7-17 Exam: Applying Algebra to Geometric Situations

1. Write down the slope perpendicular to the given slope.

   (a) $m = -\frac{4}{3}$ $m_\perp =$

   (b) $m = 3$ $m_\perp =$

   (c) $m = 0.5$ $m_\perp =$

   (d) $m = -\frac{2}{3}$ $m_\perp =$

2. The line l has the equation $y = \frac{2}{3}x + 1$. To each line below, circle whether l is parallel, perpendicular, or neither.

   (a) parallel perpendicular neither $y = -\frac{2}{3}x - 1$

   (b) parallel perpendicular neither $y = \frac{3}{2}x + 4$

   (c) parallel perpendicular neither $2x - 3y = -7$

   (d) parallel perpendicular neither $3x + 2y = 5$

In the following problems, use the point-slope formula: $y - y_A = m(x - x_A)$

3. What is the equation of a line through the point $A(3, -2)$ and parallel to the line $y = 3x - 1$?

4. What is an equation of the perpendicular bisector of $\overline{QR}$ with $Q(2, 0)$ and $R(6, 2)$?

5. Simplify each expression. (Leave it in radical form if necessary, not a decimal.)

   (a) $\sqrt{121}$

   (b) $\sqrt{27}$

   (c) $\sqrt{50}$

   (d) $\sqrt{\frac{1}{4}}$

6. Write down the center and radius of each circle.

   (a) $(x+1)^2 + y^2 = 64$

   (b) $(x-4)^2 + (y+6)^2 = 8$

   (c) $(x-3)^2 + (y-9)^2 = 6^2$

   (d) $(x+1)^2 + (y+7)^2 = 16$

7. In the quadratic function below, a constant value, p, "completes the square".

$$f(x) = x^2 + 10x + p - p$$

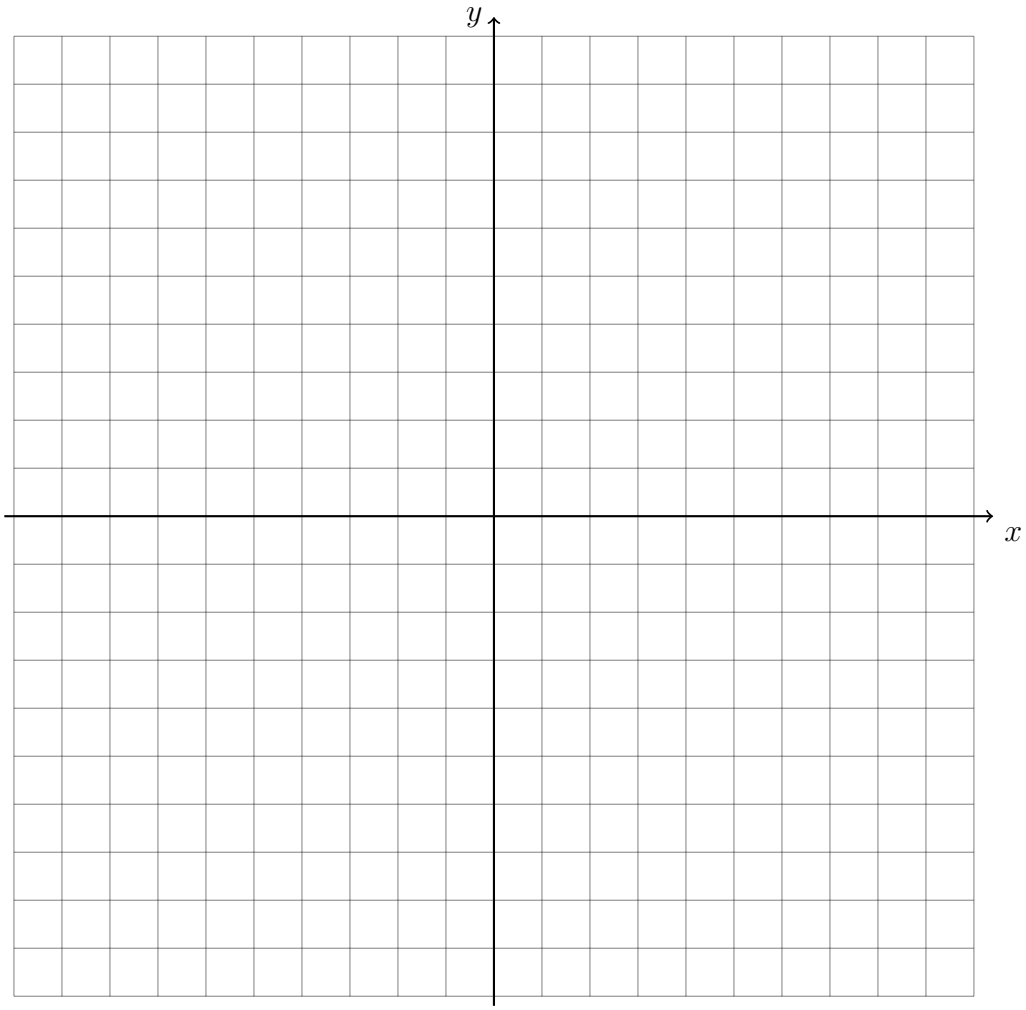
   (a) What value of p would complete the square?

   (b) Rewrite the function f in vertex form.

   (c) Write down the value of the vertex of the graph of f as a coordinate pair.

8. Graph and label the two equations. Mark their intersection as an ordered pair.

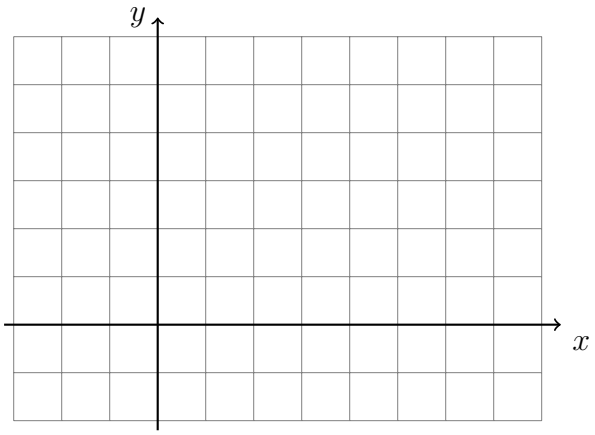
$y = \frac{3}{4}x + 2$ $3x + 3y = -15$



Are the lines parallel, perpendicular, or neither? Justify your answer, stating the values of the lines' slopes.

9. Given $J(-2, 7)$ and $K(1, 4)$, find the length of $\overline{JK}$. Leave the result in simplified radical form (not a decimal).

10. On the graph below, draw $\overline{AB}$, with $A(-2, 1)$ and $B(4, 4)$, labeling the end points.

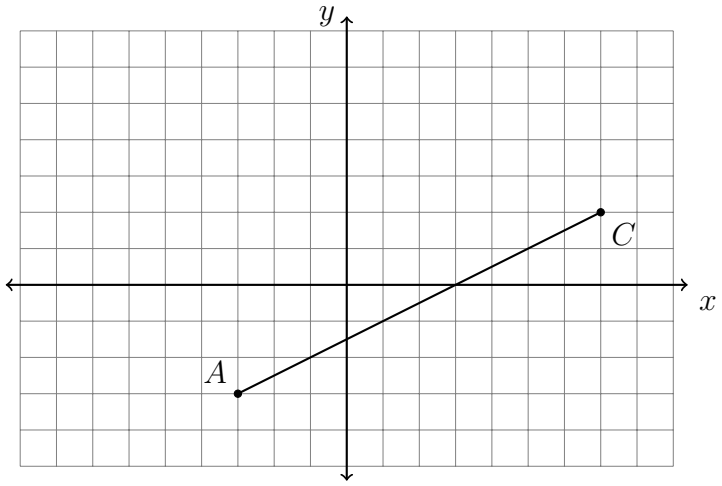


(a) Determine and state the coordinates of the midpoint M of $\overline{AB}$. Mark M and label it on the graph.

(b) Find the slope of $\overline{AB}$.

(c) Find the length of $\overline{AB}$. Leave the result as a simplified radical.

11. In the diagram below, $\overline{AC}$ has endpoints with coordinates $A(-3,-3)$ and $C(7,2)$.

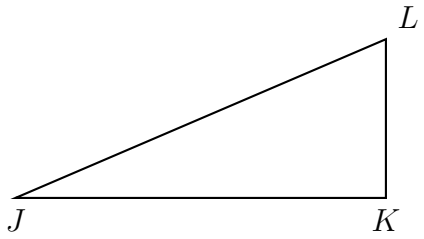


If B is a point on $\overline{AC}$ and $AB{:}BC = 2{:}3$, what are the coordinates of B?

12. $A(2,4)$ is one endpoint of $\overline{AB}$. The segment's midpoint is $M(7,3)$. Find the other endpoint, B.

13. A translation maps $A(-1,12) \rightarrow A'(5,6)$. What is the image of $B(10,-1)$ under the same translation?

14. Given right $\triangle JKL$ with $\overline{JK} \perp \overline{KL}$, $JL = 9.8$, $m\angle J = 28°$. Find the length KL, *rounded to the nearest hundredth.*



In the following two problems, solve for the value of x.

15. $\frac{1}{3}(2x + 11) = 7$

16. $\frac{1}{4}(28 - 4x) = -9$

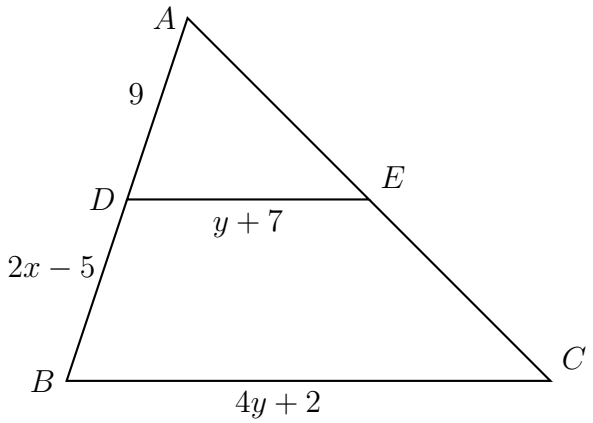
17. Given $f(x) = \frac{3}{4}x + 5$. Solve for x such that for $f(x) = 11$.

18. Given $g(x) = -2x^2 - 9x + 4$. Simplify $g(0)$.

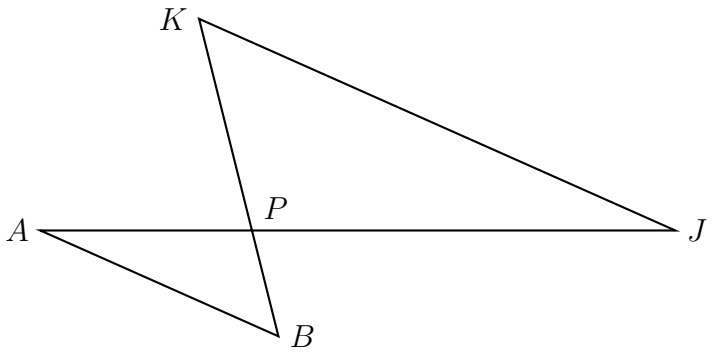
19. Given $h(x) = x^2 + 8x + 7$. Solve $h(x) = 0$.

20. Given triangle ABC with D the midpoint of $\overline{AB}$ and E the midpoint of $\overline{AC}$, as shown. Given $AD = 9$, $BD = 2x - 5$, $DE = y + 7$, and $BC = 3y + 3$.

    Find x and y.



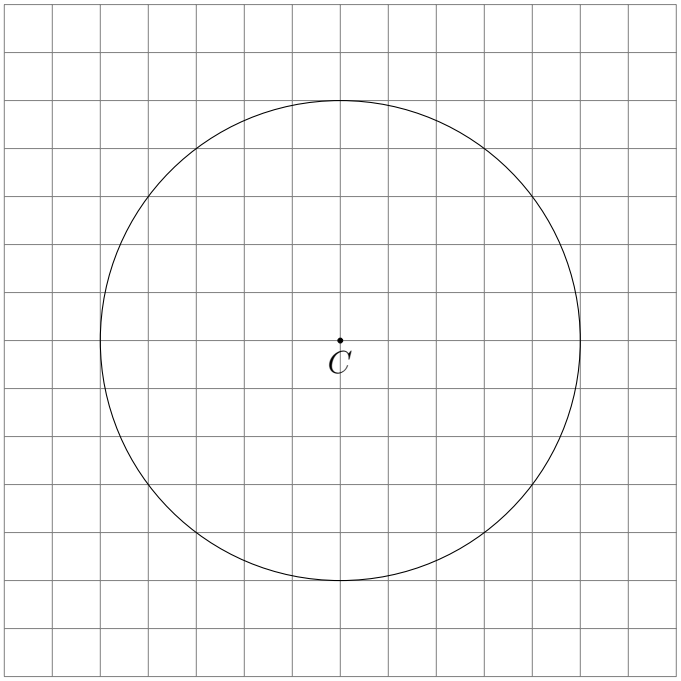
21. Given $\triangle ABP$ and $\triangle JKP$ as shown below. $\overline{AB} \parallel \overline{JK}$. $AP = 4.8$, $JP = 9.6$, and $AB = 7.1$. Find JK.



22. Given the circle C with circumference 10π.

    (a) Write down the formula for the circumference of a circle and solve for the radius yielding a circumference of 10π.

    (b) Find the area of the circle. Give an exact result in terms of π.



23. Given a circle O with radius 7.3.

    (a) Find the circumference of O, rounded *to the nearest hundredth*.

    (b) Find the area of O, rounded *to the nearest hundredth*.