1. Rectangle *ABCD* is shown below. Find the midpoint of diagonal $\overline{AC}$.
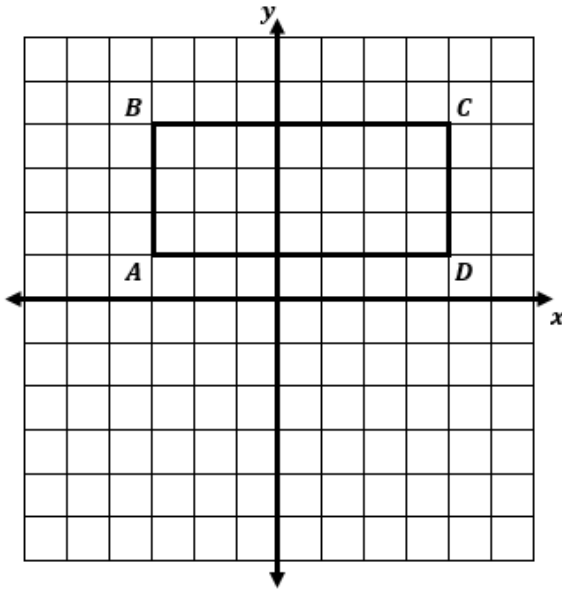
2. Find the distance between points *P*(7, 4) and *Q*(1, 2) to the nearest tenth.

   What is the midpoint of $\overline{PQ}$?

3. Find the coordinates of the midpoint of the segment whose endpoints are *H*(9, 10) and *K*(7, 6).

   Find *HK*.

4. *M* (7, 3) is the midpoint of $\overline{RS}$. The coordinates of point *S* are (8, 4). What are the coordinates of *R*?

   Find *SR*

5. Noam walks home from school by walking 8 blocks north and then 6 blocks east. How much shorter would his walk be if there were a direct path from the school to his house? Assume that the blocks are square.

6. Tony took the city bus from the local library located at (4, 0) on a coordinate plan map to his dorm located at (12, 6) on the map. If each unit represents 0.75 miles, how far is his dorm from the library?

7. Given a line segment with endpoints A(16, 8) and B(1, 3) what are the coordinates of the line segment partitioned two-fifths from A to B?

8. What are the coordinates of point C below on segment $\overline{AC}$ that is partitioned at point B in a ratio of 2 to 5?

A   B   C

(5, 0)   (8, 0)
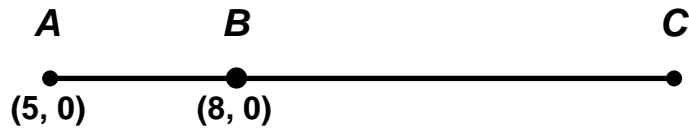
9. Given line segment $\overline{AB}$ with endpoints A(-9, 2) and B(12, 8), what are the coordinates of point C that is partitioned one-third from A to B?

10. Write an equation in slope-intercept form of a line that passes through the point (14, 8) and is (a) parallel (b) perpendicular to the line that passes through the points (4, 9) and (-3, 6).

11. Write an equation in standard form for a line that is (a) parallel (b) perpendicular to the line with an equation of $y = 3x - 5$ that passes through the point (8, 5).

12. Write an equation in slope-intercept form for a line that is (a) parallel (b) perpendicular to the line $y = -5x - 3$ and has a y-intercept of 6.
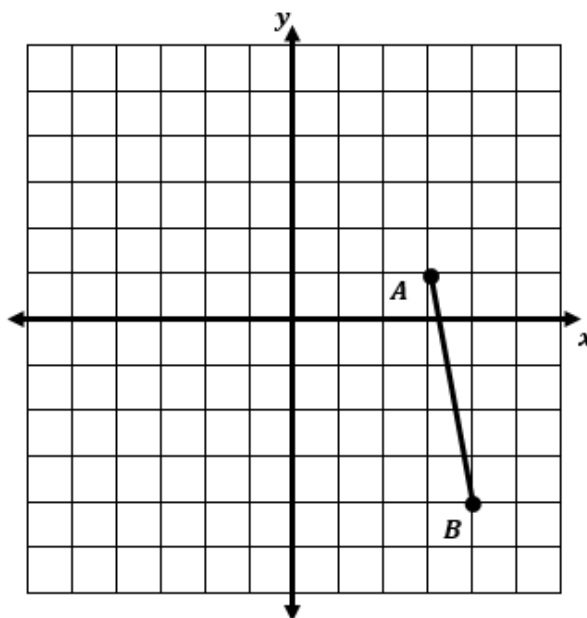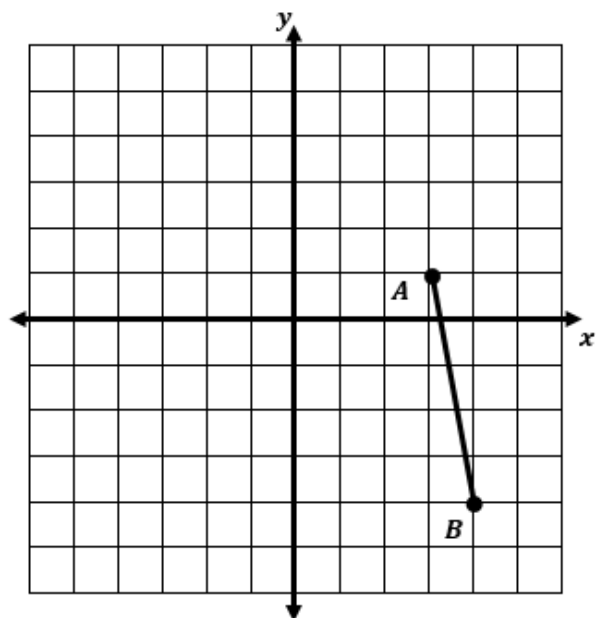
13. Define 'rigid transformation'.

Translate $\overline{AB}$ using the translation rule $(x, y) \rightarrow (x - 2, y + 4)$ then translate $\overline{A'B'}$ using the translation rule $(x, y) \rightarrow (x - 2, y - 6)$.
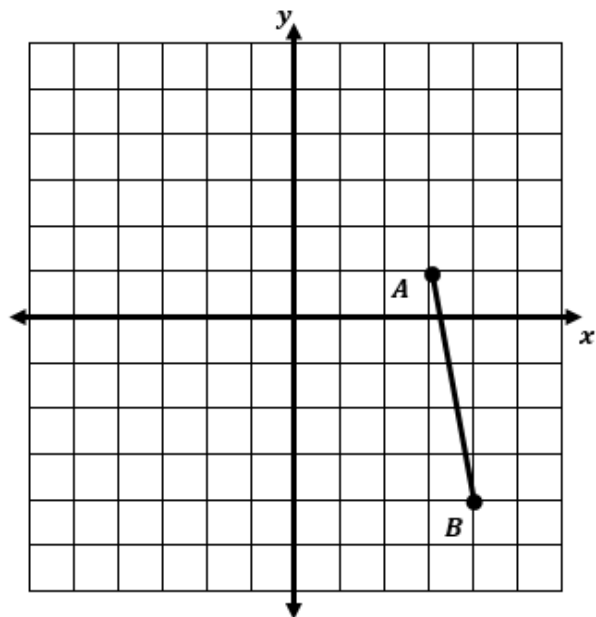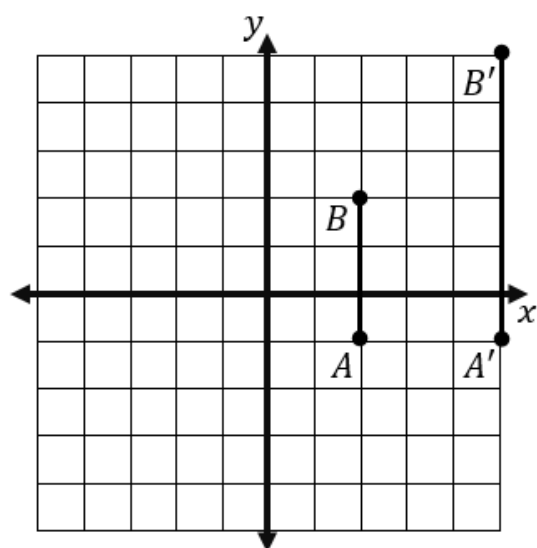

14. Reflect $\overline{AB}$ over the y-axis and then reflect $\overline{A'B'}$ over the x-axis.
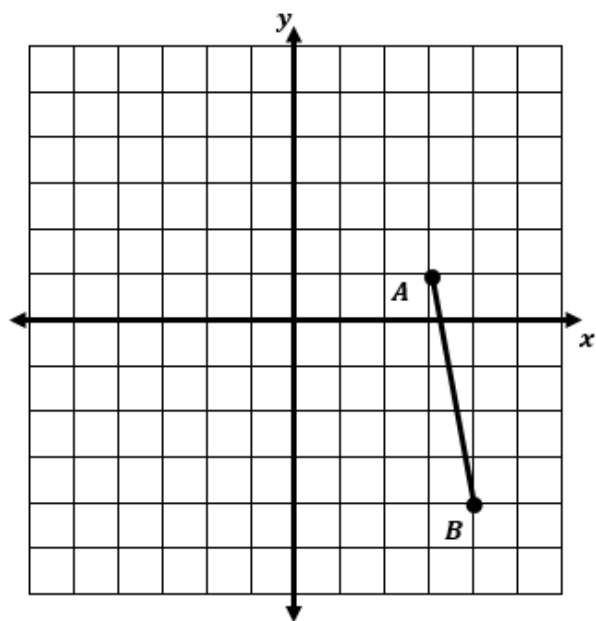
15. a. Rotate $\overline{AB}$ 90° counterclockwise around the origin.
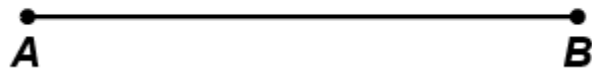   b. Rotate $\overline{AB}$ 90° clockwise around the origin

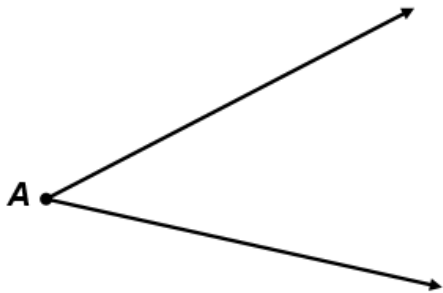16. a. What is the scale factor of the dilation of line segment $\overline{AB}$?

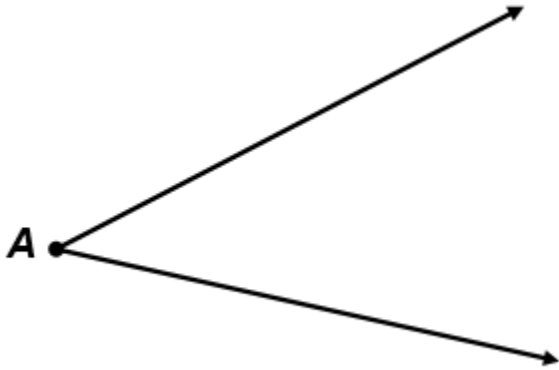   b. Draw a segment demonstrating a dilation of $\overline{AB}$ by a factor of $\frac{1}{3}$.

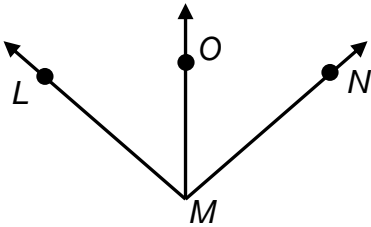17.   Use a compass and straight edge to construct a perpendicular bisector.

●————————————————————●
A   B

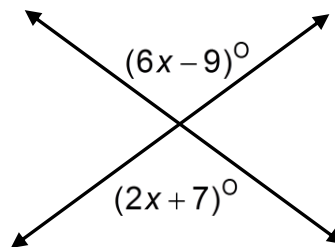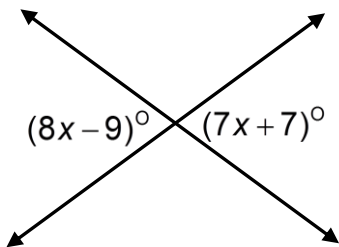18. Use a compass and straight edge to copy angle *A*.

A

19. Use a compass and straight edge to construct an angle bisector of angle *A*.
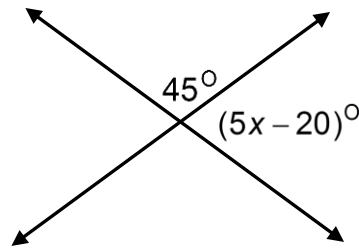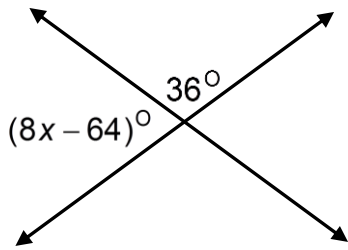
A

20. $\vec{MO}$ bisects $\angle LMN$, $m\angle LMN = (7x - 24)°$, and $m\angle NMO = (2x + 31)°$. Solve for *x* and find $m\angle LMO, m\angle OMN, and\ m\angle LMN$.
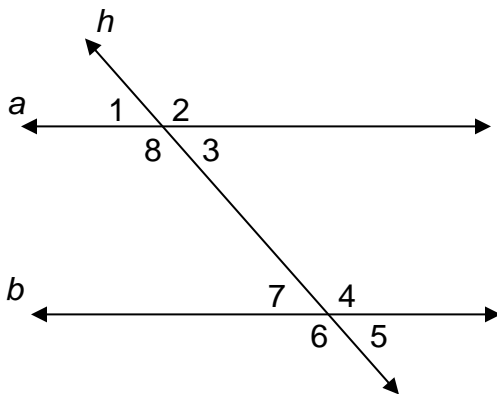
O

L   N

M

21. What is the value of *x*? Find the measure of each angle.

$(8x - 9)°$ $(7x + 7)°$

$(6x - 9)°$

$(2x + 7)°$

22. What is the value of *x*? Find the measure of each angle.

$36°$

$(8x-64)°$

$45°$

$(5x-20)°$

Use the diagram below for questions 23 and 24.

h

a || b

a   1 \ 2
   8 \ 3

b   7 \ 4
       6 \ 5

23. List all pairs of alternate exterior angles, alternate interior angles, same-side interior angles, and corresponding angles.
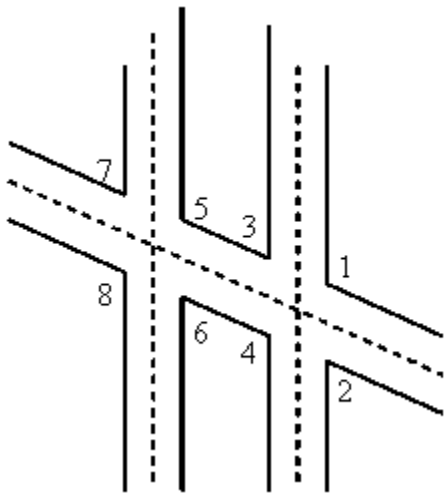
24. Which pairs of the above answers are congruent?   Supplementary?

25. Use a compass and straight edge to construct a line parallel to the given line and through the given point that is not on the line.
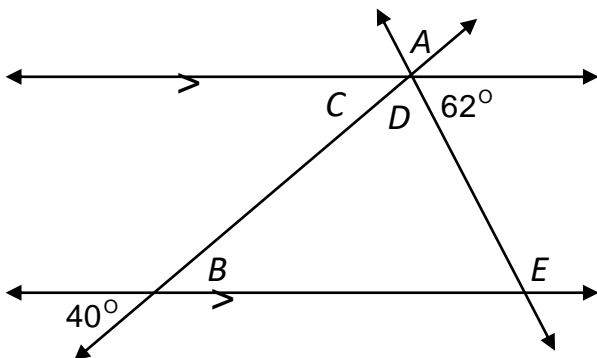
N

l

The diagram below shows parallel airport runways. A taxiway crosses both runways. Use the diagram to answer questions 26 and 27.

26. How are ∠6 and ∠2 related?

27. If ∠8 measures $112°$, what is the sum of the measures of ∠1 and ∠4?

28. Find $m\angle A, \angle B, \angle C, \angle D,$ and $\angle E$.

$m\angle A =$_____

$m\angle B =$_____
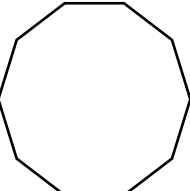
$m\angle C =$_____

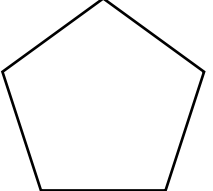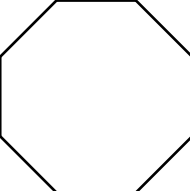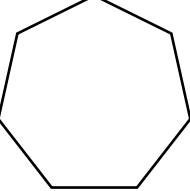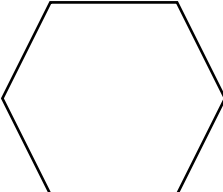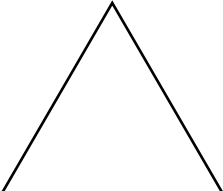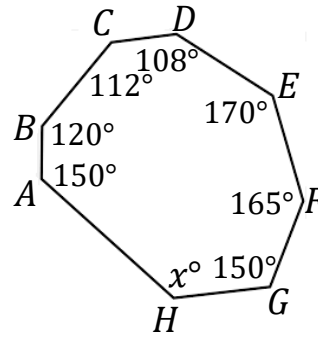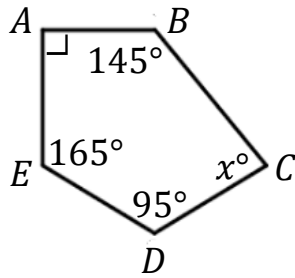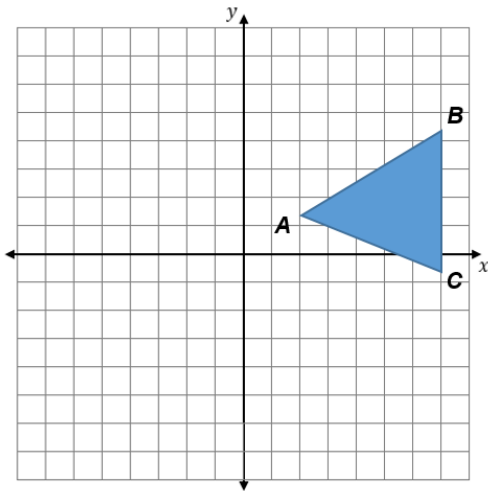$m\angle D =$_____

$m\angle E =$_____

29. Complete the table below.

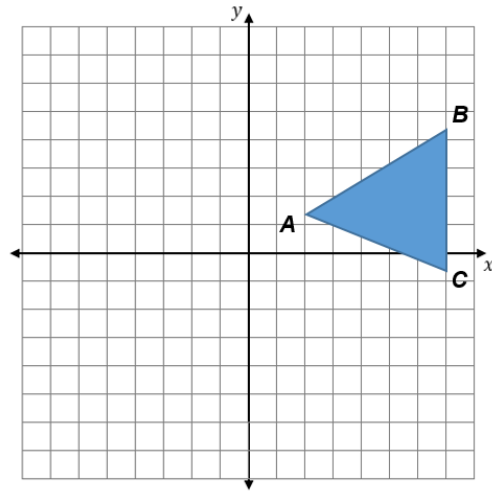| Regular Polygon	Polygon Name	Sum of the Interior Angles	Measure of One Interior Angle	Measure of One Exterior Angle
(pentagon)				
(octagon)				
(heptagon)				
(hexagon)				
(triangle)				
(nonagon)				

30. What is the measure of the missing angle in the polygons below?

A ⌐ B
145°
165° E
$x°$ C
95°
D

C D
108°
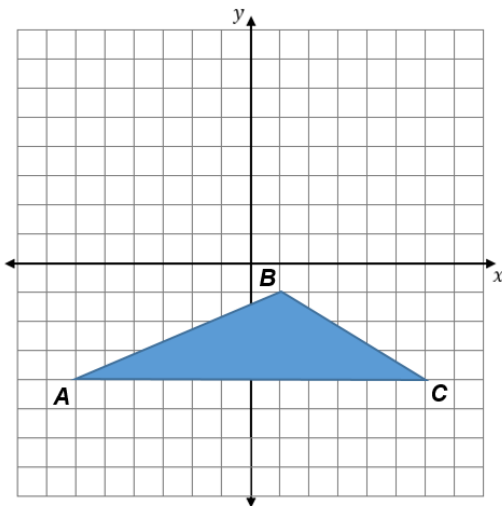112° 170° E
B 120°
150°
A
165° F
$x°$ 150°
H G

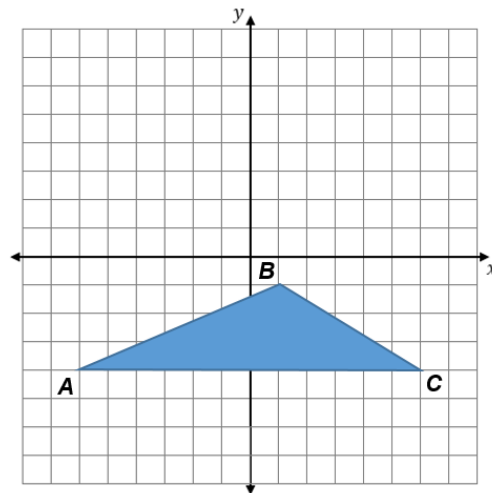31. Translate $\triangle ABC$ $(x, y) \rightarrow (x - 3, y + 2)$.　　Translate $\triangle ABC$ $(x, y) \rightarrow (x - 5, y - 2)$.

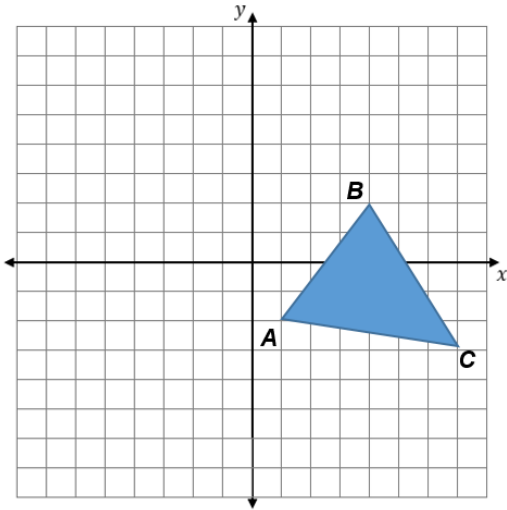32. Reflect $\triangle ABC$ across the x-axis.　　Reflect $\triangle ABC$ across the y-axis.
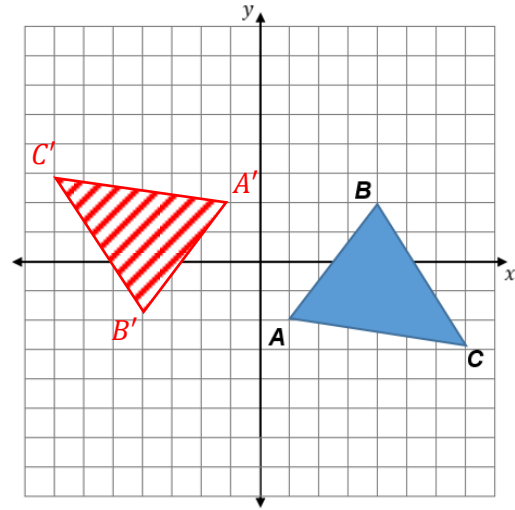
33. If a problem does NOT specify the direction of rotation, the rotation is <u>always</u> to be in this
direction…._____
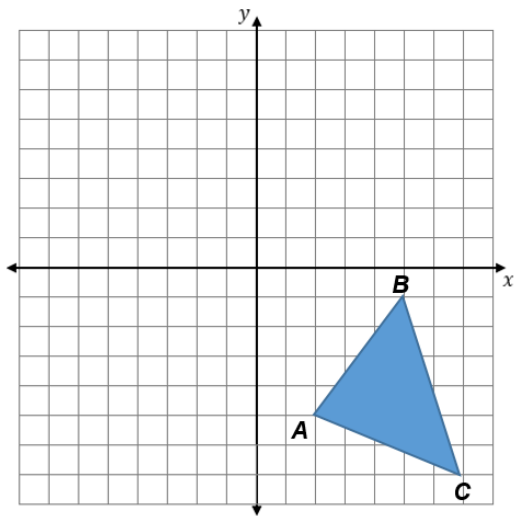
Rotate $\triangle ABC$ 90° about the origin.

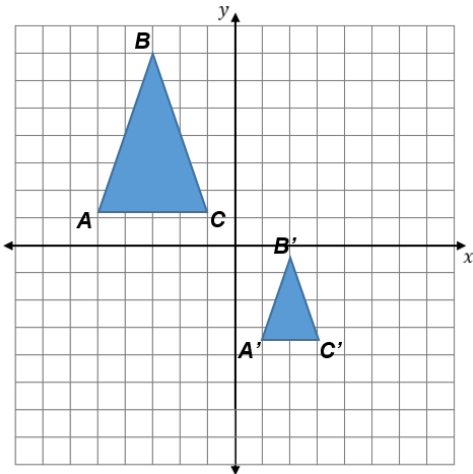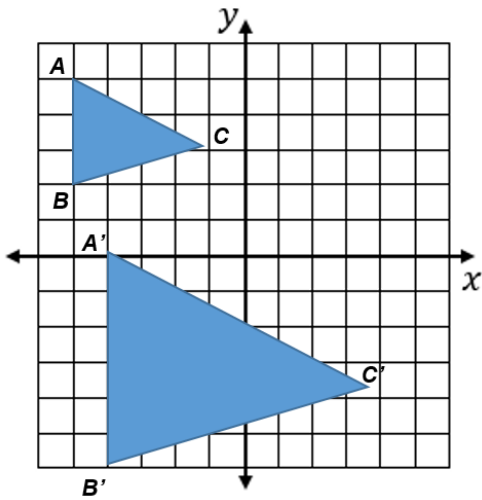Rotate $\triangle ABC$ 180° about the origin.

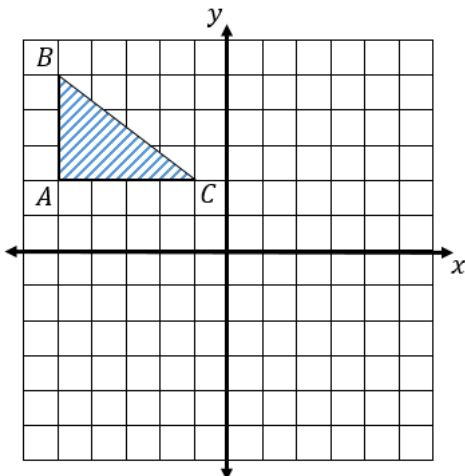34. Rotate $\triangle ABC$ 180° about the origin and then reflect it over the *y*-axis.

35. What is the scale factor in the dilation shown below?

36. What is the scale factor in the dilation shown below?
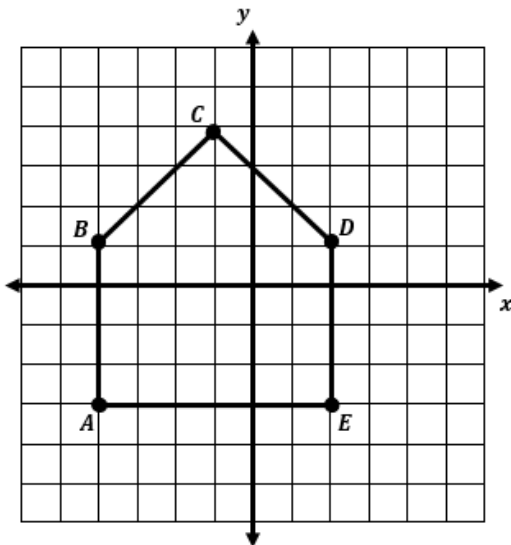

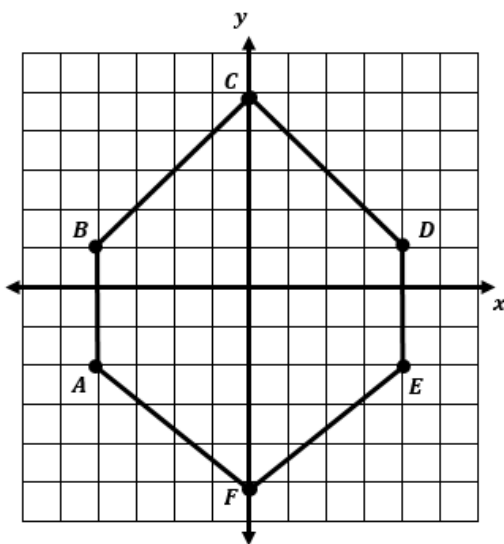37. Draw the translated image $(x, y) \rightarrow (x + 6, y - 1)$ and then reflect the image over the x-axis.

38. Find the value of *x*.
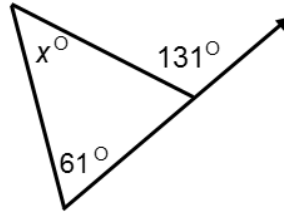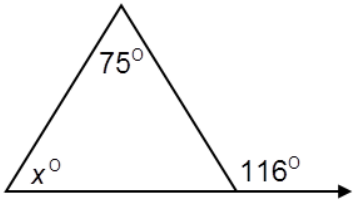
39. A softball home plate has been designed on the coordinate plane shown below. If each unit is 2 inches, what is the area of home plate?

40. If each unit in the coordinate plane below is 3 cm, what is the area of the polygon *ABCDEF*?

41. Name the Property of Equality that justifies this statement:
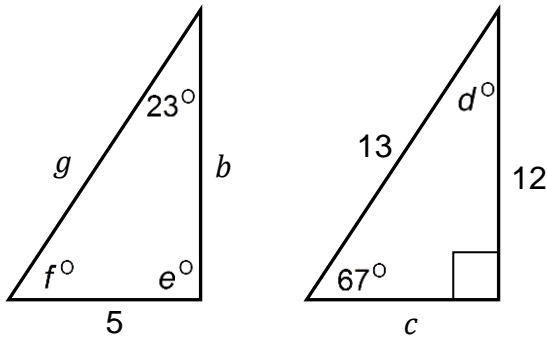
$\overline{TR} \cong \overline{TR}$

42. Name the Property of Congruence that justifies the statement:
If $\overline{XY} \cong \overline{WX}$, then $\overline{WX} \cong \overline{XY}$.

43. Name the Property of Congruence that justifies this statement:
If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$.

44. The two triangles shown below are congruent. Find the value of b, c, d, e, f, and g.

45. What other information do you need in order to prove the triangles congruent using the SAS Congruence Postulate? By AAS Congruence Theorem?
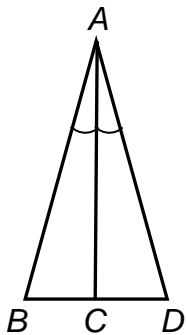
46. What else must you know to prove the triangles congruent by ASA? By SAS?

47. Write a paragraph proof.

   Given: $\overline{AB} \cong \overline{DC}$ and $\overline{AC} \cong \overline{DB}$
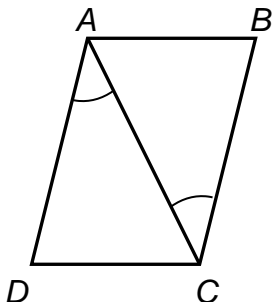   Prove: $\triangle ABC \cong \triangle DCB$
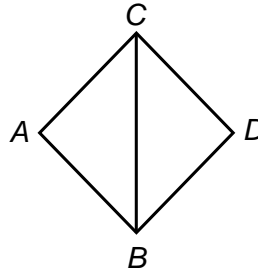
48. Write a two-column proof.

   Given: $\overrightarrow{AC}$ bisects $\angle DAB$ and $\overrightarrow{CA}$ bisects $\angle DCB$
   Prove: $\triangle DAC \cong \triangle BAC$
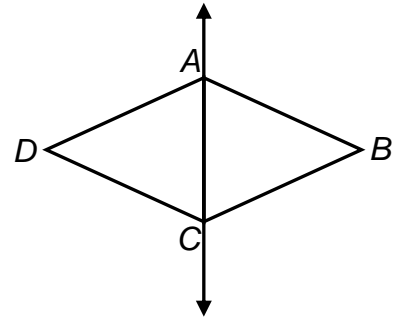
Statements	Reasons

49. Write a two-column proof.

Given: $\overline{AB} \cong \overline{AC}$, $\angle BAD \cong \angle CAD$

Prove: $\overline{AD}$ bisects $\overline{BC}$

Statements	Reasons

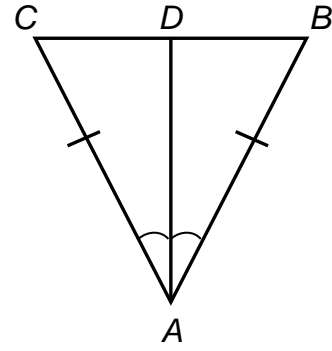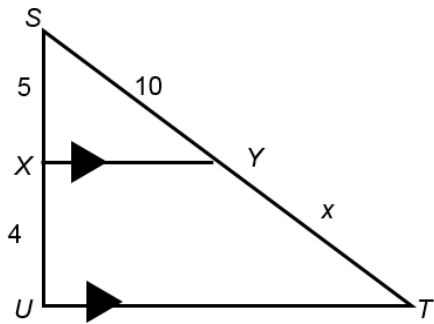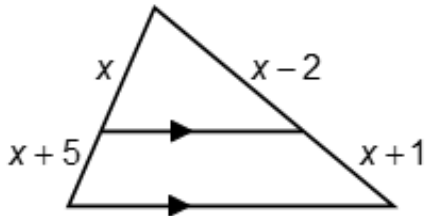50. Given $\overline{DE} \parallel \overline{BC}$, what postulate or theorem can be used to prove the triangles below similar?
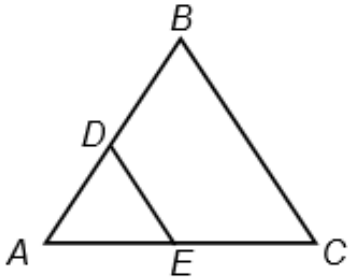
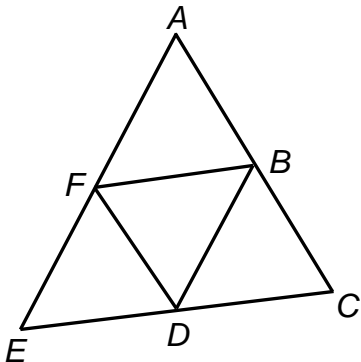

51. In the diagram below, what is the length of $\overline{ST}$?

52. What is the value of x?

53. Points B, D, and F are midpoints of the sides of △ACE. EC = 50, DF = 21 and BD = 35. Find the perimeter of △BDF. Find the perimeter of △ACE.

54. Find the value of x
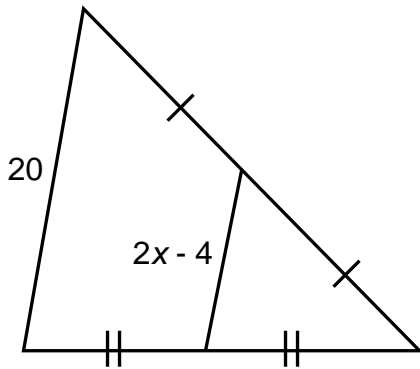
55. A surveyor is trying to measure the distance across a lake as shown below. What is the distance across the lake?
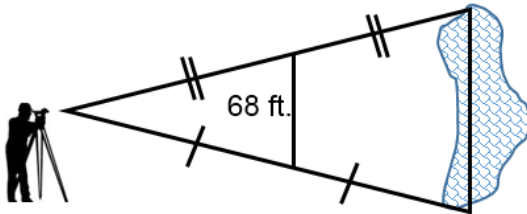
56. Two sides of a triangle have lengths 7 and 14. What must be true about the length of the third side?

57. Two sides of a triangle have lengths 3 and 9. What must be true about the length of the third side?

58. Write an inequality related to the given side lengths shown below.
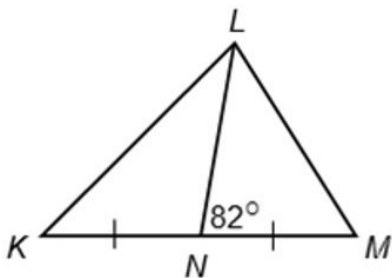
$LM \bigcirc KL$

$>, <, or =$

59. A pair of scissors is opened to two positions, A and B.

POSITION A
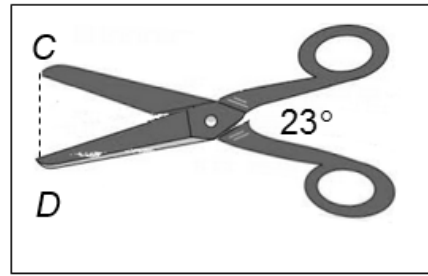
POSITION B

$$AB \bigcirc CD$$

$$>, <, or =$$

60. In $\triangle ABC$, G is the centroid and $BD = 15$. Find BG and DG.

$AG = 18$. Find GE and AE
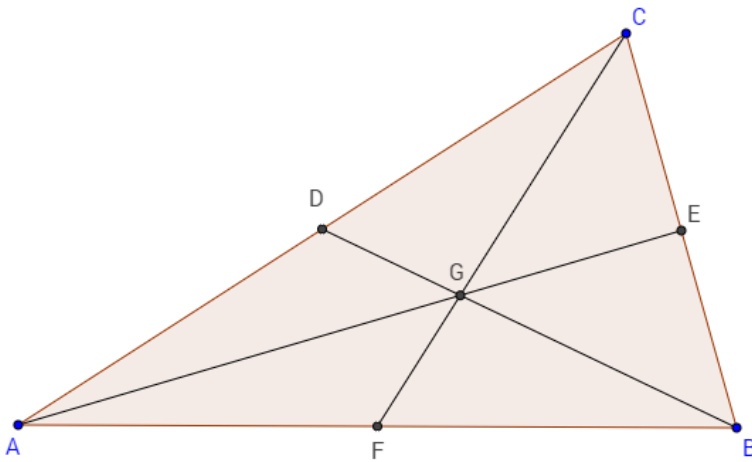
61. Point *G* is the centroid of $\triangle ABC$. Find the value of x.

C

$2(2x - 3)$

E D

G

$x + 18$

A F B
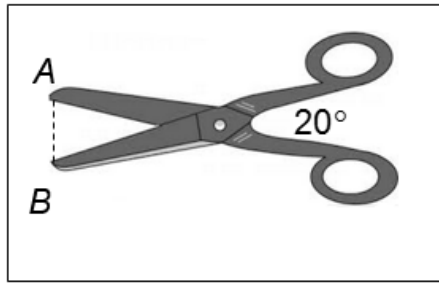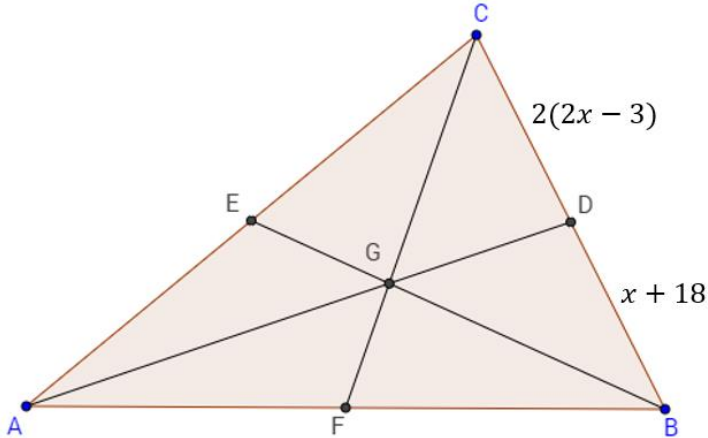
62. Find the length of the base in the rectangle below.

10

6
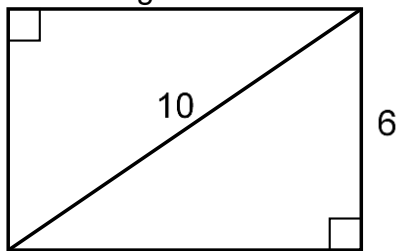
63. If a 25 foot ladder leans against the side of a building 24 feet from its base, how high up the building will the ladder reach?

25

24
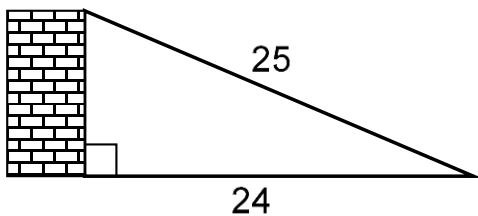
64. In the triangle below, write the sine, cosine, and tangent ratios for angle *B* and angle *C*.

B

A C
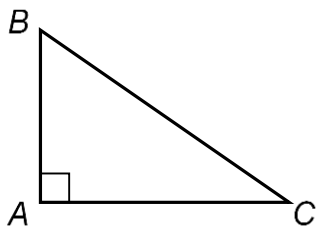
65. Is there enough information to conclude that the two triangles are congruent? If so, what is a correct congruence statement?
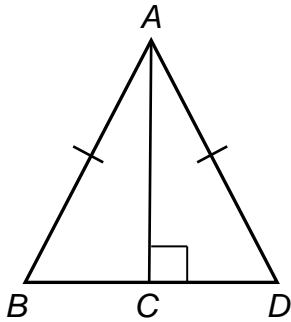
66. Write a two-column proof:

Given: $SD \perp HT$, $\overline{SH} \cong \overline{ST}$
Prove: $\triangle SHD \cong \triangle STD$

Statements	Reasons

67. Write the missing reasons to complete the flow proof.

Given: $\angle ADB$ and $\angle CDB$ are right angles, $\angle A \cong \angle C$
Prove: $\triangle ADB \cong \triangle CDB$

$\angle ADB$ and $\angle CDB$ are right $\angle$s.	→	$\triangle ADB$ and $\triangle CDB$ are right $\triangle$.
Given		a. _____

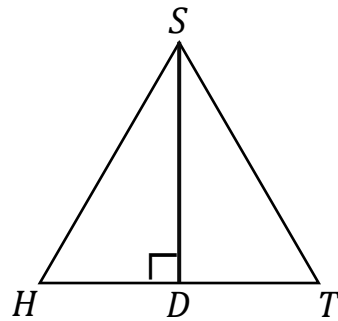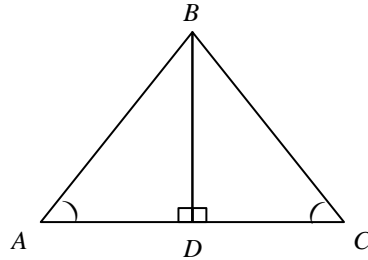| $\angle A \cong \angle C$	→	$\overline{BA} \cong \overline{BC}$	→	$\triangle ADB \cong \triangle CDB$
Given		b. _____		d. _____

$\overline{DB} \cong \overline{DB}$

c. _____

68. What are the lengths of the missing sides in the triangle?

7

y

45°

x
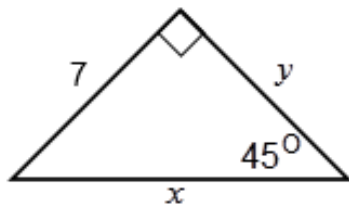
Not drawn to scale

$x =$ _____

$y =$ _____

69. Quilt squares are cut on the diagonal to form triangular quilt pieces. The hypotenuse of the resulting triangles is 10 inches long. What is the side length of each piece? Leave your answer in simplified radical form.

70. A conveyor belt carries supplies from the first floor to the second floor, which is 24 feet higher. The belt makes a 60° angle with the ground. How far do the supplies travel from one end of the conveyor belt to the other? Round your answer to the nearest foot.

71. In the triangle below, find the values of a and b.
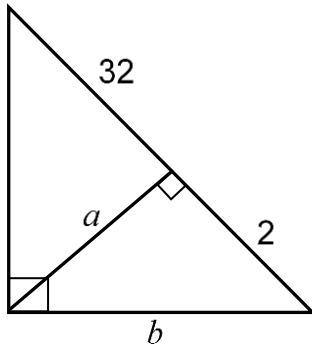
32

a

2

b
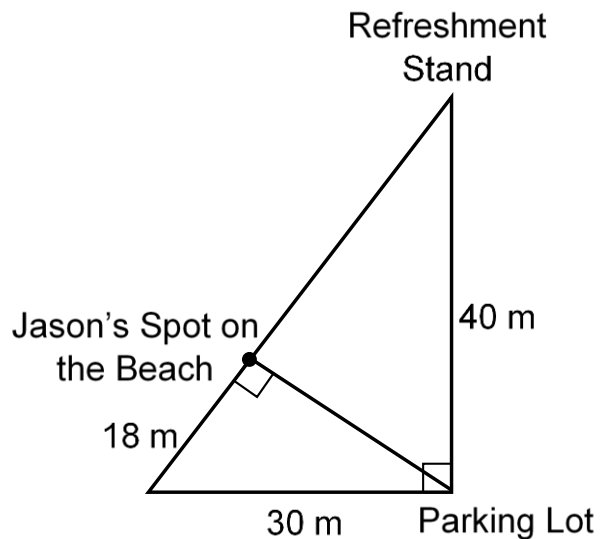
Figure not drawn to scale.

72. Jason wants to walk the shortest distance to get from the parking lot to the beach.

Refreshment
Stand

Jason's Spot on
the Beach

40 m

18 m

30 m   Parking Lot

    a. How far is the spot on the beach from the parking lot?
    b. How far will his place on the beach be from the refreshment stand?

73. Kristen lives directly east of the park. The football field is directly south of the park. The library sits on the line formed between Kristen's home and the football field at the exact point where an altitude to the right triangle formed by her home, the park, and the football field could be drawn. The library is 2 miles from her home. The football field is 5 miles from the library.

Park   Home

2 miles

Library

5 miles
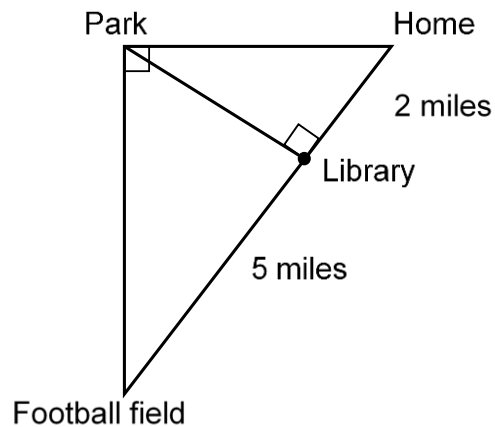
Football field

    a.   How far is library from the park?
    b.   How far is the park from the football field?

74. Find the length of $\overline{AB}$.

B

14 inches

17°

A C
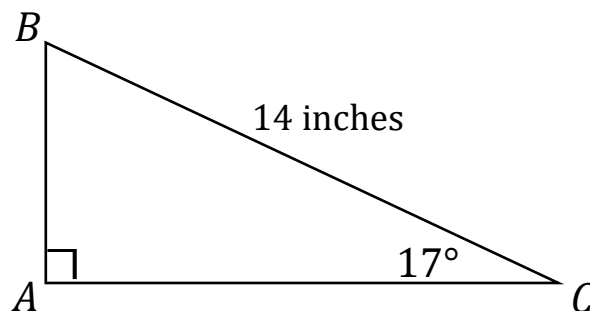
75. A large totem pole in the state of Washington is 100 feet tall. At a particular time of day, the totem pole casts a 249-foot-long shadow. Find the measure of $\angle A$ to the nearest degree.

100 ft

A

249 ft