

Creators and builders: Outcomes and activities

God is Creator Year 6

Spiritual Awareness:

God is the master creator, the creator of all. Humans can never create in the same way as God does, but because we are made in His image we do have the ability to create. Because God is the source of creativity, He can give us new ideas if we ask Him to lead and guide us in our daily activities.

God has also given creativity to the animal kingdom. We see this in the amazing ability many animals have to build homes.

Our response to 'God is Creator'

Because God is Creator I will...

- Appreciate the wonder and beauty of His creation
- Care for His creation
- Believe that God is a miraculous Creator and created the universe as He told us in Genesis Chapter 1.
- Thank God for the creativity that He gives me
- Put into practice my creative gifts

Biblical references

Matthew 25:14-29 Parable of the talents

1 Kings 6 and 1 Chronicles 29:1-9 King Solomon's Temple

Exodus 31: 1-6 The Lord said to Moses, "See, I have called by name Bezalel the son of Uri, son of Hur, of the tribe of Judah, and I have filled him with the Spirit of God, with ability and intelligence, with knowledge and all craftsmanship, to devise artistic designs, to work in gold, silver, and bronze, in cutting stones for setting, and in carving wood, to work in every craft... Eph 2:10 We are God's workmanship.

Col 3:23-24 Whatever you do, do it with all your heart, as if working for the Lord.

Key Questions

What is creativity?

Who do you know that is creative? What do they create?

Which animals display creativity?

What creative things can I do for God?

How can I develop my talents?

What is the meaning of 'practice makes perfect'?

Which examples of creativity require patience and perseverance?

Which examples of art work have been inspired by nature, e.g. colour and shape?

Why were the best and most beautiful materials used in King Solomon's Temple? (1 Chron 29:1-2)

Outcomes

Students will

Knowledge

- Understand of the ways in which particular animals demonstrate skills in building techniques
- Identify creative gifts in people.
- Gain an understanding of creative art and architecture
- Study the major inventions throughout history that have improved our quality of life

Skills

- Research, observe and report on building techniques of animals
- Creative problem solving and inventing
- Strive to excel in a personal creative skill

Values

- Use their gift of creativity.
- Appreciate creative gifts and talents in others.
- Show patience and perseverance in developing a creative skill.

Activities

- Observe animal homes, and identify those animals that show skill in building e.g. spiders, bees, ants. birds
- Compare materials, methods and standards of neatness adopted by home builders.
- Draw and label animal homes.
- Make a model of an animal home e.g. a spider's web from wool and a forked branch.
- Compare skills of animal builders to crafts and building techniques used by humans, e.g. spinning and weaving, basket weaving
- Make a list of creative skills, e.g. art, dance, music, drama, story writing, cooking, wood carving, designing clothes, designing buildings (architecture)
- Make a list of the creative skills within your family.
- Get involved in a creative activity and write about your activity.
- Discuss the importance of practice in becoming better at a skill.
- Research significant inventions throughout history

Assessment

What have I learned from the examples of animals...

- about God?
- about His creatures?
- about my own special abilities?

Values education Year 6

God is Creator

Creativity

God is an amazing creator. He wants me to be creative too. He wants me to look for new and better ways of doing things.

Creativity is...

- asking the Holy Spirit to give me His ideas
- using my talents for God
- inventing new things
- coming up with new ideas
- making things

God has created you as a unique being. Nobody is exactly like you or has your special combination of talents.

Activities

1. Imagine that you are marooned on a desert island. You have your sailboat, which has been washed ashore. There are a few provisions... a bag of rice, a packet of matches, a water bottle and a tin of baked beans. Describe how you would survive for a week, as you wait for your rescuers to find you.
2. Devise some new and interesting ideas for spending a one-week holiday at home. Make a plan and show what you will do each day.
3. Design something original. It can be a piece of art, an article of clothing, a building, a playground or a new food dish.
4. Imagine that you are an inventor and a problem solver. You have to come up with ideas for improving life on Planet Earth. Choose 3 of these areas: environment, technology, education, medicine, transport, housing, entertainment

What does the Bible say about being creative?

John 16:13 The Holy Spirit guides us.

Psalms 33:2-3 Sing to the Lord a new song.

1 Chronicles 28 God gave the plans for the building of Solomon's temple.

Isaiah 43:19 See, I am doing a new thing

Art Year 6

God is Creator

Creators and builders

Wall art text: Before I formed you in the womb I knew you. Jeremiah 1:5

Everyone can be creative!

Drawing

Students can work in pairs and draw each other's portrait. They can decide whether it will be a full-face portrait or profile (side on). The drawings can be placed on the display board with the text from Jeremiah 1:5.

Art history

- Study some work of architecture
- Study and draw Solomon's Temple from the Biblical description.

Construction

- Design and construct models of buildings. Students can work in groups. Use creativity to develop something different, original and artistically pleasing.

- Students can use construction materials freely in problem solving activities

Make available a variety of constructions materials for the students to work with.

Students can make something of their own choice. Some suggestions can be given:

- a boat
- a shelter
- a toy
- a vehicle
- a children's playground

Thinking Skills Creator Yr 6

Creativity 1

List 10 ways in which people can show creativity.



Creativity 2

Explain the meaning of this poster:



Creativity 3

Give 5 good points about being creative.

Creativity 4

Make up two sentences about creativity using some of these words.



Creativity 5

Explain how this picture can tell us about creativity.



Creativity 6

Imagine a world with no creativity.

Give 5 bad points.

Thinking Skills Creator Yr 6

<p style="text-align: center;">Creativity 7</p> <p>Think of 3 creative ways to use a coat hanger. (Not what it's normally used for.)</p>	<p style="text-align: center;">Creativity 8</p> <p>Design something original. Choose one of the following:</p> <ul style="list-style-type: none">• A song• A dance• A game• A recipe• An invention
<p style="text-align: center;">Creativity 9</p> <p>Think of a way to solve one of these problems:</p> <ul style="list-style-type: none">• Too much rubbish• Too much traffic	<p style="text-align: center;">Creativity 10</p> <p>Imagine that you and your friend have been shipwrecked on a tropical island. List 5 things you will do to survive. Think about food, water, shelter and how to signal for help.</p>
<p style="text-align: center;">Creativity 11</p> <p>Imagine that you are the Prime Minister. What will you do to improve your country?</p>	<p style="text-align: center;">Creativity 12</p> <p>List 3 animals that use creativity. Explain why these animals are creative.</p>

Inventions 1

Questions about technology

Student activities

1. What do you think are the 3 greatest inventions of all time?
2. How has technology changed the workplace?
3. Has technology ever *let you down*? (Have you ever been disappointed because something did not work properly?)
What happened?
4. How has technology improved our daily lives? Give examples and explain the advantages of technological advances.
5. What could never be replaced by technology?
Explain why not.
6. What things should never have been invented?
7. Do computers save time or do they just make us waste more time? Explain.
8. What would you like to see invented in the future?
Explain why.
9. Which modern invention could you not live without?
Explain your choice.
10. How has technology changed medical care?
11. How has technology revolutionized transport?

Inventions 2

The Invention of Umbrellas

It seems natural to open an umbrella when it rains. But actually the umbrella was not invented for protection against rain. It was first used as a shade against the sun.

Nobody knows who first invented it, but the umbrella was used in very ancient times.

The first people to use it were probably the Chinese in the eleventh century B.C. The umbrella spread to ancient Egypt and Babylon. At that time it was a symbol of honor and authority. The umbrella was only for royalty or by those in high offices.

It is believed that the first people to use the umbrella as protection against rain were the ancient Romans.

The umbrella became popular in Europe in the eighteenth century and then started to become popular worldwide. Umbrellas have not changed much in style during all this time; however, it wasn't until the *twentieth century* that umbrellas began to be made in a **variety** of colors.

1. *Who first invented the umbrella?*
2. *When did the first people start to use the umbrella?*
3. *Who were the first people to use the umbrella for protection from the rain?*
4. *When did umbrellas began being made into different colors?*

Inventions 3

For good or for bad

Just a few hundred years ago, life was far different than it is today. When people wanted to travel or communicate, they had to go on foot or horseback.

Whatever people owned—from clothing to tools—had to be made by hand.

Diseases were difficult to treat without modern medicines.

Quality of life has improved over the years through the efforts of the men and women who had the brilliance, diligence, and creativity to come up with new and better ways of doing things.

Alexander Graham Bell discovered how to send sound down a wire from the speaker to the listener, and so invented the telephone, which ultimately led to the cell phone, and our modem, and a communication system that now links the entire globe.

The electric light illuminated the darkness so people could work at night. Braille made it possible for blind people to read.

These inventions, like many others, have clearly improved life by keeping people healthier, helping them to communicate and work more efficiently, and allowing them to travel farther.

Other inventions were controversial because of their potential for destruction. Some people think that the world would be better off without the invention of the hydrogen bomb.

List 5 good inventions. Explain how they have changed people's lives.

Inventions 4

Telephone and Computers

The Telephone

The telephone is an instrument that converts voice and sound signals into electrical impulses for transmission by wire to a different location, where another telephone receives the electrical impulses and turns them back into recognizable sounds. In 1875, Alexander Graham Bell built the first telephone that transmitted electrically the human voice.

Computers

There are many major milestones in the history of computers, starting with 1936, when Konrad Zuse built the first freely programmable computer. In the 1960s computers were used by NASA to place a man on the moon. The computers then were very large.

1. What are the advantages and disadvantages of having a mobile phone?
2. Explain in 3 sentences or more how have computers changed since 1936.

Inventions 5

The car and the camera

The Car

In 1769, the very first self-propelled road vehicle was invented by French mechanic, Nicolas Joseph Cugnot, (French). It was a steam-powered model. In 1885, Karl Benz, (German) designed and built the world's first practical car to be powered by an internal-combustion engine. In 1885, Gottlieb Daimler (German), took the internal combustion engine a step further and developed a gas engine. He later built the world's first four-wheeled motor vehicle.

1. Apart from walking, how did people travel before the invention of the car?
2. How is the modern car different to the first car invented?

The Camera

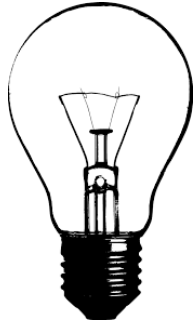
In 1814, Joseph Nicéphore Niépce (French), created the first photographic image with a camera he invented. The image required eight hours of light exposure and later faded. In 1837 Louis-Jacques-Mandé Daguerre (French), invented of the first practical process of photography.

3. How did people produce images before the camera?
4. What can we do with cameras today?

Inventions 6

The light bulb

In 1809, Humphry Davy, an English chemist, invented the first electric light. Fifty years later Thomas Edison (American), improved upon this idea. In 1878, Sir Joseph Wilson Swan, an English scientist, was the first person to invent a practical and longer-lasting electric lightbulb that burned for 13 hours. In 1879, Thomas Edison invented a carbon filament that burned for forty hours. The filament is made of tungsten wire. Tungsten is a hard metal with the highest melting point of any metal.



1. How did people light their homes before the invention of the electric light?
2. Why was Thomas Edison's invention in 1879, better than any previous attempts at making a light bulb?
3. Why is tungsten a suitable metal for using in a light bulb?
4. Draw the light bulb and label the tungsten wire filament.

Inventions 7

Household objects

Choose five of the following objects.

Name and draw each object.

Explain how life would have been without this object, or how the job would have been done before it was invented.

1. Hammer
2. Fork
3. Spade
4. Mop
5. Broom
6. Screwdriver
7. Grater
8. Peeler
9. Scissors
10. Saucepan
11. Clothes peg



Inventions 8

Household objects

Choose five of the following objects.

Name and draw each object.

Explain how life would have been without this object, or how the job would have been done before it was invented.

1. Mirror
2. Pen
3. Washing machine
4. Clock
5. Sewing machine
6. Can opener
7. Ironing board
8. Lawn mower
9. Saw
10. Drill
11. toothbrush



Spiders 1

A good place to build a web

Student activity

A spider is a creator and a builder. God has given the spider the ability to make the web, but the way she does it is left to the spider to decide.

A spider builds her home on the things she finds around her. Here are some of the things spiders build their webs upon. Write down any others that you can think of.

- twigs and branches
- leaves
- window frames
- ceilings and walls

Now draw some spiders webs built upon these things, and write the heading, "A good place for a spider's web".

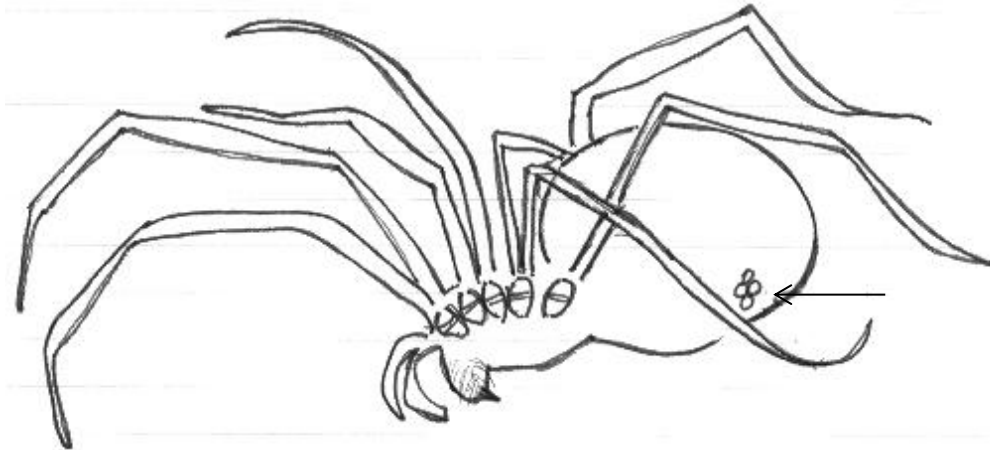


Spiders 2

Spider webs are sticky

The threads for the web come from the spider's body. Spiders' webs are built for catching flies or other insects for food. The spider waits in hiding and it feels if anything touches the web. When a fly is caught, the spider may wrap it up in sticky threads to take to its hiding place.

1. Why do you think spider's webs need to be sticky?
2. How does a spider catch its food?
3. At the end of a spider's abdomen is a factory for making silk. There are several nozzles called spinnerets. Draw a spider showing the spinnerets.



Spiders 3

Patient and diligent

If you brush away a spider's web from the corner of your ceiling, what will the spider do? Soon you will have to do your cleaning all over again. A spider never gives up building her home. We can learn from the example of a spider.

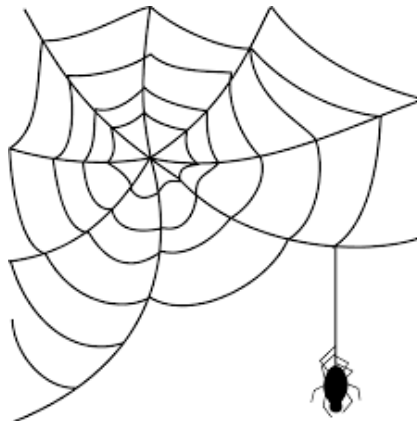
It is important to keep trying, even when you think you have failed.

A spider doesn't take long to build a web. As soon as the web is damaged it eats the old one and spins a new one. It doesn't give up.

A spider works with patience and diligence. This means it puts in a lot of effort. We can learn about diligence from the spider. It is important to do a job well and keep going right to the very end of the job, just like the spider.

Have you ever seen two spiders working on the one web? No, this doesn't happen. A spider works by herself with patience and diligence.

1. How can we learn from the spider?
2. Write down something that *you* need to keep trying at.
3. Name a job that you have to finish on your own.

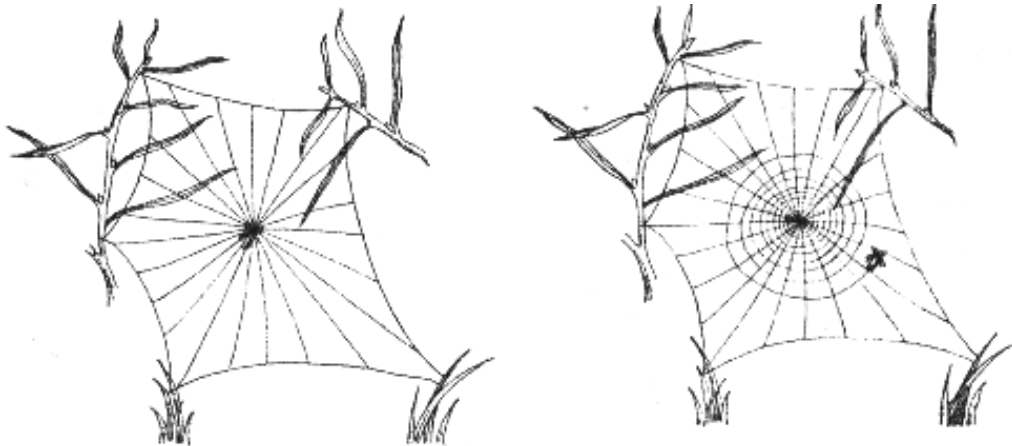


Spiders 4

How does a spider build a web?

Spiders' webs are strong and sticky. It is the lady spider who builds the web. First she chooses a good spot, and here she attaches the beginning of her web. Dangling on the end of the first thread, she now drops to the ground, or to a blade of grass, or a branch. Then she climbs back again, and waits for some wind to help her get across to something else, and so on until she has an outline for her web. Then she fills in the outline with threads running up and down, in every direction, all of them crossing one another like the spokes of a wheel.

Then she goes to the centre and takes the thread round and round in a spiral. Lastly, she goes over it again with a new sticky thread.



1. Two words to describe the spider's web: st and st
2. Who builds the web? Male or female?
3. After she chooses a good spot, she dangles on the end of a _____ coming from her body.

Spiders 5

Designed by God

Do you know how many legs a spider has? A spider has eight legs. Spiders are not insects because all insects have six legs. Spiders are in a special family of their own called arachnids. There is another difference too. Insects have three parts to their bodies, but spiders have only two. Nearly all insects have wings but spiders have none.

Insects change in some way before they take their adult shape. Think about a caterpillar and how it changes to a butterfly. Little spiders, however, hatch straight away from the egg.

Although spiders do not change shape, they do grow bigger. To do this, they burst out of their hard skins, and grow new ones.

1. What is the difference between spiders and insects?
2. What happens to a spider's skin when the spider grows?

We read in the Bible: *Ask the animals, and they will teach you that God's hand can be seen in all His marvelous creation. (Job 12:7)*



Spiders 6

A house for spiders

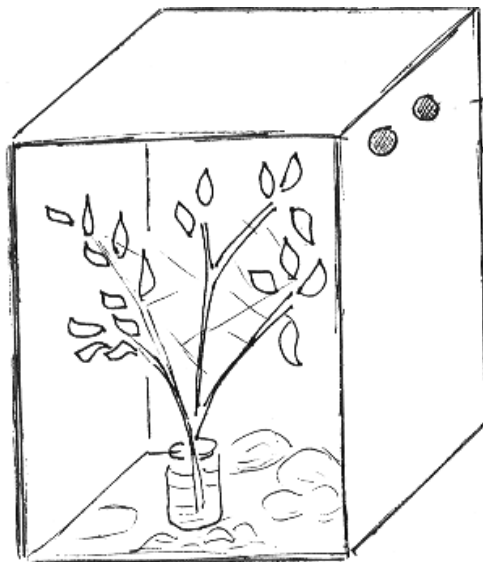
You can easily keep a house spider for a short time in a big glass container with air holes in the lid. Give it some water, somewhere to shelter and some insects for food.

What spiders eat

Spiders like their food to be alive when it is caught in the web, so you will have to catch small flies for them. They need water too, so sprinkle some spots of water on the home occasionally. Spiders are carnivorous. That means they eat meat, and might even eat each other!

The spider sucks juices from the insects and leaves the bodies. It can last a long time without food. You might see your spider spin a web. It is a good idea not to put two spiders together in the same jar, because female spiders will eat male spiders if they get a chance!

1. What do you need to make a spider house?
2. What do spiders eat?
3. How do they eat their food?
4. Why shouldn't you put two spiders in the same jar?



Spiders 7

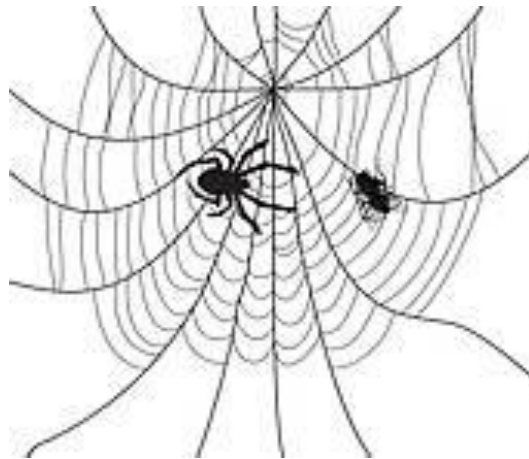
Spiders help us.

Spiders seem rather nasty creatures because they eat insects, but really, they are a help to gardeners. The spiders keep down the insect population, which would otherwise eat our flowers and vegetables. If there were no spiders, there would be too many insects.

Spiders also help us because they eat many insects that are harmful to humans. Think about flies, which eat our food and carry germs, and also insects which suck our blood and can carry disease.

Do you think that spiders had poisonous bites and ate insects when God first created them? No. In God's perfect creation, there was no killing. It was only when people disobeyed God, that killing began. Let's think about how the spider lived at the very start of creation. All spiders and insects must have eaten plants, but maybe not the ones that humans ate, because all creation was in perfect balance and there were no pests and diseases.

1. How do spiders help us?
2. Did spiders kill insects in God's perfect creation?
3. When did spiders start to kill insects?



Spiders 8

A spider's body

A spider has eight legs. They are hairy and jointed, and end in curved claws. The claws have teeth like a comb on the inside. The claws help to hold food. Spiders also use their claws as combs for cleaning themselves. A spider has no antennae like an insect. Instead it has *palps* which are joined to the mouth parts. They are like arms and hands to a spider. Spiders use their palps for feeling and touching.



Copy and fill the gaps:

Palps to a spider are like _____ to an insect.

Palps to a spider are like _____ to a human.

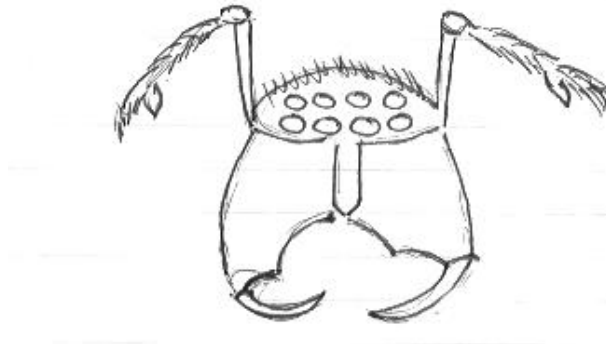
A spider usually has eight eyes. They are simple eyes that shine like jewels. People think that some spiders can see colours! A spider has to keep watch for prey. With so many eyes it can see in many directions. A spider also needs to watch out for enemies. A spider is always *alert*. Christians need to be alert too.

1. Read 1 Peter 5:8 and find out why Christians need to be alert.
2. Why do you think a spider needs so many eyes?
3. Think of some enemies that spider has.
4. Describe the way a spider might move if a fly flew past its web?

Spiders 9

A spider's head

1. Here is a drawing of a spider's head. The palps are the furry arms used for felling and touching. There are poison fangs and eyes. Draw the head and label the palps, the eyes and the fangs



2. A sense of smell is important to a spider:
for catching prey
for male spiders when trying to find a lady spider

3. A good sense of hearing is also important to a spider. A spider feels vibrations in the air through the hairs in its body. There are stories of spiders letting themselves down from ceilings to listen to music. They may think it is the buzzing of an insect.
Why is hearing important to a spider?

4. All spiders have fangs for injecting poison into their prey, but very few spiders are dangerous to humans. When a spider catches its prey, it sticks its fangs into the prey, and instantly kills it with poison. A spider doesn't really eat its prey. It sucks out the juices from the body of the insect, and leaves just an empty skin. Name something that is prey to a spider.

Spiders 10

Amazing builders

All that God has made is wonderful, and reflects His character. Just as a painting tells us something about the person who painted it, so nature can be studied to see what it tells us about God. The world which God has made has patterns and designs in it. All these things did not come about simply by chance. God is a God of order and He made things this way.

Some animals are amazing builders. Shellfish, ants, bees and termites build complex homes. Birds build nests. Both small and large animals make burrows.

God has provided all these animals with the ability to make these things. The spider is able to spin complex webs. Spiders are different from insects because they have eight legs, not six, and no spiders have wings. Baby spiders look like adults and don't go through the larva stage. Spiders have eight tiny eyes. Baby spiders spin webs and are not taught by their parents. God has given spiders some program, which we might call *instinct*, (which means we don't know how or why it works).

1. How do spiders know how to spin webs?
2. Make a table to show the difference between spiders and insects.

Spiders	Insects

Spiders 11

How baby spiders are born

Male spiders are usually smaller than female spiders. This means that they face the risk of being mistaken for prey and eaten! When it comes time for mating, the male spiders use many kinds of tricks. Some male spiders vibrate the female's web with a special rhythm to tell her that they are not to be mistaken for food. Other types of male spiders give the female a present to distract her attention. The present is an insect wrapped up in silk. Some clever male spiders suck up the food from the insect first, then spin the insect shell into a pretty silk cocoon for the female. When she finally gets it open she is in for a surprise because there is nothing to eat! Then the female spider gets angry and might kill the male spider!

As a result of mating, the female spider lays a group of eggs. She hides these under leaves of bark. Sometimes she makes a silk box for them. Baby spiders can make thread soon after they born. Some can use their thread like a kite to carry them away on the air from the nest.

Do you think that our Father who has provided so many things for the spider to enable it to live, has done an even better job providing for us?

Are you not much more valuable than them to God? (Matthew 6:26)

1. What does a male spider do to attract a female spider?
2. How does the female spider hide her eggs?
3. What special thing can baby spiders do as soon as they are born?

Spiders 12

How a spider catches prey

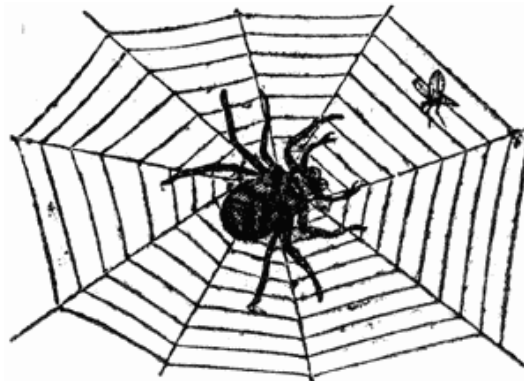
The spider can keep very still and sit in the centre of the web, or in a hide-out made of leaves woven together on the side.

The spider moves on the dry parts of the web, not the sticky part, so that it doesn't get caught. Also, the spider moves on the underside of the web, and by hanging upside down, keeps free from the sticky thread.

The spider knows if it has caught something because the web's spokes are tight and vibrate if something is caught. It is similar to us holding a fishing line. When a fish is caught we feel the line move. A big fish moves the line a lot more than a little one, so we know its size. A spider, in a similar way, knows the size of what has been caught in the web.

If the insect caught is big, the spider runs over and spins a lot of threads around it. Many spiders can inject poison to kill the insect. The spider eats the soft part on the insect and throws the shell away.

1. Why does the spider sit very still in the centre of the web?
2. How does a spider know if it has caught something?
3. What happens to the web if a big insect is caught?
4. What does the spider do after it catches an insect in the web?



Ants 1

Ants live in colonies

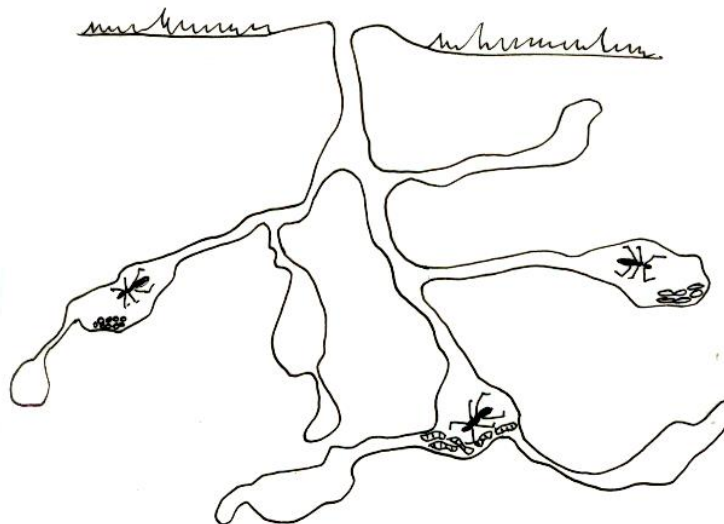
Ants are called *social* insects because they never live alone. They live in family groups called *colonies*. In one ant colony there may be several thousand ants all living together in an underground nest. The nest usually has long passages leading to chambers used for rearing the young and storing food.

In an ant colony, everything is carefully planned. There are different sections for different purposes. Here are some:

- royal quarters for the queen ant
- nurseries for the babies
- food quarters where tiny insects called aphids are kept
- mushroom gardens

The rooms are built at different levels and have different degrees of warmth and dampness. When ants first hatch out of their eggs, they are little wiggly grubs called *larvae*. As these "babies" need to be kept damp to stop their skins drying out, they are kept in a damp room. However the eggs must be kept in a warm room, but not too warm, so the worker ants move the eggs to a room further underground if it is a hot day, or move them to a room closer to the surface if it is a cold day.

Draw an ant colony and write the functions of the rooms.



Ants 2

Ants teach us about wisdom

A job that has to be done in the ant colony is garbage disposal. Each worker ant is busy keeping the nest clean, taking the rubbish to the garbage tip. Ants are very wise when it comes to looking after rubbish. It is a shame that people are not so wise about their rubbish!

The ant colony is so carefully planned. Only a wonderfully wise Creator could have made the ant to be so organized. It could not have happened by accident. God has made His creatures in such a way that we can learn from them. The ant teaches us about wisdom.

Wisdom is... *knowing the right thing to do, and doing it!*

The ant can teach us how wise it is to plan and organize. Wisdom is also thinking out the best way to do something. If you have a difficult job to do, then the best way to do it is to make a plan. Decide what you will do first, next, and so on. It is good to write down the steps for getting the job done.

Ants are intelligent builders. They are able to use all kinds of materials in making their colonies. They use earth, wood, leaves, packed mud and gravel. Perhaps their favourite home is beside a rock, where they can build many underground passages, with the rock acting as a roof.

1. What do ants do to keep their nest clean?
2. What does the careful planning of the ant colony teach us?
3. Think of a difficult job that you have to do. Make a plan for doing the job. Write down the steps.
4. What kind of materials do ants use for building homes?

Ants 3

Family Members

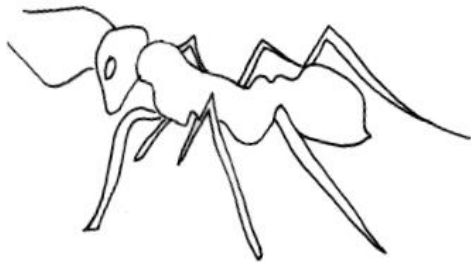
Most members of the colony are female. There may be thousands of females but only a few hundred males. The female ants are divided into different groups. There are workers, nurses, soldiers and a few queens and princesses.

Workers, nurses and soldiers

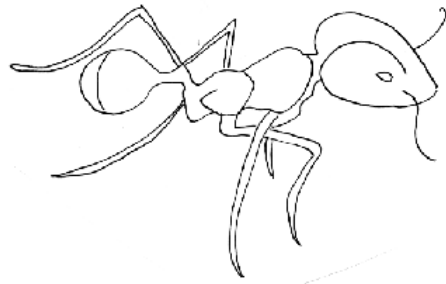
Worker ants are very busy. They look after the eggs and larvae, clean the nest, collect food and look after food storage. After the eggs have been laid by the queen, the workers take them and put them in the special chambers. The workers clean and feed the larvae. They guard the baby ants. Some of the workers repair the underground passages. Others go out and look for food. In some nests, workers open and close holes in the walls, to let more air in, or to block it out.

Nurses look after the sick or injured ants. Have you ever seen an ant carrying another ant back to the nest? The injured ants are cared for in a special hospital room.

Soldier ants can be very fierce. Some have long curved saw-toothed pincers, and a sting. They fight enemy ants from other colonies.



Worker ant



Soldier ant

Draw the worker and the soldier. Using dot points list three facts for each.

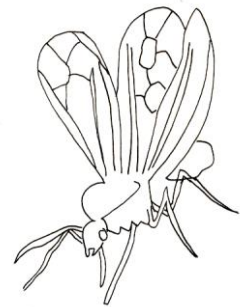
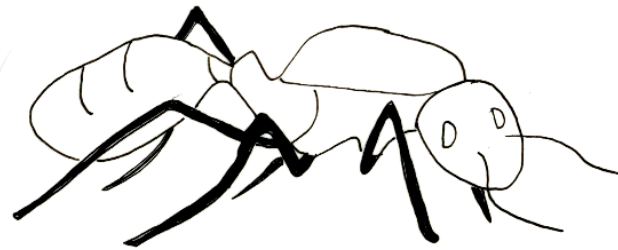
Ants 4

Queen ant and male ants

The queens and princesses, as well as all male ants are all part of the royal family! They do no work. They have everything done for them. They are fed, combed and cleaned. It is easy to pick them out from the workers, nurses and soldiers because they are the only ones with wings.

These royal ants do nothing but prepare for mating, which happens on one particular day. All the male ants make a special mating flight and mate with the queen ants. A few days after they have mated, the male ants die. The queens fly off and each one starts a new colony. The queen finds a sheltered place, digs a hole, creeps into it and seals it up with earth. Then after a few months the queen lays her eggs. The eggs are very tiny. When the eggs hatch out into larvae she feeds them with her own saliva. In her lifetime the queen will lay thousands of eggs. She will see her nest grow from a tiny hole to a large ant city.

1. Draw the male ant and queen ant and name them.
2. Which ants have wings?
3. What happens to the males after they have mated?
4. What does the queen do after she has mated?



Ants 5

The Larva and Pupa

The moment the eggs are laid, workers carry them away to a nursery, and lick them all over until they stick to one another. Then they can be carried around in groups instead of one at a time. After about three weeks the larvae hatch out of the eggs, and they are fed until they are big enough to become pupae. Then they spin a silk cocoon around themselves and stay in the cocoon for another three weeks.

Inside the cocoons they gradually change into ants. When it is time for them to come out of the cocoon the nurses cut a hole in each cocoon and take the cocoon off the ant very carefully. The nurse licks off the tight skin around the baby ant and helps straighten out the legs.

The baby ants are light in colour at first but gradually get darker. When the baby ants venture out of the nest, they have to learn their way home, by the position of the sun, as well as following the smell of other ants from the same nest. The greatest danger to baby ants is getting lost, or wandering into another enemy ant colony by accident.

1. What do the worker ants do with the eggs once they are laid?
2. How do the baby ants get out of the cocoon?
3. What is the greatest danger to a baby ant?

Life cycle

Draw four pictures to show the story of how the ant develops from the egg stage to the pupae. Write a description under each drawing.

Picture 1 The eggs - These are laid by the queen.

Picture 2 The larvae - These are the hairy little grubs which hatch out of the eggs. They feed on the queen's saliva.

Picture 3 The cocoon - When the larva is fully grown it spins a cocoon. Inside, the larva changes into a pupa.

Picture 4 The pupae - These are the tiny ants that hatch out of the cocoon.



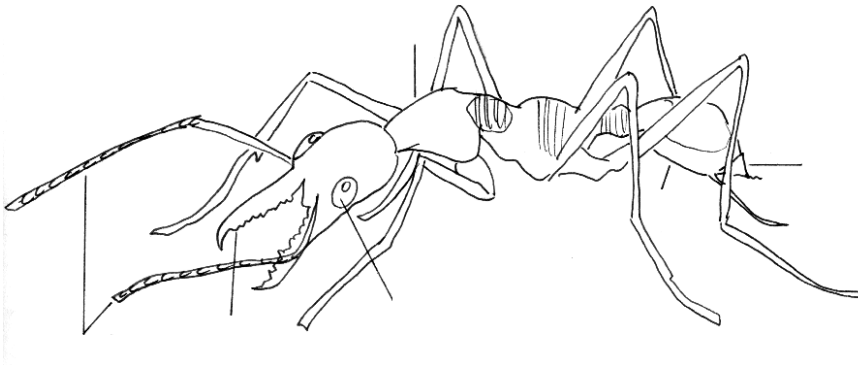
Ants 6

An ant's body

- Ants are insects. This means they have six legs.
- An ant's body has three parts.
- The abdomen is separate from the head and body. It has a distinct waist.
- Ants have *feelers* or *antennae* with a sharp bend in the middle.
- Ants have large jaws called *mandibles*, with tiny teeth, which are used in cutting.
- Male ants have two pairs of wings. Workers and soldiers do not have wings.
- Some ants have stings.
- Some worker ants can chase off intruders by squirting acid at their enemy.

Draw the ant and write name the parts:

- antennae
- jaws
- compound eye
- thorax (body part next to the head)
- abdomen (tail part)
- sting (on the tail)



Bees 1

Family members

Each hive has three kinds of bee:

1. The queen bee

She is the biggest. There is only one queen in each nest.

2. The drones

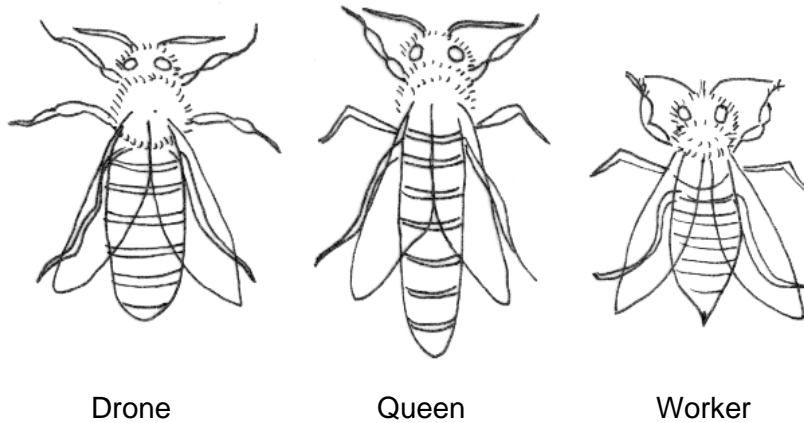
These are the males bees. They do no work at all. They are the next biggest.

3. The worker bees

These are the smallest bees. They work very hard.

When people say, "*as busy as a bee*", they are talking about the worker bees who do so many jobs in the hive, including making the honey. Just like the ant community, the bee community is extremely well organized.

Draw and name the three types of bees in the hive.



Bees 2

Bees help us

We can learn much from bees. We often say that a hard-working person is a 'busy bee'. Bees work hard to serve the members of the hive. They get food for each other and look after the babies.

Bees are servant insects. God has not only designed the worker bees to serve the hive, but they also serve us by pollinating the flowers. That means that they take pollen from one flower to another so that our fruit trees bear fruit. Bees also make delicious honey.

How do bees help each other in the hive?

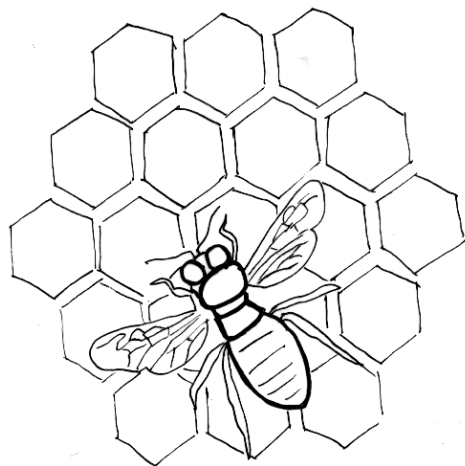
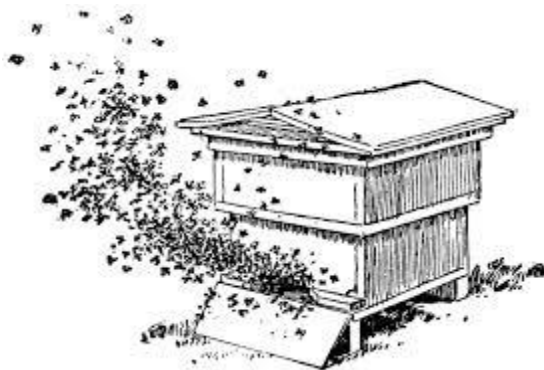
How do bees help us?

Bees work together and serve one another

In a bee community, everything runs in perfect order. Bees have no leader to tell them what to do. They just *know* what to do. God has given them instinct. This is a kind of wisdom which God gives to the animal kingdom. They just know the right thing to do and they do it.

God also gives people wisdom. We can find out the right thing to do from the Bible. However, not all people do the right thing! People can *choose* to be wise, or choose to be foolish.

1. Who do you know who is a hard worker?
2. Why is it good to be a hard worker?
3. God wants us to work to serve others. How can we work to serve God?
4. How does the worker bee teach us about serving?
5. How can we serve other people?



Bees 3

Jobs of the worker bees: Builders

The workers build six-sided wax cells. The six-sided cells, called hexagons, fit together like a jigsaw puzzle. The hexagon is stronger than any other shape. There are two layers of them. This is the honeycomb. The worker bees change the honey they eat into wax inside their body. They use the wax for building honeycomb. Many bees work together on one cell.

1. What is honeycomb made from?
2. How many layers are there?
3. What do worker bees eat?
4. What do they change the honey into?
5. What do they use the wax for?

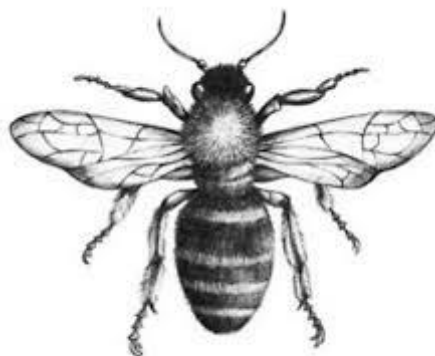
Jobs of the worker bees: Collecting pollen

If bees did not take collect pollen, then we would have no fruit. God designed the bees to take the pollen from the male part of the flower to the female part, so that seeds can form. Fruit forms around the seeds.

This is how the bees take the pollen from one part of the flower to another:

On the bee's body there are lots of tiny hairs. The pollen grains get caught in these. A bee's body can become covered in pollen. The bee scrapes the pollen from his body to his back legs, where there are special long hairs to hold the pollen. When he has enough pollen he returns to the hive.

1. Why do flowers need pollen?
2. What do the pollen grains get caught in?
3. Why does the bee scrape the pollen from his back legs to his front legs?
4. What does the bee do when he has enough pollen?



Jobs of the worker bees: Collecting nectar

In sunny weather, worker bees collect nectar from deep inside the flowers. They use their long tongue to sip the sweet thick liquid. When a bee finds nectar it does a special 'honey dance'. The bee sways her body from side to side. This sends out signals to other bees, so that they know where to come and find the nectar. Bees do not just care for themselves. They work together and help one another.

Honey bees only visit the flowers that are easy to get pollen from. Blossom is a good shape for the bee to sip nectar from. The colour and scent of the flower helps the bee to find the right one.

1. When do bees like to collect nectar?
2. What is nectar?
3. How does a bee let another bee know when it has found nectar?
4. How does a bee find the best flowers for nectar?

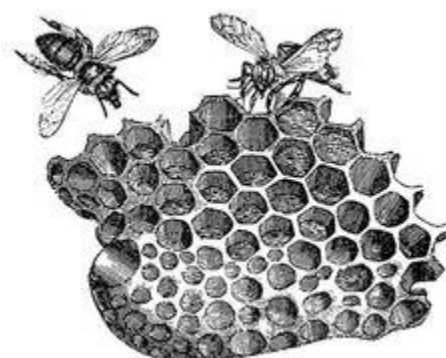


Jobs of the worker bees: Making honey

Bees carry the nectar back to the hive in a 'honey stomach'. While they are carrying the nectar, certain chemicals in their bodies start changing it into honey. Once they are back at the hive, they squeeze the nectar out of the honey stomach and pass it on to other worker bees. These bees pack it into the honeycomb. Honeycomb cells are six-sided (hexagons). When a cell is quite full, one of the workers closes it up with a little wax lid, keeping the honey air-tight.

The pollen is packed into other cells, and mixed with a little honey to make a kind of bread, which is used as food for the colony.

1. How do bees carry nectar back to the hive?
2. What happens to the nectar inside the bee's honey stomach?
3. What happens when the bee gets back to the hive?
4. Draw a honeycomb. Make sure the cells are six-sided.



Jobs of the worker bees: House Keepers

Some worker bees work at cleaning the hive. They crawl over the floor and carry out any dirt or dead bees in their jaws.

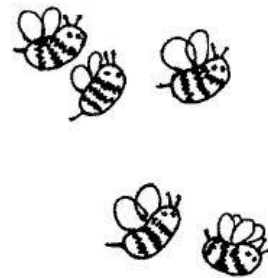
How do worker bees carry out the dirt and dead bees?

Nurses

The nurse bees look after the baby bees. The nurse bees feed the little grubs called *larvae*. They run around from cell to cell, making sure that each tiny larva is all right and that it has enough to eat.

For three days all the larvae live on *royal jelly*. Then the nurse bees feed most of them with nectar and pollen which they have collected from flowers. The pollen and nectar have been stored in the cells as *bee bread*. The queen bees are not given bee bread. They keep eating royal jelly so that they grow into queens.

1. What do the nurse bees do?
2. What is royal jelly?
3. What do larvae eat after three days?
4. What do queen bees eat all the time?



Jobs of the worker bees: Air Conditioners

Near the doorway of the hive stand bees that make a humming sound, but not because they are angry. They make the noise with their wings. They fan their wings very fast. This keeps the air moving and cools the hive in hot weather. It stops the honey from getting too soft and runny.

1. Why do some bees make a humming sound with their wings?
2. Why does honey need to be kept cool?

Armed Guards

The armed guards stand at the entrance of the bee hive. Bees have to pass the guards to get into the hive. The guards are armed with stings. They only let in the bees that belong to their hive. They know which ones belong because of their smell. They drive away any robber bees that may come from other colonies to steal honey.

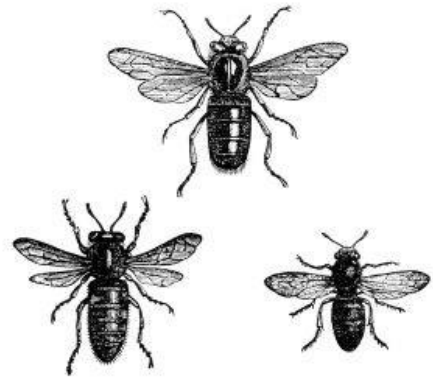
1. Where do the guards stand?
2. What is their weapon?
3. Who do the guards let into the hive?
4. Who do they keep away?

Bees 4: The Drones and the Queen Bee

The Drones

The drones are very sleepy and do no work at all. They cannot gather nectar because their tongues are too short. They have no pollen baskets for gathering pollen and they have no stings. The drones are very noisy, and buzz a lot. The purpose of the drones is to mate with the new queen so that she can lay eggs. After the drones have mated with the queen, they are usually thrown out of the hive because they are useless, and only extra mouths to feed.

1. Why aren't the drones very useful?
2. Can drones sting?
3. What is the purpose of the drones in the hive?

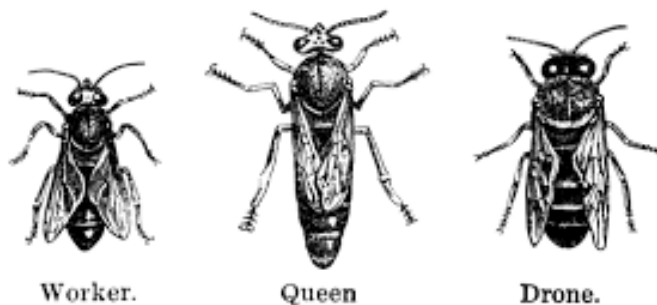


The Queen Bee

The queen is the most important bee in the hive. The other bees honour her and give her full attention throughout her life. She is surrounded and protected. She becomes a queen because she is fed on a special food called royal jelly. This makes her longer, bigger and shinier than the other bees. She is fed by the worker bees, who also comb the fur on her body.

A queen starts laying eggs once she has mated with a drone. The queen lays her eggs in the wax cells. She lays two kinds of eggs. One kind of egg will grow into workers and the other kind will grow into drones.

1. What does the queen look like?
2. Who looks after the queen?
3. What special attention does she receive?
4. Where does the queen lay her eggs?
5. What are the two kinds of eggs that the queen lays?

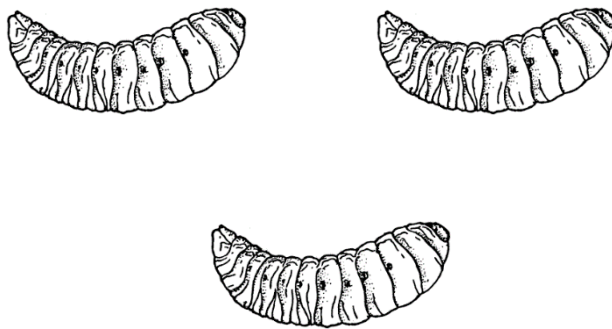


Bees 5

The larvae

The eggs hatch into small white grubs. These are called *larvae*. The nurse bees feed them on pollen and honey. After five days, they have developed into tiny bees called *pupae*. They stay in the cells for another thirteen days. Then they bite their way out of cell, by biting through the wax which covers the cell.

1. What are the *larvae*?
2. Who looks after them?
3. What is the total amount of time they stay in the cell after hatching?
4. How do they get out of the cell?

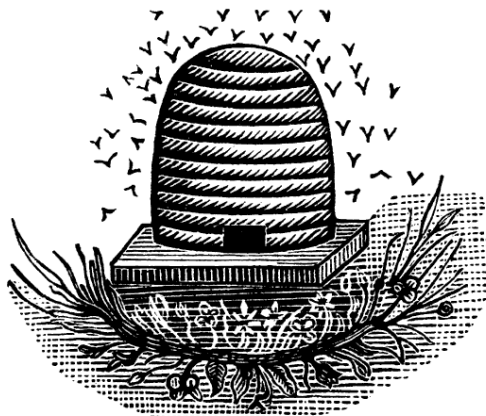


Bees 6

The swarm

When there are too many bees in the hive, the old queen leaves, taking many worker bees with her. Some of the worker bees scout for a new home. The swarm gathers together in a cluster on a branch before they move into their new home.

1. What happens when there are too many bees in a hive?
2. What does it mean to *scout* for a new home?
3. What does a *cluster* mean?



Bees 7: Structure

A bee's head

The head has five amazing eyes: two large ones and three small ones. As well as being able to see in all directions at once, she can see the earth and the sky at the same time. The eyes also let light through in an amazing way. Bees can see many different patterns of white, grey and black, and can actually *read* her way to flowers and back to the hive again. Because of her amazing eyes, the bee has a wonderful sense of direction.

The head also has feelers, to feel and smell. Bees also have a mouth with strong jaws for chewing and a long tongue for sipping nectar.

1. How many eyes does a bee have?
2. What is so amazing about the bee's eyes?



A bee's body

A bee is an insect. This means it has six legs. Its body is divided into three parts: the head, the thorax and the abdomen. Draw a bee and label the parts.

The thorax is the middle part of the body. It has four thin wings. There are two on each side and they can move four times a second. The tail part is the abdomen. This is the biggest part. It has a honey sac where it stores nectar.

Worker bees have stings on their tails. The sting has two spears which are joined to a red, egg-shaped bag which holds poison. Each spear has barbs on the end. These are like fish hooks. These make it very hard to pull out of the flesh. Sometimes the bee has to leave them there in order to get away. When she does this, she dies. Worker bees can usually get their stings out of other bees, but not out of a human being's skin.

1. To which part of the body are the four wings attached?
2. What is so amazing about the wings?
3. What is stored in the abdomen?
4. Which members of the bee family have stings?
5. What is the sting like? What happens if the bee loses her sting?



Bees 8

The dance of the bees

When a bee goes out looking for nectar it performs a “dance” which sends signals back to the other bees to come and get the food. They get electrical charges on their body while flying and can send out electric signals by their dance.

A bee can fly away from the hive for about 8 km and find its way back. But if they fly this far they get too tired to work. Usually they fly about 2 km (1.24 miles) from their hive looking for food.

Bees have favourite flowers for nectar: Their favourite colours are blue and yellow.



1. How does a bee tell other bees that they have found food?
2. What does this show us about God the Creator?
3. Write an amazing fact about a bee that is far away from home?
4. What colours do bees like?

Draw either a bee dance, or a bee on o