BECA / Huson / Geometry Name:
September 20, 2016

Do Now

Let's Get This Started!

Points, Lines, Planes, Rays, and Line Segments

Vocabulary

Write the term that best completes each statement.

1. A geometric figure created without using tools is a(n) _____.

2. _____ are two or more lines that are not in the same plane.

3. A(n) _____ is a location in space.

4. The points where a line segment begins and ends are the _____.

5. A(n) _____ is a straight continuous arrangement of an infinite number of points.

6. Two or more line segments of equal measure are _____.

7. You _____ a geometric figure when you use only a compass and straightedge.

8. Points that are all located on the same line are _____.

9. A(n) _____ is a portion of a line that includes two points and all of the collinear points between the two points.

10. A flat surface is a(n) _____.

11. A(n) _____ is a portion of a line that begins with a single point and extends infinitely in one direction.

12. Two or more lines located in the same plane are _____.

13. When you _____ a geometric figure, you use tools such as a ruler, straightedge, compass, or protractor.

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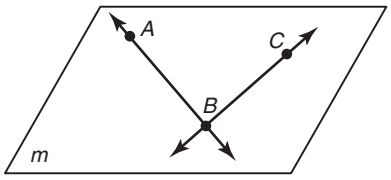
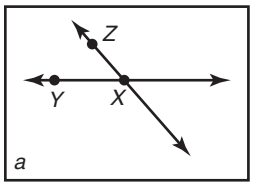
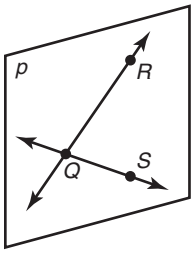
Problem Set

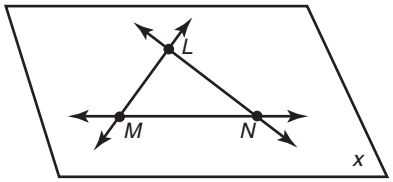
Identify the point(s), line(s), and plane(s) in each figure.

1. 

Points: A, B, and C
Lines: $\overleftrightarrow{AB}$ and $\overleftrightarrow{BC}$
Plane: m

2. 

3. 

4. 

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Draw a figure for each description. Label all points mentioned in the description.

5. Points *R*, *S*, and *T* are collinear such that point *T* is located halfway between points *S* and *R*.

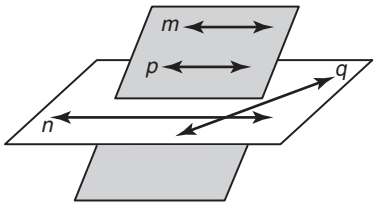
6. Points *A*, *D*, and *X* are collinear such that point *A* is located halfway between points *D* and *X*.

7. Points *A*, *B*, and *C* are collinear such that point *B* is between points *A* and *C* and the distance between points *A* and *B* is twice the distance between points *B* and *C*.

8. Points *F*, *G*, and *H* are collinear such that point *F* is between points *G* and *H* and the distance between points *F* and *G* is one third the distance between points *G* and *H*.

Identify all examples of coplanar lines in each figure.

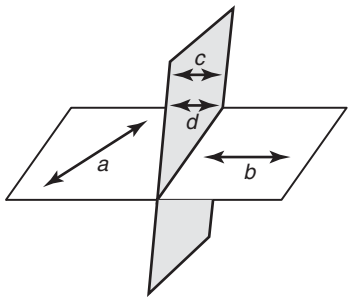
9.



Lines *m* and *p* are coplanar.

Lines *n* and *q* are coplanar.

10.



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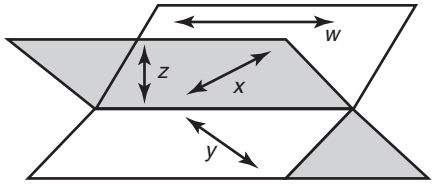

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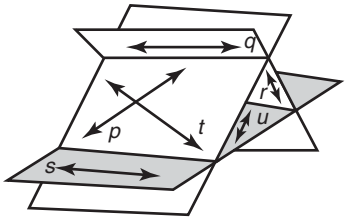
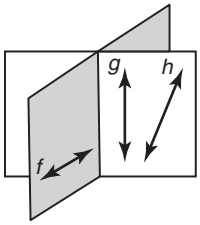


Identify all skew lines in each figure.

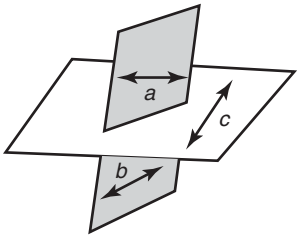
13.



Lines *f* and *g* are skew.

Lines *f* and *h* are skew.

14.



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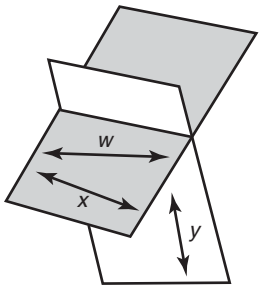

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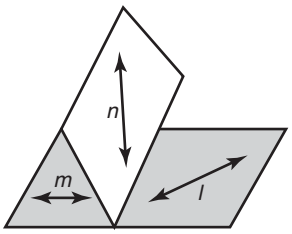

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Draw and label an example of each geometric figure.

17. $\overleftrightarrow{XY}$

18. $\overline{CD}$

19. $\overline{PR}$

20. $\overleftrightarrow{FG}$

21. $\overleftrightarrow{HM}$

22. $\overrightarrow{KJ}$

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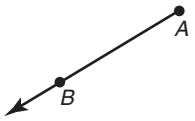
LESSON 1.1 Skills Practice

Use symbols to write the name of each geometric figure.

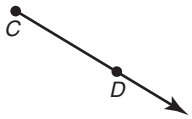
23.

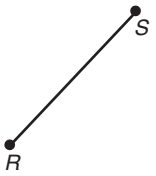
$\overline{RT}$

24. 

25.

26.

27. 

28. 

Use a ruler to measure each segment to the nearest centimeter. Then use symbols to express the measure of each segment.

29. A ——— B

$AB = 4$ centimeters or $m\overline{AB} = 4$ centimeters

30. A ——— B

31. A ——— B

32. A ——— B

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Let's Move!

Translating and Constructing Line Segments

Vocabulary

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

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

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. A(n) _____ is a rigid motion that "slides" each point of a figure the same distance and direction.

8. A basic geometric construction called _____ can be used to translate a line segment when measurement is not possible.

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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)

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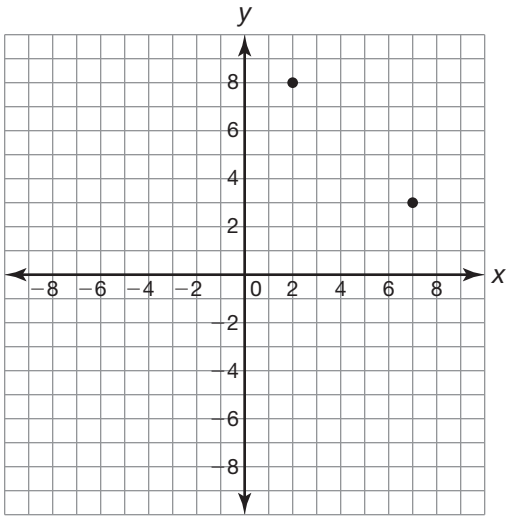
Name _____ Date _____

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

7.



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

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

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

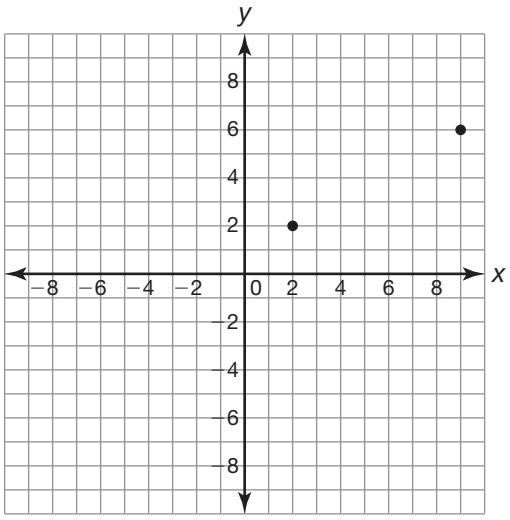
$d = \sqrt{5^2 + (-5)^2}$

$d = \sqrt{25 + 25}$

$d = \sqrt{50}$

$d \approx 7.1$

8.



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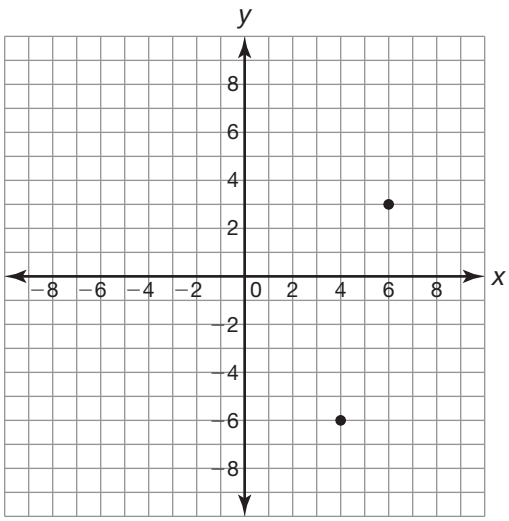

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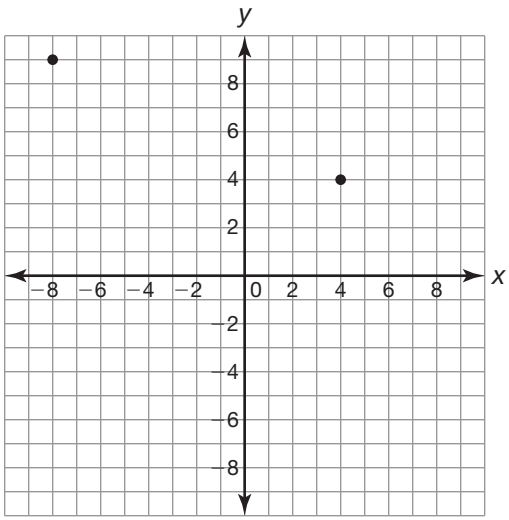

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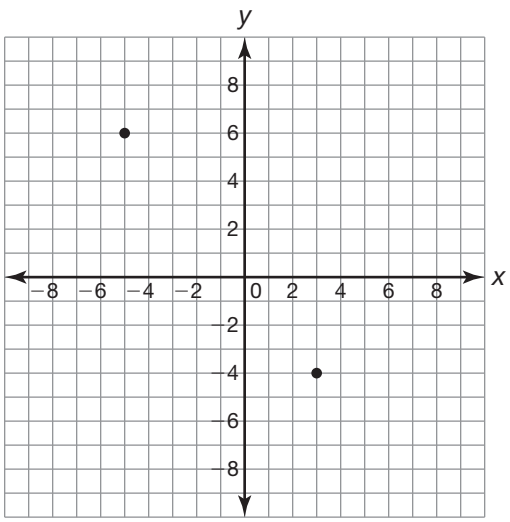
11.



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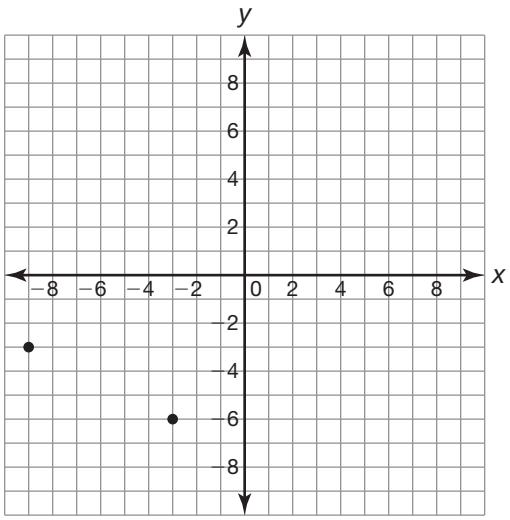

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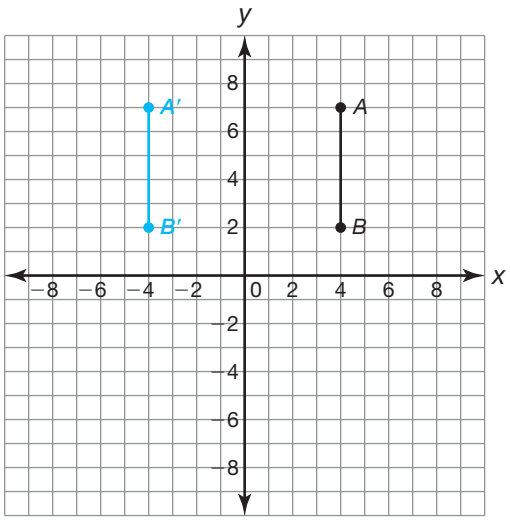
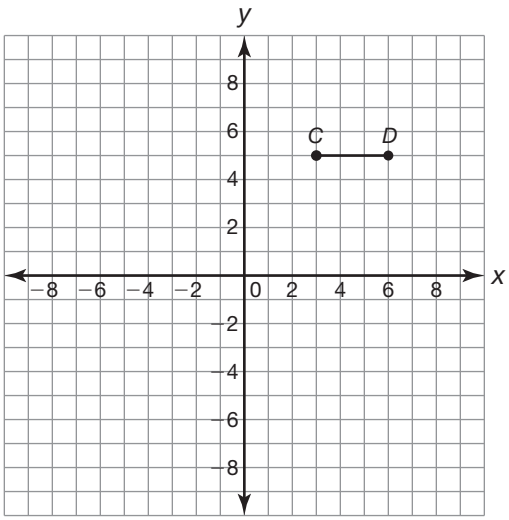
LESSON 1.2 Skills Practice

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

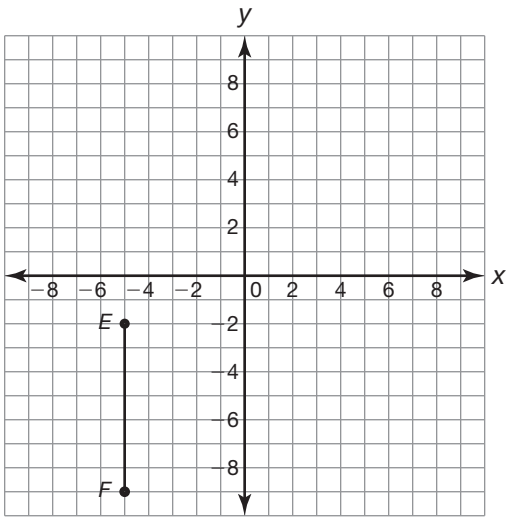
13. Translate $\overline{AB}$ 8 units to the left.



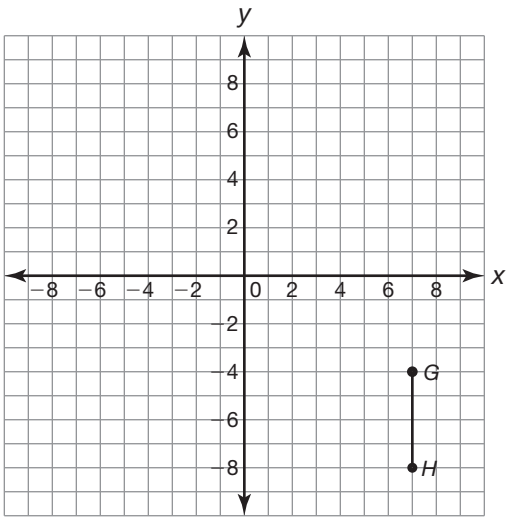
14. Translate $\overline{CD}$ 9 units down.



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



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



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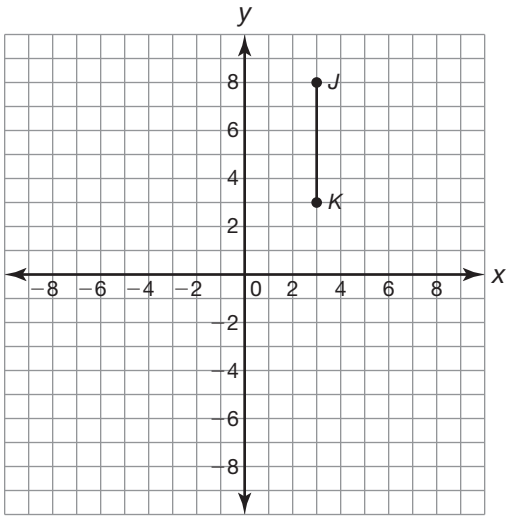
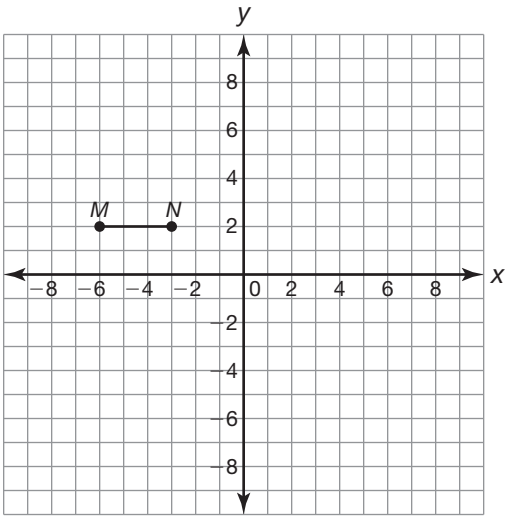
17. Translate $\overline{JK}$ 12 units down and 7 units to the left.



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 $\overline{MN}$.

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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)

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3. (−7, 2) and (3, 6)

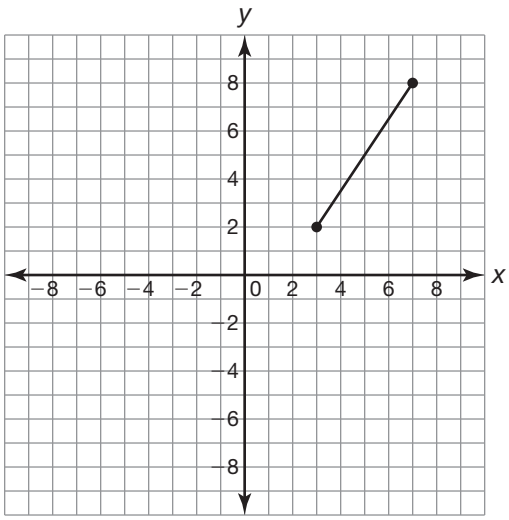
4. (6, −3) and (−4, 5)

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.



$x_1 = 3, y_1 = 2$

$x_2 = 7, y_2 = 8$

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

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

$= (5, 5)$

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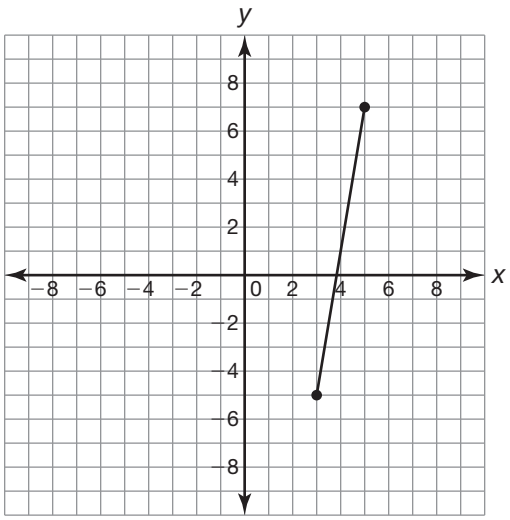
8.



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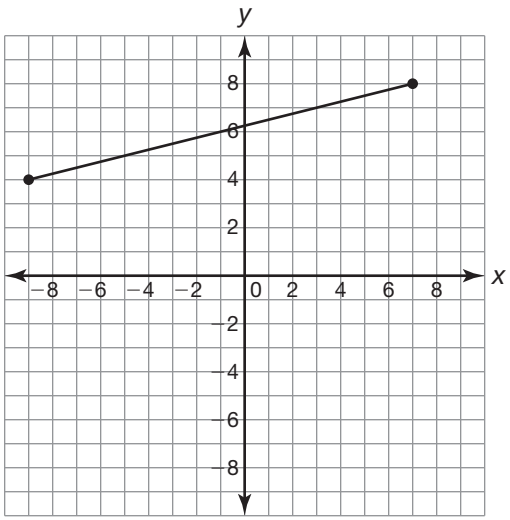

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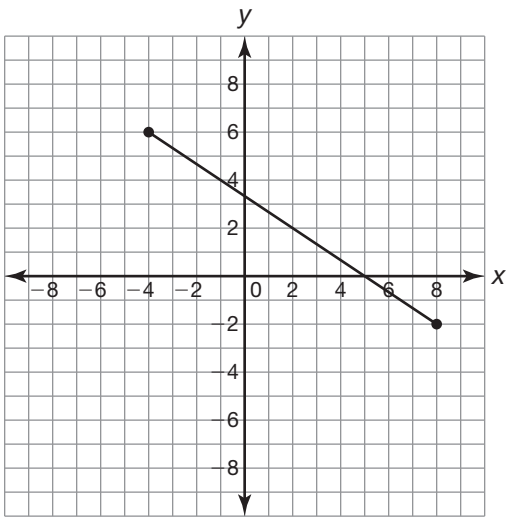

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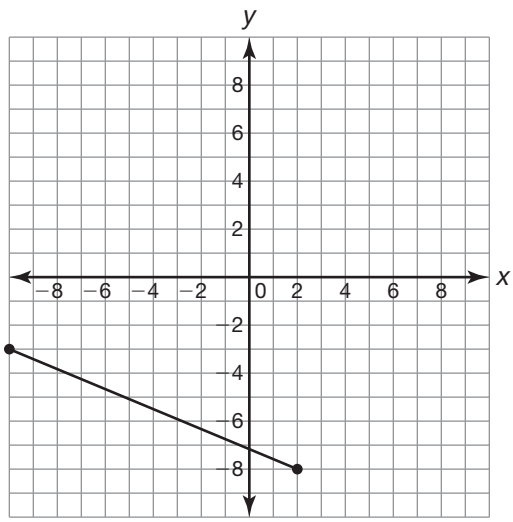

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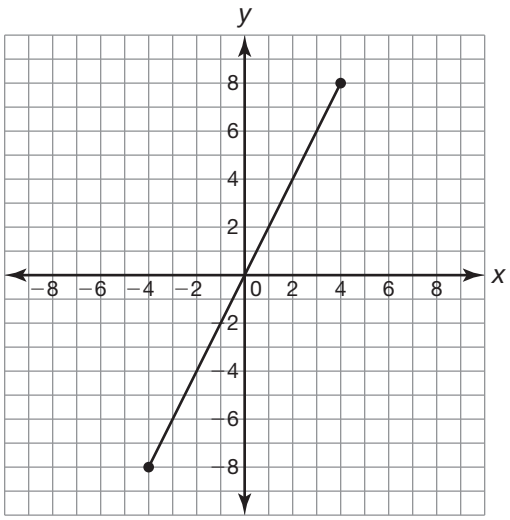
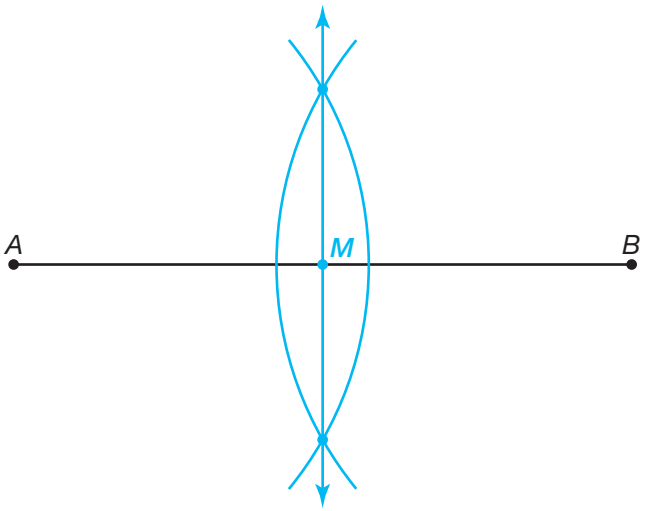


Locate the midpoint of each line segment using construction tools and label it point *M*.

13.



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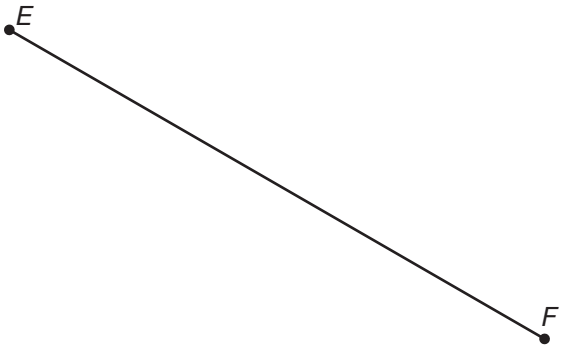

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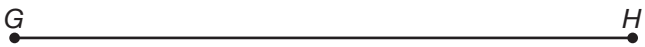

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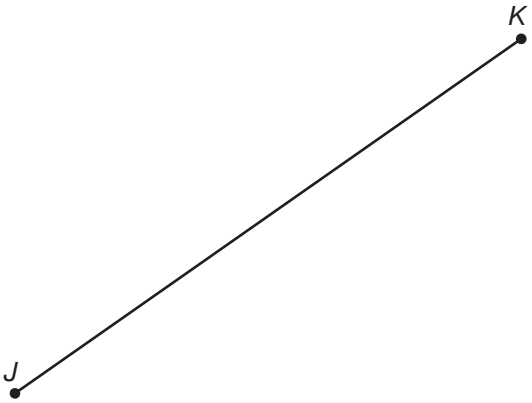

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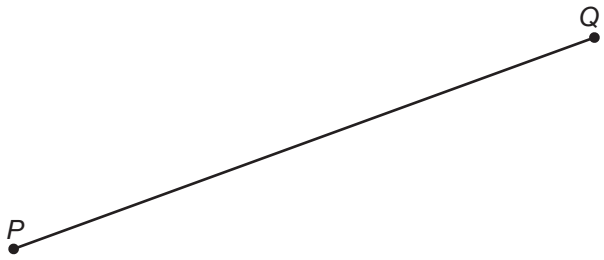

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It's All About Angles

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

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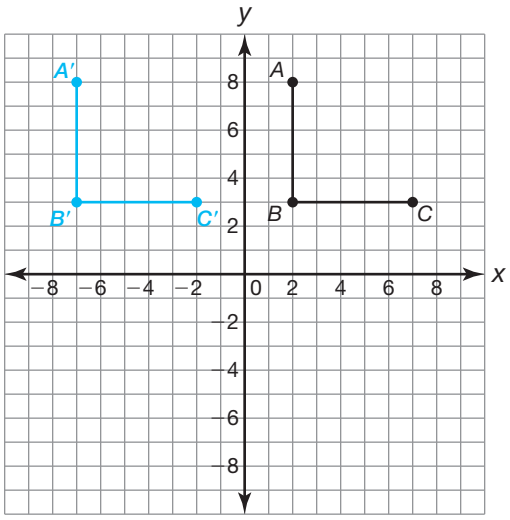
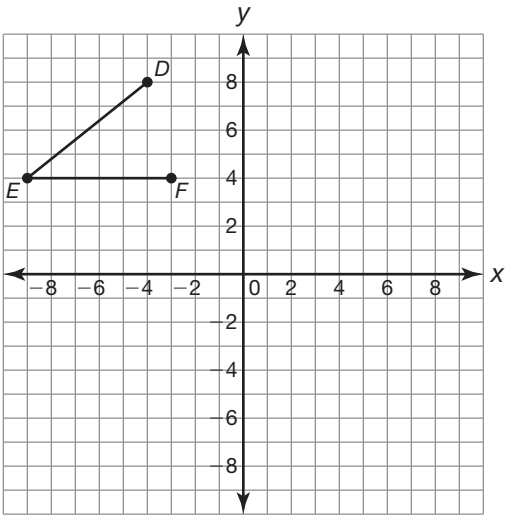
Problem Set

Translate each given angle on the coordinate plane as described.

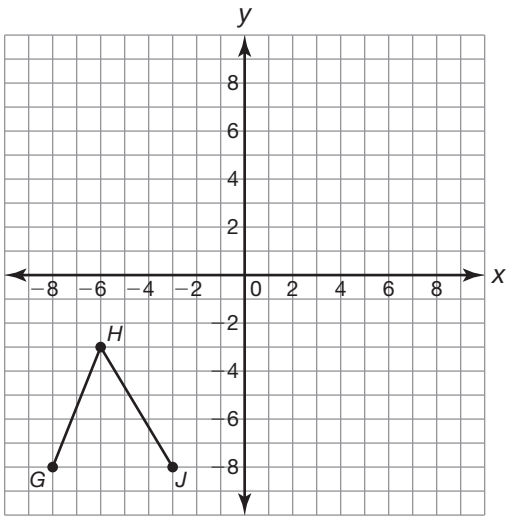
1. Translate $\angle ABC$ 9 units to the left.



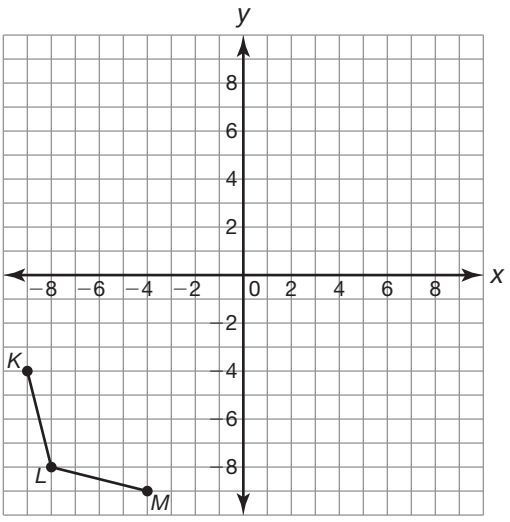
2. Translate $\angle DEF$ 12 units down.



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



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



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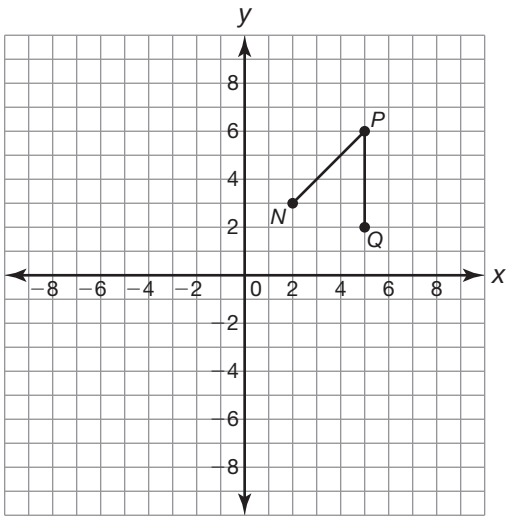
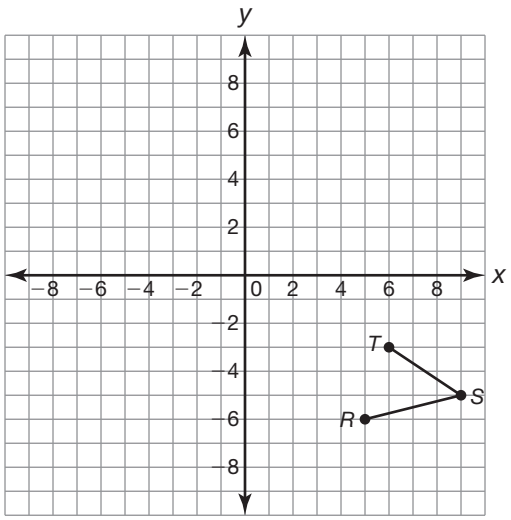
5. Translate $\angle NPQ$ 8 units to the left and 11 units down.

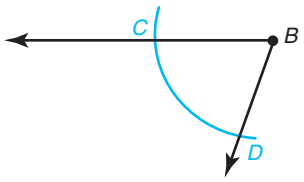


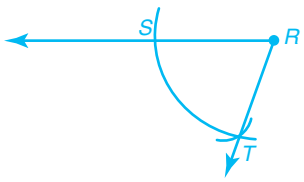
6. Translate $\angle RST$ 15 units to the left and 9 units up.



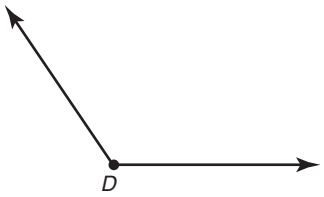
Construct each angle as described.

7. Copy $\angle B$.





8. Copy $\angle D$.



$\angle CBD \cong \angle SRT$

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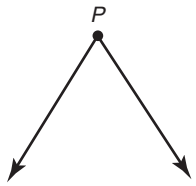
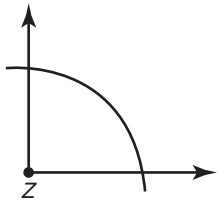
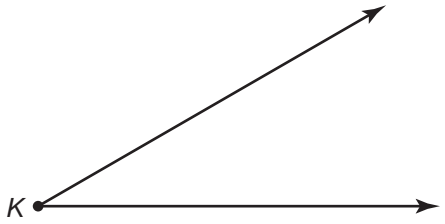
9. Copy $\angle P$.



10. Copy $\angle Z$.



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



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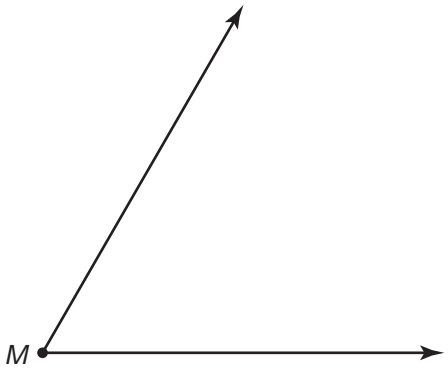
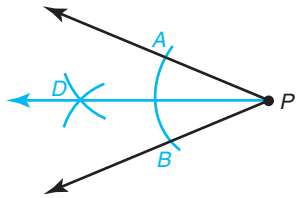
12. Construct an angle that is twice the measure of $\angle M$.



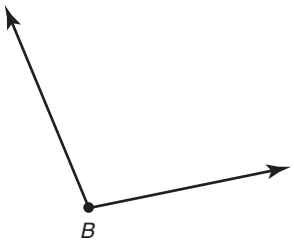
Construct the angle bisector of each given angle.

13.



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

14.



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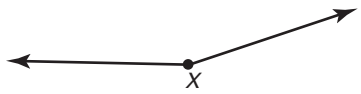

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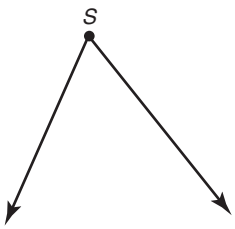

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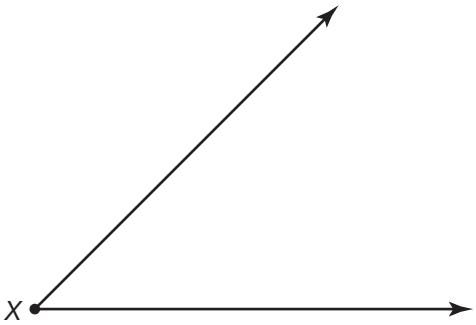
17. Construct an angle that is one-fourth the measure of $\angle F$.

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



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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: $y = -6x - 2$

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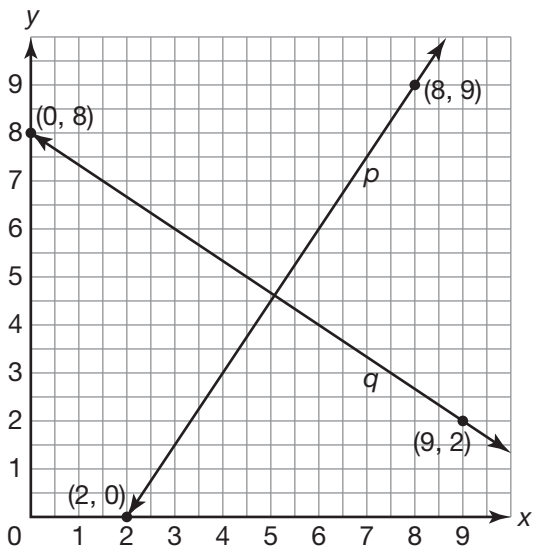
5. line p: $y - x = 4$
line q: $2x + y = 8$

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.

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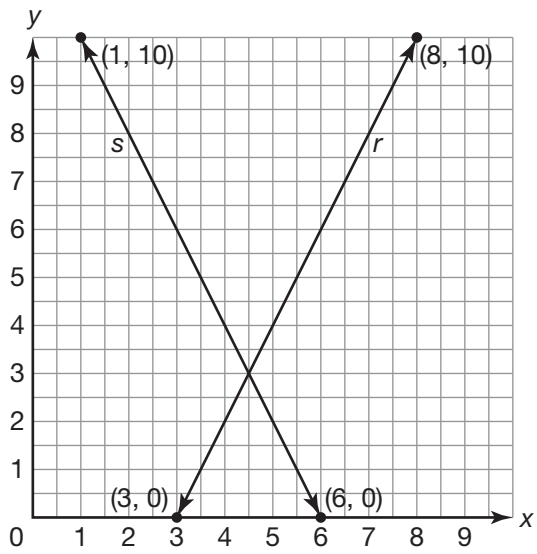
8.



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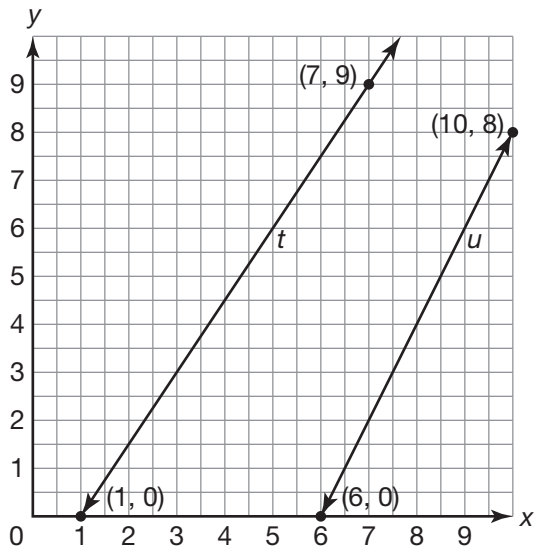

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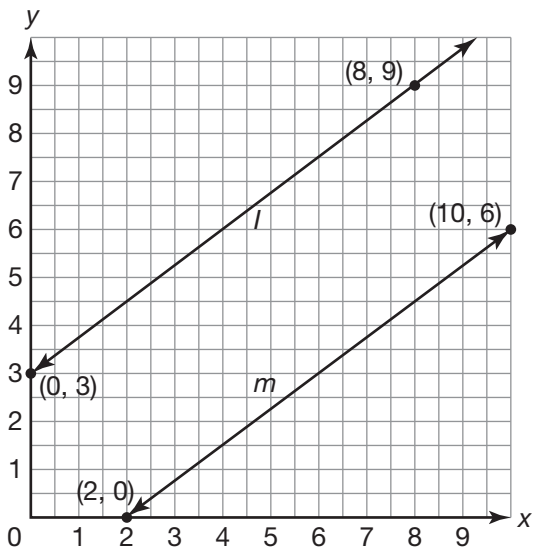

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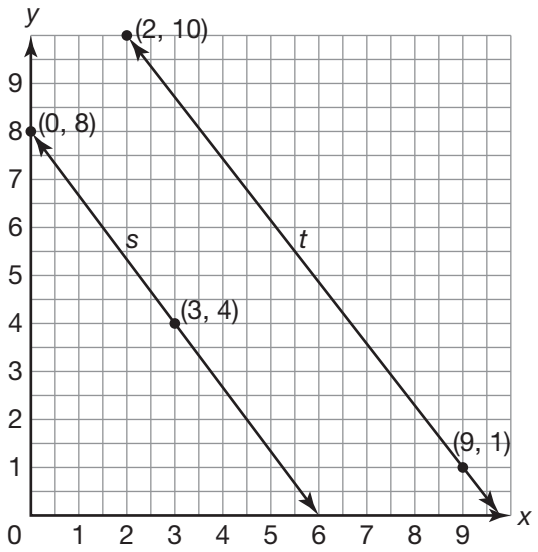

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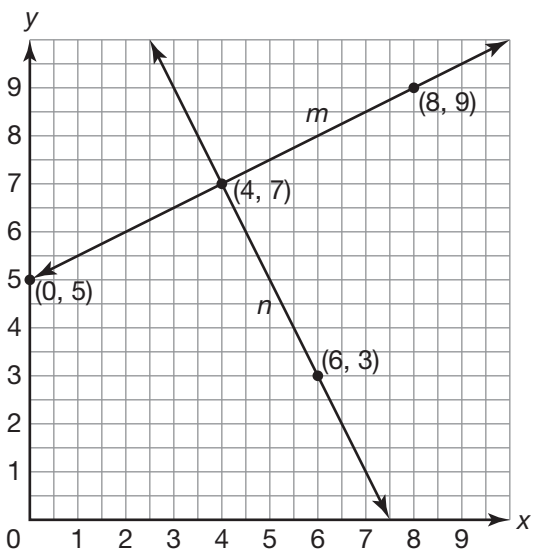
12.



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)?

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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 $(9, 8)$?

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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:

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

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

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

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

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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)?

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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)

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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.

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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.

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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.

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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.

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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.

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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.

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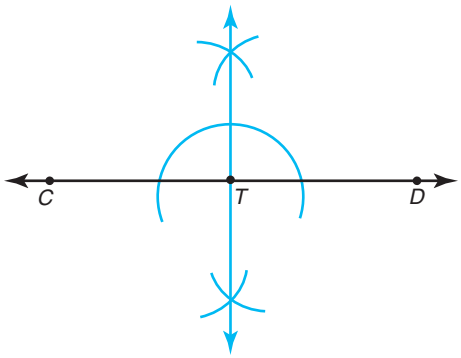
Constructing Perpendicular Lines, Parallel Lines, and Polygons

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.

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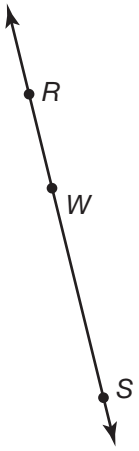
3. Construct a line that is perpendicular to $\overleftrightarrow{RS}$ and passes through point *W*.



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

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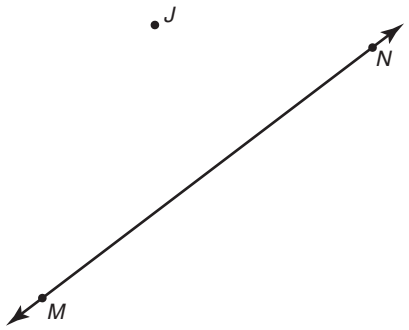
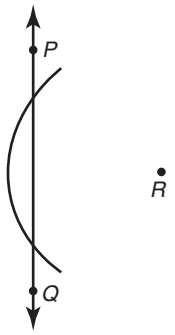
5. Construct a line that is perpendicular to $\overleftrightarrow{MN}$ and passes through point J.



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



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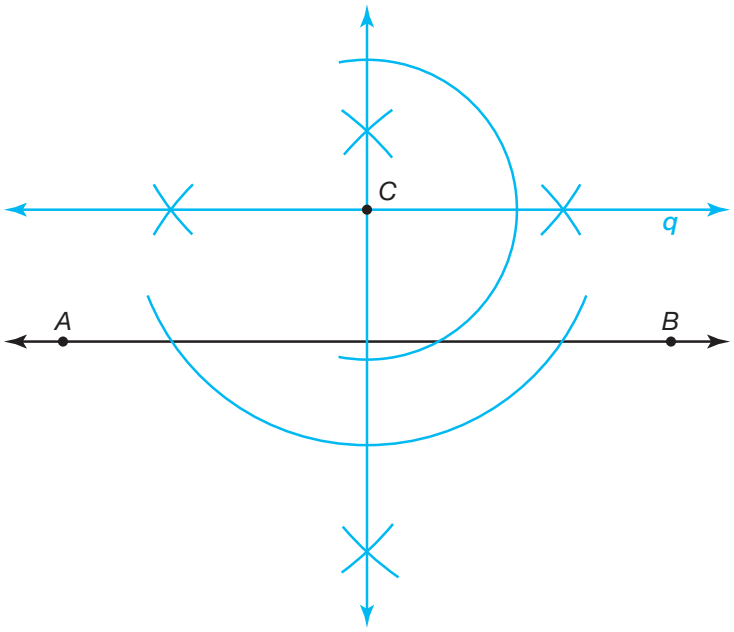
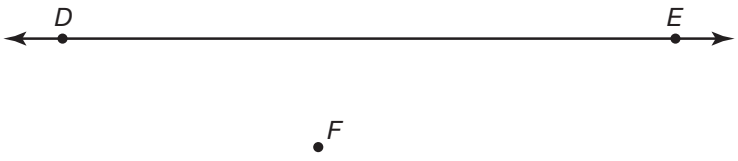
Construct a line parallel to each given line and through the given point.

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.



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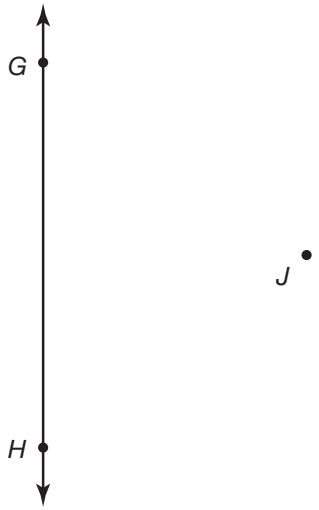
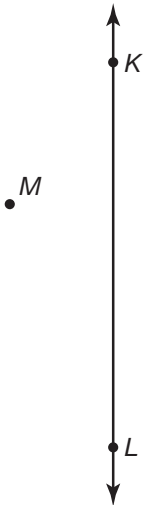
9. Construct a line that is parallel to $\overleftrightarrow{GH}$ and passes through point *J*.



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



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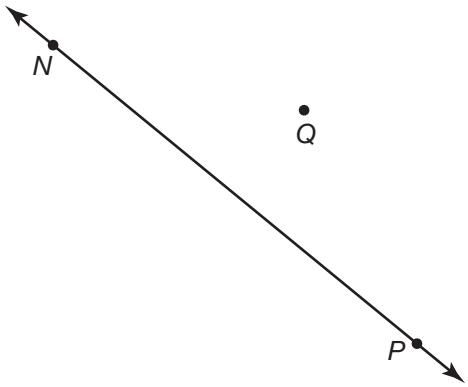
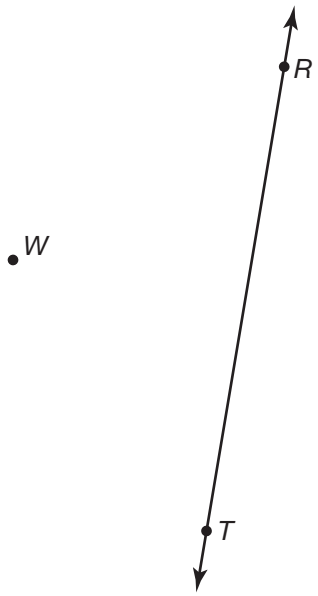
11. Construct a line that is parallel to $\overleftrightarrow{NP}$ and passes through point Q.



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



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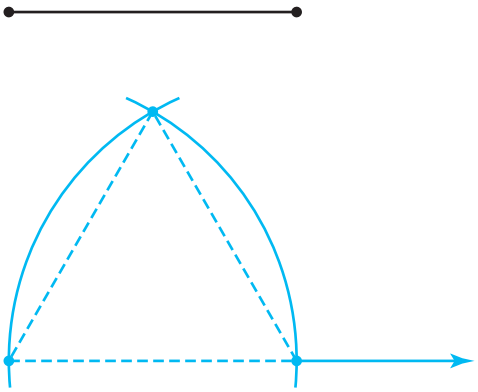
Construct each geometric figure.

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



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

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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.

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

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

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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.

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What's the Point?
Points of Concurrency

Vocabulary

Describe similarities and differences between each pair of terms.

1. concurrent and point of concurrency

2. incenter and orthocenter

3. centroid and circumcenter

4. altitude and median

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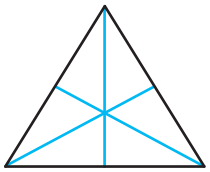
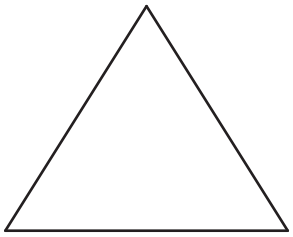
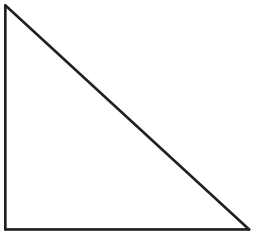
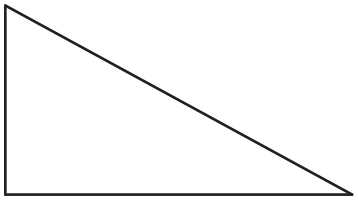
Problem Set

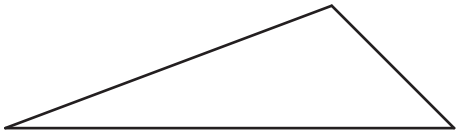
Draw the incenter of each triangle.

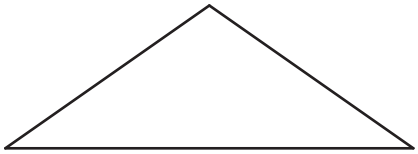
1. 

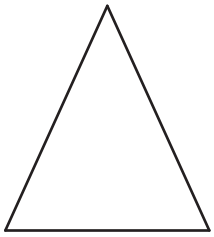
2. 

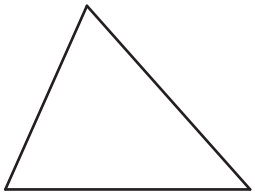
3. 

4. 

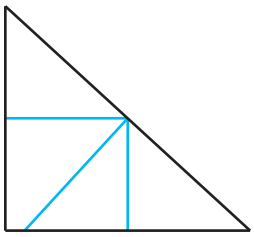
5. 

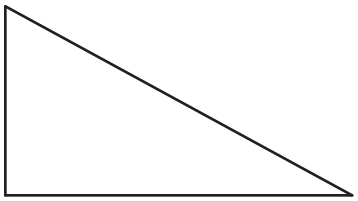
6. 

7. 

8. 

Draw the circumcenter of each triangle.

9. 

10. 

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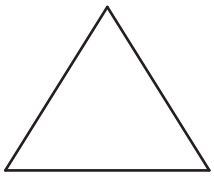
11.



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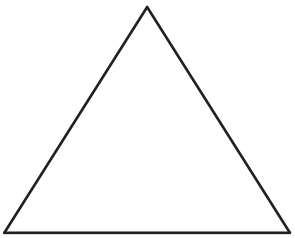

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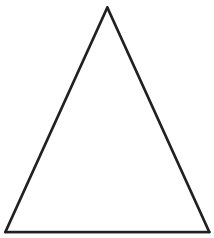

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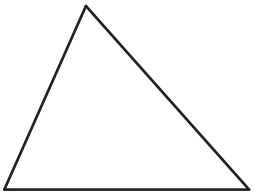

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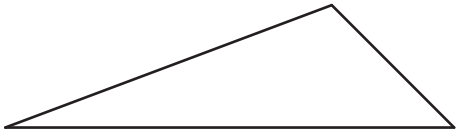

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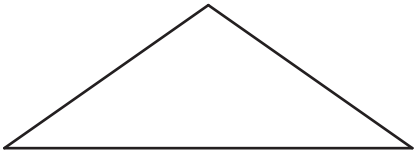
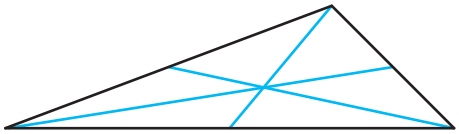


Draw the centroid of each triangle.

17.



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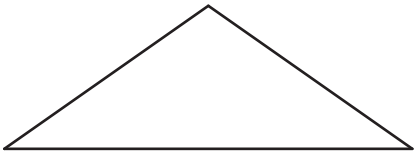

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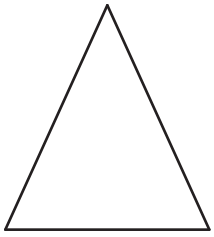

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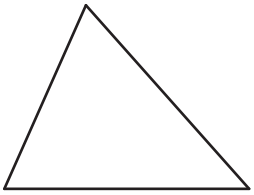

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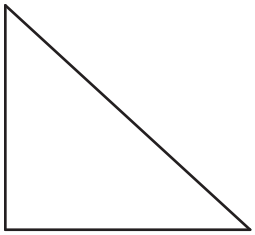
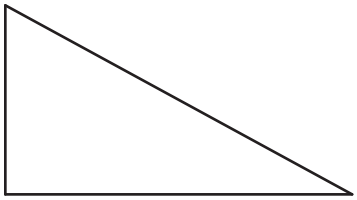
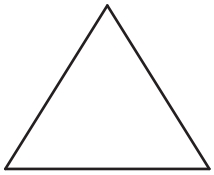
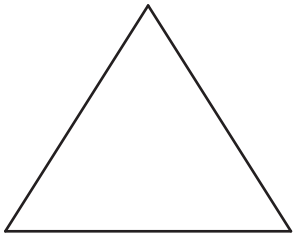
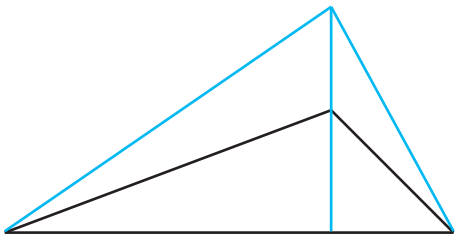
21. 

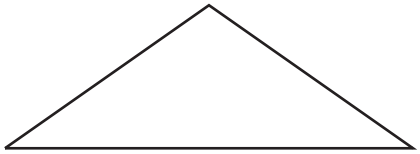
22. 

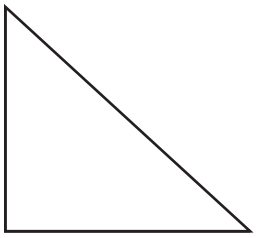
23. 

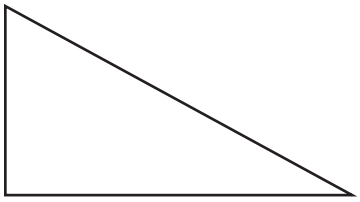
24. 

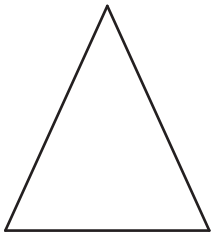
Draw the orthocenter of each triangle.

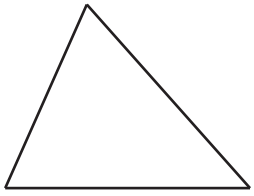
25. 

26. 

27. 

28. 

29. 

30. 

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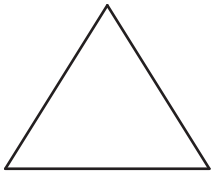
31.



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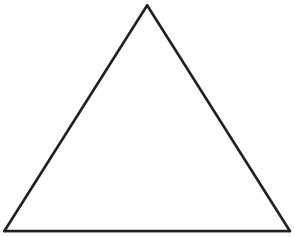
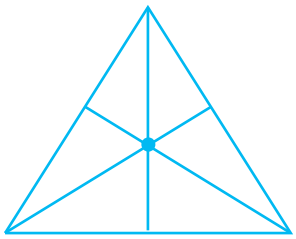


Answer each question about points of concurrency. Draw an example to illustrate your answer.

33. For which type of triangle are the incenter, circumcenter, centroid, and orthocenter the same point?

equilateral triangles



34. For which type of triangle are the orthocenter and circumcenter outside of the triangle?

35. For which type of triangle are the circumcenter and orthocenter on the triangle?

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36. For which type of triangle are the incenter, circumcenter, centroid, and orthocenter all inside the triangle?

37. For what type(s) of triangle(s) do the centroid, circumcenter, and orthocenter all lie on a straight line?

38. For what type of triangle is the orthocenter a vertex of the triangle?

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Given the coordinates of the vertices of a triangle, classify the triangle using algebra.

39. $A(-5, 5)$, $B(5, 5)$, $C(0, -5)$

segment AB

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

$d = \sqrt{10^2 + 0^2}$

$d = \sqrt{100}$

$d = 10$

segment AC

$d = \sqrt{[0 - (-5)]^2 + (-5 - 5)^2}$

$d = \sqrt{5^2 + (-10)^2}$

$d = \sqrt{125}$

$d \approx 11.18$

segment BC

$d = \sqrt{(0 - 5)^2 + (-5 - 5)^2}$

$d = \sqrt{(-5)^2 + (-10)^2}$

$d = \sqrt{125}$

$d \approx 11.18$

The lengths of two of the segments are equal, so the triangle is isosceles.

40. $R(-3, -1)$, $S(1, 2)$, $T(4, -2)$

41. $F(-2, 5)$, $G(1, 6)$, $H(5, -4)$

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42. $M(5, -1)$, $N(3, -5)$, $P(-1, -3)$

43. $K(-2, 1)$, $L(4, -3)$, $M(-1, 5)$

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44. $E(-5, 7)$, $F(3, 4)$, $G(-8, -1)$

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1

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