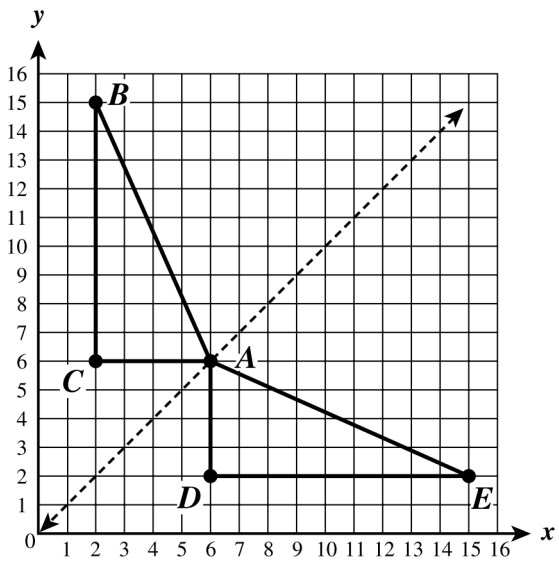
Whittier Tech

Grade 10:
Honors Algebra II/Geometry
Summer Project

Grade 10 Honors Algebra II/Geometry

Name: _____ **Date:** _____

1. Right triangles *ABC* and *AED* are shownon the coordinate grid below.



Which single transformation, with respect to the line $y = x$, maps $\triangle ABC \rightarrow \triangle AED$?

A. dilation B. reflection

C. rotation D. translation

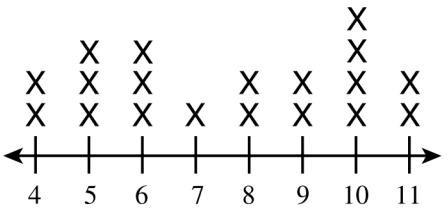
2. The distance along the walking trail behind Jessica's school is approximately 6,290 feet. Jessica calculated the mean length of her walking steps to be 2.9 feet.

Which of the following is closest to the number of steps Jessica would take to walk the entire trail?

A. 200 steps B. 1,800 steps

C. 2,000 steps D. 18,000 steps

3. Sandra created the line plot shown below to display data on the shoe sizes of her classmates.

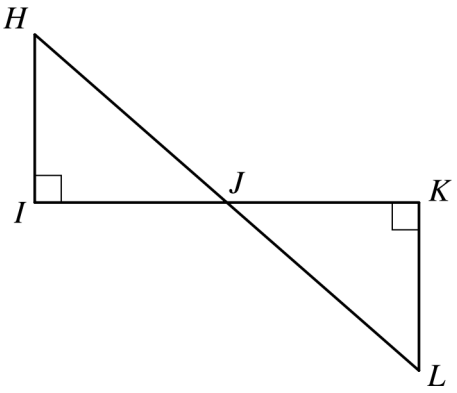


Shoe Sizes of Classmates

Based on the data given in the line plot, what is the median shoe size of Sandra's classmates?

A. 7 B. 8 C. 10 D. 19

4. In the figure below, $\triangle HIJ \cong \triangle LKJ$.

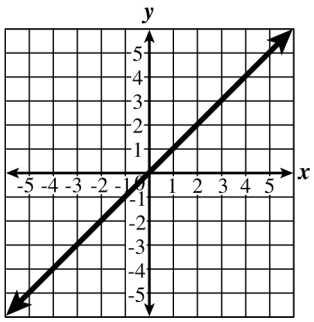


If $m\angle L = 50^\circ$, what is $m\angle IJH$?

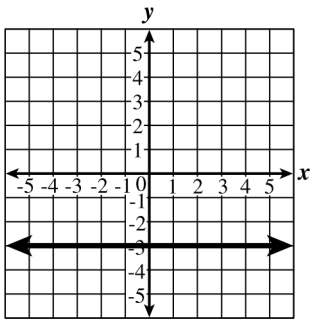
A. 35° B. 40° C. 45° D. 50°

5. Which of the following best represents the graph of a line with an undefined slope?

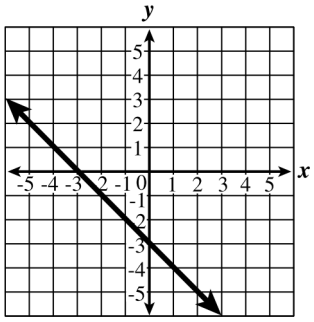
A.



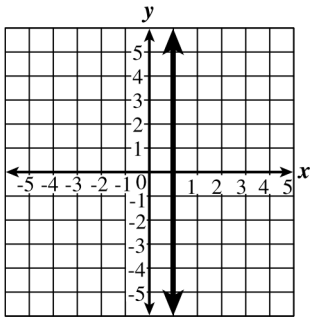
B.



C.



D.



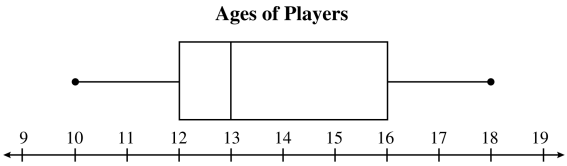
6. Andrew used a wooden stick to estimate the length of a couch. Andrew, who is approximately 6 feet tall, measured his height to be about $1\frac{1}{2}$ sticks in length. He measured the couch to be about 2 sticks in length.

   Based on Andrew's measurements, which of the following is closest to the length of the couch?

   A. 8 feet B. 9 feet

   C. 12 feet D. 18 feet

7. The following box-and-whisker plot shows the ages of players on a neighborhood baseball team.



   a) What is the range of the data set?

8. A landscape artist plans to create a garden on the front lawn of an art museum. The garden will be in the shape of a trapezoid. If the height of the trapezoid is 15 feet, and its bases measure 14 feet and 20 feet, what is the area, in square feet, of the trapezoid?

9. Andy's Housecleaning Service charges a fixed fee of $40 per job, plus $15 per half-hour that a job requires.

   a) If c represents Andy's total charges, write an equation that expresses c in terms of h, the number of half-hours that a job requires.

   b) What is the total charge for Andy's services when a job requires $5\frac{1}{2}$ hours? Show all your work.

      Hannah's Homemaids, another housecleaning service, charges no fixed fee but charges $25 per half-hour that a job requires.

   c) If c represents Hannah's total charges, write an equation that expresses c in terms of h, the number of half-hours that a job requires.

   d) The Jordans plan to have their house cleaned, and they like Andy's and Hannah's services equally well. For what number of half-hours would the charges for the two services be identical? Show or explain how you got your answer.

10. The value of all of the quarters and dimes in a parking meter is \$18. There are twice as many quarters as dimes. What is the total number of dimes in the parking meter?

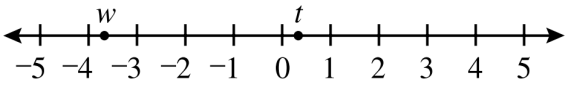
11. Ms. Vargas is analyzing the scores her 10 chemistry students earned on their last test. To make her calculations easier, she reduced each score by 80 points and arrived at the simplified data set shown below.

    {0, 4, 4, 5, 6, 7, 7, 7, 7, 9}

    a) For the simplified data set, find each of the measures listed below. Show or explain how you got each answer.
    - mean
    - median
    - mode
    - range

    b) For the set of *actual* scores on the chemistry test, find each of the measures listed below. Show or explain how you got each answer.
    - mean
    - median
    - mode
    - range

12. Two real numbers have coordinates w and t as shown on the number line below.



    a) What are the two real numbers represented by w and t on the number line?

    b) The coordinate of Point A on the number line is $w + t$. Plot and label Point A on the number line and explain how you decided upon its location.

    c) The coordinate of Point B on the number line is $w - t$. Plot and label Point B on the number line and explain how you decided upon its location.

    d) The coordinate of Point C on the number line is $w \cdot t$. Plot and label Point C on the number line and explain how you decided upon its location.

13. If 4 more than twice a number is 18, find the number.

14. The cost of a long-distance telephone call is determined by a flat fee for the first 5 minutes and a fixed amount for each additional minute. If a 15-minute telephone call costs \$3.25 and a 23-minute call costs \$5.17, find the cost of a 30-minute call.

15. James is four years younger than Austin. If three times James' age is increased by the square of Austin's age, the result is 28. Find the ages of James and Austin.

16. What is the slope of the line that passes through the points $(4, 5)$ and $(7, 3)$?

17. a) On the same set of coordinate axes, graph the following system of inequalities:

    $y \leq -3x + 2$
    $y - x > 0$

    b) Write the coordinates of a point not in the solution set of the inequalities graphed in part *a*.

18. Find an equation of the line passing through the point $(6, 5)$ and perpendicular to the line whose equation is $2y + 3x = 6$.

19. The expression $(m - n) - (n - m)$ is equivalent to

    A. $2m - 2n$ B. $2m$
    C. $-2n$ D. $m - n$

20. A set of data consists of 3, 3, 6, 4, and 9. The median for these data is

    A. 6 B. 5 C. 3 D. 4

21. Pat's grades on Course I tests were 90, 75, 98, 82, 90, and 87. The mode of her grades is

    A. 90 B. 89 C. 87 D. 82

22. The set of scores on a mathematics test is 72, 80, 80, 82, 87, 89, and 91. The mean score is

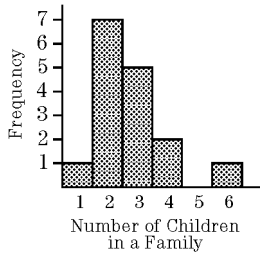
A. 84 B. 83 C. 82 D. 80

23. The accompanying histogram shows the distribution of the number of children in the families of the students in a ninth-grade class.

The mode of the set of data in the histogram is

A. 5 B. 2

C. 3 D. 7



24. A student's four test scores were 88, 91, 93, and 86. What score would be needed on a fifth test to obtain a mean of 90 for all five tests?

A. 90 B. 92 C. 95 D. 96

25. What was the median high temperature in Middletown during the 7-day period shown in the accompanying table?

Daily High Temperature in Middletown	
Day	**Temperature (F°)**
Sunday	68
Monday	73
Tuesday	73
Wednesday	75
Thursday	69
Friday	67
Saturday	63

A. 69 B. 70 C. 73 D. 75

26. For a set of scores, 80 is the score for the 75th percentile. Which statement is true?

A. Eighty scores are at or below 75.

B. Seventy-five scores are at or below 80.

C. Seventy-five percent of the scores are at or below 80.

D. Eighty percent of the scores are at or below 75.

27. Which measure is always the same as the 50th percentile?

A. mean B. median

C. mode D. lower quartile

28. The freshman class held a canned food drive for 12 weeks. The results are summarized in the table below.

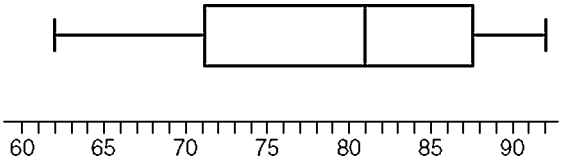
Canned Food Drive Results

Week	1	2	3	4	5	6	7	8	9	10	11	12
Number of Cans	20	35	32	45	58	46	28	23	31	79	65	62

Which number represents the second quartile of the number of cans of food collected?

A. 29.5 B. 30.5 C. 40 D. 60

29. The accompanying diagram shows a box-and-whisker plot of student test scores on last year's Mathematics A midterm examination. What is the median score?



A. 62 B. 71 C. 81 D. 92

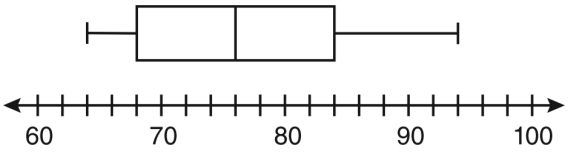
30. Jorge made the accompanying stem-and-leaf plot of the weights, in pounds, of each member of the wrestling team he was coaching. What is the mode of the weights?

Stem	Leaf						
10	9						
11							
12	3	8					
13	2	4	4	6	8		
14	1	3	5	5	9		
15	2	3	7	7	9		
16	1	3	7	8	8	8	9
17	3	8					

Key: 16 | 1 = 161

A. 145 B. 150 C. 152 D. 168

31. The box-and-whisker plot below represents students' scores on a recent English test.



Student Scores

What is the value of the upper quartile?

A. 68 B. 76 C. 84 D. 94

32. Which pair of angles x and y are supplementary?

A. $m\angle x = 113$, $m\angle y = 67$

B. $m\angle x = 76$, $m\angle y = 14$

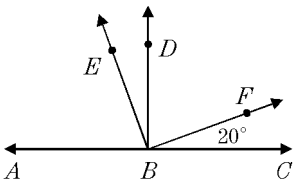
C. $m\angle x = 140$, $m\angle y = 190$

D. $m\angle x = 180$, $m\angle y = 180$

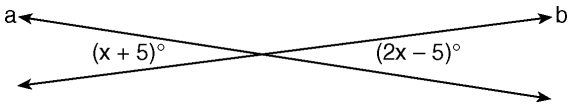
33. In the accompanying diagram, $\overrightarrow{BD} \perp \overleftrightarrow{ABC}$ at B and $\overrightarrow{BE} \perp \overrightarrow{BF}$ at B. If $m\angle FBC = 20$, what is $m\angle EBD$?

A. 20 B. 70

C. 90 D. 110



34. In the accompanying diagram, line a intersects line b.



What is the value of x?

A. -10 B. 5 C. 10 D. 90

35. The measures of two angles of a triangle are 70 and 55. This triangle is

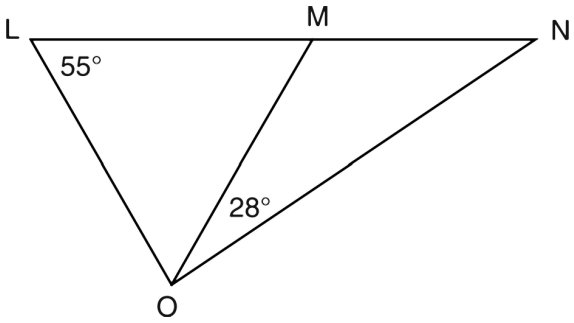
A. a right triangle

B. a scalene triangle

C. an obtuse triangle

D. an isosceles triangle

36. In the diagram below, $\triangle LMO$ is isosceles with $LO = MO$.



If $m\angle L = 55$ and $m\angle NOM = 28$, what is $m\angle N$?

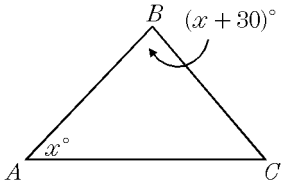
A. 27 B. 28 C. 42 D. 70

37. In the accompanying diagram of isosceles triangle ABC, $\overline{AB} \cong \overline{BC}$, $m\angle BAC = x$, and $m\angle ABC = x + 30$.

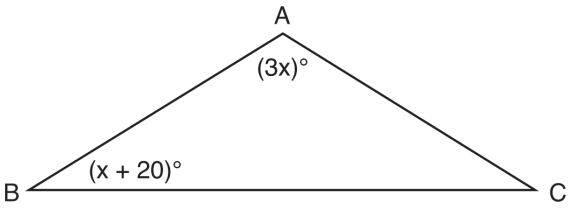
What is the value of x?

A. 80 B. 75

C. 50 D. 30



38. In the diagram below of $\triangle ABC$, $\overline{AB} \cong \overline{AC}$, $m\angle A = 3x$, and $m\angle B = x + 20$.



What is the value of x?

A. 10 B. 28 C. 32 D. 40

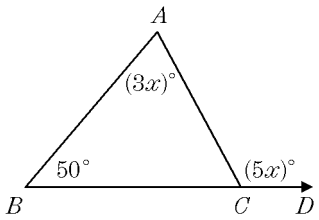
39. In the accompanying diagram, $\angle ACD$ is an exterior angle of $\triangle ABC$, $m\angle A = 3x$, $m\angle ACD = 5x$, and $m\angle B = 50$. What is the value of x?

A. 25

B. 30

C. 60

D. 100



40. The ratio of the dimensions of a rectangular picture is 5 : 4. The shorter dimension is $6\frac{1}{2}$ inches. What is the longer dimension?

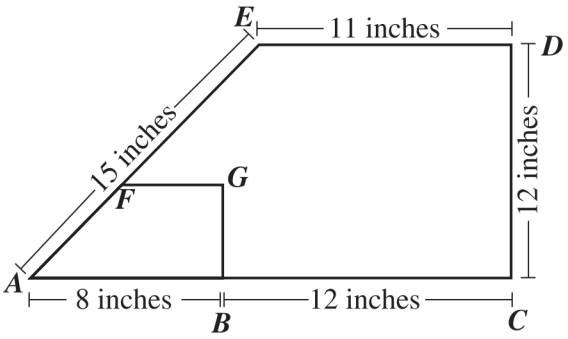
A. $5\frac{1}{4}$ inches B. $7\frac{1}{2}$ inches

C. $7\frac{3}{4}$ inches D. $8\frac{1}{8}$ inches

41. The lengths of the sides of a triangle are 8, 15, and 17. If the longest side of a similar triangle is 51, what is the length of the *shortest* side?

A. 32 B. 24 C. 16 D. 4

42. In the figure below, quadrilateral $ACDE$ is similar to quadrilateral $ABGF$.

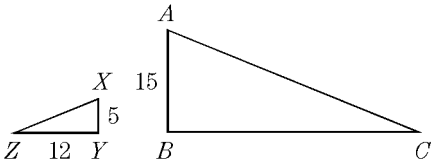


What is the length of $\overline{AF}$?

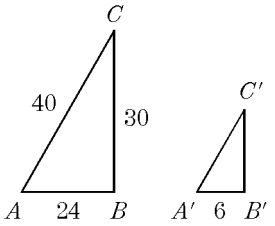
A. 6.0 inches B. 6.4 inches

C. 10.0 inches D. 10.7 inches

43. In the accompanying diagram of triangle XYZ and triangle ABC, $\angle X \cong \angle A$ and $\angle Y \cong \angle B$. If $XY = 5$, $YZ = 12$, and $AB = 15$, what is BC?



44. In the accompanying diagram, $\triangle ABC$ is similar to $\triangle A'B'C'$, $AB = 24$, $BC = 30$, and $CA = 40$. If the shortest side of $\triangle A'B'C'$ is 6, find the length of the longest side of $\triangle A'B'C'$.



45. The sides of a triangle have lengths 6, 8, and 11. What is the length of the *longest* side of a similar triangle whose perimeter is 75?

46. The altitudes of two similar triangles are in the ratio 2 : 3. If the perimeter of the smaller triangle is 18, find the perimeter of the larger triangle.

47. In two similar triangles, the ratio of the lengths of a pair of corresponding sides is $7:8$. If the perimeter of the larger triangle is 32, find the perimeter of the *smaller* triangle.

48. A tree casts a shadow 24 feet long at the same time a man 6 feet tall casts a shadow 4 feet long. Find the number of feet in the height of the tree.

49. On level ground, a person 6 feet tall casts a shadow of 8 feet. At the same time, a nearby tree casts a shadow of 20 feet. Find the number of feet in the height of the tree.

50. If $\triangle RST \sim \triangle ABC$, $m\angle A = x^2 - 8x$, $m\angle C = 4x - 5$, and $m\angle R = 5x + 30$, find $m\angle C$.

51. A translation moves $A(-3, 2)$ to $A'(0, 0)$. Find B', the image of $B(5, 4)$, under the same translation.

A. $(8, 2)$ B. $(2, 6)$

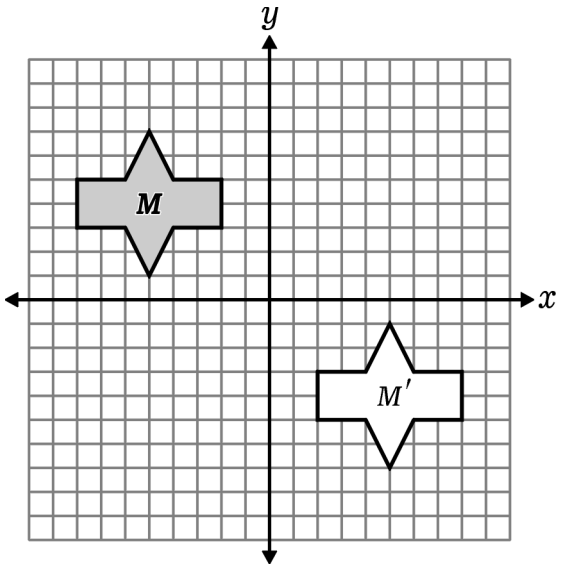
C. $(7, 3)$ D. $(-8, -2)$

52. Which of the following is *not* a congruence transformation for a two-dimensional figure?

A. dilation B. rotation

C. reflection D. translation

53. In the diagram, M and M' are congruent.



Which of the following is *not* a way of transforming M into M'?

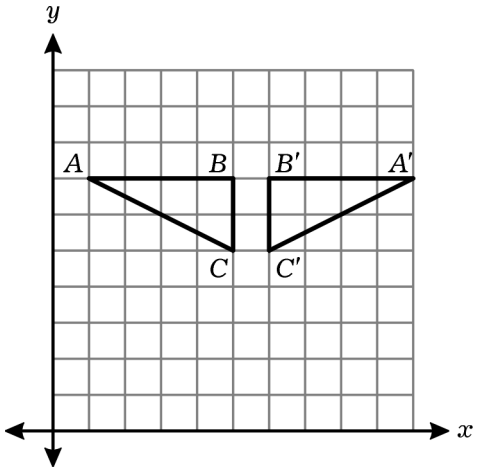
A. a rotation of 180° about the origin

B. a reflection across the x-axis, then a reflection across the y-axis

C. a reflection across the y-axis, then a translation down 2 units

D. a translation down 8 units, then a translation right 10 units

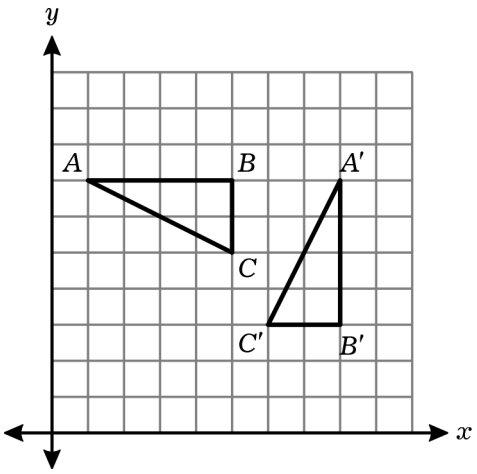
54. Triangle $A'B'C'$ is an image of the other triangle. What kind of transformation is shown?



A. translation B. reflection

C. dilation D. rotation

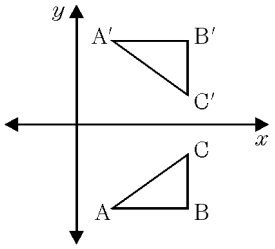
55. Triangle $A'B'C'$ is an image of the other triangle. What kind of transformation is shown?



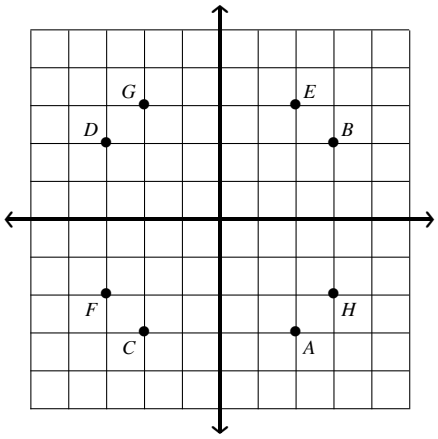
A. translation
B. reflection
C. dilation
D. rotation

56. In the diagram, $\triangle A'B'C'$ is the image of $\triangle ABC$. Which type of transformation is shown?

A. reflection
B. rotation
C. translation
D. dilation



57. What is the image of point A after a rotation of 90° in the counterclockwise direction?

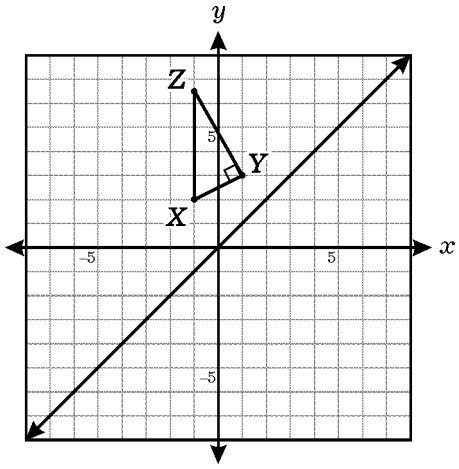


A. B B. D C. E D. F

58. Find the image of the point $(5, 3)$ after a 90° clockwise rotation.

A. $(-3, 5)$
B. $(3, 5)$
C. $(3, -5)$
D. $(5, -3)$

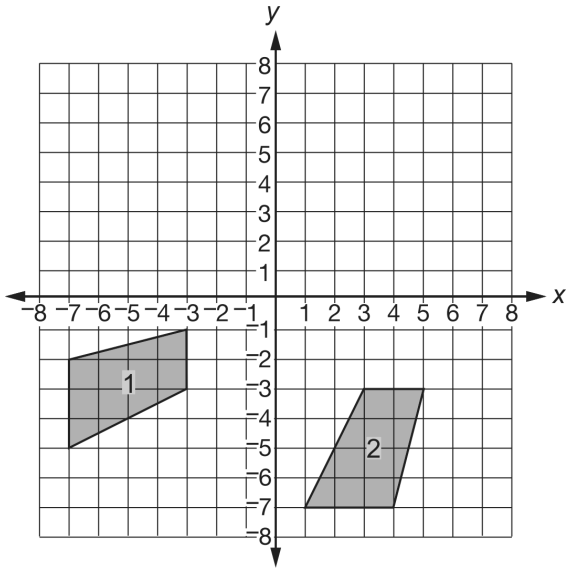
59. In the coordinate plane, right triangle XYZ is reflected over the line $y = x$.



If the reflected image is triangle $X'Y'Z'$, what are the coordinates of right angle Y'?

A. $(3, 1)$
B. $(3, 0)$
C. $(1, -3)$
D. $(1, -2)$

60. Use the graph to answer the question.



Which pair of transformations moves quadrilateral 1 to quadrilateral 2?

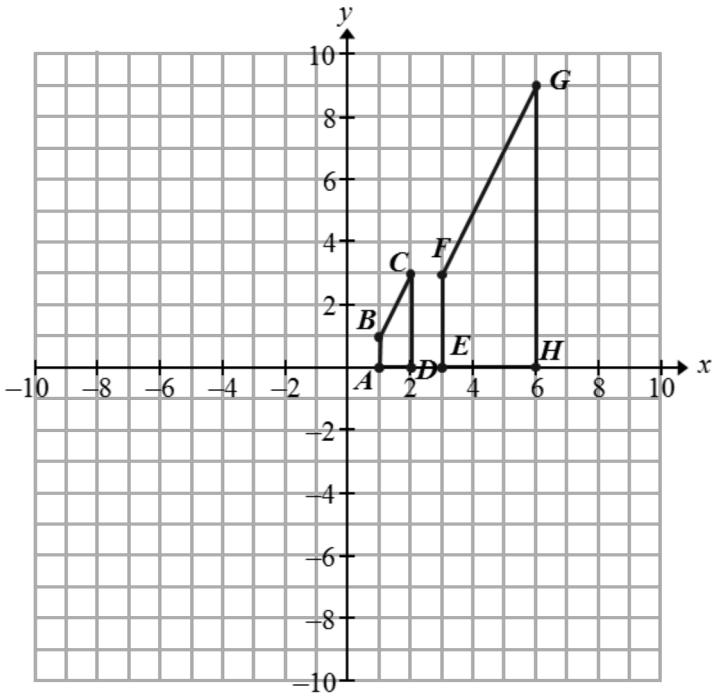
A. reflect it over the line $y = -3$, then rotate it 90° counterclockwise about the origin

B. reflect it over the x-axis, then rotate it 180° about the origin

C. rotate it 90° counterclockwise about point $(-3, -3)$, then translate it 8 units to the right

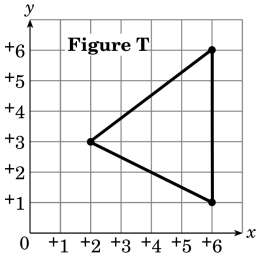
D. translate it 8 units to the right, then reflect it over the line $y = -3$

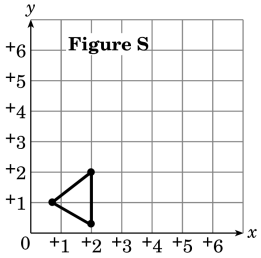
61. Quadrilateral *ABCD*, shown in the coordinate plane below, is dilated with the center at the origin to form quadrilateral *EFGH*. What is the scale factor of the dilation?



A. $\frac{1}{4}$ B. $\frac{1}{3}$ C. 3 D. 4

62. Figure *S* is the result of a dilation of Figure *T*.





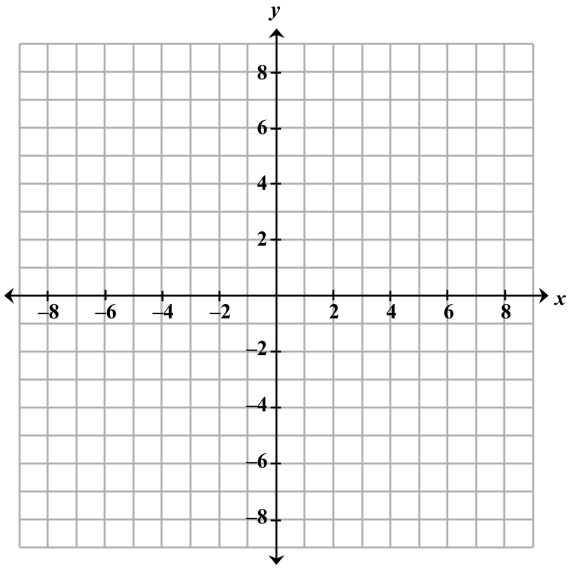
What is the scale factor of the dilation?

A. $\frac{1}{3}$ B. $\frac{1}{2}$ C. 2 D. 3

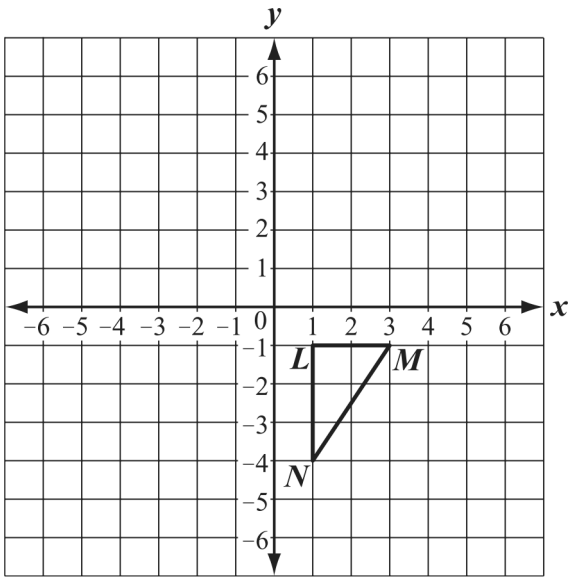
63. The coordinates of point *P* are $(-6, 5)$. Point *R* is a reflection of point *P* across the *x*-axis.

The coordinates of point *Q* are $(-1, 0)$. Point *T* is a reflection of point *Q* across the *y*-axis.

Plot and label points *P*, *Q*, *R*, and *T* on the coordinate plane.



64.



a) On your grid, draw the image of triangle *LMN* after it is translated 4 units to the left. Label the image *PQR*. List the coordinates for points *P*, *Q*, and *R*.

b) On your grid, draw the image of triangle *LMN* after it is translated 6 units up and 3 units to the right. Label the image *TUV*. List the coordinates for points *T*, *U*, and *V*.

c) On your grid, draw the image of triangle *LMN* after it is reflected over the *x*-axis. Label the image *XYZ*. List the coordinates for points *X*, *Y*, and *Z*.

65. Which sentence is an example of the distributive property?

A. $ab = ba$ B. $a(bc) = (ab)c$

C. $a(b + c) = ab + ac$ D. $a \cdot 1 = a$

66. What is the multiplicative inverse of $\frac{x}{2}$?

A. 1 B. $\frac{2}{x}$ C. $-\frac{x}{2}$ D. $2x$

67. Which equation is an illustration of the additive identity property?

A. $x \cdot 1 = x$ B. $x + 0 = x$

C. $x - x = 0$ D. $x \cdot \frac{1}{x} = 1$

68. Which equation illustrates the multiplicative identity element?

A. $x + 0 = x$ B. $x - x = 0$

C. $x \cdot = 1$ D. $x \cdot 1 = x$

69. If $dx - 2 = h$, then x is equal to

A. $h + \frac{2}{d}$ B. $\frac{h-2}{d}$ C. $\frac{h+2}{d}$ D. $\frac{h}{d} + 2$

70. What is the solution set of the equation $|2 - 3x| = 5$?

A. $\{-1\}$ B. $\left\{-1, \frac{7}{3}\right\}$

C. $\{5, -5\}$ D. $\{\}$

71. What is the solution of the inequality $|x + 3| \leq 5$?

A. $-8 \leq x \leq 2$ B. $-2 \leq x \leq 8$

C. $x \leq -8$ or $x \geq 2$ D. $x \leq -2$ or $x \geq 8$

72. Which point satisfies the equation $2x + 3y = 8$?

A. $(1, 4)$ B. $(2, 2)$

C. $(-1, 3)$ D. $(-2, 4)$

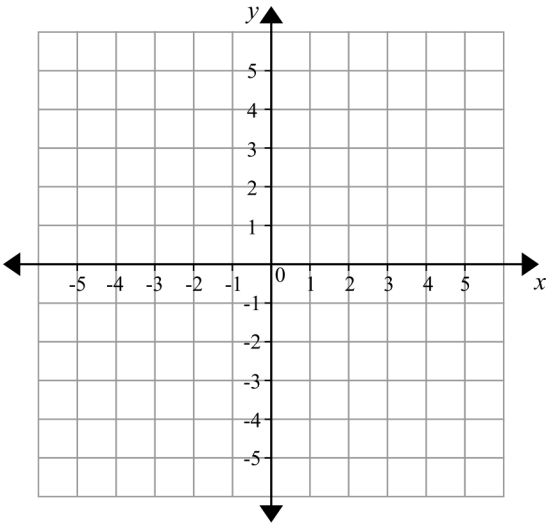
73. What is the *y*-intercept of the graph of the equation $y = \frac{1}{4}x - \frac{2}{3}$?

A. $-\frac{2}{3}$ B. $\frac{2}{3}$ C. $-\frac{1}{4}$ D. $\frac{1}{4}$

74. What is the slope of the line whose equation is $y = 2x - 10$?

A. $\frac{1}{2}$ B. 2 C. 5 D. -10

75. You may want to use the following coordinate plane to help you answer the following question(s).



As the result of a transformation, the image of the point $(-1, 3)$ is $(-3, 1)$. This is an example of a reflection across the

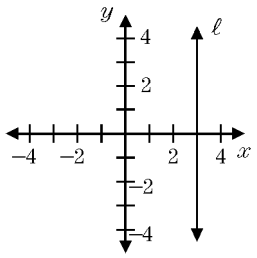
A. line $y = x$.
B. line $y = -x$.
C. x-axis.
D. y-axis.

76. If the points $(3, 2)$ and $(x, -5)$ lie on a line whose slope is $-\frac{7}{2}$, then x equals

A. 5
B. 6
C. $\frac{15}{7}$
D. 4

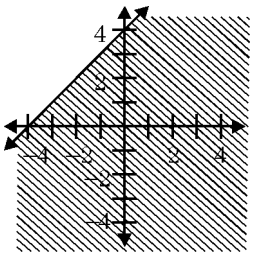
77. In the accompanying diagram, which is an equation of line ℓ?

A. $y = 3$
B. $x = 3$
C. $x + y = 3$
D. $x - y = 3$

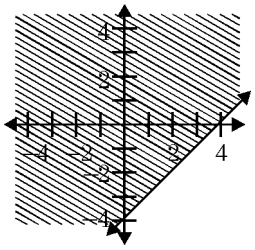


78. Which graph illustrates the relationship $x + y \leq 4$?

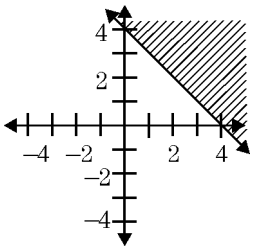
A.



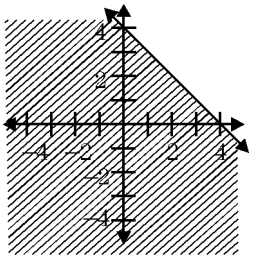
B.



C.



D.



79. Which is an equation of the line that passes through the point $(5, -2)$ and has a slope of -3?

A. $y = -3x - 13$
B. $y = 3x - 13$
C. $y = -3x + 13$
D. $y = 3x + 13$

80. Which statement is true about the lines formed by the graphs of the equations $y = x - 3$ and $x = y - 3$?

A. They are identical.
B. They intersect but are not perpendicular.
C. They are parallel.
D. They are perpendicular.

81. If line ℓ is perpendicular to line m and the slope of line ℓ is undefined, what is the slope of line m?

A. 1 B. $\frac{1}{2}$ C. 0 D. -1

82. What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

A. $-\frac{3}{2}$ B. $-\frac{2}{3}$ C. $\frac{2}{3}$ D. $\frac{3}{2}$

83. The graph of the equation $x - 3y = 6$ is parallel to the graph of

A. $y = -3x + 7$ B. $y = -\frac{1}{3}x + 5$

C. $y = 3x - 8$ D. $y = \frac{1}{3}x + 8$

84. Larry has 7 more dimes than nickels, for a total value of \$1.45. If n represents the number of nickels, which equation could be used to find the number of nickels Larry has?

A. $n + (n + 7) = 145$

B. $5n + 5(n + 7) = 145$

C. $5n + 10(n + 7) = 145$

D. $15(n + n + 7) = 145$

85. The formula $C = \frac{5}{9}(F - 32)$ can be used to find the Celsius temperature (C) for a given Fahrenheit temperature (F). What Celsius temperature is equal to a Fahrenheit temperature of 77°?

A. 8° B. 25° C. 45° D. 171°

86. Julia went to the movies and bought one jumbo popcorn and two chocolate chip cookies for \$5.00. Marvin went to the same movie and bought one jumbo popcorn and four chocolate chip cookies for \$6.00. How much does one chocolate chip cookie cost?

A. \$0.50 B. \$0.75 C. \$1.00 D. \$2.00

87. Solve for x: $\frac{2}{3}x = -12$

88. Solve for c: $\frac{c-2}{4} = \frac{3}{2}$

89. Solve for x in terms of a and b: $2x + a = b$

90. Two points whose coordinates are $(4, 17)$ and $(2, a)$ determine a line whose slope is 6. Find the value of a.

91. Solve the following system of equations algebraically and check:

$$4x - 5y = 18$$
$$3x - 2y = 10$$

92. Find three consecutive even integers such that the sum of the smallest integer and twice the second is 12 more than the third. [*Only an algebraic solution will be accepted.*]

93. The chart below compares two runners.

Runner	**Distance, in miles**	**Time, in hours**
Greg	11	2
Dave	16	3

Based on the information in this chart, state which runner has the faster rate. Justify your answer.

94. When a diver goes underwater, the weight of the water exerts pressure on the diver. The table below shows how the water pressure on the diver increases as the diver's depth increases.

Water Pressure on Diver

Diver's Depth (in feet)	Water Pressure (in pounds per square inch)
10	4.4
20	8.8
30	13.2
40	17.6
50	22.0

a) Based on the table above, what will be the water pressure on a diver at a depth of 60 feet? Show your work or explain how you obtained your answer.

b) Based on the table above, what will be the water pressure on a diver at a depth of 100 feet? Show your work or explain how you obtained your answer.

c) Write an equation that describes the relationship between the depth, D, and the pressure, P, based on the pattern shown in the table.

d) Use your equation from part c to determine the depth of the diver, assuming the water pressure on the diver is 46.2 pounds per square inch. Show your work or explain how you obtained your answer.

95. A garden center has small plows available for rent. The rental charge includes a \$30 initial fee plus \$3 for each day that the plow is rented.

a) What is the cost of renting a plow for 2 days? Show or explain how you obtained your answer.

b) What is the cost of renting a plow for 16 days? Show or explain how you obtained your answer.

c) Jim and 2 of his neighbors plan to rent a plow for 16 days and to share the cost equally. How much will each of them save by renting the plow together for 16 days rather than renting the plow individually for 2 days each? Show or explain how you obtained your answer.

96. Given: $\angle 1 \cong \angle 2$ and $\overline{DB} \perp \overline{AC}$.

Prove: $\triangle ABD \cong \triangle CBD$