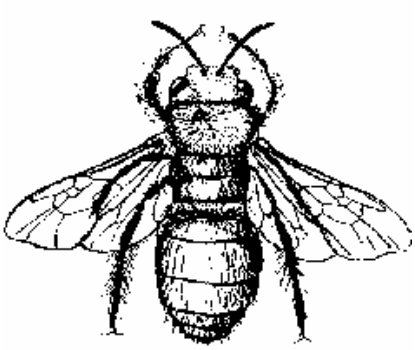
Community Insects



God is Wise / God is a Servant

This unit of study has been designed for use with the Beacon Media resource:

Themes for Christian Studies **-** a Biblical foundation for learning

Notes for teachers

Christian life and character development

- Observe the wisdom of the ant community in preparing for the future.
- Observe the instinct used by community insects, and relate this to God's gift of wisdom i.e. knowing the right thing to do.
- Observe the wisdom displayed in the insect communities, and the ability to work together in an organised fashion.
- Observe the serving qualities in the insect communities, with each member working to help other members.
- Marvel at the intricate and elaborate systems of ant and bee communities, designed by the Creator.

Related Bible references – refer to:

- ***Themes for Christian Studies*** – *God is Wise, God is a Servant*.
- ***Jesus First - a guide to character development*** for character development activities.

Literacy

- Aesop's fable: *The Ant and the Grasshopper (Themes for Christian Studies 5- Wise)*
- Word banks
- Reading for information.
- Summarizing information.
- Recording observations.

Art

- Make a giant beehive from hexagons and make paper mache bees to go on the hexagon patterned background.
- Make paper mache ants
- Make a cut-out ant from *Themes for Christian Studies* 5.

Science

- Make an ant farm from a discarded fish tank and observe the habits of an ant community. (Ant farm kit available from toy shops.)
- Set out some honey and see whether you can attract ant or bees.
- Go on nature walks.

Maths

Work with hexagons and triangles; Count the legs of ants or bees. (Count by sixes)

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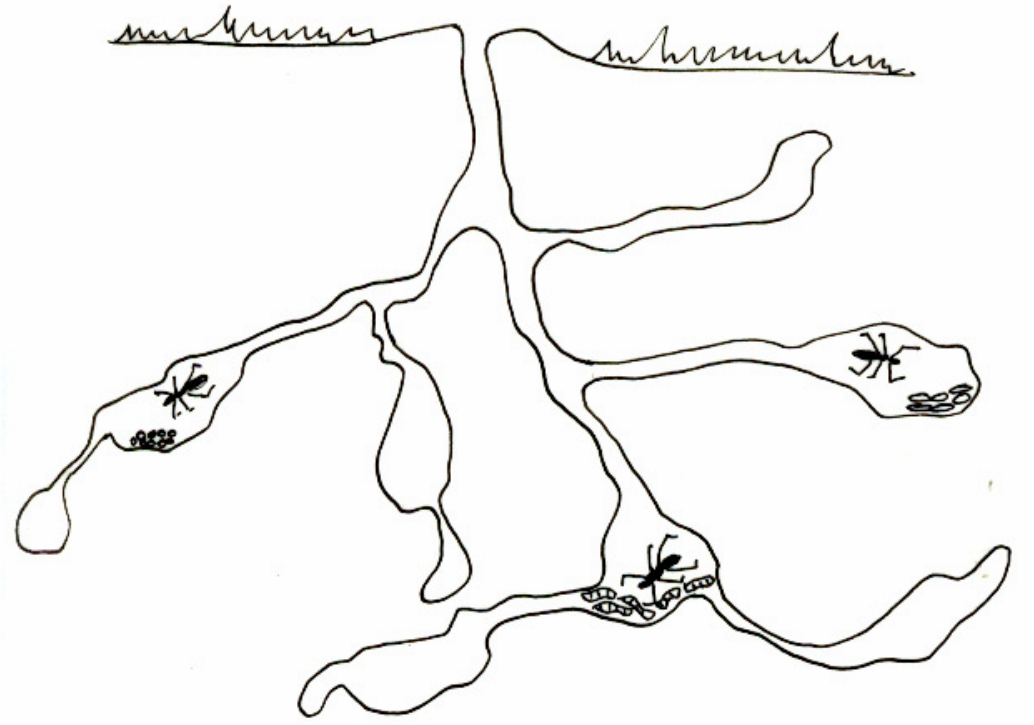
Ants

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 wriggly 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. What a lot of work it is looking after the eggs and larvae!

Another job that has to be done in the ant colony is the disposal of garbage. 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. Why are ants called social insects?
2. What is an ant colony?
3. An ants' nest usually has long _____ and _____ at the end.
4. What are the chambers used for?
5. Why is dampness important in the nursery?
6. What must be done to look after the eggs?
7. What do ants do to keep their nest clean?
8. What does the careful planning of the ant colony teach us?
9. Think of a difficult job that you have to do. For example, it could be a homework project, making a model or preparing a meal. Make a plan for doing the job. Write down the steps.
10. What kind of materials do ants use to make their homes?

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
- 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. A bulldog ant for example, has long curved saw-toothed pincers, and a sting. They fight enemy ants from other colonies.

Worker ant

Soldier ant

Questions:

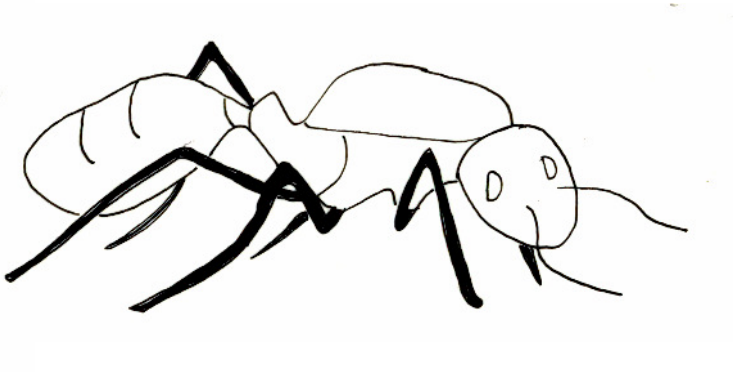
1. How many females might there be in a colony?
2. How many males?
3. Are the workers male or female?
4. What do the workers do?
5. What do the nurses do?
6. What do the soldiers do?
7. Are the solders male or female?

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, each one to start 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 t o a large ant city.

Male ant



Queen ant

Questions:

1. The male ants and the queens are the only ones without _____.
2. The mating flight is an amazing example of animal instinct. The ants just know that it is time to mate. What is animal instinct and how do you think animals get their instinct?
3. What happens to the males after they have mated?
4. What does the queen do after she has mated?

The Larva and Pupa (plural = larvae and pupae)
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.

Eggs Larva Cocoons

Questions:
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?

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.

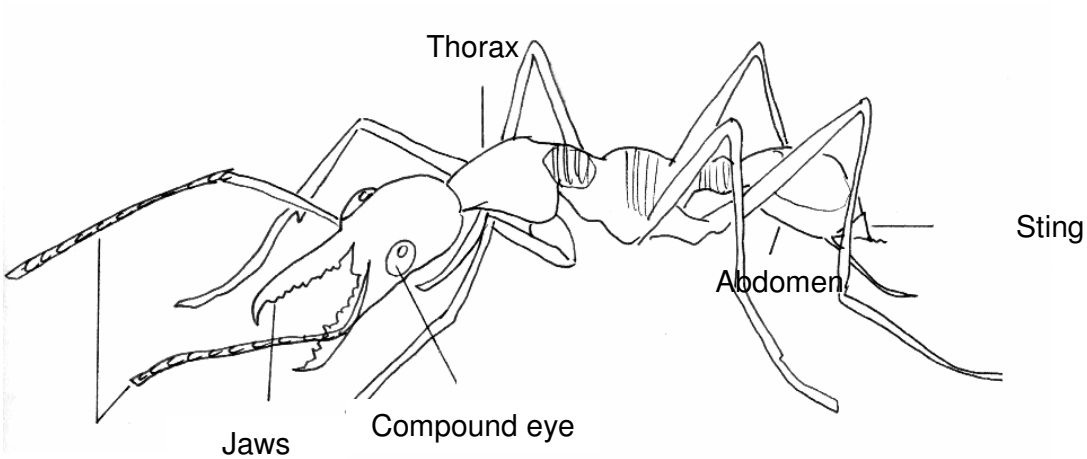
Picture 2 The larvae
These are the hairy little grubs which hatch out of the eggs. They feed on the queen's saliva.

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.

An ant's body

- Ants are insects. This means they have six legs. Find them on the drawing and colour them in.
- An ant's body has three parts. Find them: head, thorax, abdomen
- 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 your own picture of an ant

Ants teach us to be wise

1. Read Proverbs 6: 6-8. A *sluggard* is a lazy person. Why do you think that God would tell a lazy person to learn a lesson from an ant?
2. Why does the Bible say the ant is a wise little creature?
3. Why is it a wise thing to gather food in the harvest?

The Bible tells us about many wise people. One was Joseph. He asked God for wisdom to tell the meaning of dreams. God gave some wise advice when he told Joseph that the people must save up the wheat in the seven good years of harvest, so that there would be enough for the seven bad years. (See Themes Level 3 God is Wise).

One of Aesop's fables tells us about the wisdom of the ant who stored food for the winter. It is the story of *The Grasshopper and the Ant.* (See *Themes for Christian Studies* Level 5 God is Wise)

4. How do we know that ants store up food?

- You may have seen an ant carrying food. Where is it taking the food?
- How can we tell from its underground nest?

5. Write a sentence using each of these words, explaining why we would use these words to describe the ant. (Use you dictionary)

- hard working
- considerate
- loyal
- sharing
- wise
- intelligent
- strong
- organized

6. Of all the creatures in the animal kingdom, the tiny ant has the largest brain in proportion to its size. If we look at the way in which the ant organizes its community, then it is not surprising. What lessons can human communities learn from the ant?

Bees

Family members

Each hive has three kinds of bee:

1. The queen bee

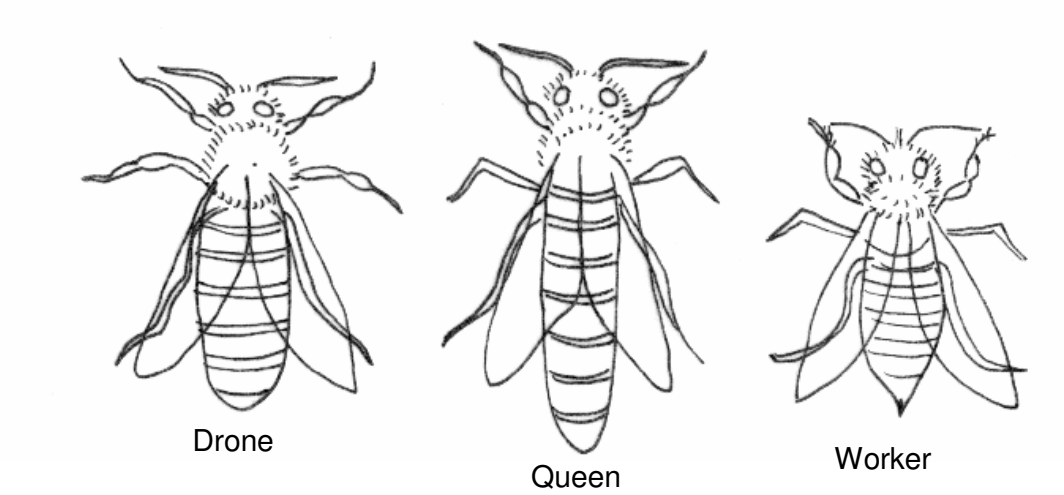
She is the biggest. There is only one queen in each nest.

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.

We can learn much from bees, just as we can from ants. We often use the busy bee symbol to represent people who are hard workers. Bees work hard to serve the members of the hive. They are servant insects. God has not only designed the worker bees to serve the hive, but they also serve us in pollinating the flowers. This makes our fruit trees bear fruit. Bees also make delicious honey.

God is Wise

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 that 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! That's

because people can *choose* to be wise, or choose to be foolish. Bees do not have that choice.

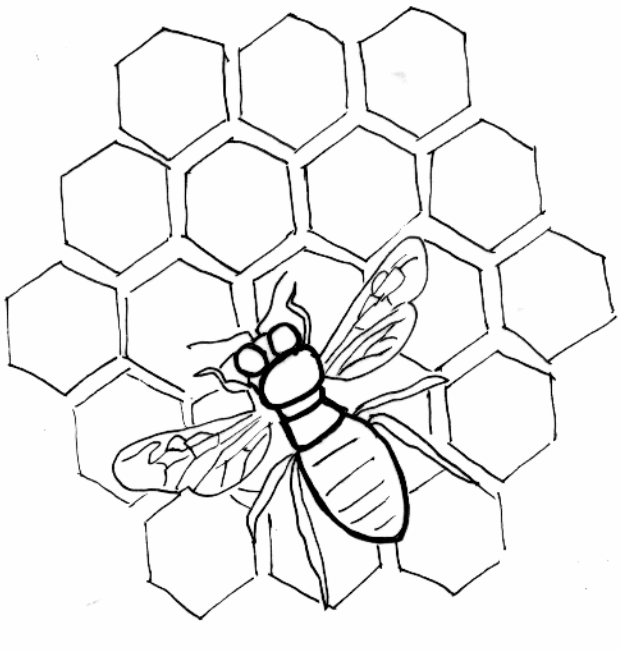
God is a Servant

1. Make a sign "God is a Servant" to stick on your wall. Under it draw some community insects and write some Bible verses about serving.
2. Do you know anyone who is a hard worker? Who?
3. Why is it good to be a hard worker?
4. God wants us to work to serve others. How can we work to serve God?
5. How does the worker bee teach us about serving?
6. How can we serve other people?
7. How did Jesus serve others when He was living on earth?

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?

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?

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?

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. 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?

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?

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?

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 grow into workers and the other kind 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?

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?

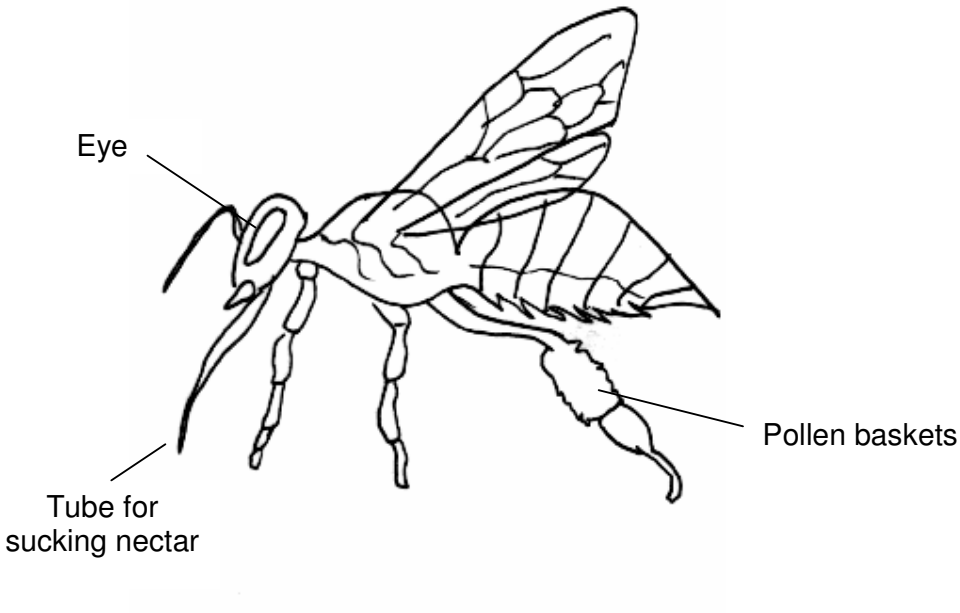
The swarm

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?

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.



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.

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 tail. 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, bit not out of a human being's skin.

1. How many legs does a bee have?
2. How many eyes does a bee have?
3. What is so amazing about the bee's eyes?
4. Where are the four wings attached?
5. What is so amazing about the wings?
6. What is stored in the abdomen?
7. Which members of the bee family have stings?
8. What is the sting like?
9. What happens to the bee if she has to leave her sting in an enemy?