Name _____ Date _____

Let's Move!
Translating and Constructing Line Segments

Vocabulary

Choose the term from the box that best completes each statement.

Distance Formula	transformation	image
rigid motion	translation	pre-image
congruent line segment	congruent	arc
copying (duplicating) a line segment		

1. A(n) _____ is a transformation of points in space.
2. The new figure created from a translation is called the _____.
3. A(n) _____ is a part of a circle and can be thought of as the curve between two points on a circle.
4. A(n) _____ is the mapping, or movement, of all the points of a figure in a plane according to a common operation.
5. The _____ can be used to calculate the distance between two points on a coordinate place.
6. In a translation, the original figure is called the _____.
7. Line segments that have the same length are called _____.
8. A(n) _____ is a rigid motion that "slides" each point of a figure the same distance and direction.
9. _____ means to have the same size, shape, and measure.
10. A basic geometric construction called _____ can be used to translate a line segment when measurement is not possible.

Problem Set

Calculate the distance between each given pair of points. Round your answer to the nearest tenth, if necessary.

1. (3, 1) and (6, 5)

$x_1 = 3, y_1 = 1, x_2 = 6, y_2 = 5$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$d = \sqrt{(6 - 3)^2 + (5 - 1)^2}$

$d = \sqrt{3^2 + 4^2}$

$d = \sqrt{9 + 16}$

$d = \sqrt{25}$

$d = 5$

2. (2, 8) and (4, 3)

3. (−6, 4) and (5, −1)

4. (9, −2) and (2, −9)

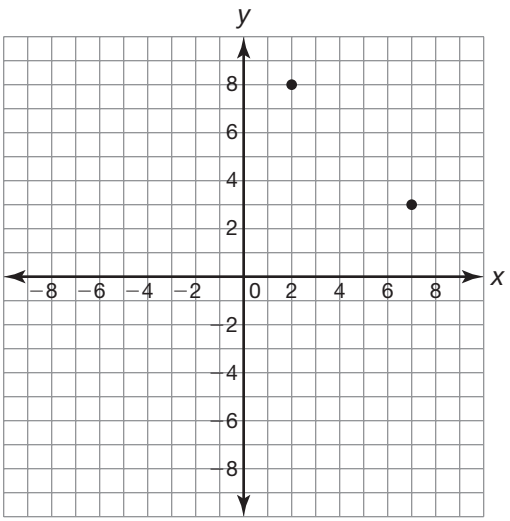
5. (0, −6) and (8, 0)

6. (−5, −8) and (−2, −9)

Name _____ Date _____

Calculate the distance between each given pair of points on the coordinate plane. Round your answer to the nearest tenth, if necessary.

7.



$x_1 = 2, y_1 = 8, x_2 = 7, y_2 = 3$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$d = \sqrt{(7 - 2)^2 + (3 - 8)^2}$

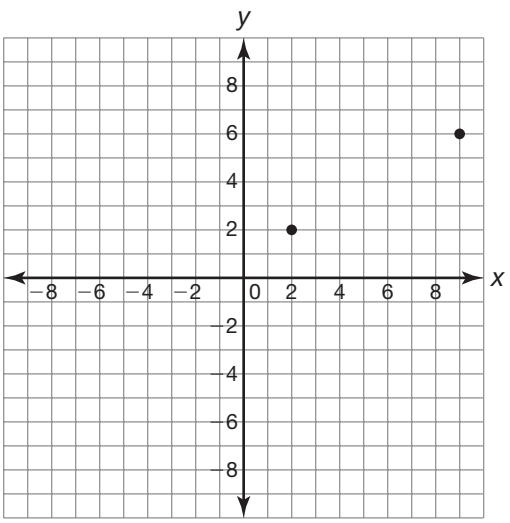
$d = \sqrt{5^2 + (-5)^2}$

$d = \sqrt{25 + 25}$

$d = \sqrt{50}$

$d \approx 7.1$

8.



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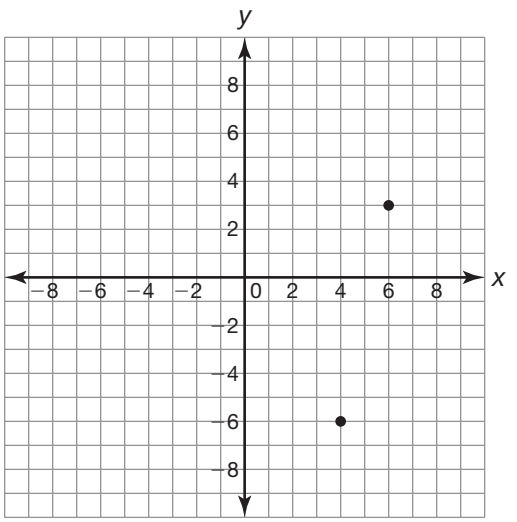
9.



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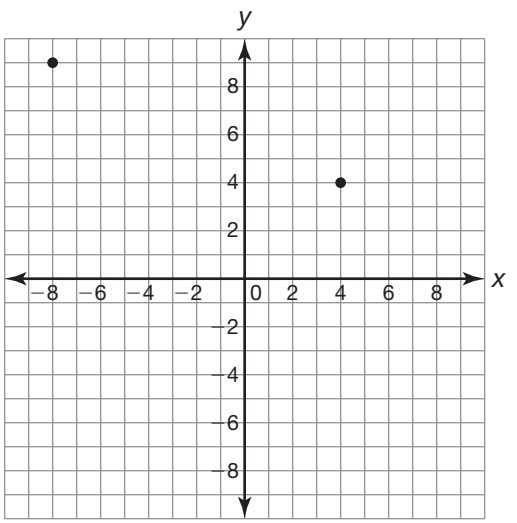

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Name _____ Date _____

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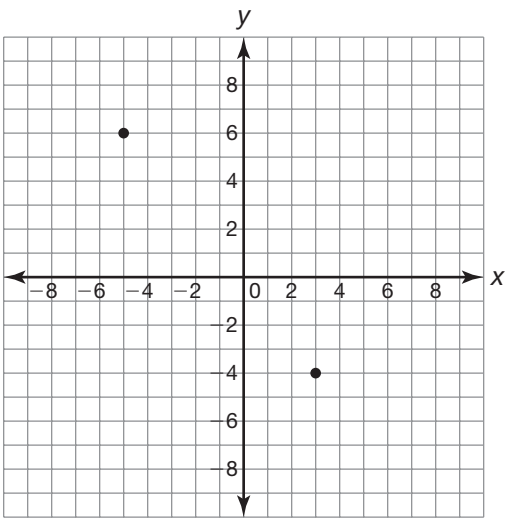

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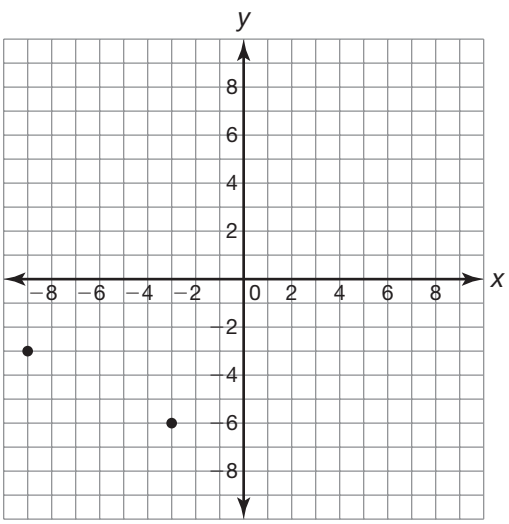
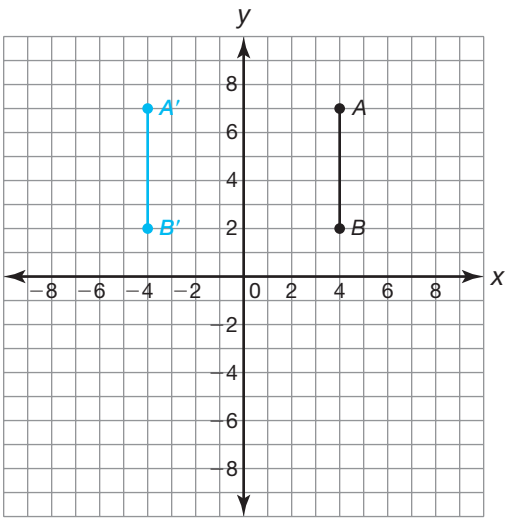


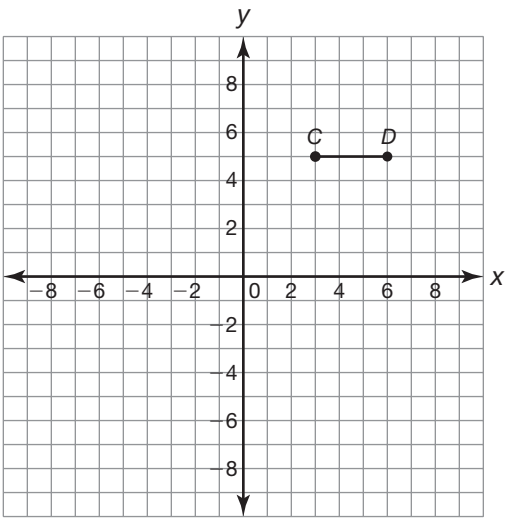
12

Translate each given line segment on the coordinate plane as described.

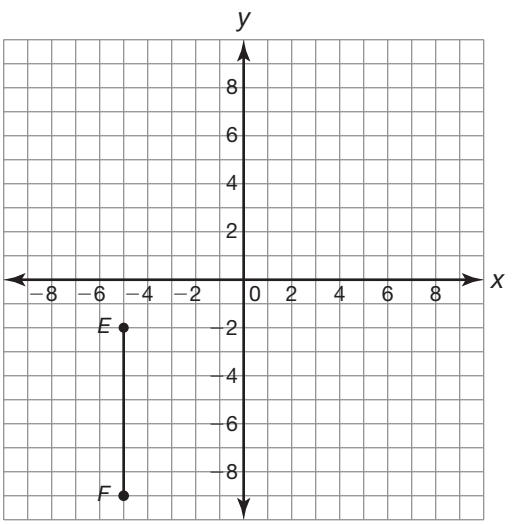
13. Translate $\overline{AB}$ 8 units to the left.



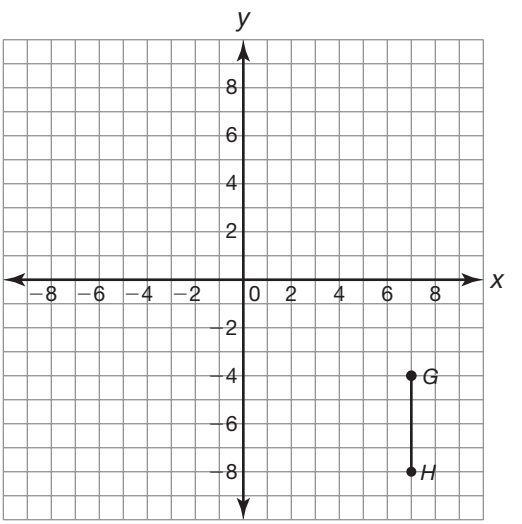
14. Translate $\overline{CD}$ 9 units down.



15. Translate $\overline{EF}$ 7 units to the right.



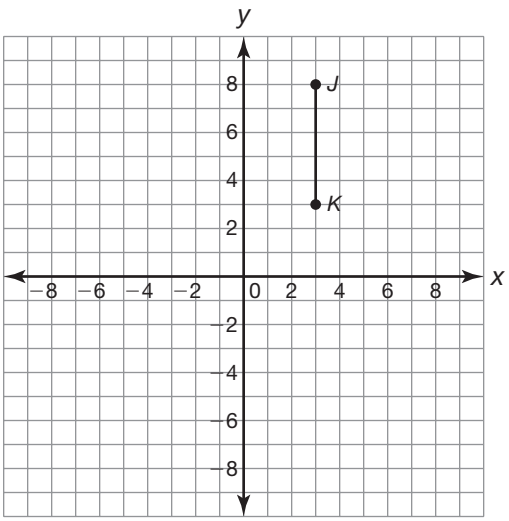
16. Translate $\overline{GH}$ 12 units up.



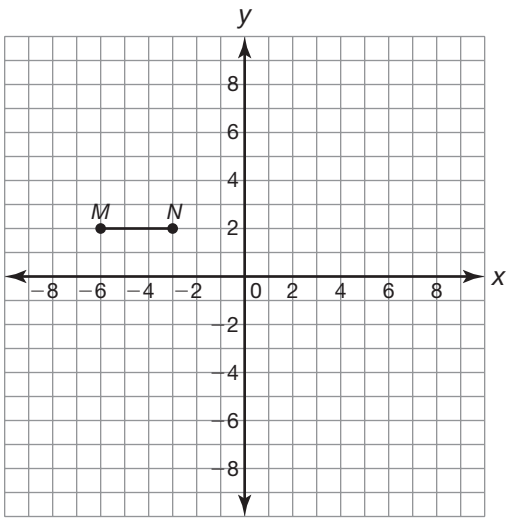
12

Name _____ Date _____

17. Translate $\overline{JK}$ 12 units down and 7 units to the left.



18. Translate $\overline{MN}$ 5 units down and 10 units to the right.

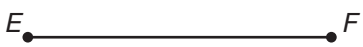


Construct each line segment described.

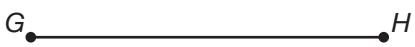
19. Duplicate $\overline{AB}$.

20. Duplicate $\overline{CD}$.

21. Duplicate $\overline{EF}$.



22. Duplicate $\overline{GH}$.



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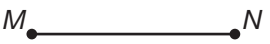
23. Construct a line segment twice the length of $\overline{JK}$.

24. Construct a line segment twice the length of $\overline{MN}$.



Name _____ Date _____

Treasure Hunt
Midpoints and Bisectors

Vocabulary

Match each definition to the corresponding term.

1. midpoint

2. Midpoint Formula

3. segment bisector

4. bisecting a line segment

a. a line, line segment, or ray that divides a line segment into two line segments of equal measure

b. a basic geometric construction used to locate the midpoint of a line segment

c. a point exactly halfway between the endpoints of a line segment

d. $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Problem Set

Determine the midpoint of a line segment with each set of given endpoints.

1. (8, 0) and (4, 6)

$x_1 = 8, y_1 = 0$

$x_2 = 4, y_2 = 6$

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{8 + 4}{2}, \frac{0 + 6}{2}\right)$$

$$= \left(\frac{12}{2}, \frac{6}{2}\right)$$

$$= (6, 3)$$

2. (3, 8) and (9, 10)

3. (−7, 2) and (3, 6)

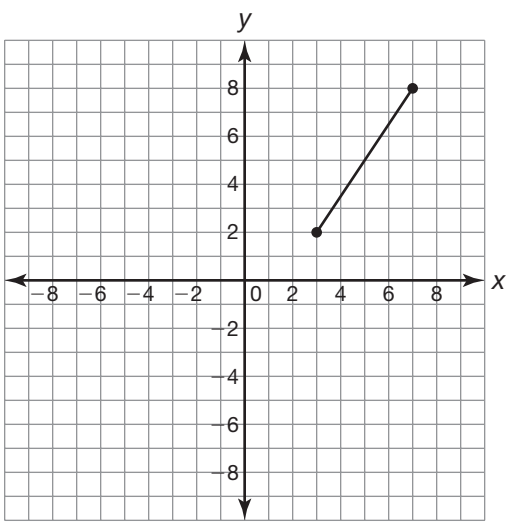
4. (6, −3) and (−4, 5)

5. (−10, −1) and (0, 4)

6. (−2, 7) and (−8, −9)

Determine the midpoint of the given line segment on each coordinate plane using the Midpoint Formula.

7.



$x_1 = 3, y_1 = 2$

$x_2 = 7, y_2 = 8$

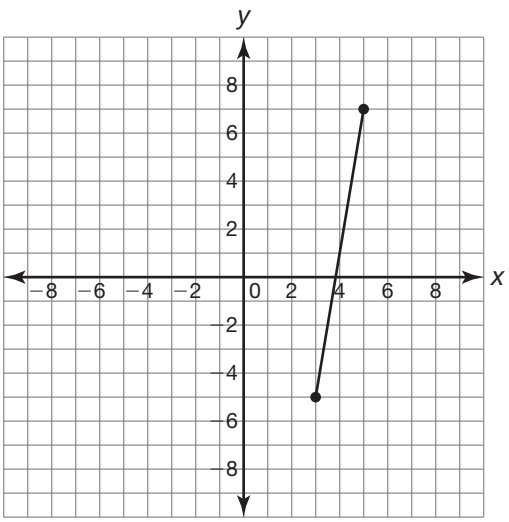
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{3 + 7}{2}, \frac{2 + 8}{2}\right)$$

$$= \left(\frac{10}{2}, \frac{10}{2}\right)$$

$$= (5, 5)$$

Name _____ Date _____

8.



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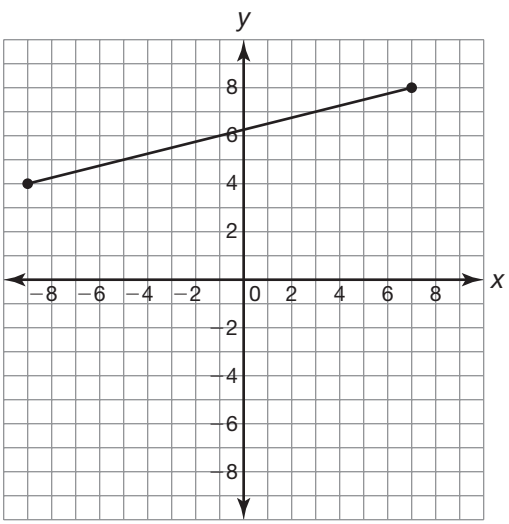

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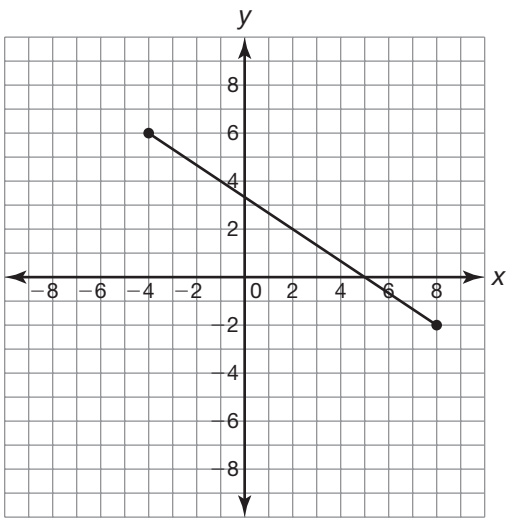

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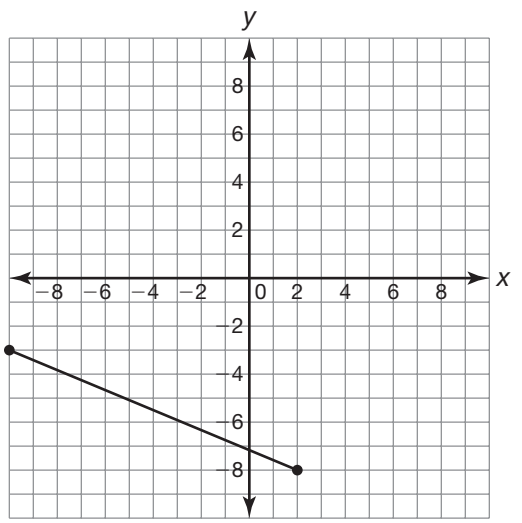

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Name _____ Date _____

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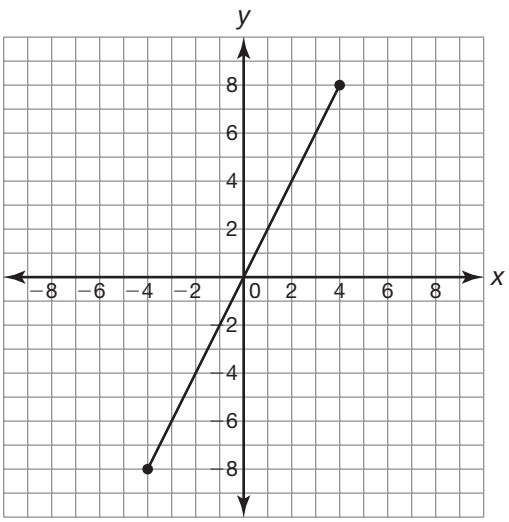
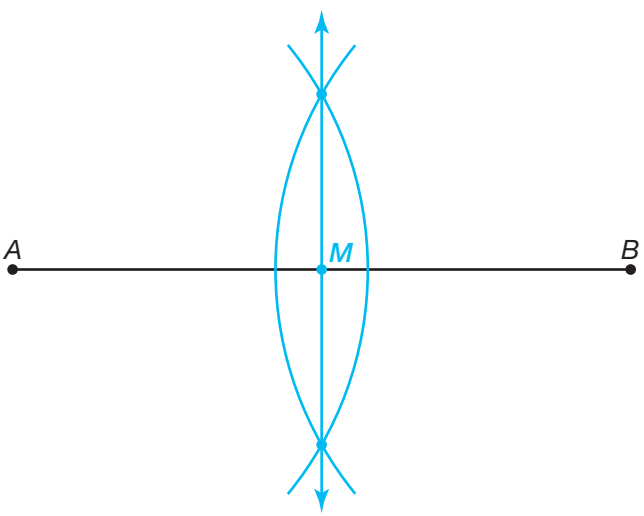


Locate the midpoint of each line segment using construction tools and label it point *M*.

13.



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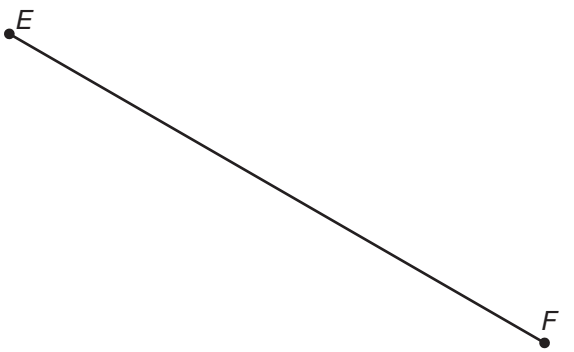

Name _____ Date _____

16.

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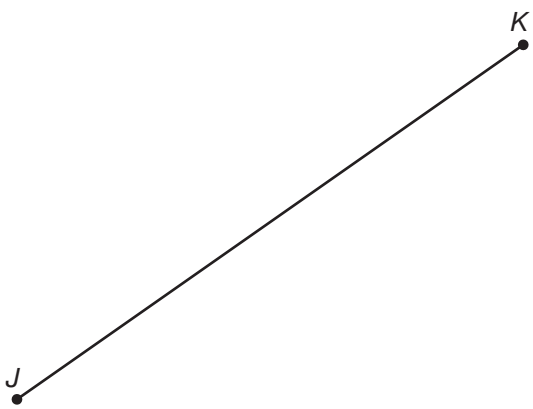

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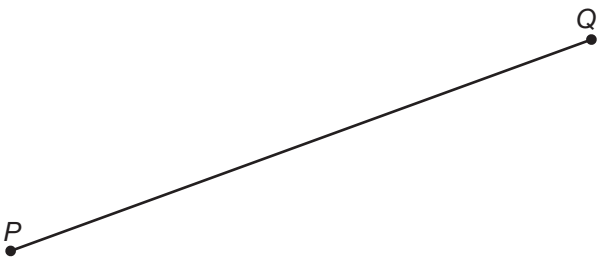


Name _____ Date _____

It's All About Angles

Translating and Constructing Angles and Angle Bisectors

Vocabulary

Define each term in your own words.

1. angle

2. angle bisector

Describe how to perform each construction in your own words.

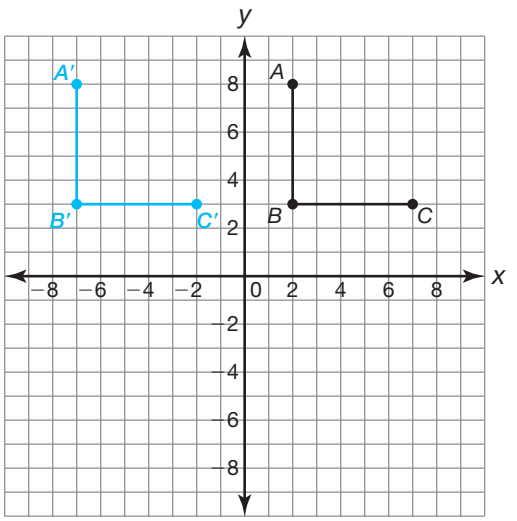
3. copying or duplicating an angle

4. bisecting an angle

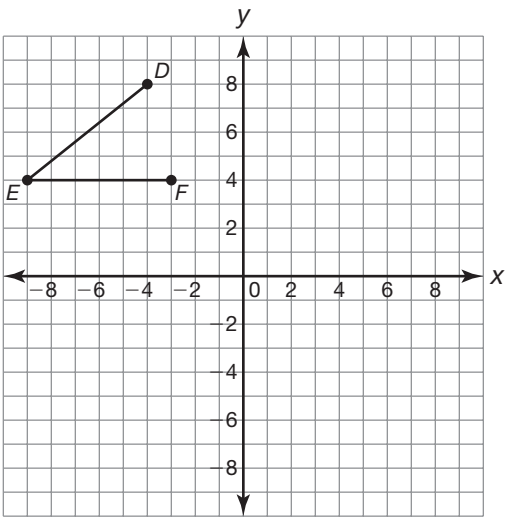
Problem Set

Translate each given angle on the coordinate plane as described.

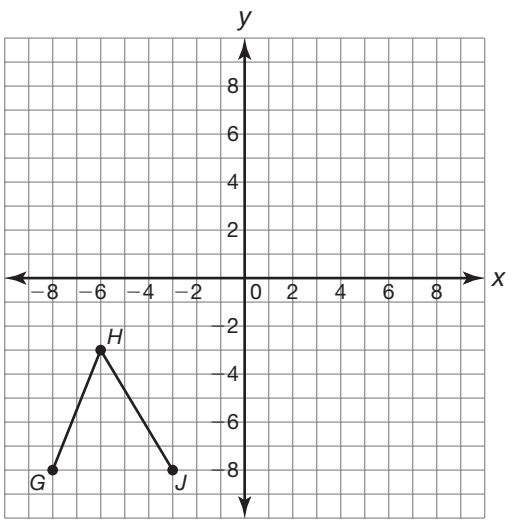
1. Translate $\angle ABC$ 9 units to the left.



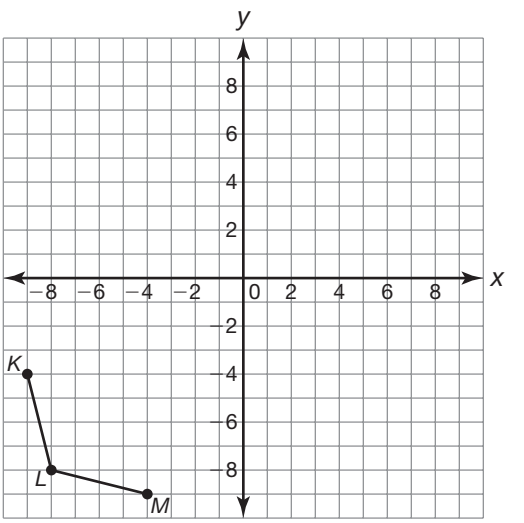
2. Translate $\angle DEF$ 12 units down.



3. Translate $\angle GHJ$ 10 units to the right.



4. Translate $\angle KLM$ 13 units up.



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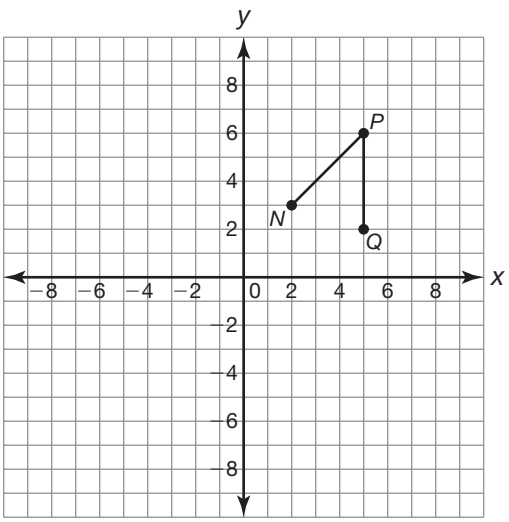
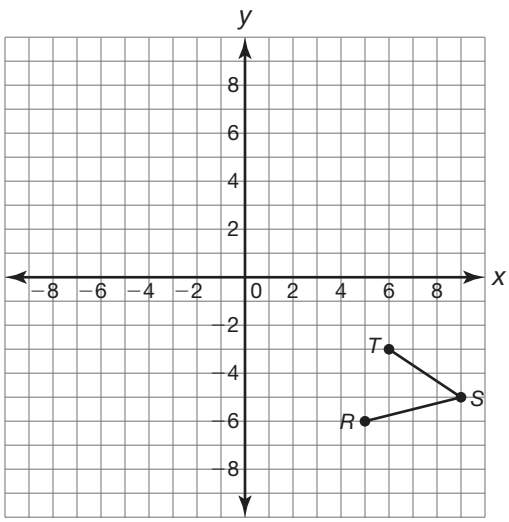
Name _____ Date _____

5. Translate $\angle NPQ$ 8 units to the left and 11 units down.

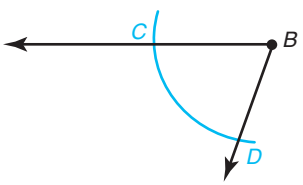


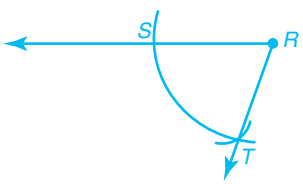
6. Translate $\angle RST$ 15 units to the left and 9 units up.



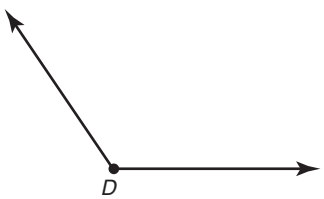
Construct each angle as described using a compass and a straightedge.

7. Copy $\angle B$.





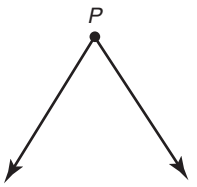
8. Copy $\angle D$.



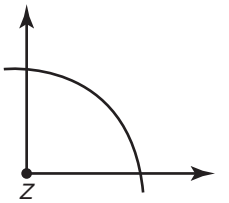
$\angle CBD \cong \angle SRT$

12

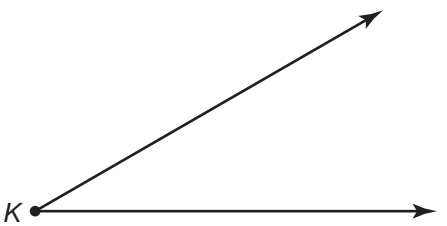
9. Copy $\angle P$.



10. Copy $\angle Z$.

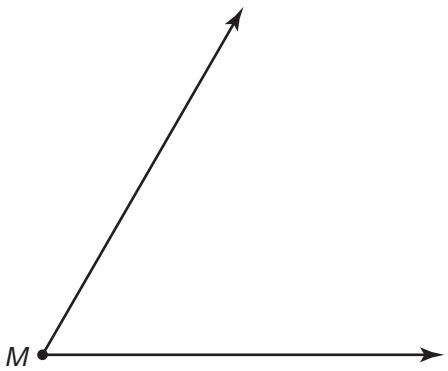


11. Construct an angle that is twice the measure of $\angle K$.



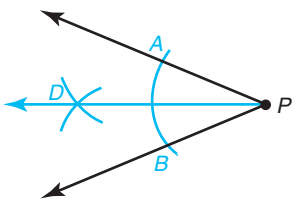
Name _____ Date _____

12. Construct an angle that is twice the measure of $\angle M$.



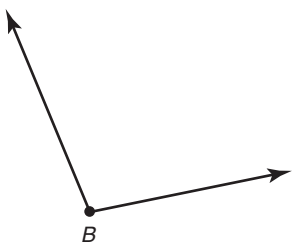
Construct the angle bisector of each given angle.

13.



$\overline{PD}$ is the angle bisector of $\angle P$.

14.



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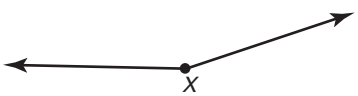

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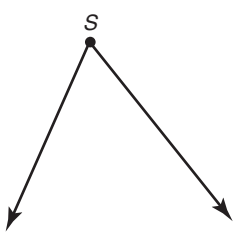
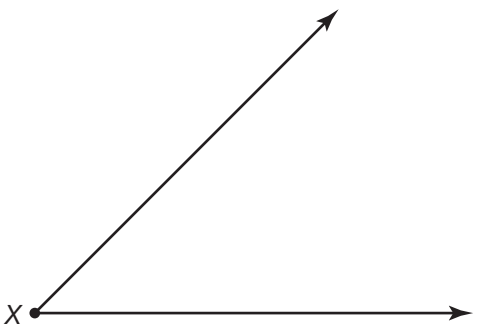


17. Construct an angle that is one-fourth the measure of $\angle F$.

18. Construct an angle that is one-fourth the measure of $\angle X$.



Name _____ Date _____

Did You Find a Parking Space?

Parallel and Perpendicular Lines on the Coordinate Plane

Vocabulary

Complete the sentence.

1. The point-slope form of the equation of the line that passes through (x_1, y_1) and has slope m is _____.

Problem Set

Determine whether each pair of lines are parallel, perpendicular, or neither. Explain your reasoning.

1. line n: $y = -2x - 4$
   line m: $y = -2x + 8$
   Parallel. The slope of line n is -2, which is equal to the slope of line m, so the lines are parallel.

2. line p: $y = 3x + 5$
   line q: $y = \frac{1}{3}x + 5$

3. line r: $y = -5x + 12$
   line s: $y = \frac{1}{5}x - 6$

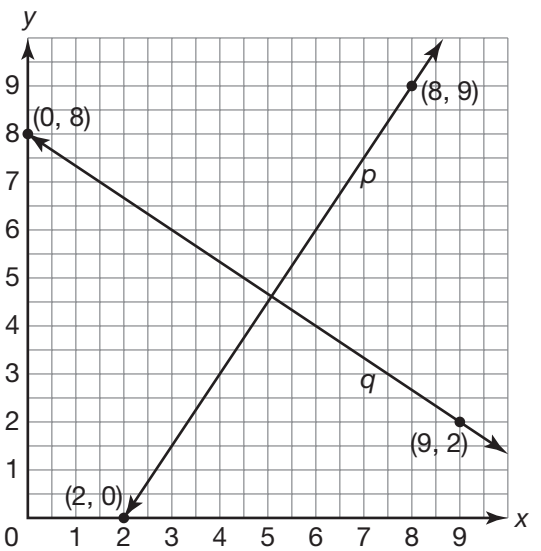
4. line n: $y = 6x + 2$
   line m: $y = -6x - 2$

5. line p: $y - x = 4$
line q: $2x + y = 8$

6. line r: $2y + x = 6$
line s: $3x + 6y = 12$

Determine whether the lines shown on each coordinate plane are parallel, perpendicular, or neither. Explain your reasoning.

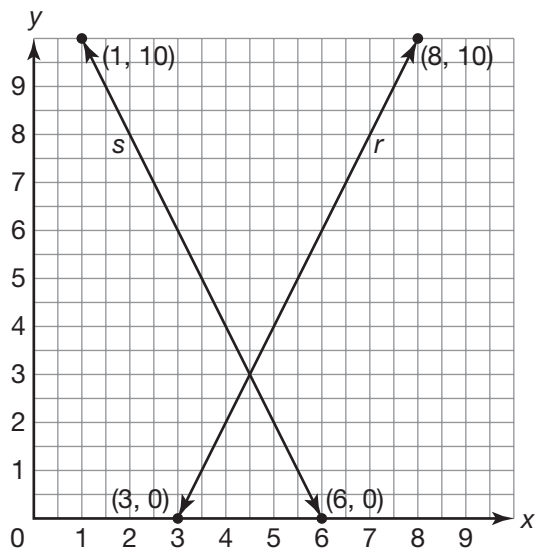
7.



The lines are perpendicular. The slope of line p is $\frac{3}{2}$ and the slope of line q is $-\frac{2}{3}$. Because $\frac{3}{2}\left(-\frac{2}{3}\right) = -1$, the lines are perpendicular.

Name _____ Date _____

8.



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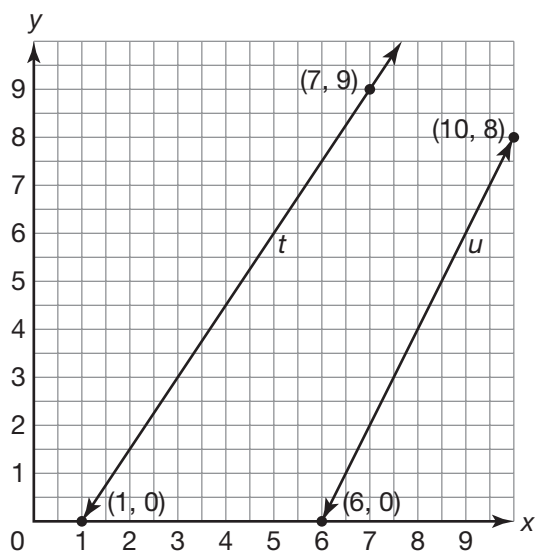

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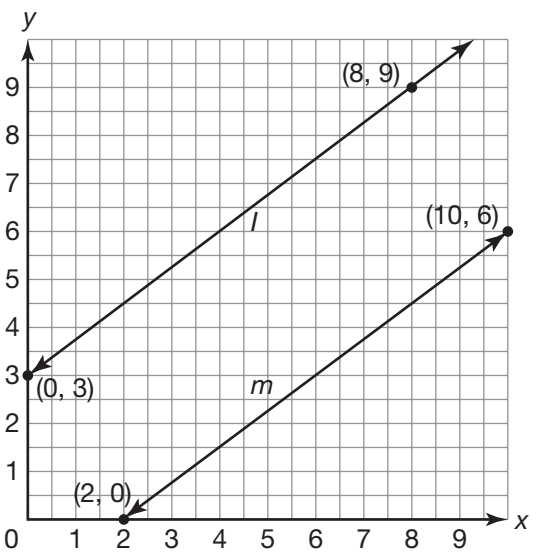

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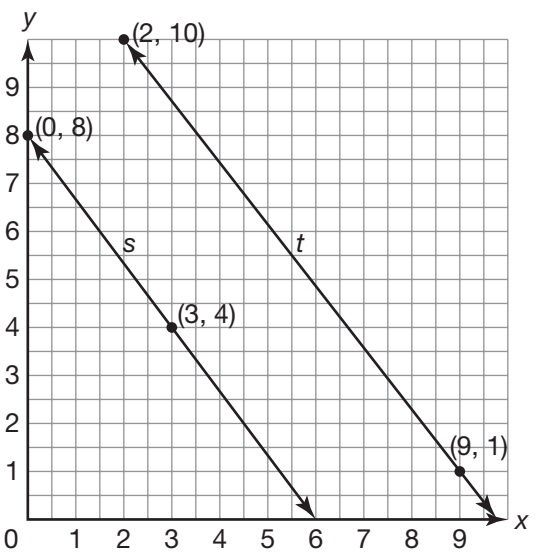

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Name _____ Date _____

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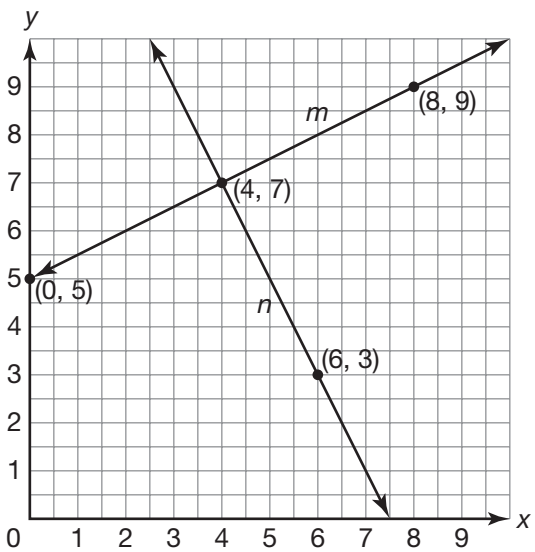


Determine an equation for each parallel line described. Write your answer in both point-slope form and slope-intercept form.

13. What is the equation of a line parallel to $y = \frac{4}{5}x + 2$ that passes through (1, 2)?

Point-slope form: $(y - 2) = \frac{4}{5}(x - 1)$

Slope-intercept form:

$y - 2 = \frac{4}{5}x - \frac{4}{5}$

$y = \frac{4}{5}x - \frac{4}{5} + 2$

$y = \frac{4}{5}x + \frac{6}{5}$

14. What is the equation of a line parallel to $y = -5x + 3$ that passes through (3, 1)?

12

15. What is the equation of a line parallel to $y = 7x - 8$ that passes through $(5, -2)$?

16. What is the equation of a line parallel to $y = -\frac{1}{2}x + 6$ that passes through $(-4, 1)$?

17. What is the equation of a line parallel to $y = \frac{1}{3}x - 4$ that passes through $(9, 8)$?

Name _____ Date _____

18. What is the equation of a line parallel to $y = -4x - 7$ that passes through $(2, -9)$?

Determine an equation for each perpendicular line described. Write your answer in both point-slope form and slope-intercept form.

19. What is the equation of a line perpendicular to $y = 2x - 6$ that passes through $(5, 4)$?

The slope of the new line must be $-\frac{1}{2}$.

Point-slope form: $(y - 4) = -\frac{1}{2}(x - 5)$

Slope-intercept form:

$y - 4 = -\frac{1}{2}x + \frac{5}{2}$

$y = -\frac{1}{2}x + \frac{5}{2} + 4$

$y = -\frac{1}{2}x + \frac{13}{2}$

12

20. What is the equation of a line perpendicular to $y = -3x + 4$ that passes through $(-1, 6)$?

21. What is the equation of a line perpendicular to $y = -\frac{2}{5}x - 1$ that passes through (2, −8)?

22. What is the equation of a line perpendicular to $y = \frac{3}{4}x + 12$ that passes through (12, 3)?

23. What is the equation of a line perpendicular to $y = 6x - 5$ that passes through (6, −3)?

24. What is the equation of a line perpendicular to $y = \frac{5}{2}x - 1$ that passes through (−1, −4)?

Name _____ Date _____

Determine the equation of a vertical line that passes through each given point.

25. (−2, 1)
$x = -2$

26. (3, 15)

27. (9, −7)

28. (−11, −8)

29. (−5, −10)

30. (0, −4)

Determine the equation of a horizontal line that passes through each given point.

31. (4, 7)
$y = 7$

32. (−6, 5)

33. (−8, −3)

34. (2, −9)

35. (−7, 8)

36. (6, −2)

Calculate the distance from each given point to the given line.

37. Point: (0, 4); Line: $f(x) = 2x - 3$

Write the equation for the line perpendicular to the given line that goes through the given point.

Since the slope of f is 2, the slope of the perpendicular segment is $-\frac{1}{2}$.

$y = mx + b$

$4 = -\frac{1}{2}(0) + b$

$4 = b$

The equation of the line containing the perpendicular segment is $y = -\frac{1}{2}x + 4$.

Calculate the point of intersection of the segment and the line $f(x) = 2x - 3$.

$-\frac{1}{2}x + 4 = 2x - 3$

$-x + 8 = 4x - 6$

$-5x = -14$

$x = \frac{-14}{-5} = 2.8$

$y = -\frac{1}{2}(2.8) + 4 = 2.6$

The point of intersection is (2.8, 2.6).

Calculate the distance.

$d = \sqrt{(0 - 2.8)^2 + (4 - 2.6)^2}$

$d = \sqrt{(-2.8)^2 + (1.4)^2}$

$d = \sqrt{7.84 + 1.96}$

$d = \sqrt{9.8} \approx 3.13$

The distance from the point (0, 4) to the line $f(x) = 2x - 3$ is approximately 3.13 units.

Name _____ Date _____

38. Point: $(-1, 3)$; Line: $f(x) = -\frac{1}{2}x - 4$

Write the equation for the line perpendicular to the given line that goes through the given point.

39. Point: $(-2, 5)$; Line: $f(x) = \frac{2}{3}x - \frac{1}{6}$

Write the equation for the line perpendicular to the given line that goes through the given point.

Name _____ Date _____

40. Point: $(-1, -2)$; Line: $f(x) = -4x + 11$

Write the equation for the line perpendicular to the given line that goes through the given point.

41. Point: (3, −1); Line: $f(x) = \frac{1}{3}x - 6$

Write the equation for the line perpendicular to the given line that goes through the given point.

Name _____ Date _____

42. Point: $(-4, -2)$; Line: $f(x) = -\frac{1}{2}x + 4$

Write the equation for the line perpendicular to the given line that goes through the given point.

12

Name _____ Date _____

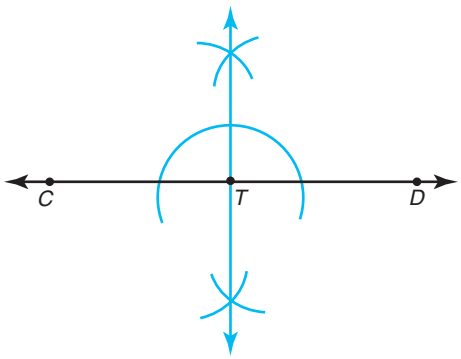
Making Copies—Just as Perfect as the Original!

Constructing Perpendicular Lines, Parallel Lines, and Polygons

Problem Set

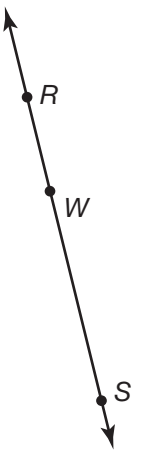
Construct a line perpendicular to each given line and through the given point.

1. Construct a line that is perpendicular to $\overleftrightarrow{CD}$ and passes through point T.



2. Construct a line that is perpendicular to $\overleftrightarrow{AB}$ and passes through point X.

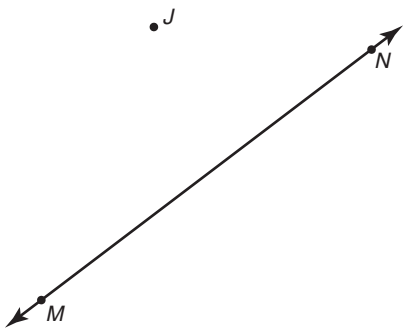
3. Construct a line that is perpendicular to $\overleftrightarrow{RS}$ and passes through point *W*.



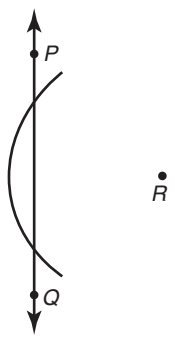
4. Construct a line that is perpendicular to $\overleftrightarrow{YZ}$ and passes through point *G*.

Name _____ Date _____

5. Construct a line that is perpendicular to $\overleftrightarrow{MN}$ and passes through point J.



6. Construct a line that is perpendicular to $\overleftrightarrow{PQ}$ and passes through point R.



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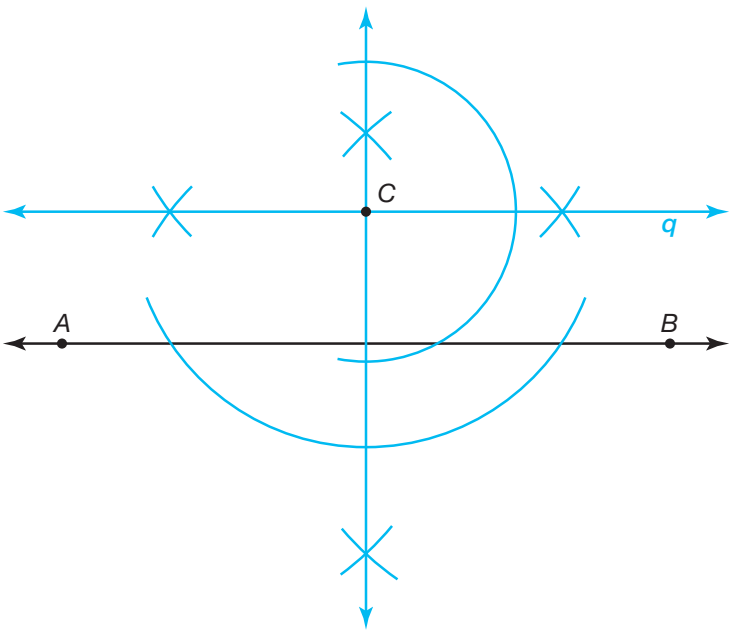
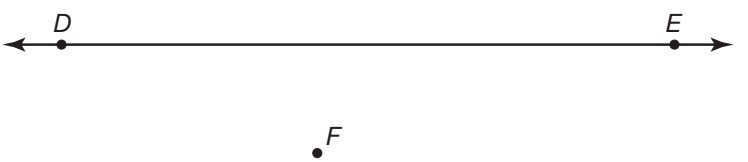
Construct a line parallel to each given line and through the given point.

7. Construct a line that is parallel to $\overleftrightarrow{AB}$ and passes through point C.



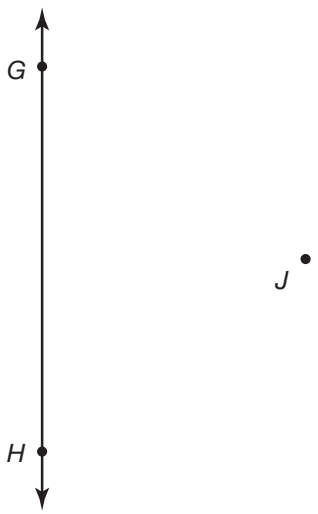
Line q is parallel to $\overleftrightarrow{AB}$.

8. Construct a line that is parallel to $\overleftrightarrow{DE}$ and passes through point F.

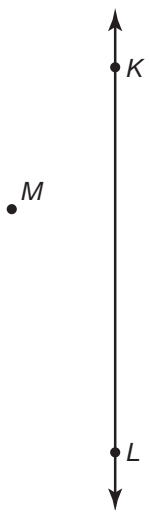


Name _____ Date _____

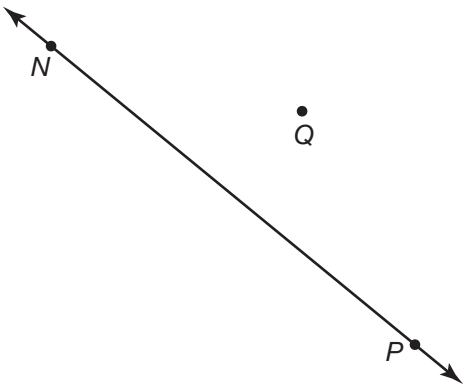
9. Construct a line that is parallel to $\overleftrightarrow{GH}$ and passes through point *J*.



10. Construct a line that is parallel to $\overleftrightarrow{KL}$ and passes through point *M*.



11. Construct a line that is parallel to $\overleftrightarrow{NP}$ and passes through point Q.



12. Construct a line that is parallel to $\overleftrightarrow{RT}$ and passes through point W.

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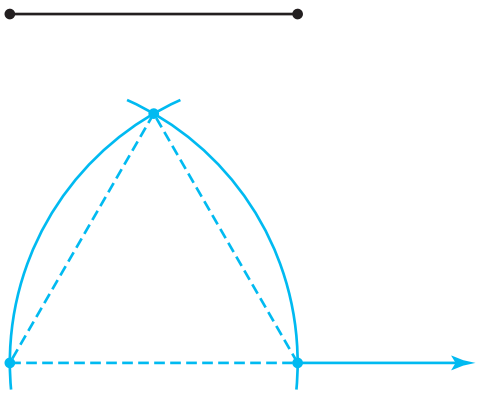
Name _____ Date _____

Construct each geometric figure.

13. Construct an equilateral triangle. The length of one side is given.



14. Construct an equilateral triangle. The length of one side is given.

15. Construct an isosceles triangle that is not an equilateral triangle such that each leg is longer than the base. The length of the base is given.

16. Construct an isosceles triangle that is not an equilateral triangle such that each leg is shorter than the base. The length of the base is given.

Name _____ Date _____

17. Construct a square. The perimeter of the square is given.

18. Construct a square. The perimeter of the square is given.

19. Construct a rectangle that is not a square. The perimeter of the rectangle is given.

20. Construct a rectangle that is not a square. The perimeter of the rectangle is given.