Unit 4 Test - Geometric Transformations

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Use an ordered pair to describe the translation that is 1 units to the left and 6 units up.
   a. $(-1, -6)$     b. $(1, -6)$     c. $(-1, 6)$     d. $(1, 6)$

The hexagon $GIKMPR$ and $\triangle FJN$ are regular. The dashed line segments form $30^\circ$ angles.

2. Find the angle of rotation about $O$ that maps $RF$ to $IJ$.
   a. $240^\circ$     b. $210^\circ$     c. $120^\circ$     d. $270^\circ$

3. Name the smallest angle of $\triangle ABC$. The diagram is not to scale.
   a. Two angles are the same size and smaller than the third.
   b. $\angle C$
   c. $\angle B$
   d. $\angle A$
4. Which translation from solid-lined figure to dashed-lined figure is given by the vector \((-3, 3)\)?

- a.  
- b.  
- c.  
- d.  

5. The dashed triangle is a dilation image of the solid triangle. What is the scale factor?

- a. \(\frac{2}{3}\)  
- b. \(\frac{1}{2}\)  
- c. \(\frac{1}{4}\)  
- d. 2
Find the distance between points \( P(5, 9) \) and \( Q(3, 7) \) to the nearest tenth.

- a. 4
- b. 8
- c. 2.8
- d. 17.9

List the sides in order from shortest to longest. The diagram is not to scale.

- a. \( JK, LJ, LK \)
- b. \( LK, LJ, JK \)
- c. \( JK, LK, LJ \)
- d. \( LK, JK, LJ \)

The vertices of a triangle are \( P(-4, -8) \), \( Q(-6, 6) \), and \( R(1, -7) \). Name the vertices of the image reflected in the \( y \)-axis.

- a. \( P'(4, 8), Q'(6, -6), R'(-1, 7) \)
- b. \( P'(-4, -8), Q'(-6, 6), R'(1, -7) \)
- c. \( P'(4, -8), Q'(6, 6), R'(-1, -7) \)
- d. \( P'(-4, 8), Q'(-6, -6), R'(1, 7) \)
9. Which graph shows a triangle and its reflection image in the $x$-axis?
   a.  
   b.  
   c.  
   d.  

10. Find the value of $x$.
   a. 60  
   b. 120  
   c. 16  
   d. $-16$
11. $\overline{MO}$ bisects $\angle LMN$, $m\angle LMN = 6x - 26$, $m\angle LMO = x + 31$. Find $m\angle NMO$. The diagram is not to scale.

![Diagram](image)

- a. 42.4
- b. 53
- c. 84.8
- d. 58

12. Find the values of $x$ and $y$.

![Diagram](image)

- a. $x = 51$, $y = 129$
- b. $x = 17$, $y = 20$
- c. $x = 129$, $y = 51$
- d. $x = 20$, $y = 17$

13. Which three lengths could be the lengths of the sides of a triangle?

- a. 20 cm, 6 cm, 6 cm
- b. 10 cm, 15 cm, 22 cm
- c. 8 cm, 22 cm, 12 cm
- d. 11 cm, 7 cm, 18 cm

14. Find the value of $x$. The diagram is not to scale.

![Diagram](image)

- a. 86
- b. 72
- c. 36
- d. 62
15. What can you conclude from the information in the diagram?

![Diagram of triangle ABC with points D, E, and F forming a right triangle at E.]

a. 1. \(\overline{AB} \cong \overline{AC}\)
   2. \(\angle CFE\) is a right angle
   3. \(\angle CEF\) and \(\angle DEF\) are adjacent angles
b. 1. \(\overline{AB} \cong \overline{CB}\)
   2. \(\angle CFE\) is a right angle
   3. \(\angle CEF\) and \(\angle DEF\) are vertical angles
c. 1. \(\overline{AB} \cong \overline{CB}\)
   2. \(\overline{EC} \cong \overline{ED}\)
   3. \(\angle ECD\) and \(\angle ACB\) are vertical angles
d. 1. \(\overline{AB} \cong \overline{ACB}\)
   2. \(\overline{EC} \cong \overline{ED}\)
   3. \(\angle ECD\) and \(\angle ACB\) are adjacent angles

16. The vertices of a rectangle are \(R(-5, -5), S(-1, -5), T(-1, 1),\) and \(U(-5, 1)\). After translation, \(R'\) is the point \((-3, -11)\). Find the translation vector and coordinates of \(U'\).

a. \((2, 6); (-3, 7)\)
   c. \((2, -6); (-3, -5)\)
   b. \((-2, 6); (-7, 7)\)
   d. \((-2, -6); (-7, -5)\)

17. A blueprint for a house has a scale of 1 : 10. A wall in the blueprint is 9 in. What is the length of the actual wall?

a. 1,080 feet  
b. 7.5 feet  
c. 7.5 in.  
d. 90 feet
Short Answer

Use scalar multiplication to find the image vertices for a dilation with center (0, 0) and the given scale factor.

18. scale factor 3

19. a. Graph the quadrilateral \( WXYZ \) with vertices \( W(3, -5), X(1, -3), Y(-1, -5), \) and \( Z(1, -7). \)
   b. Rotate the figure 90° counterclockwise around the origin and graph the rotation.

20. Li went for a mountain-bike ride in a relatively flat wooded area. She rode for 6 km in one direction and then turned and pedaled 5 km in another. Finally she turned in the direction of her starting point and rode 9 km. When she stopped, was it possible that Li was back at her starting point? Explain.