Seven Wonders of the Ancient World / Lighthouse of Alexandria (core lesson)

Objectives
Over one or several lessons, students will be introduced to an important architectural site that was written about by ancient tourists and historians. They will create a scale drawing of a similarly-sized lighthouse, reinforcing math concepts. They may also learn about the geography of the area, the history of the lighthouse and those who built and used it, and the science of why it now lies on the floor of the sea.

This lesson pairs Math TEKS with a Visual Art lesson. Follow-up lessons in other disciplines may include:

- building a scale 3-D model from cardboard or chipboard
- studying plate tectonics and the effects of earthquakes on land and water masses
- viewing the NOVA program which chronicled the 1994 archaeological discovery of the ruins
- studying optics as they may have been used in lighthouses from ancient to modern times
- studying the anatomy and history of mirrors
- learning about the polytheistic world views of ancient builders and the gods/goddesses they believed in
- learning about ancient trade routes, methods of transportation and commerce
- learning about everyday life in ancient times
- challenging students to name modern wonders of the world and explain their significance

In this lesson, students will learn about the Lighthouse of Alexandria and will do a scale drawing of a similarly sized and shaped lighthouse.

Materials
Gridded paper 8.5 x 11"
Pencils
Erasers
Colored pencils (optional)
Compass (optional)
Straight edge or ruler (optional)
Visuals:
> Pictures of the Lighthouse of Alexandria (reconstructed)
> Physical map of Mediterranean Sea showing Nile Delta and surrounding areas

Lesson
Step 1
Tell students, "We will be learning about one of the Seven Ancient Wonders of the World, man-made structures which were so impressive that ancient historians and tourists recorded them in writings or verbal histories. Of the Seven Wonders, only one still exists that is easily viewed, and that is the Great Pyramid of Giza in Egypt."

Step 2
Show students pictures of what we believe the lighthouse looked like, and share some of its history (see fact sheet). Ask them:

- "What purpose does a lighthouse serve?
- What would determine where a lighthouse is placed?
- What geometric forms can you identify in the Lighthouse of Alexandria?"

Step 3
Tell students, "Just as in ancient times, architects are people who plan buildings and structures to be strong and safe in their environments. Ask them:

- "What are some features of a building's construction that would contribute to its durability?
- With what materials would a lighthouse be constructed in different parts of the world?
- What challenges would the builders have faced?
- How have construction techniques evolved over the centuries?"

Step 4
Tell students, "Planning is done before the building, and our art project today is to do planning drawings of a lighthouse similar to the Lighthouse of Alexandria. Like the ancient lighthouse, we will draw plans of one that
has a square base, an octagonal mid-section for height, and a tall cylinder which will hold the light source."

Step 5
Tell students, "We use the idea of scale to fit the image of a large building onto a small paper surface. We can make the scale anything we want: one foot of actual size = one unit on the graph paper, for instance, or one hundred feet of actual size = one unit on the graph paper. Depending on the type of graph paper we are using, we want to make sure our drawing will fit, so a recommended scale will be one inch = one hundred feet."

Step 6
Tell students, "Our first drawing will show the plan of the building as a bird might see it flying overhead: a "bird's eye view. Using a light touch, so that erasing is easy, use a pencil to:

- Draw a 600' x 600' square, using the scale of one inch= one hundred feet. This is the land base of our lighthouse.
- Find and mark with a dot the center point of the square. You will find center by drawing two diagonal lines, corner to corner
- Using this center, mark a 200' x 200' smaller square within the larger square base.
- Create an octagon within the smaller square, with each side equal to 50'. To do this, make a mark on the center of each of the smaller square's sides. This will help you find the center of four of the octagon's sides. Extend 4 octagon sides from these centers and then connect the sides to create the remaining 4 diagonal sides. (You can also create the remaining sides by drawing diagonal lines from corner to corner in the small square. These lines will cross through the centers of the diagonal octagon sides.)
- Using any smaller measure (or 50'), grid equal distances all the way around the center point. Connect these marks to create the small center circle. (optional: use compass)

Step 7
Tell students, "Now we are going to create a sideways scale view of our lighthouse. Use the following dimensions to draw it, starting at the ground level and using the scale of one inch = 100'. As you draw each section, label it as "square base= 100' high, etc.:

- Draw the land base of the lighthouse. It is 100' high and 600' wide.
- Draw the smaller square riser, centered on the larger base. It is 100' high and 200' wide.
- Draw the octagon, again centered on the larger and smaller squares. It is 150' high and 150' wide.
- Draw the cylinder, represented by the circle on the bird's eye drawing. It is 100' high and 100' wide. This may contain the light source: what would it be made of and how would it be seen?
- On top the lighthouse, draw a statue: what does it signify?