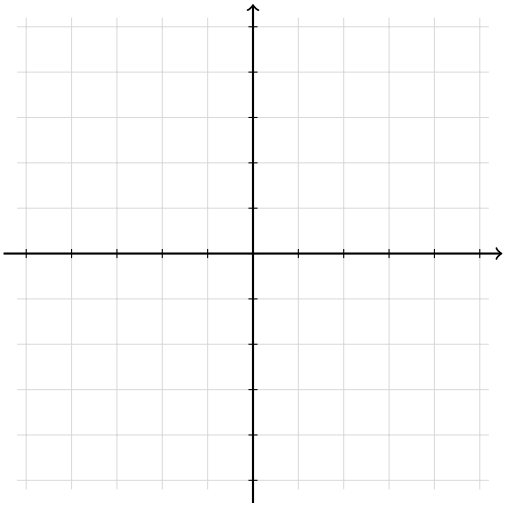
b) Find the equation of a line **perpendicular** to this line.

7. (5 pts)

Graph the following system of inequalities. Shade the solution region.

$$y \geq 4x - 2$$
$$-3y - 3x < 6$$

Give one solution (an ordered pair) that lies in the shaded region: _____



8. (10 pts)

a) A school sold adult and student tickets for a play. Adult tickets cost \$12 each, and student tickets cost \$7 each. They sold 110 tickets in total and collected \$1,090 in ticket sales.

Write a system of equations to represent this situation and solve it to determine how many adult tickets and how many student tickets were sold.

b) In a triangle, the measure of the second angle is 10 degrees more than twice the measure of the first angle. The third angle is 20 degrees less than the second angle.

Find the measure of all three angles. Show your work clearly.

9. (10 pts)

Evaluate a piecewise function and graph it.

The function $f(x)$ is defined as:

$$f(x) = \begin{cases} -2x + 5 & \text{if } x < 0 \\ x^2 & \text{if } 0 \leq x < 3 \\ 4x - 1 & \text{if } x \geq 3 \end{cases}$$

Evaluate the function at the following values. Show your work.

a) $f(-2) =$ _____

b) $f(0) =$ _____

c) $f(2.5) =$ _____

d) $f(3) =$ _____

e) $f(5) =$ _____

Graph the piecewise function. Use the coordinate grid below. Label all axes, include open/closed circles, and be precise.

10. (5 pts)

Simplify or solve each of the following expressions or equations:

a) Simplify the expression:

$$\frac{x^2 \cdot x^{-3}}{x^4}$$

b) Solve for x:

$$2^{2x+1} = 128$$

c) Simplify:

$$64^{\frac{2}{3}}$$

d) Simplify the expression:

$$\left(\frac{(m^4n^3)(m^{-2}n^{-4})}{m^{-3}n^{-2}}\right)^{-2}$$

e) Solve for x:

$$2^{x+1} + 2^x = 96$$

11. (5 pts)

The population of a small town grows exponentially. The population doubles every 5 years, and the current population is 1,200 people.

a) Write an exponential function to model the population after t years.

b) Find the population after 15 years.

12. (5 pts)

Distribute the following expressions and simplify.

a) $3\,(x+2)$

b) $x\left(3+4x^{-2}+3x^{-1}\right)$

c) $(x-2)\,(x+2)$

d) $(2x-2)\,(3x+3)$

e) $\left(x^2+3x+4\right)(x+3)$

13. (5 pts)

Factor the following expressions completely.

a) $3x^2 + 7x + 4$

b) $x^2 + 7x + 12$

c) $9x^2 - 25$

d) $2x^3 + 4x^2 + 3x + 6$

e) $4x^2 + 12x + 9$

14. (5 pts)

Use the quadratic formula to solve each of the following equations. Show all your work and box your final answers.

a) $x^2 - 5x + 6 = 0$

b) $x^2 - 4x + 4 = 0$

c) $x^2 + 4x + 5 = 0$

15. (15 pts)

$$y = x^2 + 6x - 4$$

$$y = a$$

(a) What is the value of a that causes the line $y = a$ to intersect the parabola at exactly one point?

(b) What is the value of a that causes the line $y = a$ to intersect the parabola at exactly two points?

(c) What is the value of a that causes the line $y = a$ to not intersect the parabola at all?