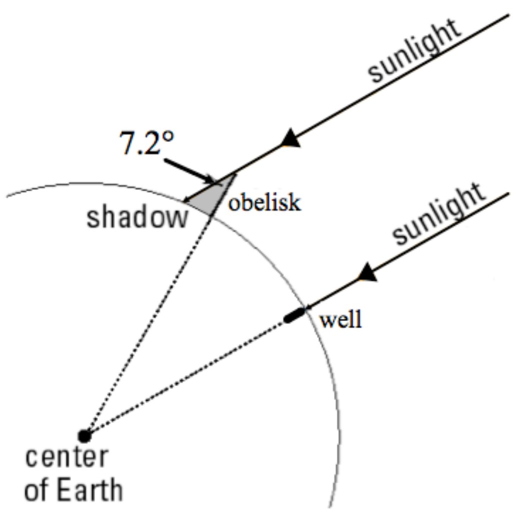
Quiz 6 will be Wednesday, Oct. 24: Distance Formula

1. Eratosthenes: The Measurement of the Earth's Circumference. Eratosthenes, a Greek mathematician calculated the circumference of the earth over 2,200 years ago with remarkable accuracy (less than 1% error) by making two simple measurements, and using the geometry of chapter 3. His calculation required two assumptions:

1. The earth is a sphere.
2. Because the sun is so far away, the rays of light intersect the earth as parallel lines.

Here's how he did it: Eratosthenes lived in the city of Alexandria, in northern Egypt. He knew that at noon on the summer solstice, the longest day of the year, in the town of Syene 800 km. to the south, there was no shadow at the bottom of a well. This meant the sun was directly overhead in Syene at noon on that day each year.

On the summer solstice in his home city of Alexandria, Eratosthenes knew that at noon the sun was *not* directly overhead because it was further north than Syene. He measured the angle formed by a shadow from a vertical obelisk. This angle turned out to be about 7.2 degrees.



Knowing the angle made by the shadow of the obelisk, and the distance between the two cities, Eratosthenes estimated the circumference of the earth using a theorem about parallel lines (which one?), and proportional reasoning.

Use Eratosthenes method to determine the circumference of the earth in kilometers:

_______________ km

Section 3-4 begins our study of **triangles**.

2. a. Turn to p. 93 and look over the various types of triangles.
   b. Complete each statement with the word *sometimes, always* or *never*
   i. If a triangle is isosceles, then it is _____________ equilateral.

   ii. If a triangle is equilateral, then it is ____________ isosceles.

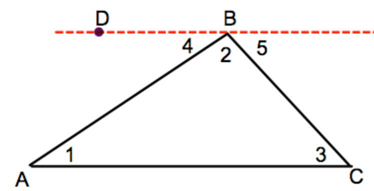
   iii. If a triangle is scalene, then it is ____________ isosceles.

   iv. If a triangle is obtuse, then it is ____________ isosceles.

3. Earlier this year we used the triangle template on our geometer to convince ourselves that the sum of the measures of the angles in a triangle is 180°. Now, we are ready to prove that.

Theorem 3-11: The sum of the measures of the angles of a triangle is 180

Given: ΔABC



Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180$

Proof:

Statement	Reasons
1. Through B draw $\overleftrightarrow{BD}$ parallel to $\overleftrightarrow{AC}$	1.
2. $m\angle DBC + m\angle 5 =$ ____ $m\angle DBC = m\angle 4 + m\angle$ ____	2.
3.	3. Substitution
4. $\angle 4 \cong \angle$ __ , $m\angle 4 = m\angle$ __ $\angle 5 \cong \angle$ __ , $m\angle 5 = m\angle$ __	4. Thm 3-2: If two parallel lines are cut by transversal, alt int angles are congruent.
5.	5.

4. **Radicals.** Simplify the following radical expressions

a. $2\sqrt{18}+\sqrt{54}-3\sqrt{12}$ b. $2\sqrt{5}\left(\sqrt{5}-\sqrt{20}\right)$

c. $\left(3+\sqrt{7}\right)\left(3-\sqrt{7}\right)$ d. $\left(\sqrt{5}+1\right)^2$

5. **Distance formula.** Write the algebraic representation for the locus of points that are as far from (3, 5) as (6, 9) is. Diagram required

6. A point P(x, y) is between the point A(1, 3) and B(8, 6). use the distance formula and the definition of "between" to write an equation expressing this condition on P. Begin with a sketch.

7. Find each value of *k* for which the lines $y = 9kx - 1$ and $kx + 4y = 12$ are perpendicular