Geometry 5.1 Worksheet

1. A right triangle is placed in a convenient position in the first quadrant of a coordinate plane. Which is the missing label for the vertex?

   ![Coordinate Plane Diagram]

   a. \((v,0)\)  
   b. \((0,u)\)  
   c. \((0,v)\)  
   d. \((u,v)\)

2. In a triangle, a segment connecting the midpoints of two sides of the triangle is called a _____.

   a. shortcut  
   b. midsegment  
   c. centroid  
   d. vertex

3. Solve for \(x\) given \(BD = \frac{5}{2}x + 4\) and \(AE = 6x + 4\). Assume \(B\) is the midpoint of \(\overline{AC}\) and \(D\) is the midpoint of \(\overline{CE}\).

   ![Triangle Diagram]

   a. \(\frac{1}{2}\)  
   b. 4  
   c. 2  
   d. \(-\frac{1}{4}\)
4. Place a right triangle in a convenient position in the first quadrant of a coordinate plane. Label each vertex using variables for each of the coordinates. Be sure to use the fewest possible variables.

![Diagram of a right triangle with labeled vertices.]

5. Place a square in a convenient position in the first quadrant of a coordinate plane. Label each vertex using variables for each of the coordinates. Be sure to use the fewest possible variables.

![Diagram of a square with labeled vertices.]

6. Using the diagram, give the coordinates of \( M \) if it is a midpoint.

![Diagram with labeled vertices and point \( M \).]

7. How many midsegments does a triangle have?
8. Solve for \(x\) given \(BD = 3x + 3\) and \(AE = 4x + 8\). Assume \(B\) is the midpoint of \(AC\) and \(D\) is the midpoint of \(CE\).

9. Refer to the figure below.

If \(EF = 5x + 6\) and \(AC = 3x - 2\), then what is the length of \(BF\)?

In the diagram, \(DE, EF,\) and \(DF\) are midsegments of triangle \(ABC\). Find the value of the variable if \(AB = 12, BC = 15,\) and \(AC = 16\).

10. \(x\)

11. \(y\)

12. \(z\)
13. Refer to the figure below.

\[ \begin{array}{c}
\text{A} \\
\text{M} \\
\text{N} \\
\text{B} \\
\text{C}
\end{array} \]

a. If \( BC = 15 \), then \( LN = \) ______.

b. If \( AB = 3x + 5 \) and \( NM = 2x + 1 \), then \( NM = \) ______.

14. Given that the vertices of \( \triangle ABC \) are \( A(0, 0) \), \( B(4a, 0) \), and \( C(2a, 2a) \), find the coordinates of the midpoint of each side of the triangle. What kind of triangle (scalene, isosceles, or equilateral) is formed by connecting the midpoints found?

15. Place a square on a coordinate graph and label each vertex with variables. Prove that the diagonals of a square are congruent and perpendicular to each other.

16. Use the figure below to prove that the segment connecting the midpoints of two sides of a triangle is parallel to the third side and has a length that is half that of the third side.

\[ \begin{array}{c}
\text{A}(0, 0) \\
\text{N} \\
\text{M} \\
\text{C}(6k, 4k) \\
\text{B}(3k, 0)
\end{array} \]

17. \( \trianglePRS \) is equilateral and \( \overline{TQ} \parallel \overline{SR} \). Is \( \overline{TQ} \) a midsegment of \( \trianglePRS \)? Explain.