



***THE
SECRET OF
A HONEYBEE***

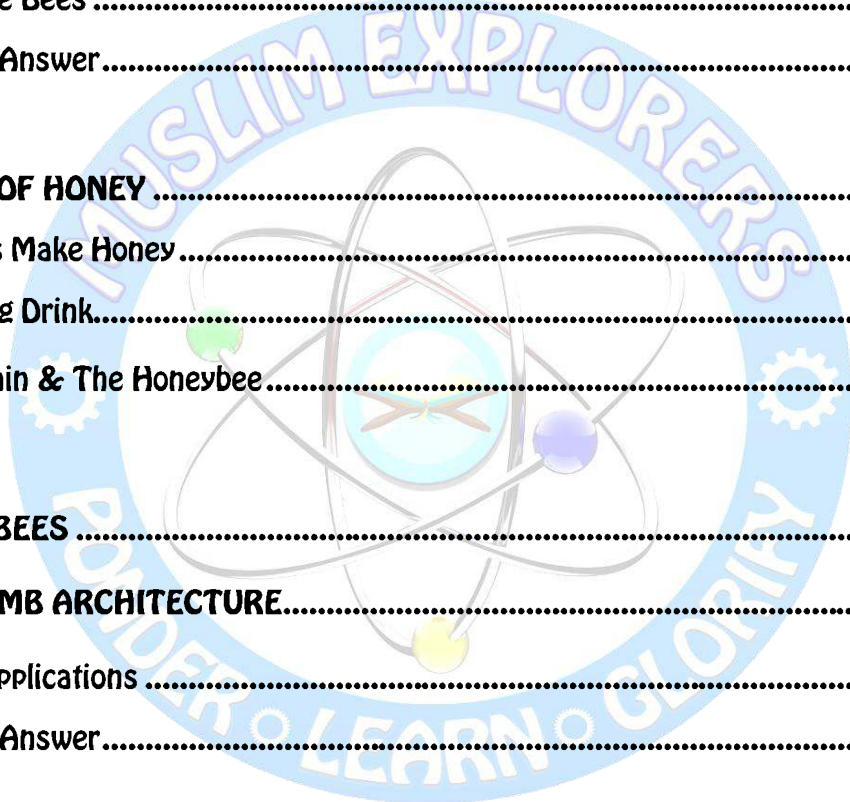
أَوْحَىٰ رَبُّكَ إِلَى النَّحْلِ...

***And Your Lord inspired
to the bee...***



Table Of Contents

THE INSPIRATION.....	3
An-Nahl.....	4
MEET THE BEE FAMILY	5
Gifts From The Bees	6
Can You Answer.....	7
THE MIRACLE OF HONEY	9
How The Bees Make Honey.....	10
The Healing Drink.....	11
The Momin & The Honeybee.....	12
THE TALKING BEES	14
THE HONEYCOMB ARCHITECTURE.....	16
Honeycomb Applications	17
Can You Answer.....	18



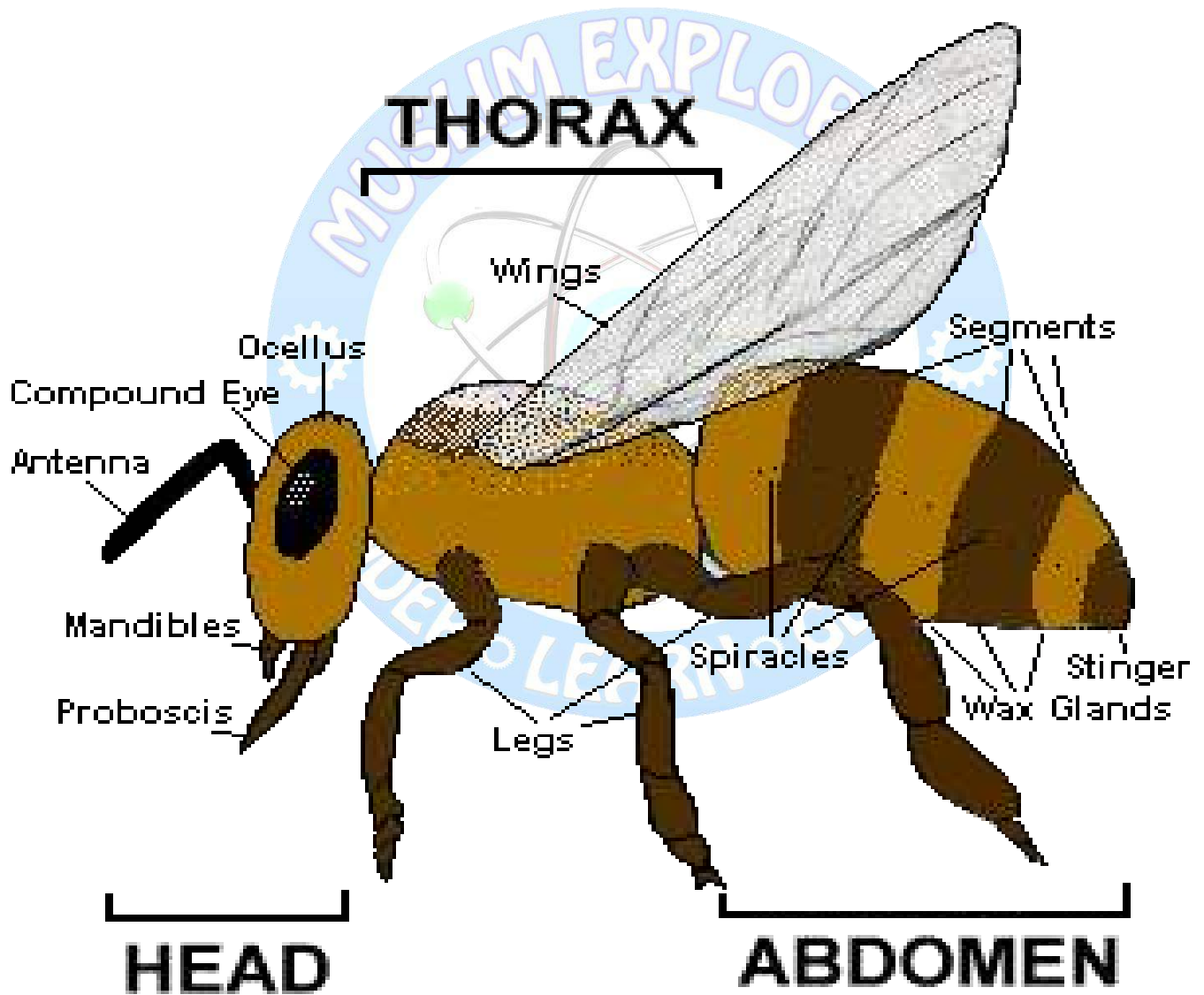
THE INSPIRATION

وَأَوْحَىٰ رَبُّكَ إِلَى النَّحْلِ أَنْ اتَّخِذِي مِنَ الْجِبَالِ بُيُوتًا وَمِنَ الشَّجَرِ وَمِمَّا
يَعْرِشُونَ ﴿٦٨﴾ ثُمَّ كُلِي مِنْ كُلِّ الثَّمَرَاتِ فَاسْلُكِي سُبُلَ رَبِّكِ ذُلُلًا
يَخْرُجُ مِنْ بُطُونِهَا شَرَابٌ مُخْتَلِفٌ أَلْوَانُهُ فِيهِ شِفَاءٌ لِلنَّاسِ ۗ إِنَّ فِي
ذَلِكَ لَآيَةً لِّقَوْمٍ يَتَفَكَّرُونَ ﴿٦٩﴾

And your Lord inspired to the bee, "Take for yourself among the mountains, houses, and among the trees and [in] that which they construct. (68) Then eat from all the fruits and follow the ways of your Lord laid down [for you]." There emerges from their bellies a drink, varying in colors, in which there is healing for people. Indeed in that is a sign for a people who give thought. (69)

How do the verses of Surah An-Nahl inspire you?

النحل

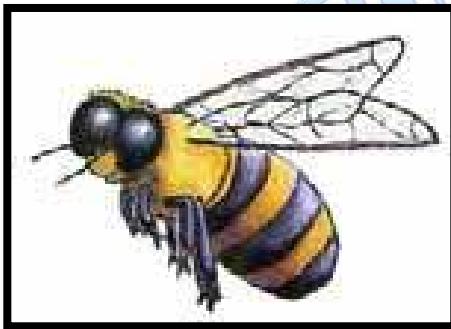


MEET THE BEE FAMILY

It's the largest female bee that rules the hive. There is only one queen per colony, without which the rest of the colony cannot survive. It lays approx 1,500 to 2,000 eggs per day during the summer. It's come from a special larger cell. The larval queen is fed exclusively royal jelly.



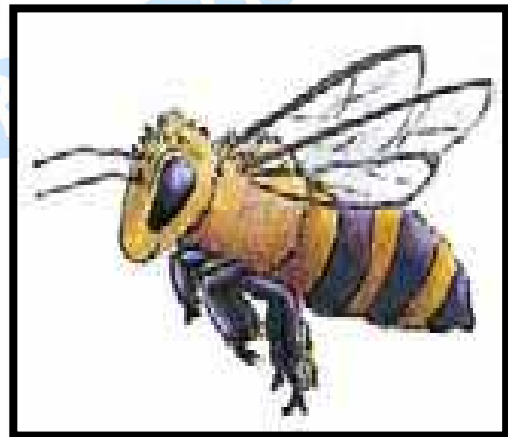
QUEEN BEE



THE DRONE

Drones are the only male resident within a colony. They are about 15% of the hive's population. At the beginning of a spring season they are one hundred in number, in a healthy hive often their population is not greater than a thousand.

Worker bees are female bees and form the largest population of the hive. They make beeswax to build the hive and search nectar out in the field. These are the bees responsible for caring for young, food storage, cleaning, and protection, tending to the queen, and regulating the temperature of the hive. They live for 5-8 weeks in the summer. They can live longer during the winter when there's less "work" to be done.



WORKER BEE

GIFTS FROM THE BEES

Pollination

One part of the flower called the "ANTHER" makes pollen.

Another part of the flower, called the "PISTIL" leads to the eggs.



HONEY



BEE SWAX

Can You Answer?

What job does a Queen Bee performs?

How many eggs can a queen bee lay in its lifetime?

What happens when there is more than one queen?

What does the queen bee feeds on?

Who are the male members of the bee family?

Can you form a To Do List for the worker bees?

✓ _____

✓ _____

✓ _____

✓ _____

✓ _____

✓ _____

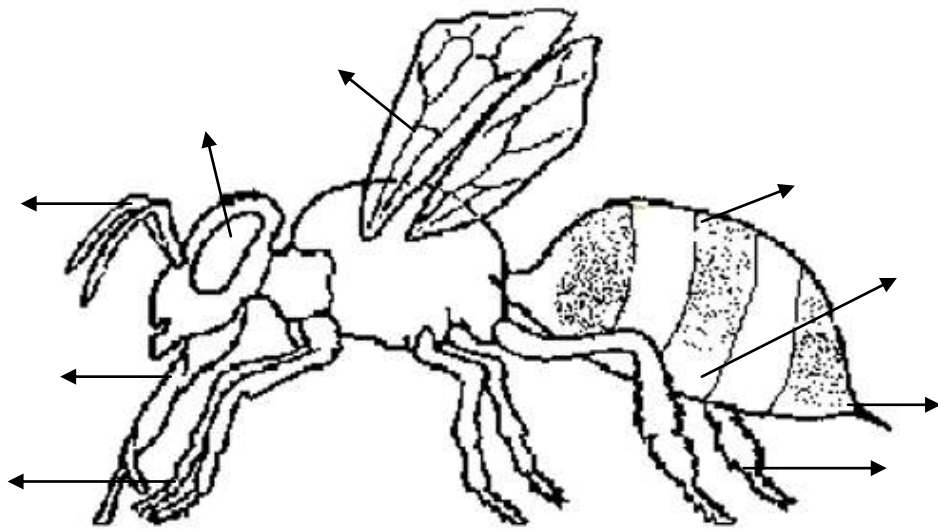
✓ _____

✓ _____

✓ _____

✓ _____

Try to label these body parts of a honey bee



The body of a honeybee is mainly divided into three parts.
Can you name them?

✓ _____

✓ _____

✓ _____

THE MIRACLE OF HONEY

ثُمَّ كُلِي مِنْ كُلِّ الثَّمَرَاتِ فَاسْلُكِي سُبُلَ رَبِّكِ ذُلُلًا يَخْرُجُ مِنْ بُطُونِهَا
شَرَابٌ مُخْتَلِفٌ أَلْوَانُهُ فِيهِ شِفَاءٌ لِلنَّاسِ إِنَّ فِي ذَلِكَ لَآيَةً لِقَوْمٍ
يَتَفَكَّرُونَ ﴿٦٩﴾

Then eat from all the fruits and follow the ways of your Lord laid down [for you]." There emerges from their bellies a drink, varying in colors, in which there is healing for people. Indeed in that is a sign for a people who give thought.

(Qur'an, 16:69)

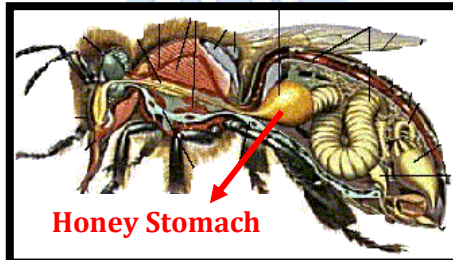
Ponder on this verse and write the four main points that ALLAH S.W.T has emphasized about the miracle of honey?

HOW BEES MAKE HONEY

..... ثُمَّ كُلِي مِنْ كُلِّ الثَّمَرَاتِ فَاسْلُكِي سُبُلَ رَبِّكِ ذُلُلًا يَخْرُجُ مِنْ بُطُونِهَا شَرَابٌ



Bees drink nectar from flowers using their long tongue. Their tongue is nearly twice as long as their body. This helps them reach the nectar inside the flower.



Bees store the nectar in a special sac called a "Honey Stomach". Inside the honey stomach the nectar is broken down into two sugars called FRUCTOSE and GLUCOSE.



The bees then spit (regurgitates) the nectar from their honey Stomachs into the honeycomb cells.



After fanning the honey, the hive bees cover the cells with a wax cap, sealing the honey into the honeycomb for later consumption.

Now, the hive bees beat their wings furiously, fanning the nectar to evaporate its remaining water content. As the water evaporates, the sugars

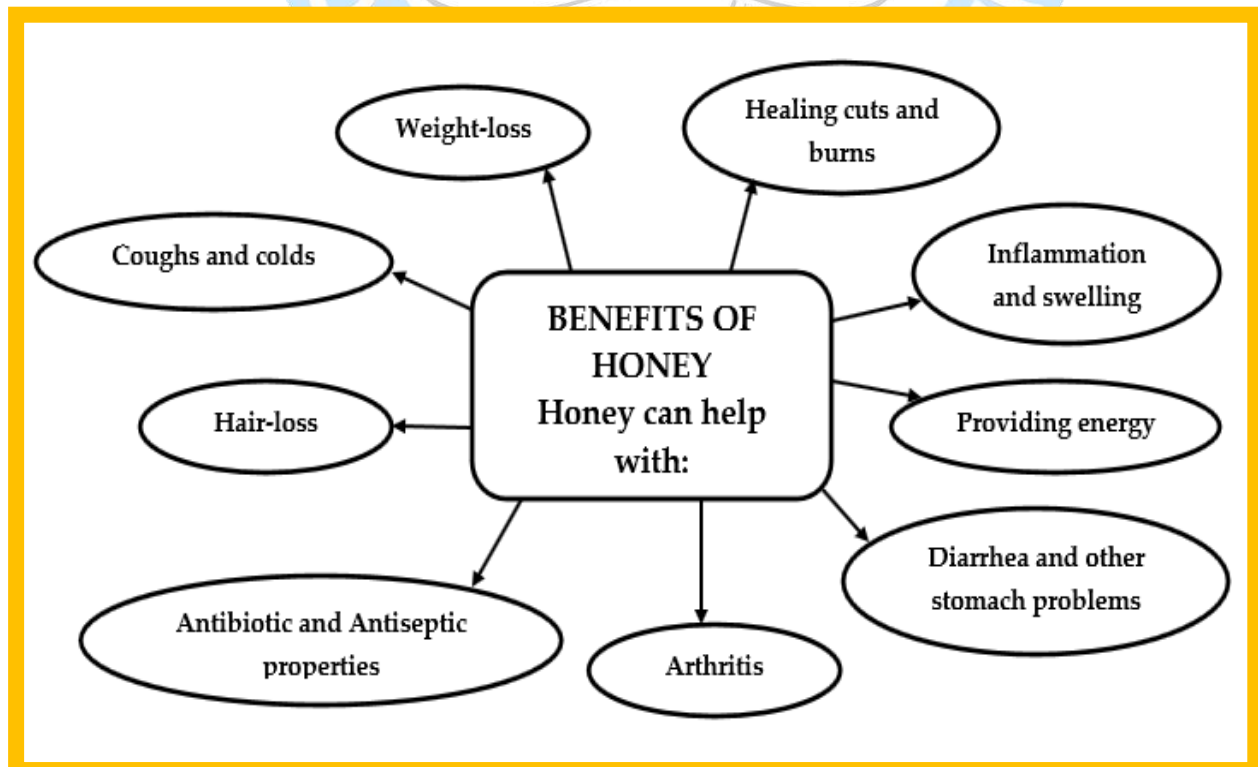


THE HEALING DRINK

..... شَرَابٌ مُخْتَلِفٌ أَلْوَانُهُ



..... فِيهِ شِفَاءٌ لِلنَّاسِ



THE MOMIN & HONEYBEE

إِنَّ فِي ذَلِكَ لَآيَةً لِّقَوْمٍ يَتَفَكَّرُونَ ﴿٦٩﴾

Abdullah bin Amr bin Aas (R.A) relates that Prophet Muhammad (S.A.W.S) said ; “...I swear by Him, Who owns my soul that a Momin is like a honey bee, which sucks nectar from flowers , turned it into the beneficial honey, and neither misuses or damages the flower petal by its weight” (Tirmidhi)

What lessons do you learn from the Verse 69 of An-Nahl?

What does the Arabic word “Nahl” means?

How many flowers do bees visits to make 1 tsp of honey?

How does a honeybee benefit others?

Write the five main steps of honey formation?

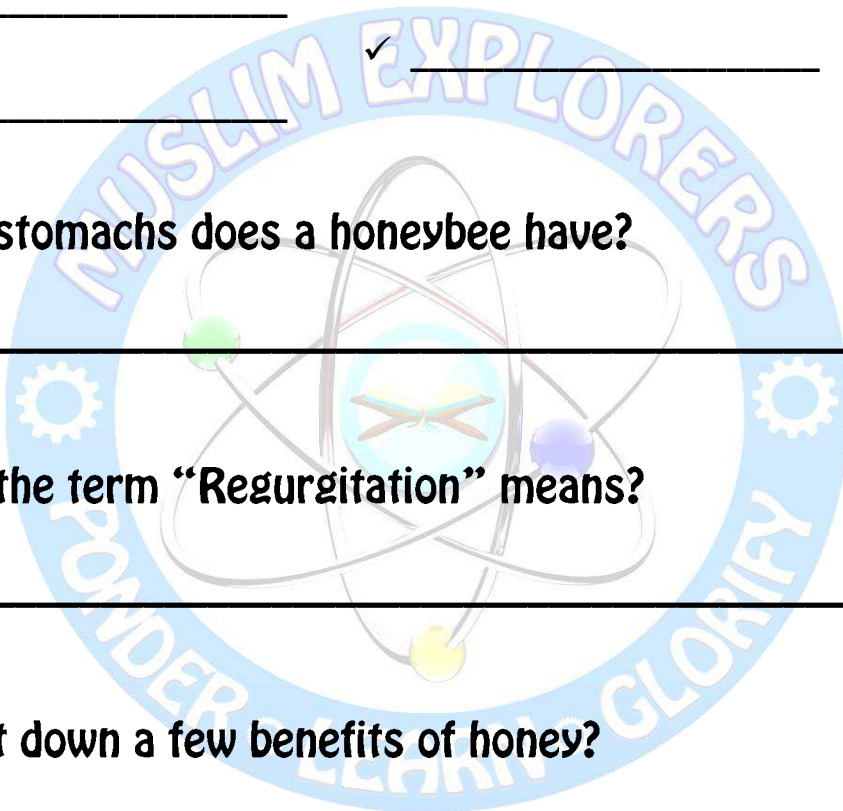
- ✓ _____
- ✓ _____
- ✓ _____
- ✓ _____
- ✓ _____

How many stomachs does a honeybee have?

What does the term “Regurgitation” means?

Can you list down a few benefits of honey?

- | | |
|---------|---------|
| ✓ _____ | ✓ _____ |
| ✓ _____ | ✓ _____ |
| ✓ _____ | ✓ _____ |
| ✓ _____ | ✓ _____ |
| ✓ _____ | ✓ _____ |



THE TALKING BEES

PHEROMONAL COMMUNICATION

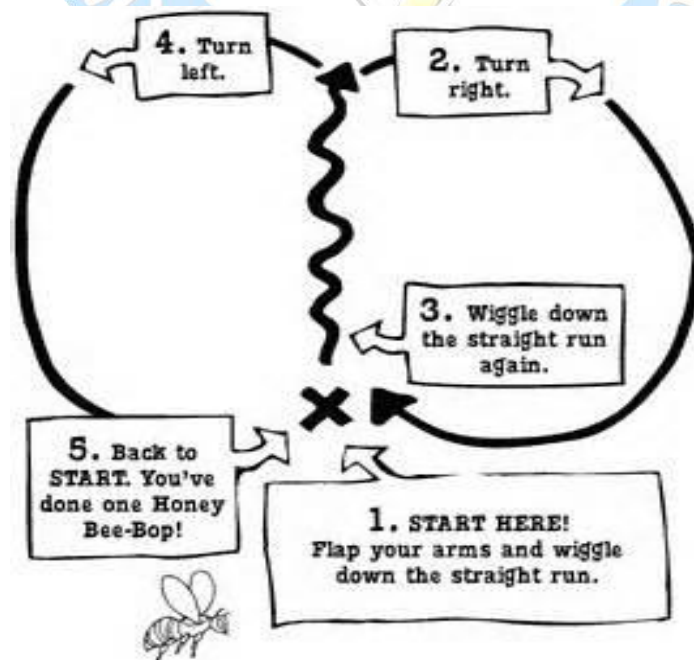
Pheromones (mixtures of chemical substances) are released by a bee sending a message as a liquid or vapor. Bees receiving the message smell pheromones with their antennae that cause change in their physiology or behavior.

This communication system is used in following fields: DEFENCE OF THE HIVE, NURSING LARVAE, DISTRIBUTION OF LABOUR, GUIDING BACK HOME, and QUEEN'S SPECIAL PHEROMONES

THE WAGGLE RUNS

Honeybees have specific body movements, the "Waggle Runs". These movements are performed by a bee when it finds a nectar source (a group of flowers).

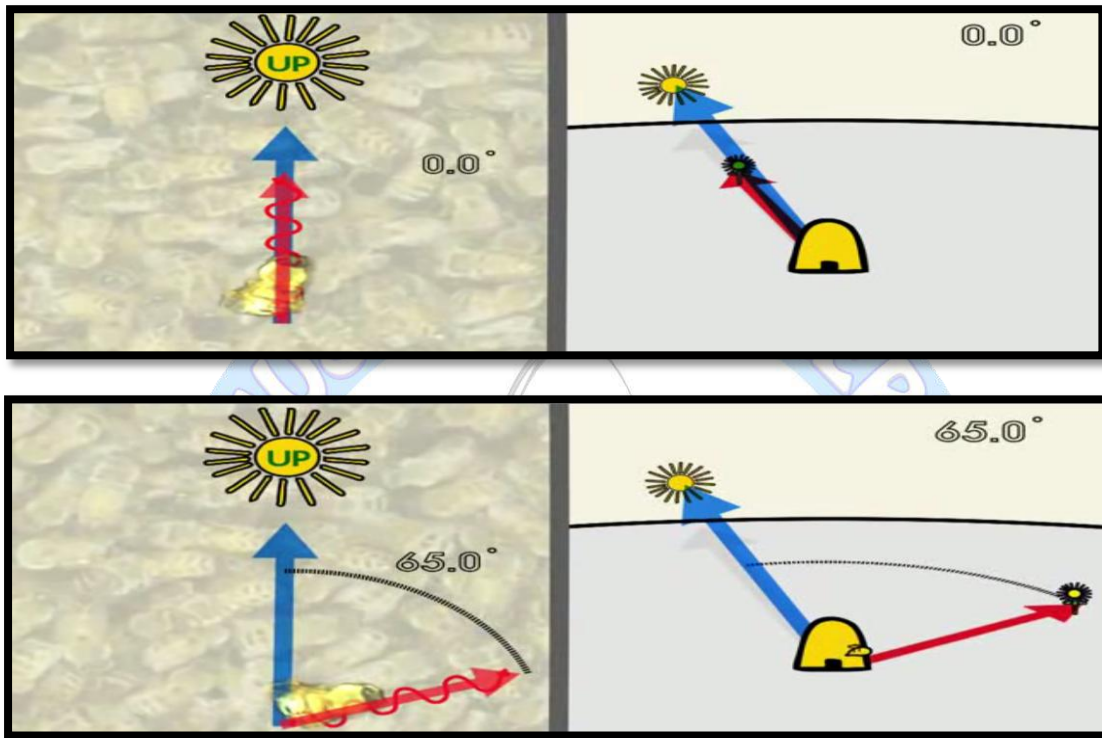
The honeybee's movement encodes key information about the source. For instance, as she performs waggle runs on the vertical comb surface, her average body angle with respect to gravity corresponds to the direction of the food source relative to the current position of the sun.



THE WAGGLE RUN

For example:

- a) If the food source lies in the exact direction of the sun, she will waggle straight upwards.
- b) If the food lies, say, 65 degrees to the right of the imaginary line to the sun, she will angle upwards 65 degrees to the right of vertical.



Also, the duration of her wagging runs is directly linked to the flight distance from the hive to the food source. Further, the more attractive the destination, the longer and more vigorously she dances, and the more quickly she returns for the start of each waggle run. Depending on the richness of the food source, she may perform up to 100 waggle runs in a single dance.

Humans can't perform such calculations manually, without the help of any measuring instruments. Then how can the honey bees do this?

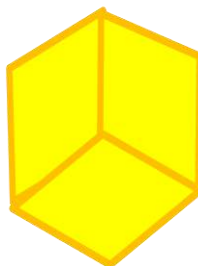
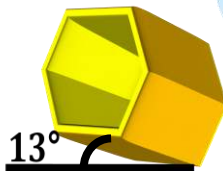
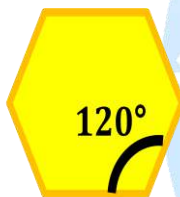
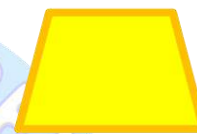
The answer is divine inspiration;

أَوْحَىٰ رَبُّكَ إِلَى النَّحْلِ...
"And you're Lord inspired to the bee...."

HONEYCOMB ARCHITECTURE

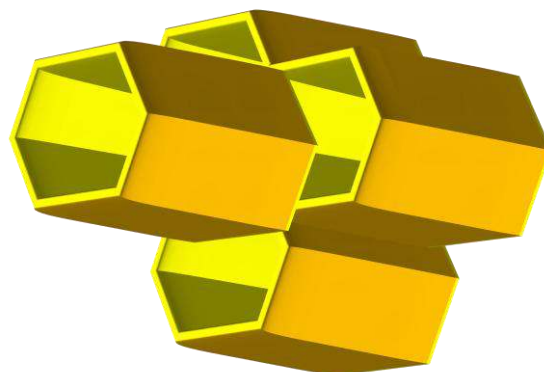
A honeycomb is a mass of identical and exceptionally regular hexagonal cells, made up of beeswax. It contains larvae and store honey. Bees use different geometrical shapes to design a perfect honeycomb.

- Hexagons (For the comb's cover).
- Trapezoids (For the lateral walls).
- Equilateral rhombs (For the base of cells).



While constructing honeycomb bees need to make complex calculations and to make three different types of angles:

- 120° (The internal angles in hexagon cell).
- 13° (The upward angle of cells, to prevent honey from flowing out).
- The angles between the equilateral rhombs in the cell's base.

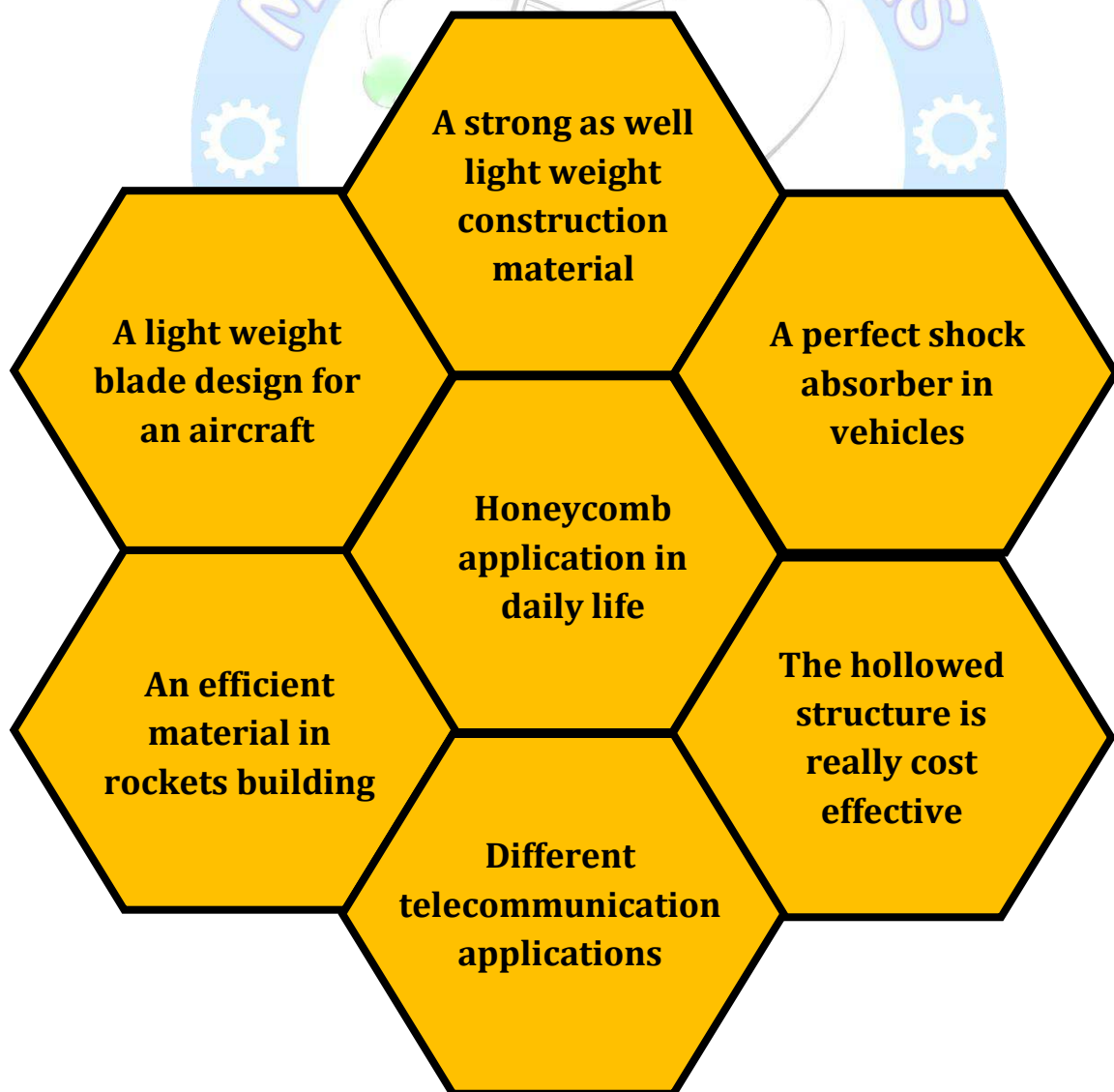


Honeycomb Applications

THE EFFICIENCY SECRET



THE ARTIFICIAL HONEYCOMB



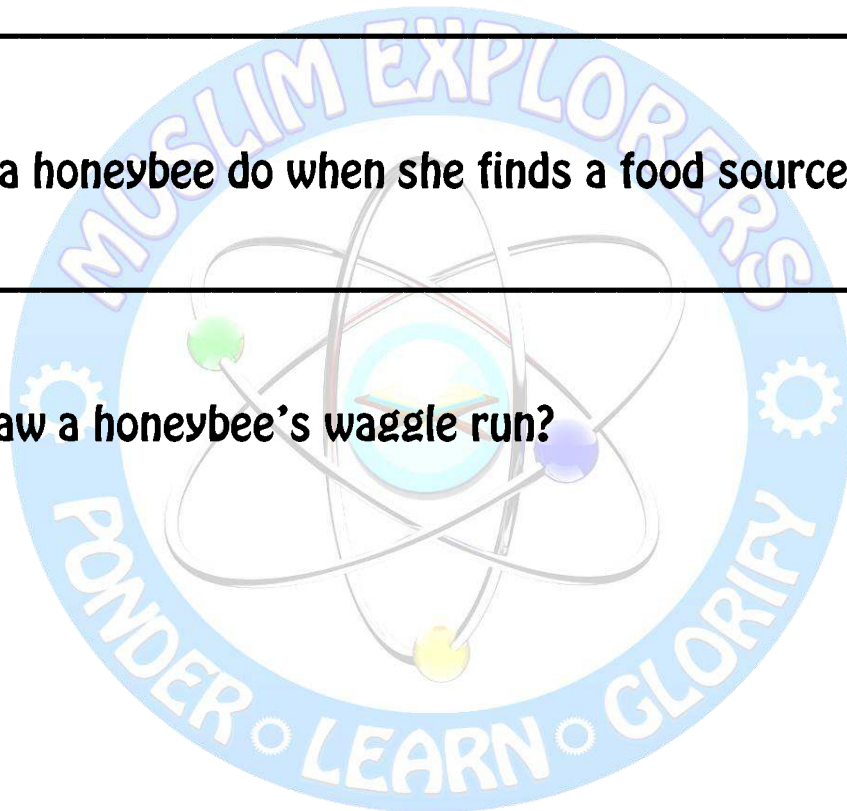
CAN YOU ANSWER?

How does a honey bee talk?

How does a honey bee smell?

What does a honeybee do when she finds a food source?

Can you draw a honeybee's waggle run?

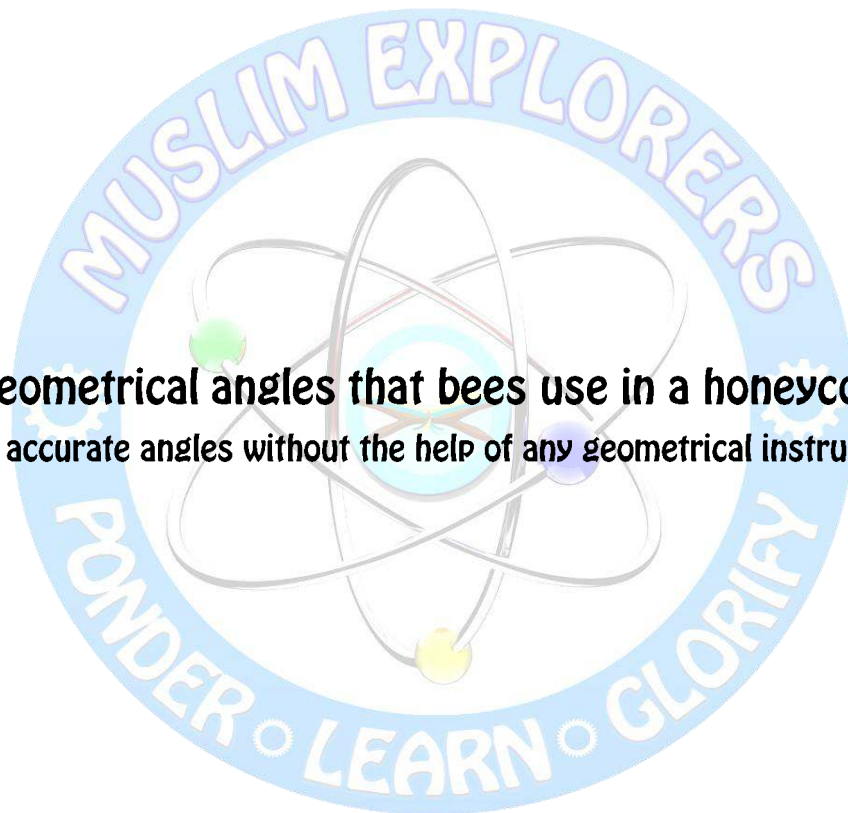


Who taught honeybees Mathematics & Geometry?

What are the efficiency secrets of a honeycomb?

- ✓ _____
- ✓ _____
- ✓ _____

Draw the shapes that bees use in honeycomb designing.



Draw the geometrical angles that bees use in a honeycomb.

(Can you draw accurate angles without the help of any geometrical instruments?)

List a few applications of honeycomb in the modern world?

- ✓ _____
- ✓ _____
- ✓ _____
- ✓ _____