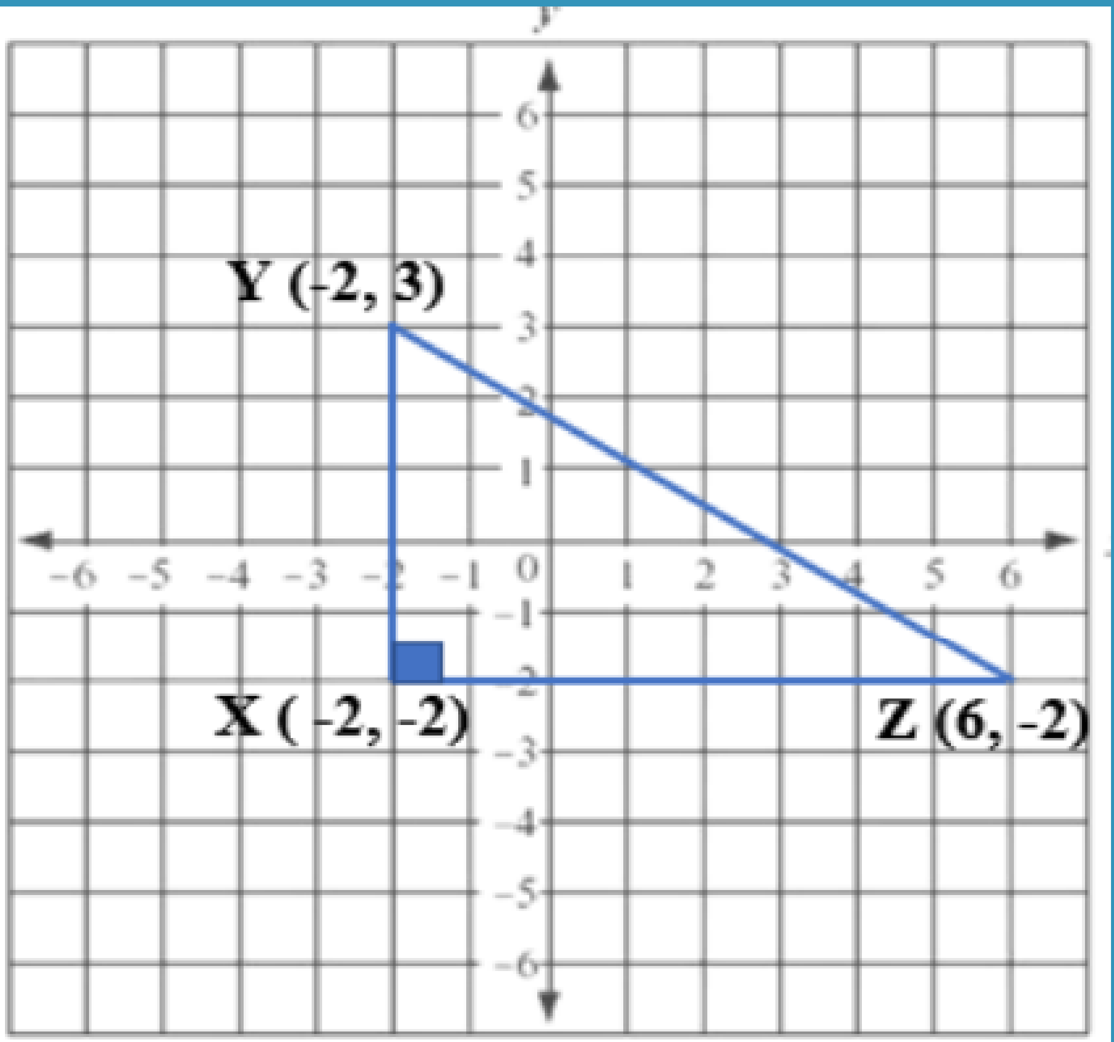
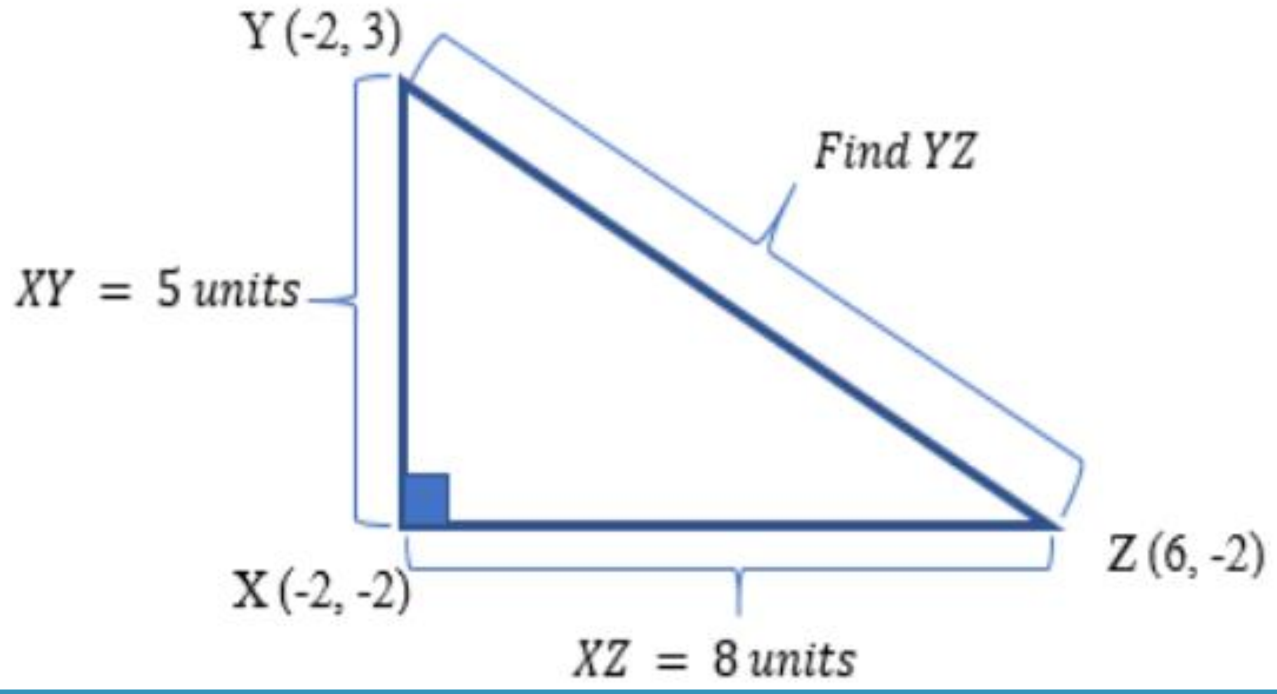
Distance and Midpoint Formulas

Mathematics 3

1. Determine the distance between points Y and Z which are shown on the coordinate plane at the right (see Figure 2).



To find the distance between points Y and Z, we have added point X with coordinates $(-2, -2)$ to create a right triangle. This will enable us to use the Pythagorean theorem. Isolating right triangle ΔXYZ, we'll have figure 3 shown below.



The vertices of the triangle are $X\ (-2,-2)$, $Y\ (-2,3)$ and $Z\ (6,-2)$. Side XY is parallel to the y – axis and points X and Y lie on a vertical line. To compute for the length XY, we simply have $|y_X - y_Y| = |-2-3| = 5$ units. Side XZ is parallel to the x – axis and points X and Z lie on a horizontal line. its length is 8 units. Similarly, we can compute for the length $XZ = |x_X - x_Z| = |-2-6| = 8$ units. Given that the triangle is right, YZ is the longest side which is the hypotenuse and we can use the Pythagorean Theorem to find its length.

Consider the legs of the right triangle XY and XZ as *a* and *b,* and the longest side YZ as the hypotenuse c. Now, let us determine the length of side YZ (*c*) using the Pythagorean theorem.

$$c^2 = a^2 + b^2 \Rightarrow c^2 = 8^2 + 5^2 \Rightarrow c^2 = 64 + 25 \Rightarrow c = \sqrt{\mathbf{89}} \approx \mathbf{9.43}$$

Using the Pythagorean Theorem, we were able to find the length of side YZ which is $\sqrt{\mathbf{89}}$ units and the distance between points Y and Z is $\sqrt{\mathbf{89}}$ or approximately **9.43** units.