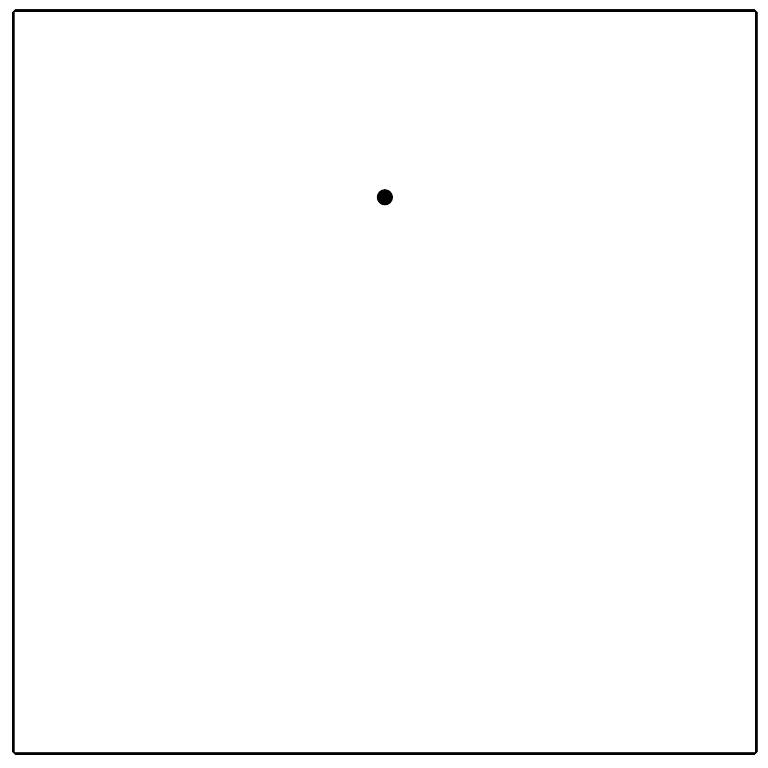
## Lesson 14: Coordinate Proof

* Let’s use coordinates to prove theorems and to compute perimeter and area.

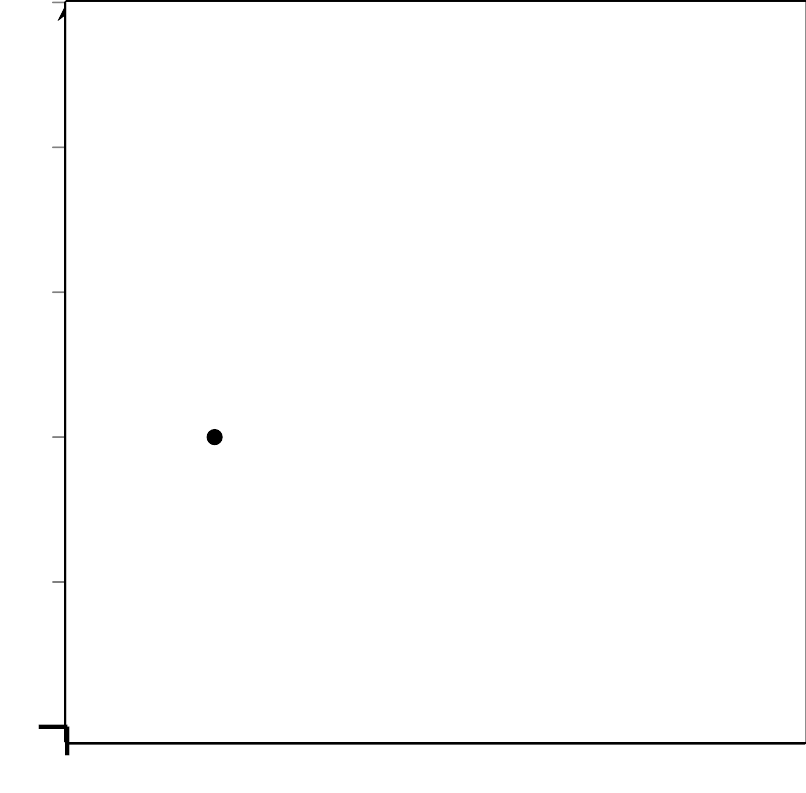
### 14.1: Which One Doesn’t Belong: Coordinate Quadrilaterals

Which one doesn’t belong?

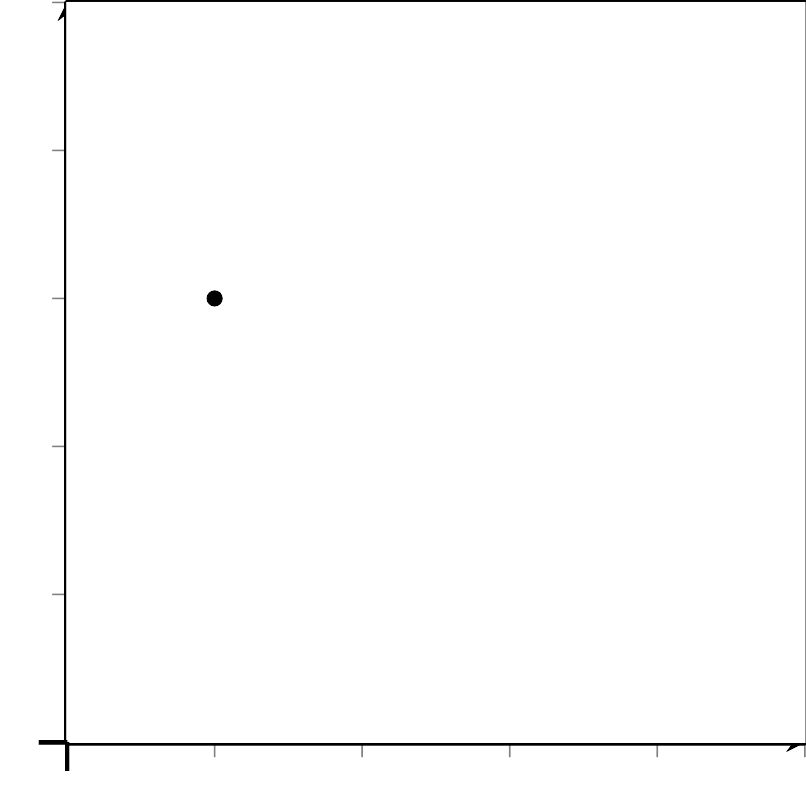
A



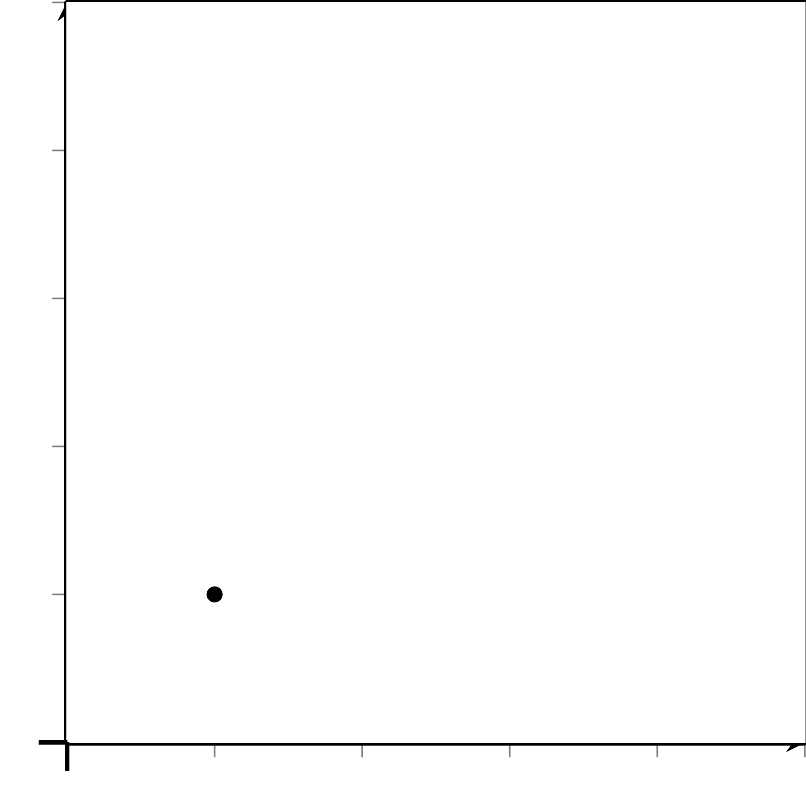
B



C



D



### 14.2: Name This Quadrilateral

A quadrilateral has vertices and .

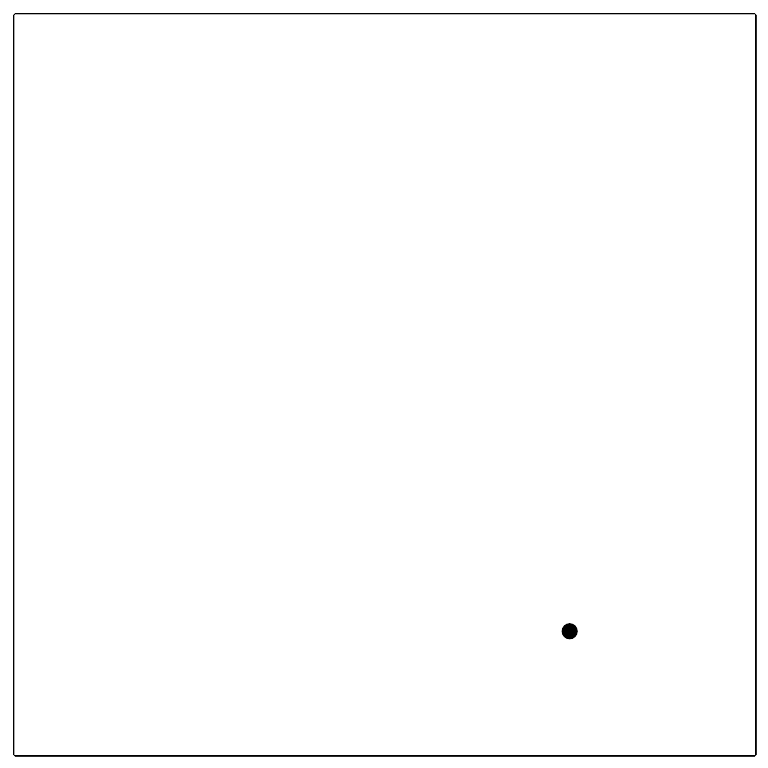
1. What type of quadrilateral is it? Explain or show your reasoning.
2. Find the perimeter of this quadrilateral.
3. Find the area of this quadrilateral.

#### Are you ready for more?

1. A parallelogram has vertices , and . Find the area of this parallelogram.
2. Consider a general parallelogram with vertices and where and are positive. Write an expression for its area in terms of and .

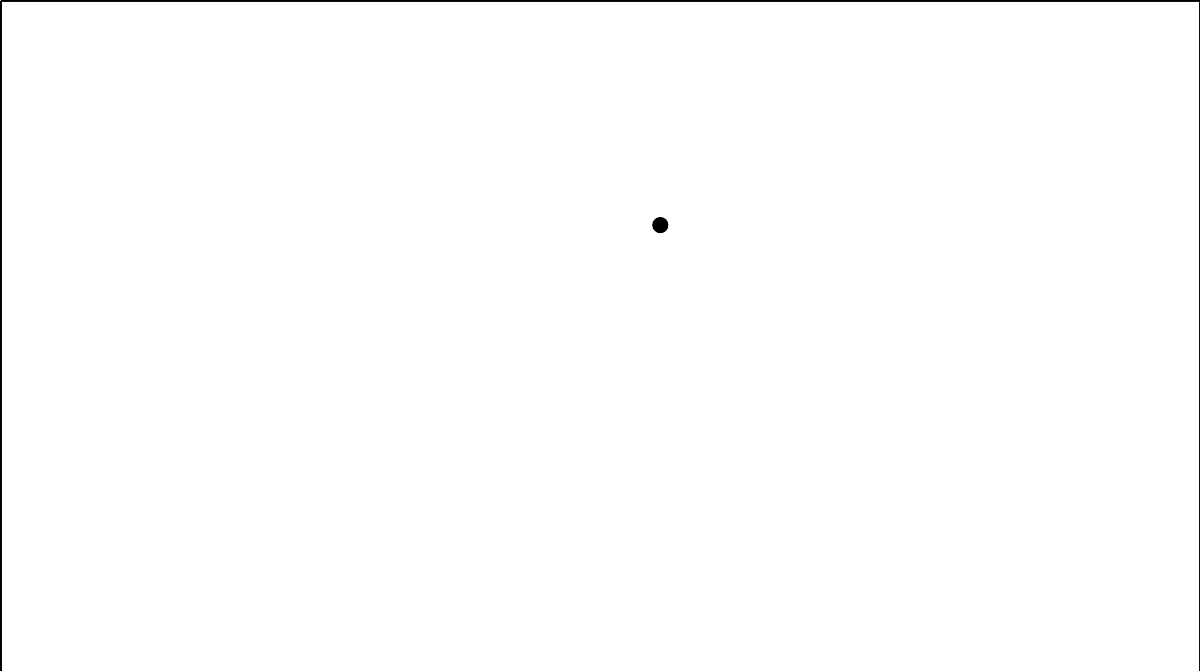
### 14.3: Circular Logic

The image shows a circle with several points plotted on the circle.



1. What kind of segment is in reference to the circle?
2. Choose one of the plotted points on the circle and call it . Each student in the group should choose a different point. Draw segments and . What does the measure of angle appear to be?
3. Calculate the slopes of segments and . What do your results tell you?
4. Compare your results to those of others in your group. What did they find?
5. Based on your group’s results, write a conjecture that captures what you are seeing.

### Lesson 14 Summary



What kind of shape is quadrilateral ? It looks like it might be a rhombus. To check, we can calculate the length of each side. Using the Pythagorean Theorem, we find that the lengths of segments and are units, and the lengths of segments and are units. All side lengths are between 6 and 7 units long, but they are not exactly the same. So our calculations show that is not really a rhombus, even though at first glance we might think it is.

We did just show that two pairs of opposite sides of are congruent. This means that must be a parallelogram. Checking slopes confirms this. Sides and each have slope . Sides and each have slope 6.

Can we find the area of triangle ? That seems tricky, because we don’t know the height of the triangle using as the base. However, angle seems like it could be a right angle. In that case, we could use sides and as the base and height.

To see if is a right angle, we can calculate slopes. The slope of is or , and the slope of is . Since the slopes are opposite reciprocals, the segments are perpendicular and angle is indeed a right angle. This means that we can think of as the base and as the height. The length of is 10 units and the length of is 5 units. So the area of triangle is 25 square units because .



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