

# God is Truth Teacher's Topic Guide Year 7

**Topic: Electricity**

**Duration: 3 weeks**

## **Spiritual Awareness:**

God has placed in the creation scientific laws that are consistent; they always act in the same way. This shows us the faithful nature of God. Just as His scientific laws can be trusted, so can His own words and principles.

## **Values; Our response to 'God is Truth'**

Because God is Truth I will...

- Trust God's laws
- Speak the truth
- Never cheat, steal, lie or exaggerate
- Be trustworthy
- Be true to my word and keep promises. (Integrity)
- Be myself and not try to be someone I am not.
- Search for the truth (life-long learning)
- Ask God to show me the truth.
- Ask the Holy Spirit to lead and guide me into all truth.
- Believe that God's word is the truth. (Trust and faith)

## **Biblical references:**

Psalm 19:7-11 The law of the Lord is perfect and trustworthy

Isaiah 54:10 Though the earth shake the hills be removed, my unfailing love will not be shaken.

Hebrews 13:8 Jesus Christ is the same yesterday, today and forever.

Malachi 3:6 I am the Lord, I change not.

Isaiah 40:8 The grass withers and the flowers fall, but the word of our God endures forever.

Psalm 33:4 For the word of the LORD is right and true; he is faithful in all he does.

Psalm 18:30 This God—how perfect are his deeds! How dependable his words! He is like a shield for all who seek his protection.

Exodus 3:14 God said to Moses, "I AM WHO I AM. This is what you are to say to the Israelites: 'I AM has sent me to you.'

## **Outcomes**

- demonstrate some understanding of the nature of a circuit, conductors and insulators, batteries, switches, bulbs, fuses and electromagnetism
- explain how the flow of energy is dependent on the conductivity of the materials in the circuit
- understand the difference between non-renewable and renewable energy
- demonstrate an awareness of energy conservation
- demonstrate ability in manipulating equipment
- connect currents, use equipment safely, plan experiments
- identify parts of a circuit and use symbols

## **Key Questions**

*About electricity*

How does electricity make life easier?

Where does electricity come from?

How long has electricity existed?

Who discovered electricity?

When did electricity first become a power source in the home?

How is electricity produced?

Why should we try to use less electricity?

How can we conserve the use of energy in the home?

About God

How did the laws of electricity come about?

What are some of the things that you know about electricity that are always the same?

When we wire up an electrical plug the right way, can we trust it?

In what way is God always the same? Can we trust Him?

What are some other scientific laws that God has placed within the universe?

How do we know that God is faithful and true?

## **Activities**

### **a) Bulbs, batteries and circuits**

- Collect batteries, pieces of wire and torch globes for informal manipulation.
- Take torches apart and describe how they work.
- Rub materials which will gain an electric charge, e.g. rub a plastic ruler and pick up pieces of hair or tissue.
- Use a lemon to create a battery.
- Make circuits that incorporate more than one globe and dry cell.
- Use a toy electric motor to spin a cardboard disc.
- Make models, such as cardboard-box robots or animals, which can be illuminated in some way.
- Investigate switches, such as the switch in a torch.
- Correctly connect a single bulb to a battery.
- Connect a series of bulbs to a battery.
- Test materials to see whether they conduct electricity. Place a range of objects in a circuit to discover which ones conduct electricity, e.g. glass, paper, plastic, tin, aluminium foil, thumb tack, pin, water.
- Generate electricity using a coil and a magnet.
- Dismantle electrical devices.
- Make a small generator/engine.
- Discuss conservation of energy.
- Discuss the nervous system in the human body, (an electrical system).

### **b) Safety and conservation**

- Discuss safety factors and make a poster.
- Make a chart showing how electricity is used in every-day life.
- List sources of non-renewable energy: coal, oil, gas.
- Discuss problems caused by the burning of these fuels: release of carbon dioxide, air pollution, greenhouse effect.
- List renewable energy sources: wind, solar energy, water, geothermal.
- List ways of conserving energy in the home.

## Assessment

1. Make an electrical circuit, draw and label it.
2. Make a chart to record materials that will/will not conduct electricity.
3. Make a model that uses an electrical circuit and explain how it works in a class presentation.
4. What have I learned from the study of electricity about God and His creation?

## Learning connections:

**English:** discussions on energy conservation issues; science reports; word banks;

**Mathematics:** Describe how mathematical laws are constant and true.

**Health:** safety with electricity; safety during electrical storms

**Social Studies:** energy conservation

**History:** the history of lighting; early discoveries, e.g. Michael Faraday, Thomas Edison

**Music:** Compare electronic and acoustic musical instruments; list how electricity is used in the production and enjoyment of music.

**Art:** Construct a model that incorporates an electrical circuit.

**Thinking skills:** Energy Sources

**Research cards:** Electricity

**Biography:** Thomas Edison

# Art Year 7

## God is Truth

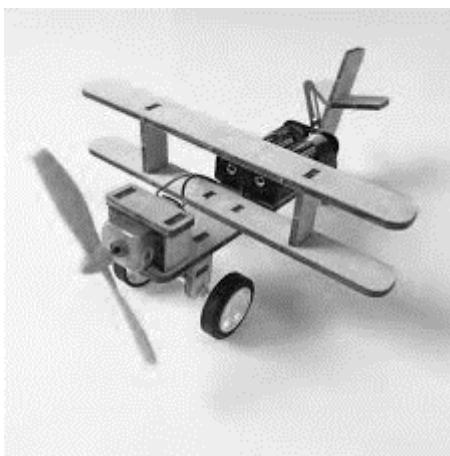
## Electricity

**Biblical wall art and text:** For since the creation of the world God's invisible qualities – his eternal power and divine nature – have been clearly seen, being understood from His creation, so that people are without excuse. Romans 1:20

God has created the invisible laws of nature. They never change.

Construction

Models that can be battery powered



# Values education Year 7

## God is Truth

### Discernment

#### Discernment is...

- knowing what is true and what is false
- listening carefully and thinking carefully when we hear new ideas
- being alert, and watching out for things that are not right

#### Activities

1. The "Truth Game" - Select a variety of objects or substances that have imitations, e.g. 2 look-alike drinking glasses, one made from glass, the other from clear plastic; a real plant and an imitation one; real pearls and imitation ones. See if your friends can pick the *real* item. Make sure they look at the items from a fair distance.
2. What is the meaning of the word 'deceive'.
3. Make a list of advertisements that are trying to deceive you. Explain how they try to trick you into buying things. Explain where they are not really telling the truth.
4. Someone tells you about a new club. It sounds to be great fun, but you are not sure about some of the rules. Which of these rules might make you think this club is not for you?
  - a) No shoes allowed
  - b) No pets allowed
  - c) No adults allowed
  - d) Bring a plate of food
  - e) Bring your most violent video game
  - f) Starting time: 10 p.m.

#### What does the Bible say about discernment?

Matthew 7:13-14 The broad and narrow way.

John 14:6-7 I am the way, the truth, the life.

Acts 4:12 There is no other name by which we are saved.

John 10:1-18 The Good Shepherd.

Matthew 7:15-21 Wolves in sheep's clothing.

John 18:37 Everyone that is of the truth hears my voice.

# Practical Science Year 7

## God is Truth

### Topic: Electricity

#### Static electricity with balloons 1

[http://www.madaboutscience.com.au/store/index.php?main\\_page=page&id=10](http://www.madaboutscience.com.au/store/index.php?main_page=page&id=10)

##### What you will need:

- Balloon
- Piece of fabric (wool works best)

##### What to do:

1. Blow-up and tie the balloon.
2. Rub it about 20 times with the piece of fabric.
3. Hold the balloon near the wall and watch it stick. You may need to rub the balloon again with the fabric if it doesn't work the first time.
4. Rub the balloon about 20 times again with a piece of fabric.
5. Hold the balloon near your hair and watch it stand on end.

##### How does it work?

Just like in the plastic straw experiment, rubbing the balloon with the piece of fabric gives it an electrical charge. The electrical charge has the power to attract things. The wall is too heavy to move towards the balloon so the balloon moves towards it. Hair is much lighter and moves towards the balloon.

# Practical Science Yr 7

## Electricity

### Static Electricity with balloons 2

<http://www.sciencekids.co.nz/experiments/staticelectricity.html>

Show that opposites attract with this static electricity experiment. Find out about positively and negatively charged particles using a few basic items, can you control if they will be attracted or unattracted to each other?

#### What you'll need:

- 2 inflated balloons with string attached
- Your hair
- Aluminium can
- Woolen fabric

#### Instructions:

1. Rub the 2 balloons one by one against the woolen fabric, then try moving the balloons together, do they want to or are they unattracted to each other?
2. Rub 1 of the balloons back and forth on your hair then slowly pull it away, ask someone nearby what they can see or if there's nobody else around try looking in a mirror.
3. Put the aluminium can on its side on a table, after rubbing the balloon on your hair again hold the balloon close to the can and watch as it rolls towards it, slowly move the balloon away from the can and it will follow.

#### What's happening?

Rubbing the balloons against the woolen fabric or your hair creates static electricity. This involves negatively charged particles (electrons) jumping to positively charged objects. When you rub the balloons against your hair or the fabric they become negatively charged, they have taken some of the electrons from the hair/fabric and left them positively charged.

They say opposites attract and that is certainly the case in these experiments, your positively charged hair is attracted to the negatively charged balloon and starts to rise up to meet it. This is similar to the aluminium can which is drawn to the negatively charged balloon as the area near it becomes positively charged, once again opposites attract.

In the first experiment both the balloons were negatively charged after rubbing them against the woolen fabric, because of this they were unattracted to each other.

## Practical Science Yr 7

### Electricity

#### Make your own lightning (static electricity)

In a storm cloud, the moving air makes tiny water droplets and ice rub together so they become charged with static electricity. The positive electrical charges float up near the top of the cloud and the larger ones, with negative charges, stay near the bottom. This separation of electrical charges is very unstable and lightning is the way the charges are equalized or become balanced.

#### You will need:

- A large iron or steel pot (not aluminum) with a plastic handle.
- Rubber gloves.
- An iron or steel fork.
- A plastic sheet (a dry-cleaner garment bag is good source).

#### Instructions:

Tape the plastic sheet to a table top.

Put on the rubber gloves.

Darken the room as much as possible.

Hold the large iron pot or pan by its insulating handle and rub the pan vigorously to and fro on the plastic sheet.

Holding the fork firmly in the other hand, bring its prongs slowly near the rim. When the gap between pot and fork is small, a tiny spark should jump across (A darker room will help you see the spark more clearly).

It is as though the pan is the thundercloud, the fork is the lightning rod and you are the Earth's surface.

**Please note:** The humidity in the air can affect static electricity. If the air is damp, such as during the winter, then this experiment may not work.

# Practical Science Yr 7

## Electricity

### Roll a can with static electricity

<http://www.sciencebob.com/experiments/staticroll.php>

#### What you will need

- An empty soft drink can
- blown-up balloon
- A head of hair

#### What to do

1. Place the can on its side on a flat smooth surface like a table or a smooth floor.
2. Rub the blown up balloon back and forth through your hair really fast.
3. Now the fun part - Hold the balloon close to the can without actually touching the can. The can will start to roll towards the balloon without you even touching it!

**Try This Too:** While you've got the balloon out, tear up part of a tissue into tiny pieces about 1/4 inch (.5 cm) big. Rub the balloon in your hair again and bring it close to the tissue pieces. They will be attracted to the balloon and then jump away.

#### How does it work?

When you rub the balloon through your hair, invisible electrons (with a negative charge) build up on the surface of the balloon. This is called static electricity, which means "non-moving electricity" The electrons have the power to pull very light objects (with a positive charge) toward them - like the soft drink can.

#### Make it an experiment

The project above is a DEMONSTRATION. To make it a true experiment, you can try to answer these questions:

1. Does the size of the balloon change the power of the pull?
2. Does the length of the person's hair effect the power of the static electricity?
3. How much water can you put in the can until the balloon can't pull it anymore?



## Practical Science Yr 7

### Electricity

### Bending Water with Static electricity

<http://www.sciencekids.co.nz/experiments/bendingwater.html>

Try bending water with static electricity produced by combing your hair or rubbing it with an inflated balloon.

#### What you'll need:

- A plastic comb (or an inflated balloon)
- A narrow stream of water from a tap
- Dry hair

#### Instructions:

1. Turn on the water so it is falling from the tap in a narrow stream (just a few millimeters across but not droplets).
2. Run the comb through your hair just as you normally would when brushing it (do this around 10 times). If you are using a balloon then rub it back and forth against your hair for a few seconds.
3. Slowly move the comb or balloon towards the stream of water (without touching it) while watching closely to see what happens.

#### What's happening?

The static electricity you built up by combing your hair or rubbing it against the balloon attracts the stream of water, bending it towards the comb or balloon like magic!

Negatively charged particles called electrons jump from your hair to the comb as they rub together, the comb now has extra electrons and is negatively charged. The water features both positive and negatively charged particles and is neutral. Positive and negative charges are attracted to each other so when you move the negatively charged comb (or balloon) towards the stream, it attracts the water's positively charged particles and the stream bends!

Thinking Skills Truth Yr 7

<p><b>Energy sources 1</b></p> <p>Draw a solar panel.</p> <p>Now redesign it by using the following steps:</p> <p><b>B</b> – igger</p> <p><b>I</b> – instead of</p> <p><b>N</b> – onsense</p> <p><b>G</b> – et rid of</p> <p><b>O</b> – ther uses</p>	<p><b>Energy sources 2</b></p> <p>Brainstorm 10 innovative ways of encouraging people to use public transport more often.</p>
<p><b>Energy sources 3</b></p> <p>Design a new product by combining a <b>hovercraft</b> with a <b>water pistol</b>.</p>	<p><b>Energy sources 4</b></p> <p><b>What if the world petrol supplies ran out?</b></p> <p>Give 10 different consequences.</p>
<p><b>Energy sources 5</b></p> <p>Electrical energy is an example of God's power in creation. Write an acrostic poem for:</p> <p><b>POWERFUL</b></p>	<p><b>Energy sources 6</b></p> <p>Name 10 materials that are <b>not</b> used in the construction of a motor vehicle.</p>

**Thinking Skills Truth Yr 7**

<p style="text-align: center;"><b>Energy sources 7</b></p> <p>Only solar-powered cars should be allowed on the roads.</p> <p>Give 3 good points and 3 bad points for this proposal.</p>	<p style="text-align: center;"><b>Energy sources 8</b></p> <p style="text-align: center;">The answer is</p> <p style="text-align: center;"><b>“wind”.</b></p> <p style="text-align: center;">Give 5 possible questions.</p>
<p style="text-align: center;"><b>Energy sources 9</b></p> <p>Construct a device that can travel at least 10 metres along the ground by using:</p> <ul style="list-style-type: none"><li>•A mousetrap</li><li>•The wheelbase of a toy car</li><li>•6 rubber bands</li><li>•One optional piece of equipment</li></ul>	<p style="text-align: center;"><b>Energy sources 10</b></p> <p>Name 5 things that a <b>balloon</b> and a <b>steeringwheel</b> have in common.</p>
<p style="text-align: center;"><b>Energy sources 11</b></p> <p>What will be the most important form of public transport in 100 years from now?</p> <p>Illustrate your ideas.</p>	<p style="text-align: center;"><b>Energy sources 12</b></p> <p>Name 4 disadvantages of electric power lines.</p> <p>Now work out an improvement for each of these disadvantages.</p>