UNIT PLAN & LESSON PLANS

(Adapted from Wiggins & McTighe, Advanced Concepts in Creating and Reviewing Units: Forms & Facts, (2012).

TEACHER:	CLASS/SUBJECT:	DATE:
	4th Grade Science	

This Unit combines both EK 2 and EK 3, both related topics.

STAGE 1- DESIRED RESULTS

Understanding Goal:

Posed as a question: 1. How can we say that science and mathematics are partners in making discoveries about the universe?

Statement: Science and mathematics can be used to describe and understand the relationships of the earth with the sun, the moon, and other heavenly bodies, relationships that impact numerous phenomena on the earth.

Standards:

- EK 2: The solar system consists of planets and other bodies that orbit the Sun in predictable paths.
- EK 3: The Earth has motional cycles as does the Earth's moon.

TRANSFER:

By the conclusion of the unit the student will independently use their learning to explain how the earth is impacted by its relationship with the sun and by its relationship with the moon.

MEANING

The student will understand that:

- The sun is a star at the center of the solar system, around which planets and other bodies orbit in *dynamic* but *predictable* paths.
- The sun is an *average* size star, one of billions of stars in the universe, and is *300,000* times closer to Earth than the next nearest star, Proxima Centauri. It is much larger than the Earth and contains 99% of the mass of our entire solar system. (Meaning to be derived is vastness, size dynamics, and scale.)
- Stars shine because they give off light, but planets shine because they *reflect* the light of the sun or other stars.
- The relationships of the earth with the sun, the moon, and other heavenly bodies impact numerous phenomena on the earth.
- Stars appear to be in fixed positions because, although they are moving, they do not have significant movement relative to our sun.

Essential Questions (Overarching/Topical) that drive the UNIT:

1. How can we say that science and mathematics are partners in making discoveries about the universe?
2. How does the position and movement of the earth and its relationship with the sun and other heavenly bodies impact our lives on earth?
3. How do people navigate using stars and star patterns?

ACQUISITION of KNOWLEDGE	ACQUISITION OF SKILLS
What facts and basic concepts should the student know and be able to recall/use? Terms: telescope, scale; planet, star, constellation, comet, asteroid, meteor, meteorite; orbit, gravity, solar system; axis, rotation and revolution; ellipse; moon, crater, lunar eclipse and solar eclipse; phase.	**What discrete skills and processes should the students learn and be able to use?** Using a T chart compare similarities and differences between the sun and stars. Using night photographs of the same location at different times of the year identify similar star patterns

Concepts: • Scale • Cyclical movements; predictable paths • System Order and characteristics of the planets in the solar system Position of Earth around the sun and the different constellations seen at different times during the year, northern and southern hemispheres. Relationships of objects within solar system: • Sun and the planets; cause of Earth's rotation and revolution (day and night; seasons) • Phases of the moon	or groups. Using models, demonstrate how: • Earth moves on its axis (rotation) • Orbit of Earth around sun (revolution) • Phases of the moon Systematically collect and use data to explain how shadows could be used to tell the time of day. Using own diagram/drawing accurately explain how the earth rotating on its axis in relation to the sun and moon results in day and night. Using either a model or a diagram/drawing accurately explain how the seasons occur. Carefully observe and accurately chart a lunar month. Respond in writing to higher order questions, accurately applying terms and collected data.

How can Religion be incorporated into this unit?

God created the world, our solar system and everything in it. Everything God made is good. (Genesis 1,2)

STAGE 2 – ASSESSMENT

Formative, performance, and summative assessments: (CODE AS SUCH.)	CRITERIA
What evidence will be collected to demonstrate student acquisition of knowledge and skills? What evidence will be collected to demonstrate that the student understands key concepts/Big Ideas in the Unit? **This is a sampling of possible formative and summative assessments as well as a culminating assessment task.**	
Quiz #1: Terms, identification of planets and heavenly bodies within the solar system.	75%
Demonstration of each: rotation, revolution, seasons, phases of moon, etc.	Checklist: Got It No evidence: understanding | Partial | Got It
Log records on phases of the moon and length of day. Purpose: exposure to another extended recording requiring accuracy of data and use of appropriate, quality resources; neat recordkeeping logs to insure s are accurately recording data.	Holistic Rubric ¾
Test: objective questions based on analyses of data, accuracy of charts; higher order thinking questions.	80%
Academic Prompt: How have science and mathematics helped you to understand the position of the Earth within our solar system?	Essay using either Holistic or Analytic Rubric: • Scientific Accuracy • Clear explanation and

	defense of position • Organization of Paragraphs • Mechanics (Grammar, Spelling, Punctuation)
What culminating assessment will demonstrate that the student understands the unit goal and can transfer that understanding to new situations? **GRASPS:** Many adults including many well educated people have misconceptions about how the seasons occur and how the phases of the moon occur. If someone in your family (**Audience**) didn't truly understand how the seasons occur (**Situation**) how would you use models and mathematics to explain how they occur (**Role, Goal**)? Create a presentation (**Product**) that would demonstrate your understanding of the cause of seasons, following the guidelines for performance in the rubric provided (**Standard**).	<u>Analytical rubric</u>: • Scientific accuracy • Oral Presentation Skills (eye contact, adept use of models, audible, etc.) • Visual Presentation

STAGE 3 – LEARNING EXPERIENCES

Day/Code	Learning Experiences, noting WHERE TO(means of engagement, materials, and procedures):	Differentiation for each learning experience:
DAY 1	Suggestion for an opening **HOOK** activity: *From: Victor, E. & Kellough, R. D. (2004) Science K-8: An integrated approach, 10th edition. Pearson Prentice Hall (Upper Saddle River, New Jersey).* **How Many is a Billion? A Trillion?** Page 203 Have the entire class count to 100 and see how long it takes to do so at one number per second. Multiply that by 10 to extrapolate the time it would take to count to 1,000 (probably about 16 minutes). If you wanted to count to 1 million (1,000,000) you would need more than 2 weeks of counting at the rate of one number per second, 16 hours per day (allowing 8 hours per day for sleep). To count to one billion (1,000,000,000) at the same rate of one number per second and 16 hours per day would take nearly 50 years. If you wanted to count to 1 trillion (1,000,000,000,000) it would take more than 31,000 years even if you did not stop to sleep. Or consider that a stack of 1 trillion one-dollar bills would reach a height of 69,000 miles.	
DAY 2		
DAY 3		