

Algebra 1 Practice Problems II

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1 Graphing

1.1 Review

1. Draw a coordinate plane and label the origin and the four quadrants.
2. Let $A = (3, 1)$. Find the coordinates of each of the following:
 - (a) the reflection of A across the x -axis
 - (b) the reflection of A across the y -axis
 - (c) the reflection of A across the line $y = x$
 - (d) the rotation of A around the origin by 180°
 - (e) the rotation of A around the origin by 90° counterclockwise
 - (f) the rotation of A around the point $(2, 2)$ by 90° clockwise
3. Quadrilateral $ABCD$ is positioned in the coordinate plane so that its vertices have coordinates

$$A = (5, 7); \quad B = (5, 6); \quad C = (3, 1); \quad D = (-4, -5).$$

Points E, F, G, H are the midpoints of segments $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}$, respectively.

- (a) Find the coordinates of E, F, G , and H .
- (b) Compute the midpoints of segments \overline{EG} and \overline{FH} .

To check your work, the two midpoints computed in part (b) should be the same. Doing this calculation in general (rather than with specific numbers) proves the following:

The midpoints of the sides of any quadrilateral form a parallelogram.

4. Maurine needs to get from $(2, 3)$ to $(17, 11)$.
 - (a) If they take the shortest path possible, how much distance would they cover?
 - (b) Suppose Maurine gets distracted while pondering the meaning of life and goes from $(2, 3)$ to $(6, 6)$, then to $(11, 18)$, then to $(17, 10)$, and finally to $(17, 11)$. What is the minimum distance Maurine can cover which is consistent with this information?
5. Which of the following expressions correctly finds the slope between the points $(-1, 7)$ and $(3, -4)$? Circle all that apply.

$$\frac{3 - (-1)}{-4 - 7} \quad \frac{7 - (-4)}{-1 - 3} \quad \frac{-4 - 7}{3 - (-1)} \quad \frac{7 - (-4)}{3 - (-1)} \quad \frac{-4 - 3}{7 - (-1)}$$

6. The points $(5, 7)$ and $(8, -1)$ lie on the line with equation $y = mx + b$, where m and b are constants. Find m and b .
7. Let $A = (1, 1)$, $B = (5, 2)$, and $C = (-4, 3)$. In this problem, we will find the coordinates of the point D for which quadrilateral $ABCD$ is a parallelogram.
 - (a) Find the slopes of lines AB and BC .

- (b) Write down an equation for the line through C parallel to AB .
- (c) Write down an equation for the line through A parallel to BC .
- (d) Since $AB \parallel CD$ and $AD \parallel BC$, point D must be the intersection of the lines you found in parts (b) and (c). Use this to find the coordinates of point D .

8. (a) Of the equations

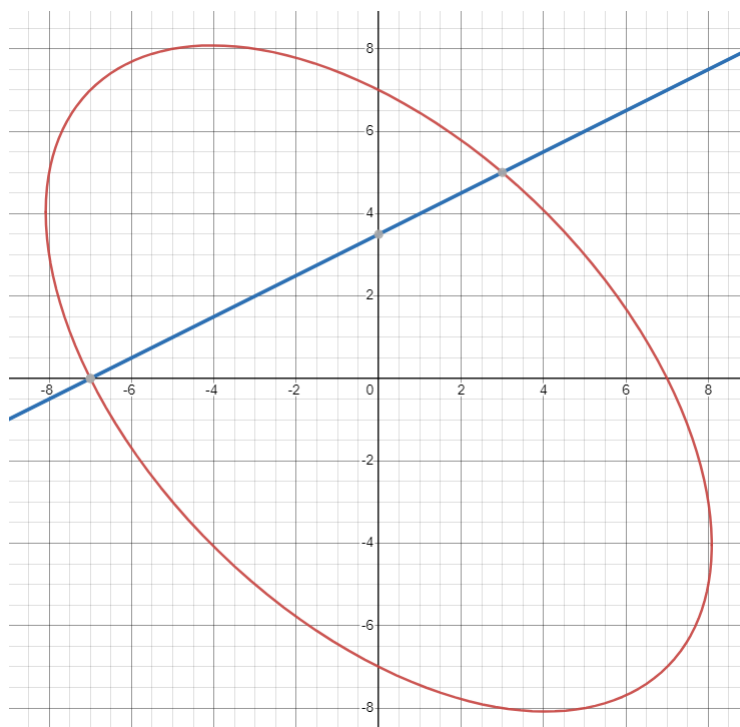
$$5x + 4y = 35; \quad (x + 4)^2 + (y - 1)^2 = 10; \quad x^2 + xy + y^2 = 49; \quad x - 2y = -7,$$

which one is an equation for the blue line below?

(b) Of the equations

$$5x + 4y = 35; \quad (x + 4)^2 + (y - 1)^2 = 10; \quad x^2 + xy + y^2 = 49; \quad x - 2y = -7,$$

which one is an equation for the red curve below?



2 Linear Inequalities