First Midterm Exam

Colorado Mesa University · 2025 Spring

NAME: _____

1. Consider the points in the xy-plane with rectangular coordinates $(5, 1)$ and $(15, -23)$.

   (a) What is an equation of the line that passes through these two points? Express the equation in the form $y = mx + b$ for some values of m and b.

   (b) What is the length of the segment of that line that lies between the two points?

   (c) What are the coordinates of the point on that line that is equally distant to these two points?
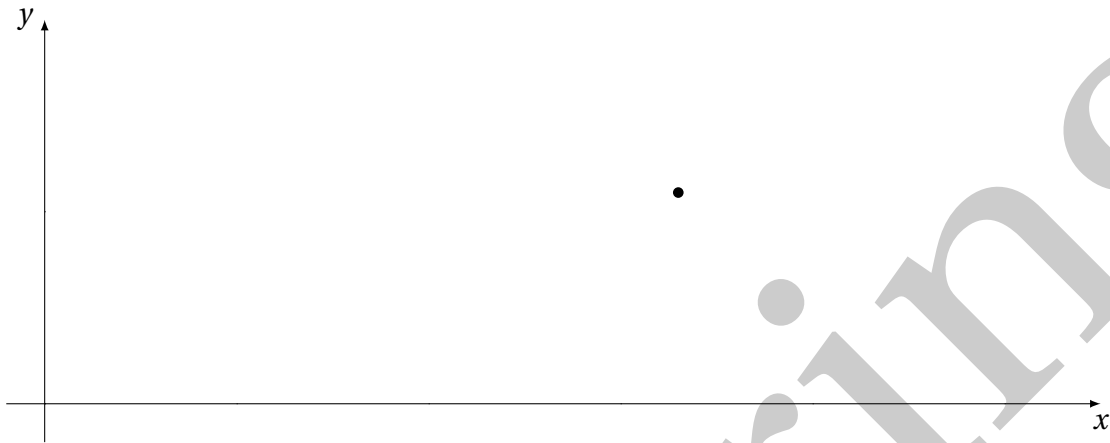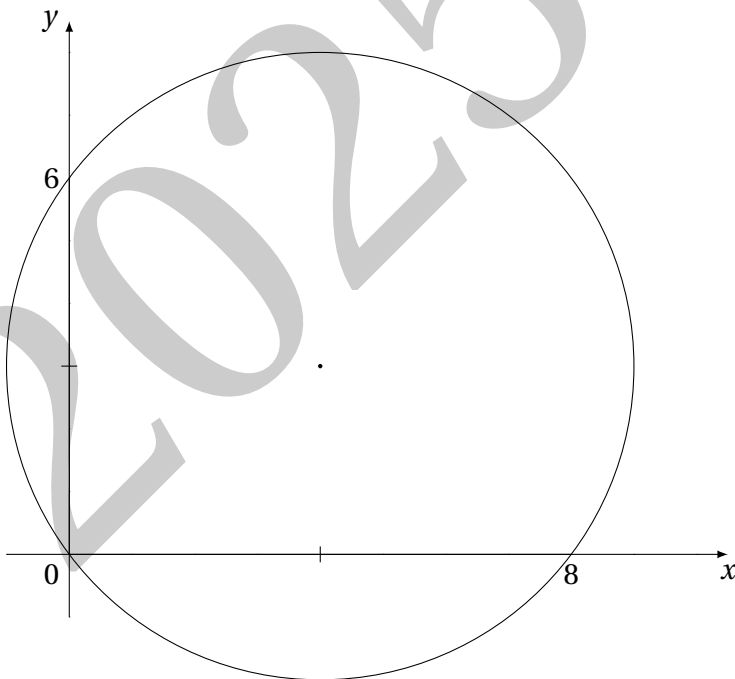
2. Measuring in inches, accurate to within a tenth of an inch, what are the coordinates of the point (•) in the rectangular coordinate system defined by the x- and y-axis below.

3. What is an equation of a circle in the xy-plane centered at $(1, -3)$ with a radius of thirteen?

4. Determine an equation for this circle and calculate the circumference of this circle.

5. Hawthorne Park, located in residential downtown Grand Junction, is approximately rectangular with its east and west sides being 360' long and its north and south sides being 460' long.

   (a) Suppose you are standing at the southwest corner of the park and want to meet your friend at the northeast corner. How much shorter of a distance would it be to cut across the park diagonally versus walking around the outside?

   There's a large gazebo located 80' from the south edge of the park and 260' from the west edge of the park. Suppose the Grand Junction Parks and Recreation Department wants to pour a new concrete footpath from the southeast corner of the park to this gazebo.

   (b) How long is the footpath going to be?

   (c) Suppose they also want to install a drinking fountain halfway along this new footpath. The nearest water main runs under the south edge of the park, so to install the water pipes they'll need to dig a straight trench from the fountain's planned location to the water main. How long will the trench need to be?

6. A rain gutter should be installed along a roof at an slant/decline, usually called the *pitch* of the gutter. A common recommendation is that the gutter should drop by ½" for every 12' of roofing.

   (a) What slope does this recommendation correspond to? (Be mindful of units)

   (b) If you have to install a gutter along a 42' length of roofing, how much higher does one end of the gutter be over the other?

   (c) If you have to install a gutter along a 42' length of roofing, what length of gutter do you need?