History of Mathematical Ideas
Quiz 5

Name:_____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. What is meant by a *constructible real number*?

A constructible real number is a point on the X-axis that is constructible from O and I by straightedge and compass.

(The above definition relies on the definition of "constructible point", which is recursively defined as follows:

(1) O and I are constructible.
(2) If two points are constructible, then the line through them is constructible.
(3) If two points are constructible, then the circle through one that passes through the other is constructible.
(4) If two lines, two circles, or a line and a circle are constructible, then the points of intersection are constructible.)

2. Given a positive length x, describe how to construct $\sqrt{x}$ using straightedge and compass.

Mark a point on the positive X-axis at a distance x from the origin. Mark a point on the negative X-axis at a distance -1 from the origin. Bisect the segment given by these two points, and use it as the center of a circle whose diameter is defined by the two marked points. This circle crosses the Y-axis at a point whose distance from the origin is $\sqrt{x}$.