The Royal

Reward

The Royal Reward

Group Geometry Project

King Euclid is a man who is very fond of geometry, especially polygons. After conquering the neighboring kingdom of Ignorance he decides to reward the greatest knights and ladies of his kingdom. He divides a large rectangular piece of land into smaller plots of land, shaped like polygons, and awards them to his top knights and a few prominent noble ladies.

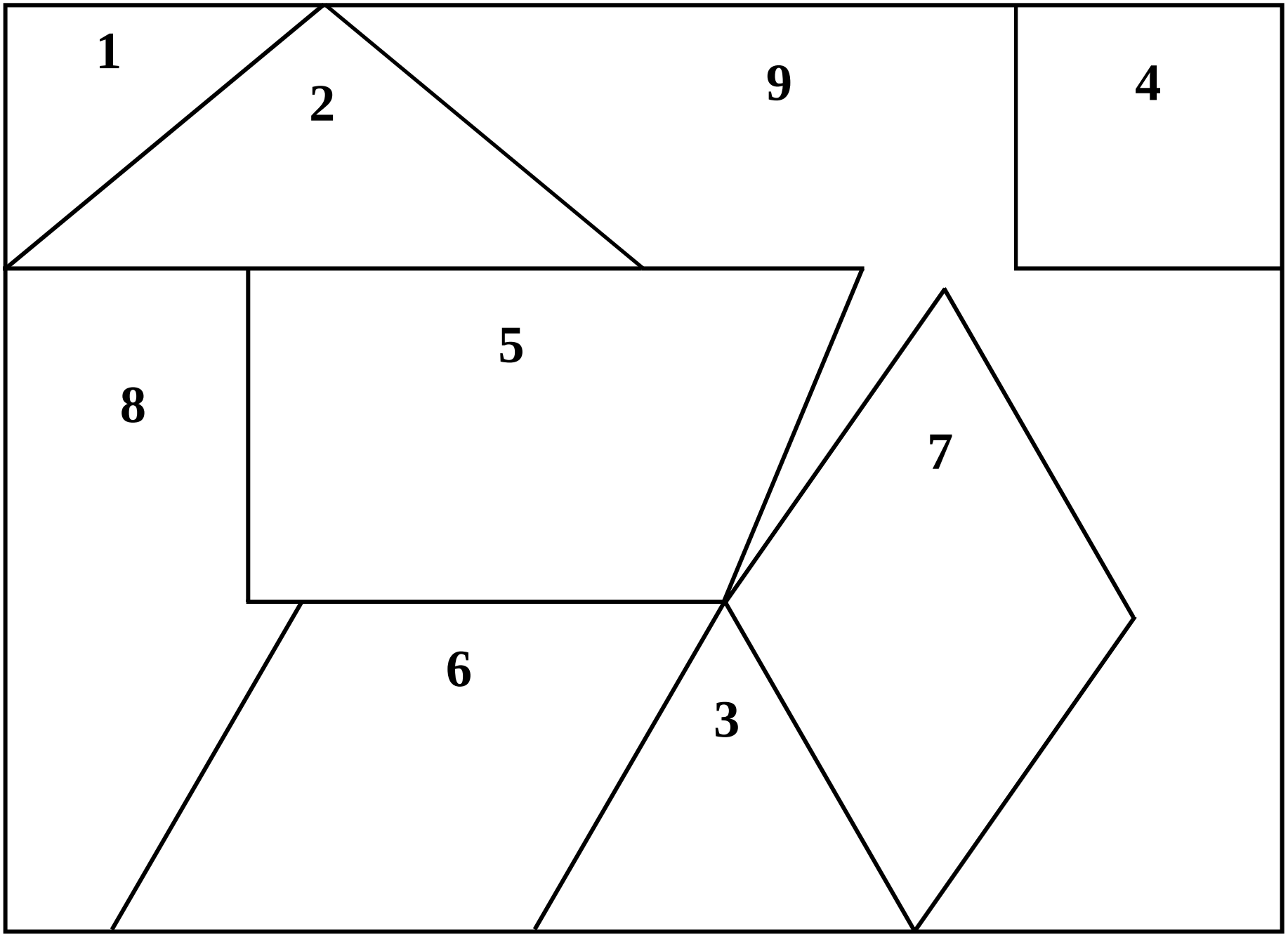
Those who are to receive land from the king for their support in the war against Ignorance include Sir Fibonacci, Lady Andrini, Sir Pascal, Sir Galileo, Sir Escher, Lady Burns, Sir Bernoulli, and Sir Pythagoras. The king decides to keep the largest plot of land. Before giving the remainder of the land to his loyal royal subjects King Euclid creates the Royal Reward Chart. Complete this chart and label the Royal Land Map in order to help the king to decide who will be the new owner for each piece of land.

If you are successful in this venture you will not only learn a great deal of geometry and become very wise, but King Euclid has promised to recommend that you receive three segments with three intersections. Of course he may recommend one segment and two arcs, a curve, one segment and one arc, or even the dreaded three segments with two intersections, depending upon the quality of your service.

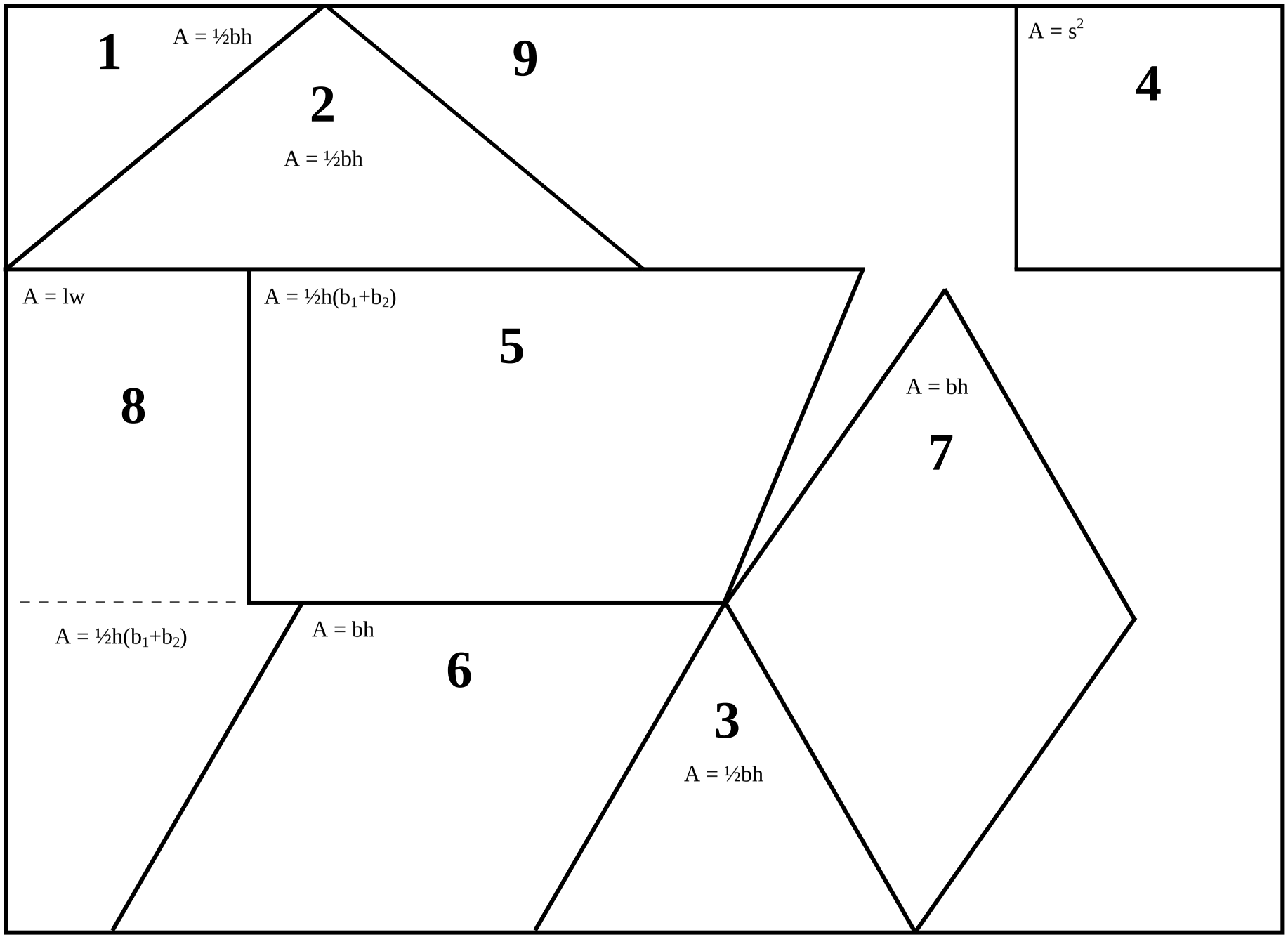
As you complete the chart and the map:

1. Measure and then label each of the angles for each piece of land on the Royal Land Map. Include this data on your chart.
2. Measure, and then label (in kilometers) each boundary line of each plot of land. The scale being used on the Royal Land Map is 1 centimeter (cm) = 1 kilometer (km). Place the boundary lengths on the inside of each polygon next to the corresponding segment. Measurements are only necessary on one side of a segment if two owners share the exact same length boundary. Include this data on your chart.
3. Label each piece of land with the name of the polygon that **best** describes it. Place the label a little below the center of the polygon (and in parentheses).
4. On your Royal Reward Chart calculate the sum of the angle measures and the perimeter of each piece of land. Pay attention to any patterns that you discover.
5. Use the Royal Land Map Area Worksheet and the area formulas given to find the approximate area of each piece of land. Record these area measurements on your chart.
6. After completing the Royal Reward Chart, King Euclid decides to reward the largest remaining piece of land to the noble that has served the king for the longest period of time. Each noble, in turn, will receive his or her piece of land according to the amount of time he or she has served the king. Using the **perimeter data** that has been collected, the king asks you to notify each noble and tell them which plot of land they have been given.
7. Lady Burns has served the king for the longest period of time, followed in order by Sir Fibonacci, Lady Andrini, Sir Pythagoras, Sir Escher, Sir Bernoulli, Sir Galileo, and finally Sir Pascal, who has only served the king for a very short period of time. On the Royal Land Map write the name of the noble that will receive each piece of land above the polygon label in the appropriate polygon.

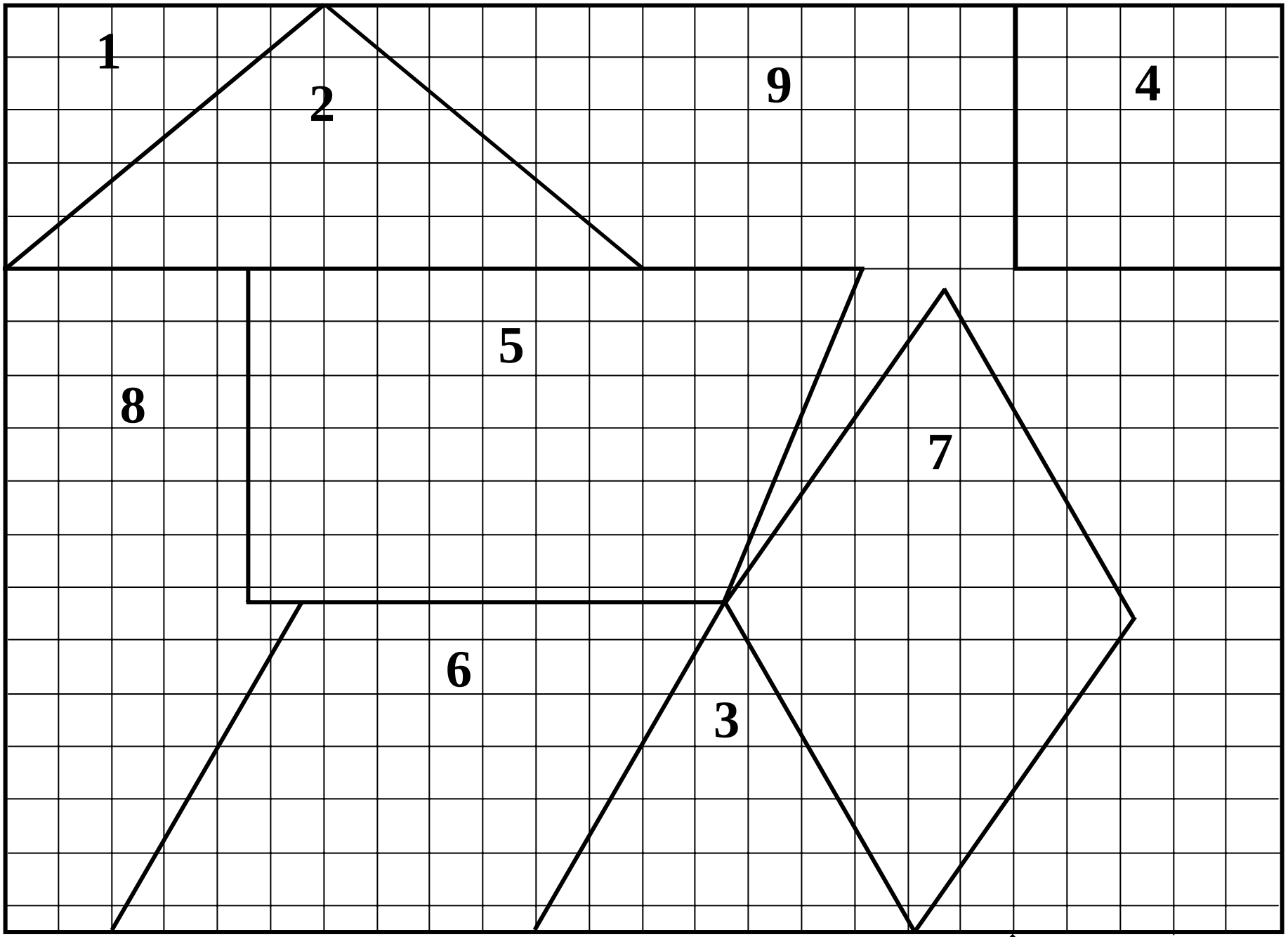
Royal Land Map



Royal Land Map Area Worksheet



Royal Land Map



The Royal Reward Chart

#	Polygon Name (specific)	Angle Measures (small to large)	Sum of Angle Measures (degrees)	Boundary Lengths (km) (small to large)	Perimeter (km)	Rank	Area (km^2)	Rank
1								
2								
3								
4								
5								
6								
7								
8								

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Interior Angles of Polygons

King Euclid notices a pattern in the sum of the interior angles of a polygon. What pattern does he notice? You have already determined the sum of the interior angles of triangles, quadrilaterals, and hexagons. What will the sum of the interior angles of a pentagon be? An octagon? A nonagon? If you do not see the pattern, draw these polygons using straight line segments and measure their interior angles to determine the sum. Once you discover the pattern use it to develop a formula for finding the sum of the interior angles of a polygon with x sides. Then use this formula for the final three polygons!

Polygon	Number of Sides	Sum of Interior Angles
Triangle		
Quadrilateral		
Pentagon		
Hexagon		
Heptagon		
Octagon		
Nonagon		
Decagon		
Hendecagon		
Dodecagon		
Any Polygon	x	
Icosagon	20	
Pentacontagon	50	
Hectogon	100	

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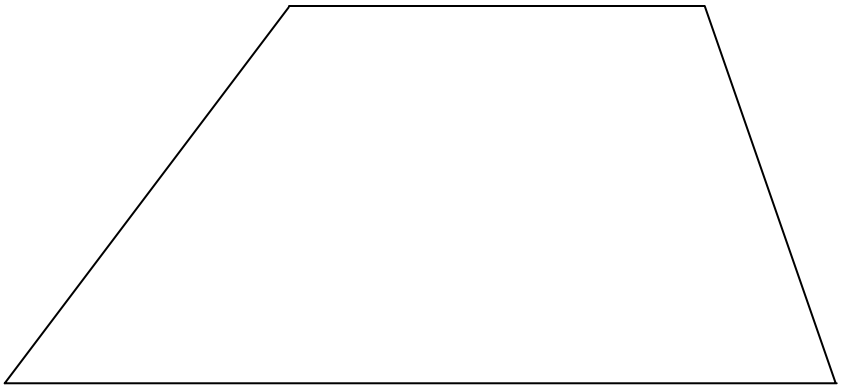
The Royal Reward - Quiz A

Use the scale map of a plot of land below to complete the quiz. Label the measures of the polygon and place the answers in the answer blanks below. The map scale is 1 cm = 1 km. Show all work for numbers 2, 4, and the extra credit problem. Use the back of the paper if necessary.



1) List the measures of the angles, in order, from least to greatest.

_____, _____, _____, _____

2) What is the sum of the interior angle measures of this polygon? _____

3) List the measures of each segment, in order, from least to greatest. Give answers in kilometers.

_____, _____, _____, _____

4) What is the perimeter of this polygon? _____

5) What is the area of this polygon (in square kilometers)? _____

6) What is the name of the polygon above? _____

Extra Credit: If the cost of fencing is 5.7 rolems per kilometer, how much would it cost to build a fence around this plot of land?

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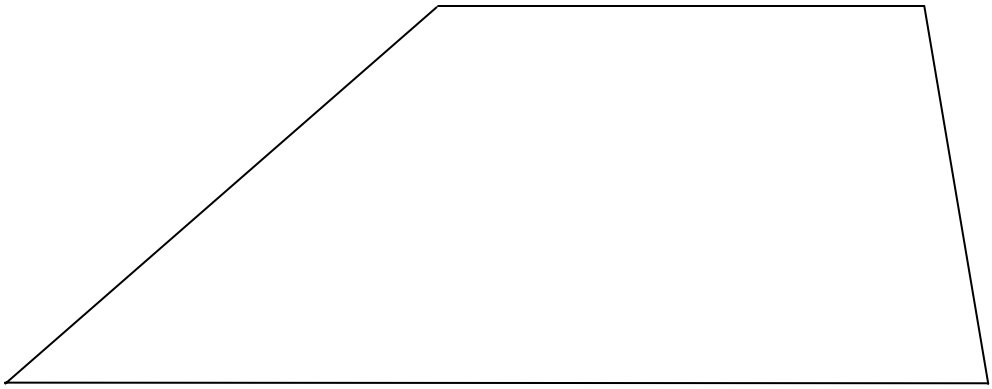
The Royal Reward - Quiz B

Use the scale map of a plot of land below to complete the quiz. Label the measures of the polygon and place the answers in the answer blanks below. The map scale is 1 cm = 1 km. Show all work for numbers 2, 4, and the extra credit problem. Use the back of the paper if necessary.



1) List the measures of the angles, in order, from least to greatest.

_____, _____, _____, _____

2) What is the sum of the interior angle measures of this polygon? _____

3) List the measures of each segment, in order, from least to greatest. Give answers in kilometers.

_____, _____, _____, _____

4) What is the perimeter of this polygon? _____

5) What is the area of this polygon (in square kilometers)? _____

6) What is the name of the polygon above? _____

Extra Credit: If the cost of fencing is 5.7 rolems per kilometer, how much would it cost to build a fence around this plot of land?

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