

Fantastic fliers

What we will learn this week:

Lesson 6

- Why bats fly
- How bats fly
- Energy requirements of flight
- Wing shapes and flight patterns

Hi friends, do you ever wish you could fly? One of the best things about being a bat is being able to fly.

Here is a FANTASTIC FACT - Bats are the only mammals capable of true flight.

Some other mammals can glide or parachute, for example sugar gliders and so called "flying squirrels" will glide from tree to tree but if the trees are too far apart no amount of flapping their arms will get them any further.

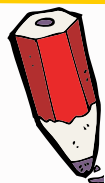
Bats are the only mammals that can drop (usually from their roost), fly and keep on flying. Some bats can even do vertical take-offs from the ground.



If you see this symbol:



you may need help from an adult.



Don't forget, the pencil symbol means it's your turn to do an activity!

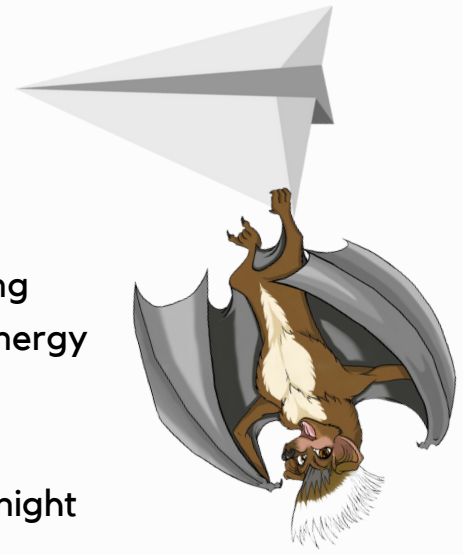
We've included all the new words in the word list at the end!

You will need :

Check out this week's activities to see what you need for each one!

1 Why do we fly?

- 1 Well it's a quicker way to get around compared to walking or swimming. Flying uses a lot of energy but it's more energy efficient.
- 2 We fly to hunt for food, this might change from night to night or season to season.
- 3 We also fly to change roosts, we need different roosts for different seasons, sometimes these roosts are very far apart.
- 4 When you can get from A to B quickly there is less chance of a predator spotting you.
- 5 Some of us have to migrate and being able to fly over deserts, seas and mountains is much easier than walking, running or swimming that far.



Hi, I'm Eidolon, a straw-coloured fruit bat. When it comes to flying, my friends and I are famous worldwide! Let me tell you why;

In October millions of us start flying to Kasanka National Park in Zambia. There are so many of us we form the biggest terrestrial mammal migration on earth!

Some of us fly over 1000 kilometres to reach Kasanka. (It takes us a while to get there!) By the end of December there will be around 10 million of us in Kasanka.

It's not just bats who travel to Kasanka, humans come to see the amazing sight of millions of us bats flying through the sky. We are a great tourist attraction, as well as an important part of the natural environment.

A bat's wings – long bones and stretchy membrane

Bats belong to a group of animals that scientists called "**Chiroptera**".

Chiroptera means hand wing. A bat's hands are its wings. A bat's skeleton is very similar to a humans but one of the big differences is that bats have very very long fingers compared to you guys. (Imagine standing with your arms open wide and level with your shoulders. If you were a bat your fingers would be long enough to touch the floor.)

A bat's arms and hands combine with a thin stretchy membrane to make its wings.

A bat's body and flight

Mouth - Breathing and echolocation are coordinated with wing beats for efficient use of energy

Heart - Very large so it can pump lots of blood to muscles

Ears - pick up echoes

Strong shoulder muscles

Thumb - Helps bat to climb up to a high place to fly from

Finger bones - Long, strong, light, give structure to the wing

Wings - Fold up when not in flight

Wing membranes are light and stretchy

Legs, tail membrane and tailbone can be used as an airbrake

Tiny hairs on wings and tail sense airflow

When they want to fly, most bats will start by dropping from somewhere high like a tree, building or cave. From there once they have picked up some speed they will open their wings, "catch" the air and fly away, so a bit like a sky jumper might do (jumping from a high plane, and then launching their parachute!). However some bats like Bongi (the Botswanan brown long-eared bat) that have broad wings can take off from the ground if they have to.



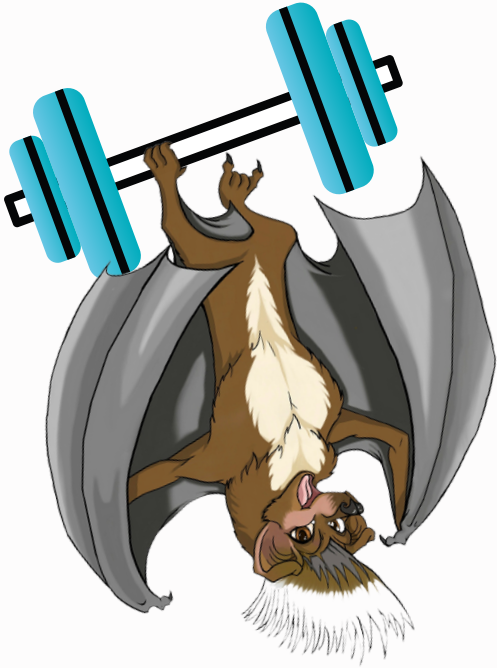
The thin stretchy membrane across our wings is a bit like having webbed hands, and it allows us to move more easily through the air, in a swimming or rowing motion! Our arms and fingers can also be moved to change the shape of the wing and alter our flight path. So for example, by folding one wing in, we can make a rapid turn if we need to.

To fly we bats need to create lift so that we can move upwards through the air. To do this we use an up and down stroke. In the up stroke bats fold their wings to reduce the resistance of the air. And then during the down stroke we push down with our wings really hard (it's called a thrust) and this gives us a lift! It's all possible because we have very strong muscles in our backs and chests.



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Energy requirements of flight



Flying is quicker than walking or running, and you can get a long way in a short time so it's a really efficient way of getting around. But it takes LOTS of energy. A bat has to be wide awake with its muscles warmed up (just like an athlete before a sports event) before it can fly. These muscles have to be able to keep working for a long time without getting tired.

It's very important to have a strong heart to pump blood all around the body especially to the flight muscles. Compared to other mammals of a similar size a bat's heart can be as much as three times larger, which means it can pump blood around the bat's body nearly twice as fast.



When a bat takes off, its breathing rate will go up very quickly to around 4 to 6 times faster than before flight. While it's flying a bat's heart rate will be very fast and its body very warm. The heart pumps blood quickly around the bat's body to make sure its muscles are well supplied with energy.





Activity 1: Quickest way home!

How to play

You will need :



Dice



A bat counter (or a button or something similar)

- Number of players – 2-5.
- Print out a copy of the board.
- Let the youngest player start by throwing the die.
- Move the number of places shown on the die.
- On some squares your bat will be lucky enough to land on a place to rest - trees and caves.
- On some squares your bat will need to save energy and may have to move back or miss a turn (the stormy nights and windy night squares).
- A bat's life can be unpredictable - You might be very unlucky and move on from a tree square only to find you land on a square where you get blown back or have to miss a turn, sorry! Better luck next time.

Meaning

Action



A tree! Hurrah, trees are great for bats. They provide shelter, food and roosts for bats. Feeding around trees gives bats extra energy .

Shelter from the wind and rain helps bats save energy when flying.

If you land on a tree square have an extra turn. (Keep your fingers crossed you move forward to a lucky square)



A cave! Hurrah, a cave gives your bat a place to rest for a while.

Now you have had a little rest move on an extra place.



Wind! Oh dear! Flying on a windy night takes lots of energy .

Get blown back two places.



A storm! Oh no, cold wet, windy weather means it's not worth coming out. It will be difficult to find food and your bat may use up lots of energy trying to stay warm and flying in the wind.

Stay in for a night - miss a turn.



Quickest way home

Find out who is the most fantastic flyer in this race to get back to the roost the fastest. Watch out for storms and windy days, and always keep an eye out for places to rest your wings to get home quicker.

56 	55 	54	53 	52	51 	50
43 	44	45 	46	47	48 	49
42 	41	40 	39	38 	37 	36
29 	30	31	32 	33	34	35
28	27	26 	25	24 	23 	22
15	16	17	18 	19	20	21 
14	13 	12 	11	10 	9	8
1 	2	3 	4	5 	6 	7 

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Wing shapes and flight patterns

You might think that a bat wing is a standard shape but actually all of our wings are different because we need them to do different things. Some of us have long thin wings which allow us to fly fast, others have shorter broader wings giving us a slower but more maneuverable flight pattern. If you watch a bat flying around in the sky at night, you'll see that we all have different flight patterns too, some of us fly straight and fast, others zoom back and forth changing direction constantly. And it's all possible because of the shape of our wings, how cool is that?



Bongi

My broad wings mean I'm good at hovering. This means I can listen for insects walking across leaves and then pick them off with my feet. I'm not as fast at flying as Avnaya but I'm good in the cluttered environment of a forest.

I have a wing span of around 76 cm. My wings are long and slim which suits fast long distance flight.



Eidolon

Avnaya



I'm a fast flyer, zig zagging through the air, this type of flight helps me to avoid predators!



Activity 2 : Make a flapping bat shadow puppet

Get creative with your friends and create some shadow puppets!



You will need :

✓ 1 sheet of paper

✓ A pencil



Kebab/skewer stick
(or something
similar e.g. thin twig)

✓ Scissors

✓ Sellotape

Instructions:

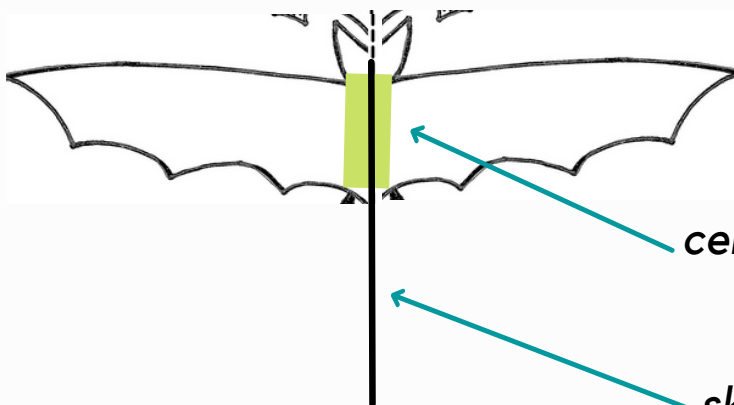
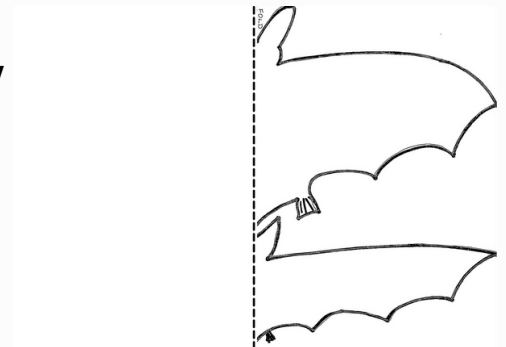


1 Fold your paper in half width ways to mark the middle and then open the paper up again.

2 Draw half a broad winged bat and half a narrow winged bat (use template on next page).

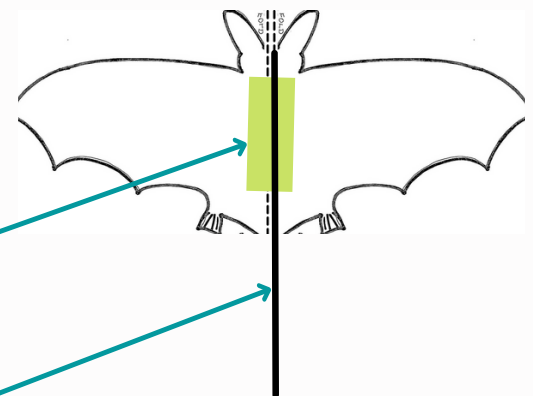
3 Fold the paper and cut out the bat shapes.

4 Lay the skewer along the fold and sellotape in place.



sellotape

skewer



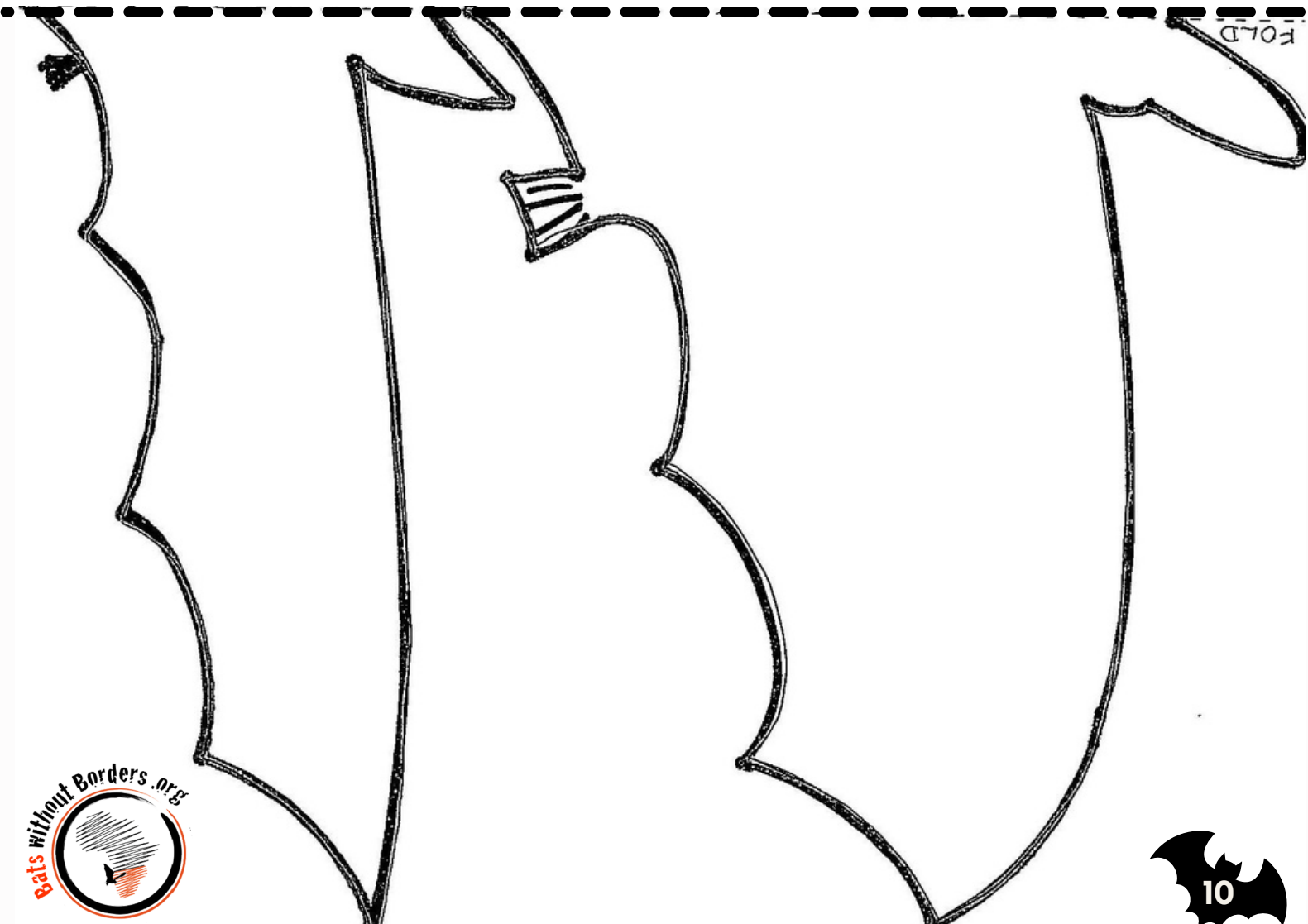
- 5 Hold the skewer stick and gently move it up and down to make your bat's wings flap.
- 6 Make a shadow puppet by shining a light and making its shadow fly along the wall.

Can you see the difference in these two wing shapes? Gently flap your shadow puppets near your face, which one makes the greatest draft? Which do you think is best at hovering?



Here's a template for you to use !

Fold here !



Glossary

(words we have learned today!)

Chiroptera = means “hand wing”.

Bats belong to a group of animals scientists call Chiroptera.



I hope you learned a lot today!
See you next fortnight, to learn all
about why bats are in trouble!

There are no solutions for this lesson
next week, but keep your eyes open for
a special extra part to this lesson !