God is A Servant Teacher's Topic Guide Year 6

Topic: Transport, tools & machines **Duration: 4 weeks**

Spiritual Awareness: Using the power in God's creation for reaching the world
God has placed within the creation, forces that serve man. Machines give us the power to perform tasks with comparatively less effort. The development of machines, transport and technology has facilitated the spread of the gospel.

God has also given us His power for sharing the Gospel. His power enables us to achieve greatly beyond what our human resources can achieve. As God's servants, we must rely on His power when sharing our faith.

Values: Our response to 'God is a Servant'
- **Service**: follow the example of Jesus, the greatest servant
- **Appreciation** of God's gifts to us through His creation
- **Enthusiasm** for sharing our faith
- **Creativity** in using the tools God has given us to use in serving Him

Bible Passages and stories about serving God by sharing the Gospel:
Luke 4:18; 7:22 Jesus came to bring the Good News
Mark 16:14-20 "Go into all the world…"
Matthew 28:18-20 - Jesus said, "All power in heaven and on earth is given to me. So go and make disciples of all nations…"
Romans 10:14-17: How can they believe if they have not heard the message? And how can they hear if the message is not proclaimed? And how can the message be proclaimed if the messengers are not sent out? How wonderful is the coming of messengers who bring the Good news.
Ephesians 6:15 Stand ready with truth as a belt right around your waist, with righteousness as a breastplate, and your shoes to announce the Good News of Peace.
The book of Acts: Paul traveled by boat to share the Good News.

Outcomes: Students will
Knowledge
- demonstrate application of the following simple machines: lever, wheel and axle, inclined plane, screw, wedge
- explain how a pulley works
- explain how the wheel allows things to move
- understand that the use of the machines involves less effort to perform work than would be required in their absence
- illustrate the significance of machines in everyday life
- appreciate the value of tools and objects that allow us to do work more effectively and efficiently and with greater ease
- identify the function and purpose of tools and machines
- experiment with some tools and machines and record observations
- explain how machines have served us in facilitating the spread of the Gospel
- identify ways in which technology can be used to spread the Gospel today, e.g. internet

Skills

- make predictions and test them
- devise experiments and record results
- compare
- draw conclusions
- Be willing to serve God and others

Activities

- Free play with levers, wheel and axles, inclined planes and pulleys.
- Use levers to lift substantial weights in the playground. Use the same pivot point but alter the length of the lever.
- Draw levers in action: spades, scissors, bottle openers, pliers, fishing rod.
- Vary the length of an arm and position of load on a lever and measure the effort required to move the load.
- Use tools and machines to move a load of books across the floor and on to a table.
- Try lifting a load with, and without a pulley. Compare the amount of force required for both tasks.
- Lift the same load with a double pulley system. Two single pulleys can be used in one system and then a double pulley system. Compare the amount of effort required for each system. Compare the amount of distance the rope travels through the various systems.
- Tie a solid toy to a spring balance and measure the force necessary to lift the toy vertically over a distance of 50 cm. The same toy, connected to the spring balance, can be pulled up a 50-cm. high ramp, 70 cm. long, and the force compared. Children can predict result for different gradations of ramps.
- Discuss application to transport modes.
- Research the development of the car.
- Design a 'crazy machine' or a machine of the future as an art activity.
- Make a machine.
- Discuss how machines have facilitated the spread of the Gospel. Consider the printing press, transport modes, computers.
- Research the lives of famous inventors and their inventions:
  James Watt, (steam engine); Elias Howe, (sewing machine); John Gutenberg, (printing press); Samuel Morse, (telegraph); Alexander Bell, (telephone); Thomas Edison, (electric light); Orville and Wilbur Wright, (aeroplane); Guglielmo Marconi, (wireless); John Baird, (television); John Holland, (submarine); Von Braun, (space rocket)
- Identify levers in the human body (e.g. arm) and discuss God's design for our bodies.

Assessment

1. Design and make a machine. Demonstrate and explain to the class how it works.
2. What have I learned from the study of tools and machines about serving God?

English: Biographies of famous inventors
Social Studies/History: History of transport and effects of transport on the community
Health: Road safety; safety with machines
Mathematics: measuring heights or graduations and weight involved in science experiments
Art: Design a machine of the future; Make models of vehicles
Thinking skills: *"Tools, machines, technology"*
Research cards: Simple machines
Biography: William Booth

Values education Year 6
God is a Servant
Enthusiasm

Enthusiasm is …

- having a positive attitude about the things you do
- not looking on the bad side of things
- putting all your energy into the job you are doing

To be good at something we need to put all our energy into it.
We need to get on with the job with a cheerful attitude. This can inspire the people around us to do the same.

1. Who do you know that is enthusiastic about the job they do?
2. How can enthusiasm make a sports team play better?
3. How can enthusiasm help people get a job done better?
4. Make a list of some of the things you are enthusiastic about.

What does the Bible say about enthusiasm?
Ecclesiastes 9:10 Whatever your hand finds to do, do it with all your might.
Philippians 2:14 Do all things without grumbling or complaining

Art Year 6

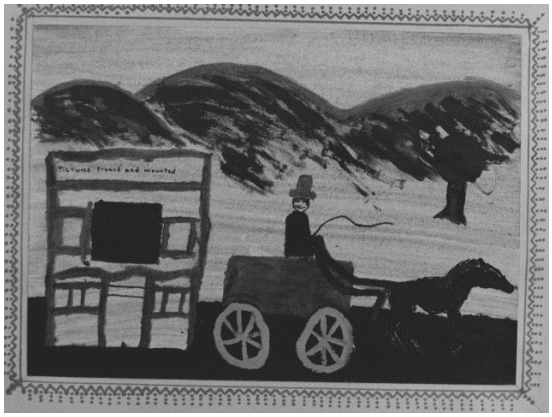
God is a Servant

Tools, transport and machines

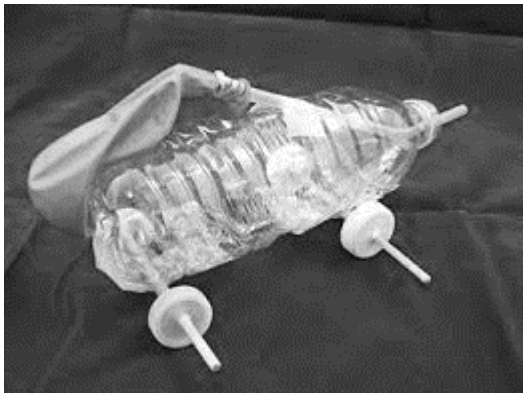
Biblical wall art and text: How can the message be proclaimed if the messengers are not sent out? How wonderful is the coming of messengers who bring good news! Romans 10:15

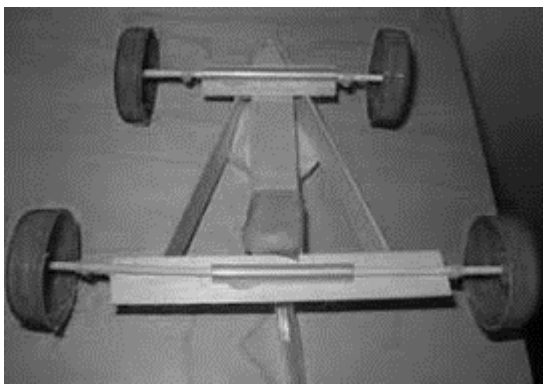
Transport and technology are means of spreading the Good News!

Painting and drawing
Make a display showing transport from early times, today and projections of transport in the future. Students can choose their subject: past, present or future.



Construction
Collect bottle caps. Students can construct a vehicle that moves, using skewers for axles, and other construction materials such as cardboard boxes and straws. For boats, they can experiment with balloon power to make the boat move in water.





Practical Science Year 6
God is a Servant

Topic: Tools, machines, technology

1. Elastic spring

What you will need:
A collection of rubber bands
Pencils

What to do:
Wind and turn an elastic band between two pencils.
Let it unwind.

This is how a spring works.

2. Design a catapult

http://www.primaryscience.ie/media/pdfs/col/Design_a_catapult_activity.pdf

Information:

- When a force acts on an object that cannot move, it may change its size or shape.
- Some things (e.g. plasticine/ modelling clay) stay in the new shape when the force is removed. But some substances, like rubber, return to their original form when the force is removed. The latter are called ELASTIC substances.
- Elastic materials store energy when they are stretched, and release the energy when the force is removed. So energy is stored in stretched rubber bands (this is the energy which you have put into it to stretch it). This energy is released when the rubber band is let go and it goes back to its original size.
- Elastic things will not stretch forever! They will snap if you stretch them too far.
- This activity also shows the strength of the triangle. The triangle is a shape often used in architecture because of its strength.

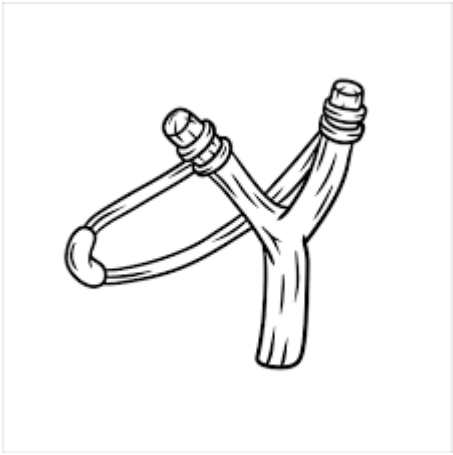
Questions:
What do you use rubber bands for?
What is the advantage of rubber bands over a piece of string? (They stretch).
When you stretch a rubber band what does it do? (It gets longer).
When you let it go again what does it do? (It goes back to its original size).
Do you think a trampoline is elastic? (Yes!)
What happens to a trampoline when you jump on it? (It stretches downwards).
Then what happens? (It goes back to its original shape, releasing the stored energy and pushes you up in the air)

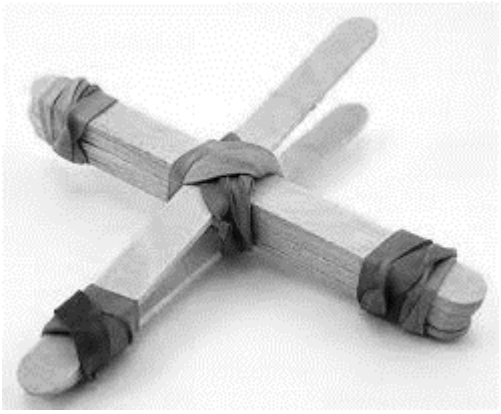
Types of catapults
See pictures below

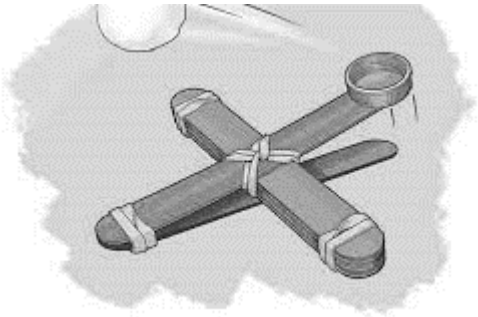
What to use
Rulers, rubber bands, small tissue paper 'bullets'

Safety:
Although paper is soft the bullets should not be aimed at anyone.

There are a large number of ways in which the principle of stored energy is used to make catapults.
The children should be encouraged to design and make their own catapults.







Practical Science: Tools, machines, technology

3. Pulleys

http://www.primaryscience.ie/media/flash/act31/index.html#

Question 1: Do you know what a pulley is?
A pulley is a simple machine with a wheel that has two raised edges. The edges allow a rope or string to run around the wheel without falling off.

A pulley can also be called a block and tackle.

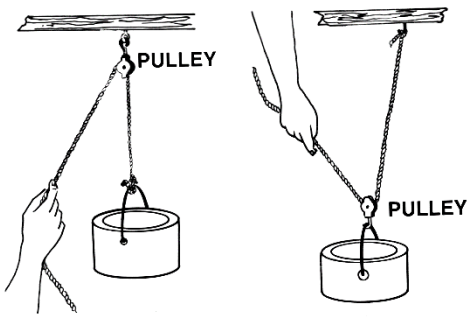
Question 2: Can you think of where pulleys are used?
Pulleys can be used in lots of different ways. They can be used to lift heavy things, so you might find them on building sites. Have you been in a lift recently? How do you think the lift was able to move up and down between floors?

Question 3: Where else might you find pulleys being used?
Pulleys can be used to move things, like pulling clothes along a clothes line in the garden, or moving a cable car from one side of a valley to another.

Make a pulley
You will need:

- A bucket
- A weight
- Rope
- A rolling pin

Attach one end of your rope strongly to the bucket handle.
Put a weight in the bucket, e.g. stones
Place the rolling pin on a desk or table, with one end hanging over the desk.
Get two people to hold the rolling pin down firmly so that it doesn't move.
Now put the other end of the rope over the end of the rolling pin hanging over the desk, and lift the bucket by pulling DOWN on the rope.
Test to see whether the bucket is easier to lift by the pulley method: (pulling down), or by just lifting it up from the floor without the pulley.



Practical Science: Tools, machines and technology

4. Levers

http://nationalgeographic.org/activity/simple-machine-challenge/

Definition of work:

The definition of work used in science may differ from what most people think of as work.

Work can be defined as applying a force over a certain distance.

Exercise:

Move a book from one desk to another.

*This Is work by the scientific definition, because y*ou *are applying force for a certain distance.*

A lever makes work easier

An example of a machine making work easier: The claw of a hammer to remove a nail.

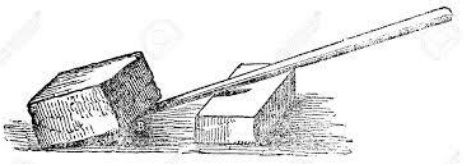
A small force applied to the handle of the hammer produces a greater force at the claw end of the hammer, allowing for the removal of nails.

Other examples of levers: A see saw; scissors; a door handle

Make a lever from a ruler

You will need:

- a firm ruler (or other long, firm, flat object)
- a pen or pencil
- a stack of books



Make a lever

Use a ruler and pencil to make a lever to lift the books.

Does it feel easier or harder to lift the stack of books when using the ruler as a lever instead of lifting them straight up?

Practical Science: Tools, machines and technology

5. The wheel and axle

The wheel and axle uses rotational movement to make work easier. When effort is applied to the wheel, it produces movement in the axle, and when it is applied to the axle, it produces movement in the wheel.

Observation

Distribute small toy cars that have wheels joined by axles to groups of students.

Discussion

How do these toy cars move?
How are the wheels on each side of the car joined to each other? (the axle)
Which common machines use only one wheel? E.g. a wheelbarrow.
How did the invention of the wheel make life easier?

The challenge

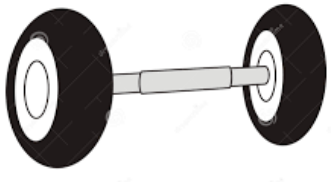
In groups, design and build a machine that incorporates wheels and axles.
Wheels can be made from plastic bottle top lids. Use hammer and nail to put a hole in the centre of the lid. (These can be prepared ahead of time by an adult.) Wooden skewers can be used for axles.

How to make wheels and axles on toy cars

There are two ways to make wheels turn. One way is the make the wheels spin and the other way is to make the axle spin.

To make a car / vehicle with a spinning axle: Slip the axle (such as a toothpick) through a larger tube / cylinder (such as a straw). Now make wheels out of something (such as bottle caps, buttons, cork, etc.). and stick these to the end of the axle (toothpick, chopstick, pencil, etc). These wheels must be tightly secured to the axle...so the axle turns inside the tube, but the wheels don't.

To make a car / vehicle with spinning wheels: If you want the wheels to spin, then you will need to place the axle (toothpick, etc.) inside a bigger hole in the middle of each wheel (or a tube / cylinder (straw) that is placed in the middle of each wheel). An example of this would be to cut a hole in a bottle cap...one large enough to stick a small straw inside of it. Then place the toothpick in between both wheels...now the wheels will turn on the toothpick (axle) instead of the axle turning with the wheels as one piece.



Practical Science: Tools, machines and technology

6. Bucket Spinning (Newton's first law of motion)

You might think that an upside-down bucket of water above your head would end up with you getting very wet but what if the bucket is spinning quickly in a circular motion? Give this fun science experiment for kids a try and see what happens while learning a thing or two about centripetal force.

What you'll need:

- A reliable bucket with a strong handle
- Water
- An open area outside where spilling some water is ok.

Instructions:

1. Fill the bucket until it is around half full with water.
2. Stand well clear of other people or anything else that could get in the way.
3. Hold the bucket by its handle with your arm extended and start spinning it by your side towards the sky and back to the ground in a circular motion, make sure to spin it fast enough to keep the water inside the bucket. Be prepared to get a little wet as your technique improves.
4. Stop spinning before your arm gets tired, watching out for splashes as you carefully bring the bucket back to rest on the ground.

What's happening?

There's half a bucket of water spinning upside down above your head and yet it's not falling out and getting you wet, what's going on?

This experiment makes use of something called 'centripetal force', which is a force acting on an object moving in a circular path, directed towards the center around which it is moving. This type of force can also be seen on roller coasters or by satellites in orbit around a planet.

As you spin the bucket you might feel that it wants to fly off in a straight line away from you (you might even accidentally let go of it), this is a demonstration of Newton's first law of motion, that an object will continue in a straight line unless an outside force (in this case your arm) acts upon it.

Thinking Skills Servant Yr 6

Tools, machines and technology 1 Invent a "super tool" that can fix all household problems.	**Tools, machines and technology 2** List 10 ways that technology and machines can **serve** by helping to spread the Gospel.
Tools, machines and technology 3 What will a computer look like 100 years from now? Draw it.	**Tools, machines and technology 4** Place the letters A-Z down the side of a page. For each letter name a tool or machine that assists us.
Tools, machines and technology 5 Draw a screw driver. Now redesign it using the following steps: **B** – igger **I** – nstead of **N** – onsense **G** – et rid of **O** – ther uses	**Tools, machines and technology 6** What if all tools were banned. Write down 10 possible consequences.

Thinking Skills Servant Yr 6

Tools, machines and technology 7 Brainstorm 10 ways we can use machines to help people.	**Tools, machines and technology 8** Write down 4 disadvantages of computers. Now work out an improvement for each of these.
Tools, machines and technology 9 Create a new machine using: **pliers** and **a lawn mower**	**Tools, machines and technology 10** All machines in the world have suddenly broken down. Give 3 interesting explanations.
Tools, machines and technology 11 Design a power tool that can work in an alternative way in the case of power failure.	**Tools, machines and technology 12** Design a clean, efficient and economical means of transport for the future.