A parabola has a focus at the point $(6, 0)$, and the equation of the directrix is $x = 2$.

**Part A**
Determine the vertex of the parabola. Explain your answer.

**Part B**
Prove that point $(12, 8)$ is on the parabola. Show your work.

**Part C**
The point $(x, y)$ is on the parabola. Use this information to derive the equation for the parabola. Show your work.

**Part D**
Sketch a graph of the parabola, indicating the vertex, focus, directrix, and two additional points on the parabola.
Circle $R$ and circle $S$ intersect at two points. The graph shows the centers of the circles, $R$ and $S$, and one of their points of intersection, $P$.

**Part A**
What is the equation of circle $R$? Explain your answer.

**Part B**
What is the equation of circle $S$? Explain your answer.

**Part C**
What is the second point of intersection of the circles? Explain your answer.
Figure $WXYZ$ is graphed on the coordinate plane.

Part A
Name a transformation consisting of one rotation about the origin followed by two reflections across the axes that carries figure $WXYZ$ onto itself. Use coordinates to show this is true. Explain your answer.

Part B
Determine whether the opposite sides of figure $WXYZ$ are congruent. Show your work.

Part C
Determine whether the opposite angles of figure $WXYZ$ are congruent. Show your work.

Part D
Determine whether the diagonals of figure $WXYZ$ are congruent. Show your work.

Part E
Based on Parts A–D, what is the best classification of figure $WXYZ$? Explain your answer.
The equation \(x^2 + y^2 + 6x – 12y + 20 = 0\) represents a circle in general form.

**Part A**
Find the equation of the circle in standard form. Show your work and explain each step.

**Part B**
What are the center and radius of the circle? Explain your answer.

**Part C**
Leah says that the point \(P(1, 3)\) is on the circle. Show work to prove Leah’s statement using both forms of the equation.

**Part D**
Points \(P\) and \(Q\) form a diameter of the circle. Point \(Q\) is located at \((-7, 9)\). Point \(X\) lies on the diameter. What are the coordinates of \(X\) such that the ratio \(PX:XQ\) is 3:2? Show your work or explain your answer.

**Part E**
A new circle is drawn with the diameter of \(PX\). Explain whether or not this new circle is similar to the given circle. If the circles are similar, include the ratio of dilation in your explanation.
A parabola has a focus at the point (6, 0), and the equation of the directrix is $x = 2$.

**Part A**
Determine the vertex of the parabola. Explain your answer.

**Part B**
Prove that point (12, 8) is on the parabola. Show your work.

**Part C**
The point $(x, y)$ is on the parabola. Use this information to derive the equation for the parabola. Show your work.

**Part D**
Sketch a graph of the parabola, indicating the vertex, focus, directrix, and two additional points on the parabola.
In the diagram, point $S$ lies on segment $RT$ and point $P$ lies on segment $QT$.

If what is the value of $y$?

A) $\sin 40^\circ$  
B) $\frac{k + 1}{\sin 40^\circ}$  
C) $k \sin 40^\circ$  
D) $(k + 1)\sin 40^\circ$
A town has a park in the shape of a right triangle, formed by Main Street, Pecan Street, and Avenue B.

**Part A**
Determine the length of the path to the nearest foot. Show your work.

**Part B**
Using the path length you found in Part A, determine the distance along the section of Avenue B that connects the path to Main Street to the nearest foot. Show your work.

**Part C**
Determine the area of the park. Show your work. Round your answer to the nearest 100 square feet.

**Part D**
What is the relationship between the two triangles within the park that are separated by the path? Explain your answer using appropriate postulates, theorems, or definitions.
Circle \( O \) is inscribed inside quadrilateral \( PRST \), as shown in this diagram.

- \( PR \) is tangent to circle \( O \) at point \( Q \).
- \( PQ = 7 \) inches
- \( RS = 20 \) inches

What is the perimeter of quadrilateral \( PRST \)?

A) 80 in.  B) 74 in.  C) 68 in.  D) 54 in.
Chord $\overline{KL}$ is congruent to chord $\overline{LM}$ in circle $O$, as shown.

What is the value of $x$?

A) 54  B) 36  C) 27  D) 24

Segments $KJ$ and $KL$ are tangent to circle $P$.

- Point $M$ lies on circle $P$.
- $m \angle JML = 40^\circ$

What is the measure of $\angle JKL$?

A) $140^\circ$  B) $100^\circ$  C) $80^\circ$  D) $50^\circ$
The measure of \( \angle QPR \) is 35° in this circle.

The measure of \( \angle RST \) is 109°. What is the measure of PRT?

A) 74°  
B) 90°  
C) 109°  
D) 144°

The center of circle \( P \) is located at \((-2, 3)\) as shown on this coordinate plane.

Line \( m \) is tangent to circle \( P \) at \((-5, 6)\). What is the equation of line \( m \)?

A) \( y = x + 9 \)  
B) \( y = x + 11 \)  
C) \( y = \frac{1}{2}x + 9 \)  
D) \( y = \frac{1}{2}x + 11 \)
This diagram shows circle $P$ with $FG \parallel JH$.

What is the measure of $\angle JPH$?

A) $108^\circ$  
B) $136^\circ$  
C) $142^\circ$  
D) $164^\circ$

Points $N$, $P$, and $Q$ lie on circle $O$, as shown in this diagram.

The measure of $\overline{QP}$ is $38^\circ$. What is the measure of $\angle NPQ$?

A) $76^\circ$  
B) $71^\circ$  
C) $52^\circ$  
D) $38^\circ$
Beth made the following pie graph to represent her monthly budget.

What percentage of her budget does she spend on her rent and car combined?

A) 50%  B) 72%  C) 90%  D) 180%

In the figure below, $O$ is the center of the circle.

If the measure of minor arc $BC$ is 60°, what is the measure of $\angle ABO$?

A) 20°  B) 30°  C) 40°  D) 50°
Regular pentagon $DEFGH$ is inscribed in circle $P$, as shown.

The length of $\overline{DEF}$ is $8\pi$ yards.

Which equation must be true?

A) $PD = 4$ yd.  
B) $DP = 8$ yd.  
C) $PG = 10$ yd.  
D) $HE = 20$ yd.

A sector of a circle is created from a central angle with a measure of $60^\circ$. If the diameter of the circle is 6 inches, what is the area of the sector?

A) $1.5\pi$ in.$^2$  
B) $2\pi$ in.$^2$  
C) $6\pi$ in.$^2$  
D) $8\pi$ in.$^2$
In Triangle DEF, the measures of its angles, and two of its side lengths are shown in this diagram.

Which expression could represent the length of $DE$?

A) $x$  
B) $x + 1$  
C) $x + 3$  
D) $x + 5$

In the figure below, the diagonals of parallelogram $ABCD$ intersect at $(5, 2)$.

What are the coordinates of point $C$?

A) $(7, 3)$  
B) $(8, 3)$  
C) $(9, 4)$  
D) $(10, 4)$
The exterior angles of a triangle have a $2:3:4$ ratio. What is the smallest exterior angle of the triangle?

A) $40^\circ$  
B) $80^\circ$  
C) $120^\circ$  
D) $160^\circ$

Sam began a construction with his compass and straightedge. The sketch shows the first steps in his construction.

Which construction is illustrated by the sketch?

A) the midpoint of a line segment  
B) an angle bisector of an acute angle  
C) a bisector of a given line through a point on the line  
D) the line perpendicular to a given line through a given point on the line
Chords $\overline{KL}$ and $\overline{MN}$ are equidistant from center $P$ in this circle.

Chord $\overline{KL}$ is 6 units long. Which statement MUST be true about the value of $x$?

A) It is 1.5.

B) It is between 1.5 and 4.5.

C) It is 4.5.

D) It is greater than 4.5.