FAITH, SCIENCE & SEXUALITY - GRADE 4A

LESSON TITLE: "Male and female God made them…"

SCIENCE LESSON CONCEPT

- *Sexual Reproduction* is the process of uniting egg and sperm in order to provide complete genetic information
- This process has a built-in feature that leads to constant diversification and new life that is different from either contribution.
- The number of possible outcomes is far beyond "astronomical." No two humans are ever quite the same.

RELIGION LESSON CONCEPTS

- When God creates, God, the Mystery of Love, *gives* itself, its very being, its existing, to the creature.
- The creature (plant, animal, human) *accepts* its being as a gift from God. Only the human creature is *aware* of this.
- This pattern of offer and acceptance continues to reproduce itself when humans create new life through sexual union.
- Only humans are *aware* of what they are doing because we *think* and *choose* while we are engaged sexually.

GOAL OF SCIENCE LESSON

- To explain how reproduction can only occur through the process of offering and accepting, giving and receiving. In reproduction, genetic information from both male and female is transmitted to the next generation but with variations in the

GOAL OF RELIGION LESSON

- To explain that human reproduction is imitating what God does when God is creating**.** God, who is spirit, gives a part of his very self to creatures.

new individual.

OUTCOME EXPECTED

- Students will learn that egg and sperm cells are unique in having only half the normal supply of chromosomes, and are designed to merge with each other to form new life.
- Students will know that each human receives 23 chromosomes from the mother and 23 from the father.
- Students will be able to explain that sperm and egg must unite in order to provide the complete genetic information needed for a new life to begin.

MATERIALS NEEDED

- Cross sectional diagram of egg
- Cross-sectional diagram of sperm
- Photos of eggs and sperm of different species

SCIENCE METHODOLOGY

- **REVIEW:** In the previous (grade 3) lesson, we observed the growth of new plant life as a seed sprouts and develops into a plant.
    - ~ A key feature of the process is that the genetic code

OUTCOME EXPECTED

- Students will be able to describe what “self-giving” means, and cite examples found in nature and especially what they notice in their own experience.
- Students will understand *mutual giving and accepting* is how humans knowingly partner with God in creating a new human life.

MATERIALS NEEDED

- notebook or journal
- photos or slides similar to the 5 scenes described in the teacher's note below

RELIGION METHODOLOGY

Guidance to the Teacher:

God is active, self-giving, compassionate love. Wondering “Where is God?” is a question that reveals more about ourselves than God. We are oblivious to the presence of

determines what kind of plant it is going to be.

~ Review vocabulary words *DNA, genetic code, chromosome, gene*.

~ We use the term *sexual reproduction* to describe the way in which genetic information is offered by one and accepted by the other through the transfer process known as *fertilization*. All plants, animals and humans reproduce sexually.

~ When a cell reproduces by splitting into two identical cells the process is called *asexual reproduction*.

- **NEW DEFINITIONS:**

  ~ The splitting of a cell into two identical cells is called ***mitosis***.

  ~ The alternative process by which cells mix different genetic information and then split is called ***meiosis***.

- In all higher species, there are two different kinds of cells that must combine in order to share their genetic information: ***egg*** and ***sperm*****.** Fish, birds, monkeys, kangaroos, jungle animals, farm animals and domestic pets all have this property in common with humans.

- **SHOW** a cross-sectional diagram of an egg. Show photos of eggs of several different species. The point is they all look about the same. What makes them different is the

the Divine all around us and in us. We look for some spectacular manifestation when this presence is all around us, showing itself in hundreds of subtle ways in the ordinary. So we, together with the children, need to be more attentive. We need to notice what is right before our eyes, prompting us, through his Holy Spirit, to offer and accept love.

- If we can alert ourselves and the children to be aware of this reality, the dualistic divide between the sacred and the secular dissolves while their distinction is respected.

- "God in all things" becomes more than a pious saying. It becomes a reality because we know how to see and what we are seeing.

- This divine presence is no respecter of race or religion. It operates globally. Nothing or no one escapes its care and merciful outpouring. If we are blind to it, we think God is absent.

- This sacramental worldview is key to the child's mature development. Offering and accepting is everywhere, for it is the double movement of love, and God is love. God is personal, active, self-giving, compassionate Love, and we are in God's image, so we as humans are "a chip off the ol' block." We are often unaware of this.

- When we become more and more aware, we

information encoded along their DNA molecules, hidden away inside the nucleus of the cell.

- **SHOW** a cross-sectional diagram of a sperm. The DNA is tightly packed into the "head" of the sperm. Show photos of sperm of several different species. The most obvious thing we see is the long tails. Again, the genetic information isn't visible.
- **EXPLAIN** that tiny as they are, each egg and each sperm are real cells and have a *nucleus*. In the nucleus the *DNA* carries the *genetic code* comprised of *chromosomes* and *genes* of that individual.
- **EXPLAIN** that generally, any human cell normally has 46 chromosomes, a "complete set." However, the human egg and sperm cells only have 23 chromosomes each. They are specifically designed to combine in a unique arrangement, providing the full genetic information needed for a new human individual.
- **DEFINITION:** Bringing egg cells and sperm cells together is known as *fertilization*.
- When that combining takes place, there is an incredible amount of variation possible – beyond trillions. Human DNA contains over 3 billion "base pairs" of molecular components, and the possible combinations are nearly unlimited. The DNA of some plants (example: corn) has even more genes, and therefore many more possible combinations.

become deeply spiritual in our human activity, including our sexual activity. We become intentional.

ACTIVITY

- **DETECTIVE WALK:** Take the class on a walk near the school. Have each child carry a pen/pencil and small notebook. Tell the children we are going on a detective walk to discover a mystery. The mystery is discovered as we follow the clues.
- **EXPLAIN** to the children that God is busy in our lives all over the place. We have to learn to "see" it. Talk about love *offering* itself and *accepting* from others. Talk about going beyond oneself. Explain what *compassion* means as tender respectful offering and accepting. Then give examples in nature and human relations. Once you sense the children understand the task, explain the Detective Walk:

RULES:

1. We will be silent so we are not distracted
2. We will use our eyes to look for clues
3. We will jot down what we see in our notebooks
4. We will have 10 minutes to hunt to see what we can observe
5. We will then meet here (designate) to return to our room
6. We will then share what we have discovered

- **POINT OUT:** Different species of animals are easy to distinguish: nobody would confuse a lion with a horse. But within groups of species, there are similarities: domestic housecats have a lot in common with lions, even though their size makes them much less dangerous. Dogs and wolves are related. Humans are related to several other mammals, but the arrangement of the chromosomes of their DNA is unique to the human species.

- Whether by looking at the structure of their skeletons or the placement and size of their various organs, it is easy to see that various animals are related to one another. Microscopic examination of DNA molecules shows that the genetic information of some species is very similar to others. Being 99% identical still leaves a lot of room for variation!

- When multiple births occur at the same time, the genetic material is extremely similar. Among a litter of dogs or cats or goats or similar domestic animals, at first glance they all look exactly the same. We can distinguish one from another by noticing spots on their coats, or oddities of their ears or tails. Later, we might start to detect "personality differences" between sibling animals.

- Some genetic traits are better than others, and farmers and ranchers try to breed both plants and animals to get the best. Thoroughbred race horses are an excellent example; but as many horse breeders have learned, the results are not always predictable. Sweet corn vs. field corn is another obvious example. Gardeners work to cross-breed prize

- **ALLOW** the children to explore the area. Walk around with them. Make sure the limits of where they may go are clear so that they stay within the range of your sight. Gather them when the time is up (You might tell them you will signal with a whistle or a bell.)

- **RETURN** to the classroom and begin the discussion, keeping the ***offering*** and ***accepting*** clearly in focus in the discussion.

ALTERNATIVE INDOOR ACTIVITY

Here are five typical photo examples to illustrate the offering and acceptance in everyday life:

The woman **offering** the little old lady a ride in a wheel chair, and the joy on the woman's face as she is **accepting** the ride…

The red light **offering** a message to stop while traffic whizzes by, and the walkers standing quietly **accepting** the light's signal while waiting for the light to change…

The leaves on the tree **offering** themselves, while the giraffe is **accepting** their luscious greenness and munches away….

The Islamic vendor **offering** his hand in friendship and the

roses. The original experiments (by Gregor Mendel in the 19th century) that demonstrated that there IS such a thing as a gene were conducted with plants that grew tall or short.

- **EXPLAIN** that human DNA follows the same basic principles of carrying information. Inside those tiny cells is the pattern not only for your heart, lungs, and stomach, which everyone has, but also for your eye color, hair color, etc., and for all that is going to provide you with unique characteristics. Each egg has 23 chromosomes and each sperm has 23 also. For a new human being, 46 chromosomes are needed.
- **CLASSROOM DISCUSSION:** People sometimes look at a small child, spot distinguishing characteristics, and say "she's got her grandma's nose," but nobody ever says "he's got his father's pancreas," because those are pretty much the same, not useful for making distinctions. What are some ways in which you resemble one parent or the other?
- However, there are some genetic conditions that are passed down through successive generations. Some are advantageous (example: being tall if you like to play basketball) and some lead to diseases (example: heart trouble).
- **OPTIONAL CLASSROOM DISCUSSION**: A) Have students state a distinguishing trait of themselves. B) What

man in the business suit **accepting** his handshake…

Mom **offering** me my peanut butter sandwich lunch and me **accepting** it and stuffing it into my backpack…

- Wherever we spot **offering** in generous compassionate self-giving we are spotting the Holy working in and through the human and through nature itself.
- Wherever we spot grateful **accepting** we are touching the Holy operating in our own daily experience.

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TEACHERS NOTE:

Offer the children images of the beauties of pollination, mating dance rituals of birds, rutting of deer, etc., always pointing out that nature itself is a window to the exchange that will become consciously aware and intentional in humans. Teach them to *see through* nature into the holy.

As the teacher or parent, keep clearly in mind the dynamic of how different species manifest this pattern of exchange as they create new life.

Point out to the children the *difference* of the pattern being engaged in nature and the distinctiveness of the human sexual exchange.

advantages or disadvantages does it bring? C) What can you do about it?

NOTE TO THE TEACHER:

FOR ADVANCED STUDENTS: Discussing genetic traits can lead into a discussion of Genetic Modification (GM) technology, which is widely done for plants, especially food crops like corn and soybeans. The development of *any* superior plant or animal species over many generations is a slow form of human-directed genetic modification. The new grain Dwarf Wheat in the 1960s staved off famine in India and Pakistan and earned a Nobel Peace Prize for Norman Borlaug in 1970. That was before direct molecular manipulation of genes was possible. The rapid pace of change today has raised some controversy.

It is *aware* and *intentional.* As such, we are preparing the child for an understanding of human sexuality as a distinctly physical/spiritual human activity. It is in direct imitation of the Godly creative act which is both aware and intentional.

SCIENCE LINKS

G. L. Schroeder, *The Hidden Face of God* (Touchstone, Simon & Schuster: 2001) ISBN # 0-684-87059-2; Chapter 5: “Meiosis and the making of a human.”

The Cell Cycle & Mitosis Tutorial - The Biology Project - University of Arizona - http://www.biology.arizona.edu/cell_bio/tutorials/cell_cycle/cells3.html

Gregor Mendel: Great Minds http://youtu.be/GTiOETaZg4w

http://www.sonic.net/~nbs/projects/anthro201/exper/experiment.cgi

RELIGION LINKS

Genesis 2:20-24

Wisdom 6:12-8:16