



Creation Lens

Exploring the World, Discovering God

Grade Level: Grade 7

Title:

Reality of “Invisible” Creation

Denomination: Catholic

Lesson ID: PS-G7-03-CA

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Note: Web sites referenced in this lesson were valid at time of publication.

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PHYSICAL SCIENCE - GRADE 7 – CATHOLIC LESSON TITLE: Reality of “Invisible” Creation

GENERAL CONCEPT: The mind can understand what the senses cannot detect.

SCIENCE LESSON CONCEPT

- When objects behave in a counter-intuitive way, it is because there is a scientific principle at work that is unfamiliar to our normal expectations

GOAL OF SCIENCE LESSON

- To learn that *vectors* play an important role in the dynamics of physical objects.

OUTCOME EXPECTED

- Students will understand that *angular momentum* is a real quantity.

RELIGION LESSON CONCEPT

- God created “all things visible and invisible.” That “invisible” creation includes mathematical concepts such as *vectors*

GOAL OF RELIGION LESSON

- To bridge from scientific understanding to appreciation of God's invisible creation.

OUTCOME EXPECTED

- Students will understand that God created everything, including the mathematical laws of physics.

MATERIALS NEEDED

- Yo-yo (1 per student or group)
- Spinning top (1 per student or group)
- Science Journal Page: Angular Momentum
- Pen or pencil

SCIENCE METHODOLOGY

- **SAY:** Today we are going to do an experiment to help us understand a physical law.
- **GIVE** each student or group a yo-yo.
- **SAY:** We are going to do an experiment that will demonstrate the effects of *angular momentum*.
- **BE** sure the yo-yo is wound tightly.
- **HAVE** the students attach the yo-yo to one finger and hold it in the palm of their hand.
- **ASK:** If we merely let the yo-yo go, what will happen? (falls and stops at the bottom of the string - boring)
- **HAVE** the students operate their yo-yos in the usual way, going up and down several times.
- **ASK:** What caused the yo-yo to fall toward the floor? (gravity)

MATERIALS NEEDED

- Mathematical formula from a textbook
- Religion Journal page: Invisible Creation
- Pen or pencil

RELIGION METHODOLOGY

- **READ** the opening lines of the Nicene Creed.
- **ASK** for examples of visible creation. Next, have students give examples of *invisible* creation. (air, love, laws of nature)
- **OPEN** a math or science book to a page containing a formula and write it on the board.
- **ASK** what is *real* in that formula? (*expresses a relationship* between things)
- **SAY** when you know a relationship is true, you know there is an *invisible* reality. The *laws* of physics are very real, but invisible. They have visible consequences, but the laws themselves are invisible.
- **ASK** how can a *relationship* be something real? What are some other relationships that are *real*? (answers will vary widely, and perhaps will include concepts like the love between family members)

- **ASK:** What was happening as the yo-yo fell? (it was rotating – very important that someone discern this)
- **ASK:** Why did the yo-yo come back to your hand? (accept student answers)
- **SAY:** Coming back up seems to defy the law of gravity. What else could be going on? (ask questions until somebody replies that it may be because the yo-yo is spinning)
- **HAVE** the students illustrate the experiment on the Science Journal page. Gravity alone would make the yo-yo stop but when it's rotating it comes back up the string. Distinguish between rotating and non-rotating conditions.
- **SAY:** I am going to give each of you (or group) a spinning top. Go ahead and make it spin on the table or the floor.
- **ASK:** What caused the top to spin (energy added via force applied by hand)
- **ASK:** Why doesn't the top fall over right away? Why *does* it fall over when it slows down?
- **SAY:** There is an invisible reality that gives the top stability. We call it a *vector of angular momentum* that points straight up the axis of the spinning top. Furthermore, that vector doesn't want to change. It tries to retain the same constant value. We say the "angular momentum is *conserved*."
- **MAKE** a list on the board of assorted invisible realities cited by the students.
- **REMIND** students that they saw a spinning top, which did not fall over because of a physical law, a mathematical relationship. That law was not obvious at first sight.
- **ASK** how the laws of physics came into being? (God created them)
- **ASK** what are some of the consequences of those laws? (spinning earth causes the sun to appear to "rise" each day; seasons change because the earth's axis is tilted; and so on across many "angular momentum" examples plus thousands of other examples)
- **DISCUSS** with students some other examples of God's power to create invisible realities.
- **POSIT:** There are realities that exist and make a difference in the real world but they are invisible. God created them when He created the mathematical laws of physics. God also created many other, more profound, realities in the world.

- **SAY:** For a yo-yo, the angular momentum vector points straight outward along the axle of the yo-yo. We cannot see it, but it is real. It's a mathematical entity, but it truly exists.
- **HAVE** the students draw and label the experiments on the Science Journal page. Be sure to draw in an arrow to depict the direction of the angular momentum vector.
- **ASK:** What happens when the energy of the spinning object runs down? (yo-yo stops, top falls over)
- **ASK:** Why does the energy run down? (friction)
- **ASK:** Is the angular momentum related to the velocity of motion? (yes)
- **HAVE** the students record the experiment on their Science Journal page.
- **HAVE** the students find other invisible realities in the world at home, and record them so they can be shared with the rest of the class. (most 7th graders can throw a spinning football, which is stable in flight because of the angular momentum vector)
- **POSIT:** Angular momentum is a science principle which can be illustrated by spinning objects.

SCIENCE LINKS

There are many computer-animations and apps that demonstrate science principles like angular momentum: the spinning earth, the orbiting earth, satellites in orbit, etc.

www.ehow.com/...science-projects-7th-graders.html

Interesting Science Projects for 7th Graders. They learn what causes a surprising effect. Many different experiments could easily be geared toward demonstrating invisible principles

RELIGION LINKS

KEY WORDS

- VECTOR
- GRAVITY
- ANGULAR MOMENTUM
- LAWS OF SCIENCE

KEY WORDS

- VISIBLE & INVISIBLE
- CREATED REALITY
- RELATIONSHIPS
- LAWS OF PHYSICS