



Complete and Incomplete Metamorphosis

Let's look at the
difference!

What is metamorphosis?

- Metamorphosis refers to the way that certain organisms develop, grow, and change form.
- Metamorphosis actually means "change".

Two Types of Metamorphosis

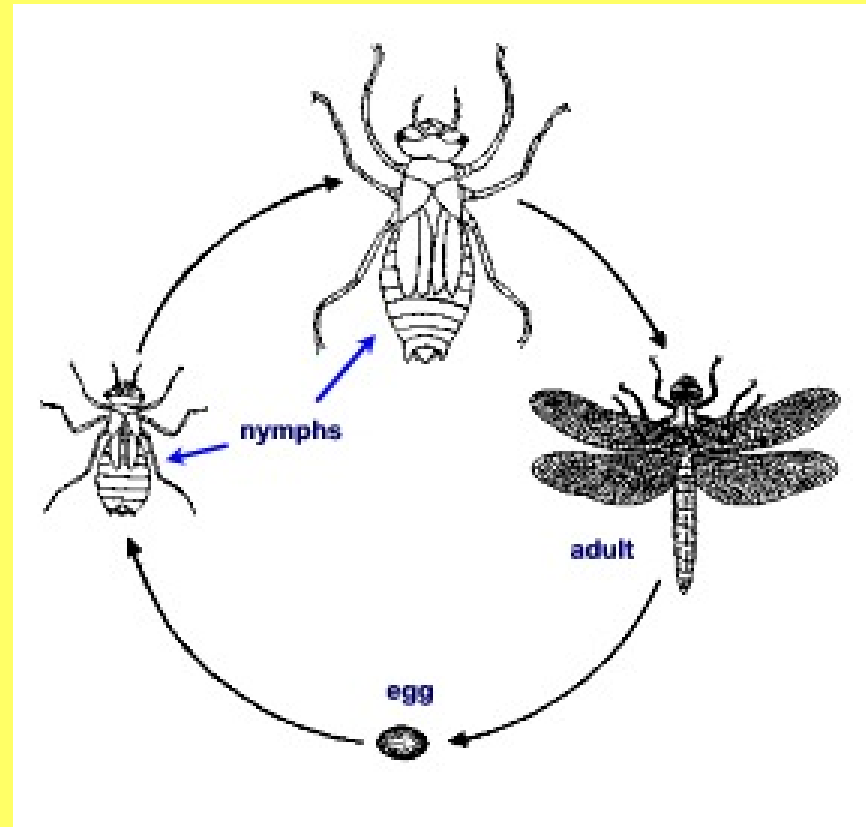
- INCOMPLETE METAMORPHOSIS -
has THREE stages
- COMPLETE METAMORPHOSIS -
has FOUR stages.

INCOMPLETE METAMORPHOSIS

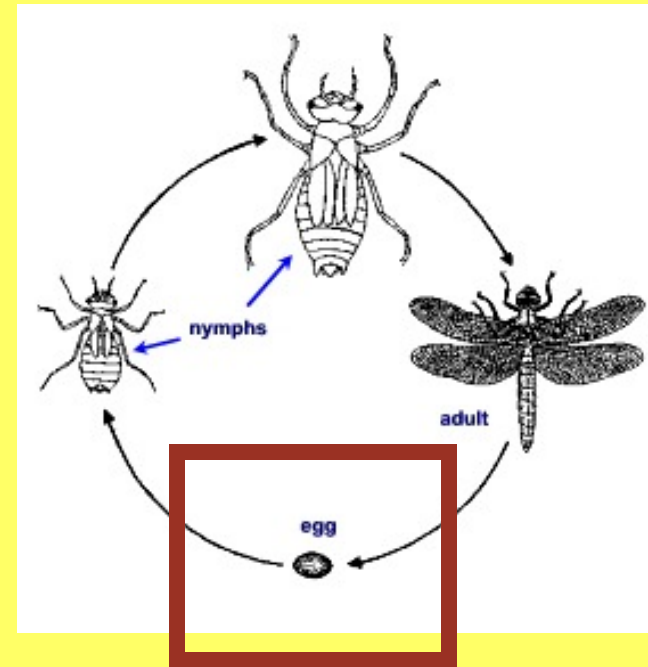
**Let's take a closer look
at each stage!**

3 STAGES OF INCOMPLETE METAMORPHOSIS

- Egg
- Nymph
- Adult

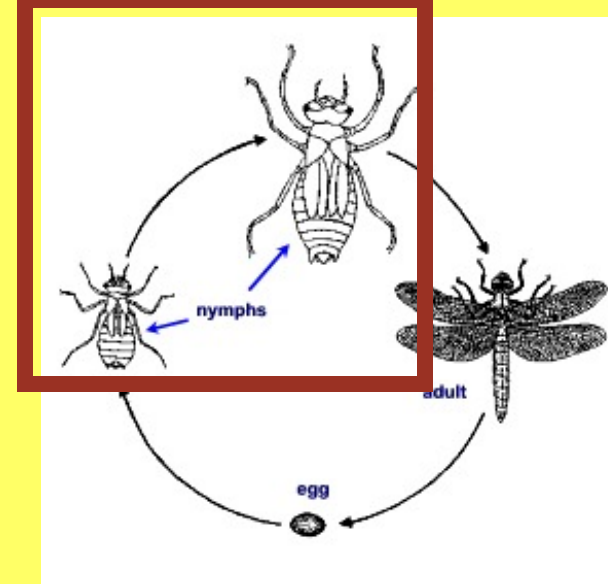


- EGG



- A female insect lays eggs. These eggs are often covered by an **egg case** which protects the eggs and holds them together.

• NYMPH



- The eggs hatch into nymphs.
- Nymphs look like **small adults**, but usually **don't have wings**.
- Insect nymphs eat the same food that the adult insect eats.
- Nymphs **shed or molt their exoskeletons** and replace them with larger ones several times as they grow.
- Most nymphs molt 4-8 times.

What is molting?

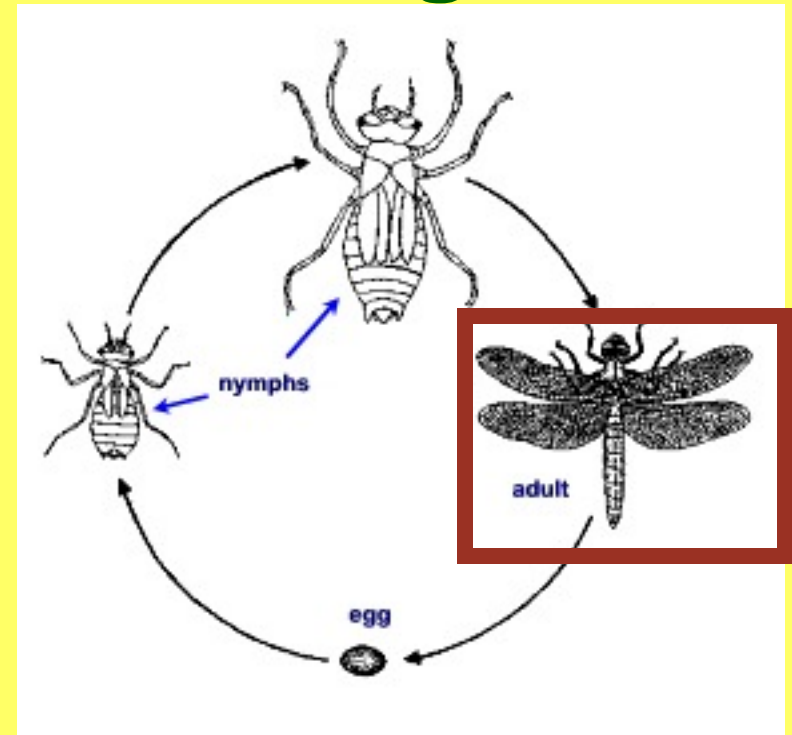
- Shed the feathers, skin, old exoskeleton or the like, that will be replaced by a new growth.
- Shed its old exoskeleton and secrete a larger one, a complex process called **molting**.

What is exoskeleton?

- Outer casings (covering) made up of a hard substance called chitin

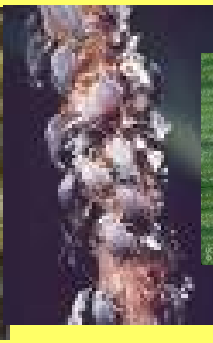
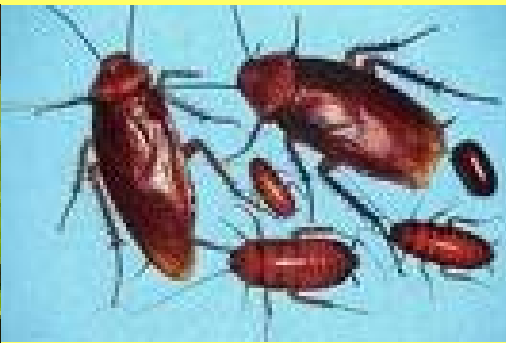
- ADULT

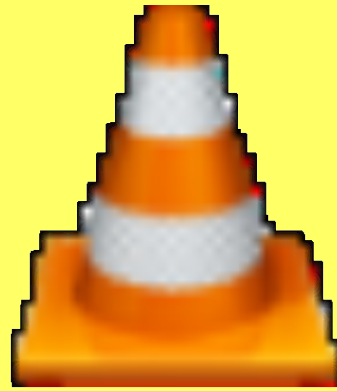
- The insects **stop molting** when they reach their adult size. By this time, they have also grown wings.



Example:

Grasshopper, cockroach, termites, aphids, scales, dragonfly





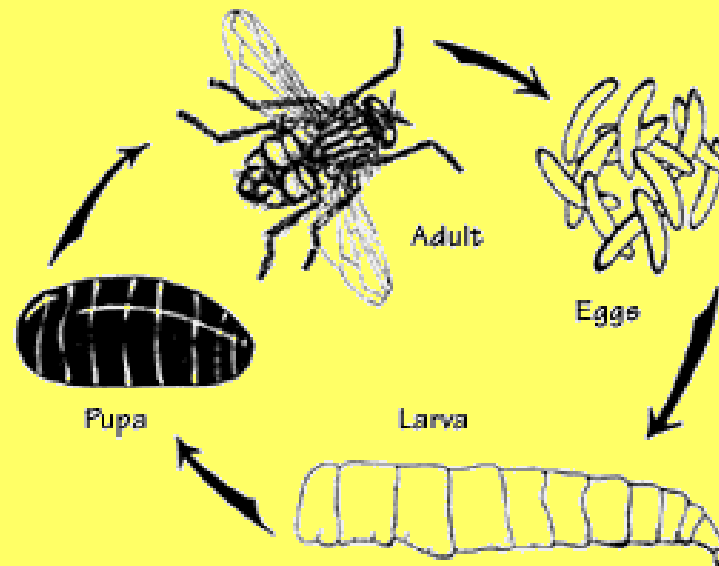
- stage Praying Mantis life cycle.

COMPLETE METAMORPHOSIS

**Let's take a closer look
at each stage!**

4 STAGES OF COMPLETE METAMORPHOSIS

- Egg
- Larva
- Pupa
- Adult

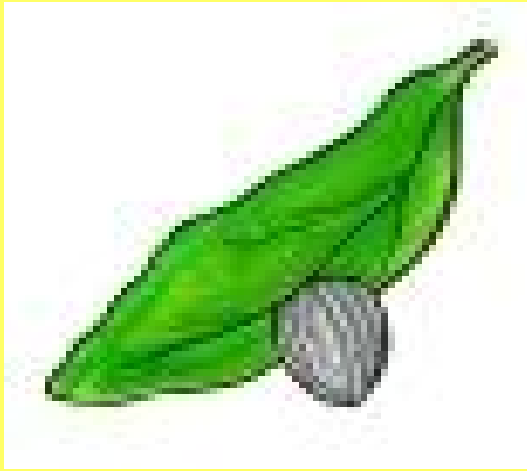


Stages in Life Cycle of Flies



Butterflies go through four life stages, and they look very different at each stage...

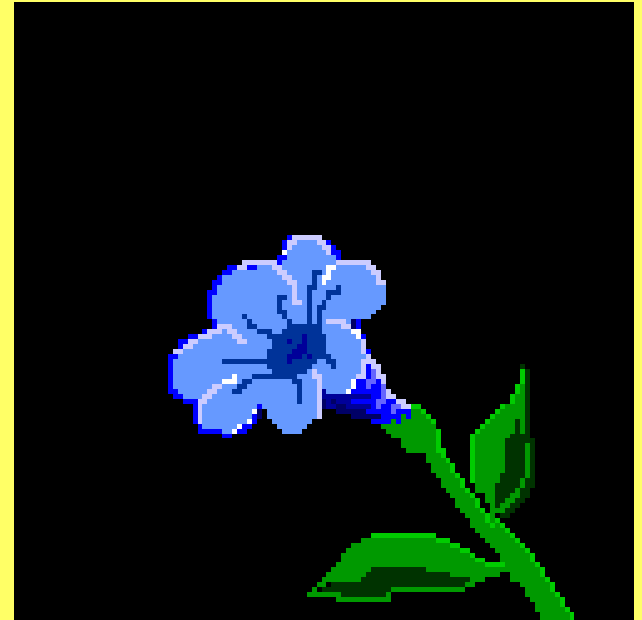




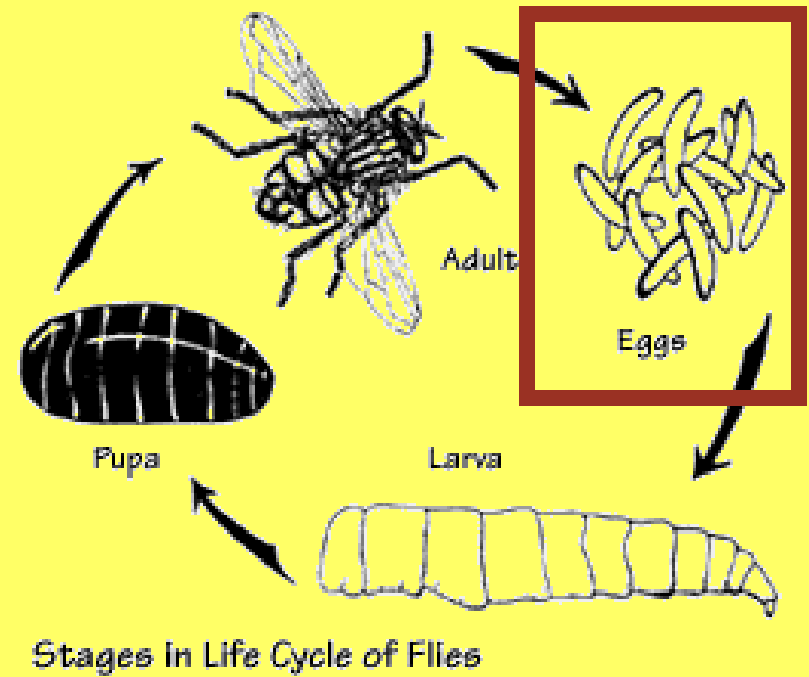
Stage One

The mummy butterfly lays her eggs safely on a leaf.

She tries to find a nice large, healthy plant so that the newly born caterpillars will have lots of fresh leaves to munch their way through!



EGG



- The female lays eggs.

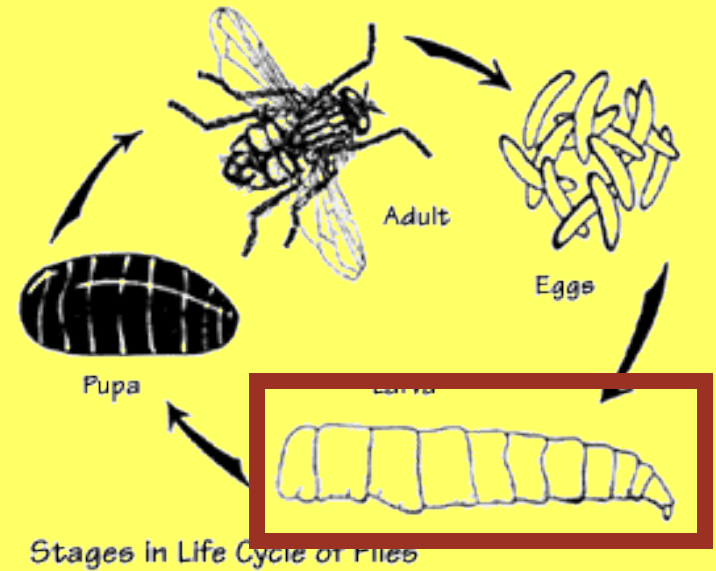
Stage Two - larva

Once the baby caterpillar hatches from its egg it begins the primary growth stage of this marvellous insect.



The **caterpillar** eats lots and lots of leaves so that it grows big and healthy.

LARVA



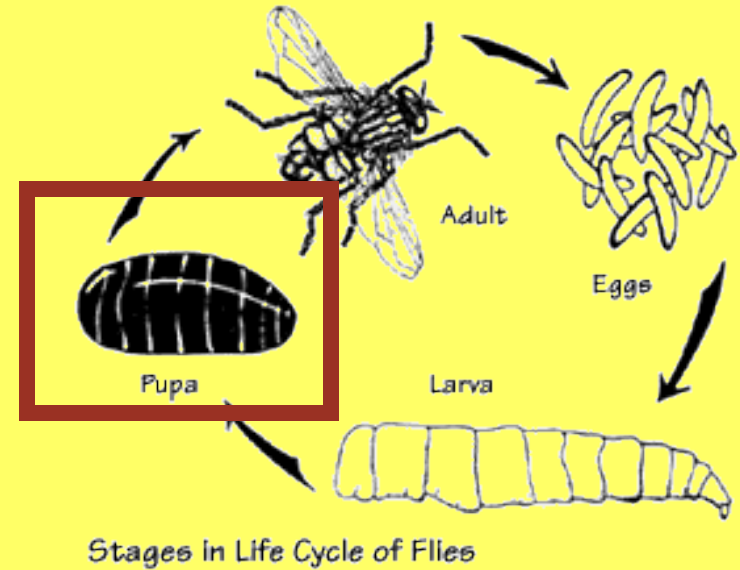
- They do not look like adult insects. They usually have a **worm-like shape (Caterpillars)**.
- Larvae **molt their skin** several times and they grow slightly larger.

Stage Three-Pupa

Soon the caterpillar is ready to become a butterfly. He weaves a **chrysalis (cocoon)** out of silk which will keep him safe whilst he transforms into a butterfly.



PUPA



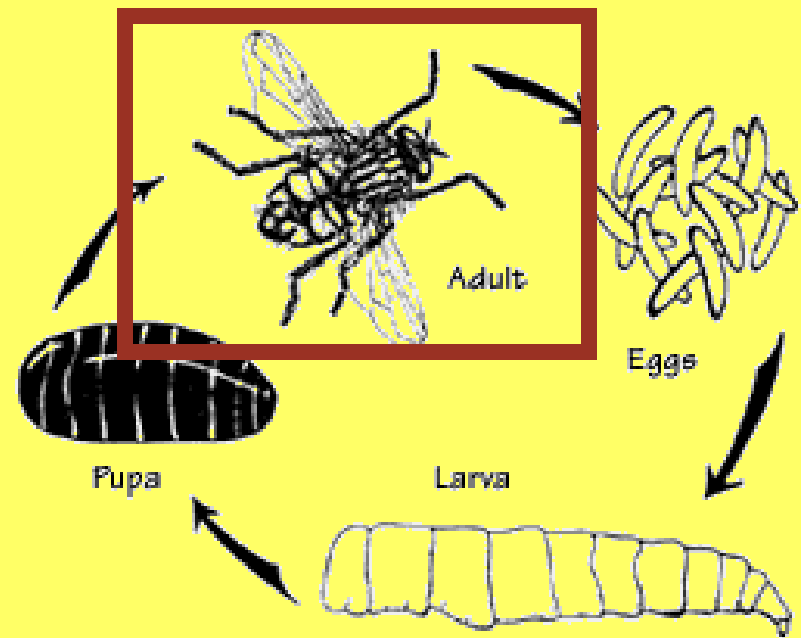
- Larva make cocoons around themselves.
- Larva don't eat while they're inside their **cocoons**.
- Their bodies develop into an adult shape with wings, legs, internal organs, etc.
- This change takes anywhere from 4 days to many months.

Stage Four

When he is ready he will split open the chrysalis (cocoon) and emerge as a fully formed butterfly.



ADULT



Stages in Life Cycle of Flies

- Inside the cocoon (chrysalis) the **larvae change into adults.** After a period of time, the adult breaks out of the cocoon.

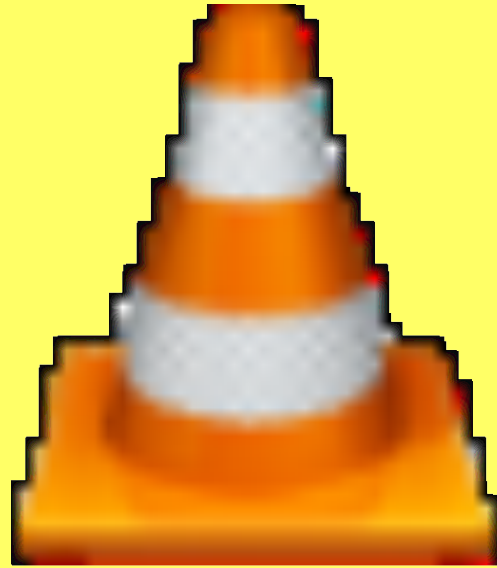
Example

- **Butterflies, beetles, bees and mosquito**



Metamorphosis Comparison

Complete	Incomplete
<ul style="list-style-type: none">* Occurs in four stages<ul style="list-style-type: none">egglarvapupaadult* Insect's appearance changes completely* Young insect looks nothing like the adult* Occurs in butterflies and moths	<ul style="list-style-type: none">Occurs in three stages<ul style="list-style-type: none">eggLarvaNymph* Young insect looks like the adult* Insect grows bigger and bigger* As the insect grows, it sheds its exoskeleton



Butterfly Life Cycle.flv

Let's see what we know!

**Let's take Professor
Know-It-All's Quiz
and see what we have
learned!**



QUESTION #1

- **What are the two types of metamorphosis?**
 1. **Complete**
 2. **Incomplete**

QUESTION #2

- How many stages are there in incomplete metamorphosis?

Answer: 3

QUESTION #3

- Name the stages of incomplete metamorphosis?

1. Egg
2. Nymph
3. Adult

QUESTION #4

- How many stages are there in complete metamorphosis?

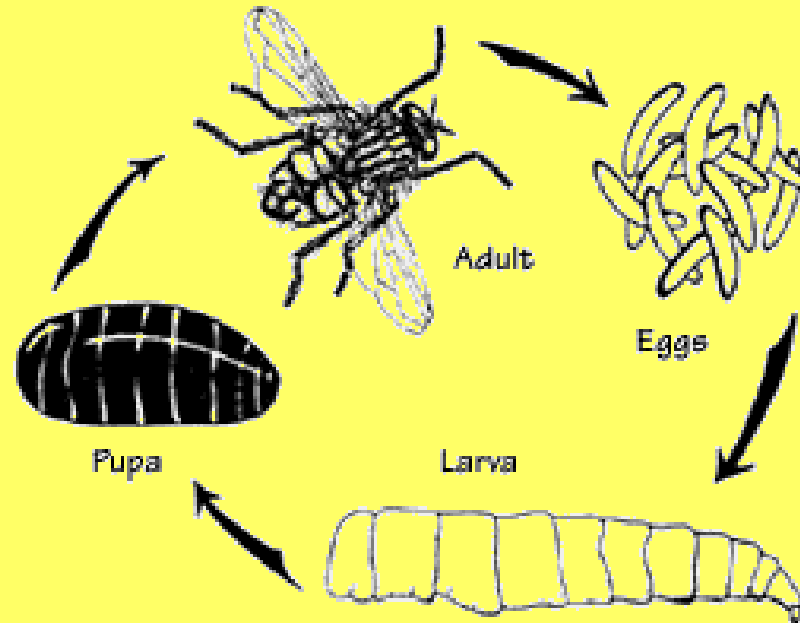
Answer: 4

QUESTION #5

Name the stages in complete metamorphosis.

1. Egg
2. Larva
3. Pupa
4. Adult

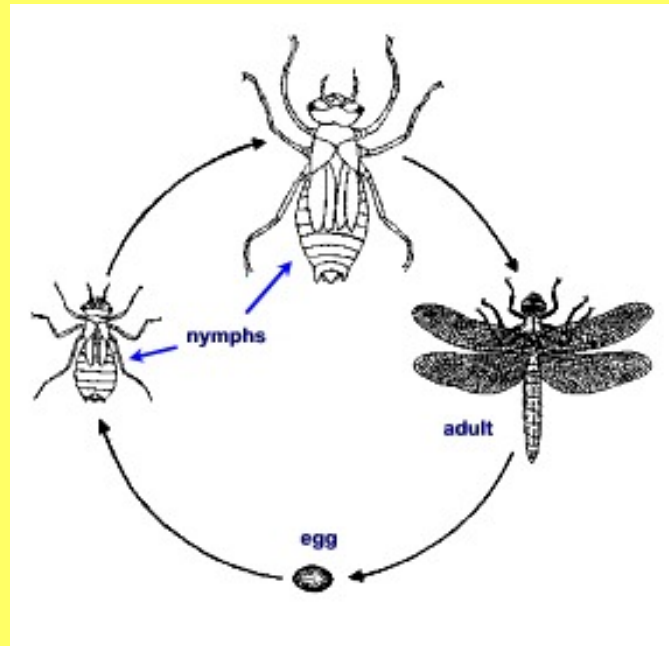
QUESTION #6



Stages in Life Cycle of Flies

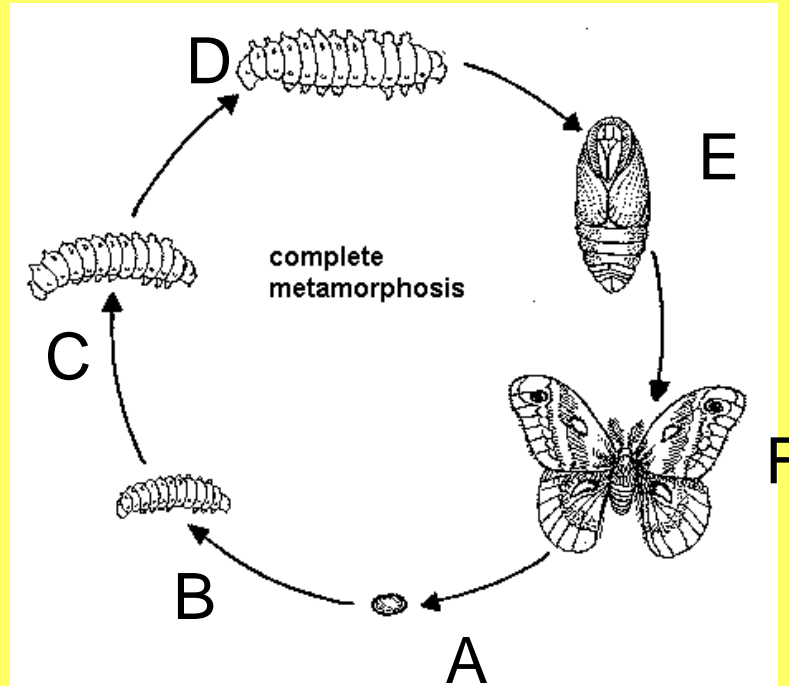
Identify the cycle as complete or incomplete metamorphosis.

QUESTION #7



Identify the cycle as complete or incomplete metamorphosis.

QUESTION #8



Identify each stage of the complete metamorphosis of the butterfly.

YOU'VE JUST COMPLETED PROFESSOR KNOW-IT-ALL'S QUIZ



*How did
you do?*

Where do butterflies lay their eggs?

leaves



flowers



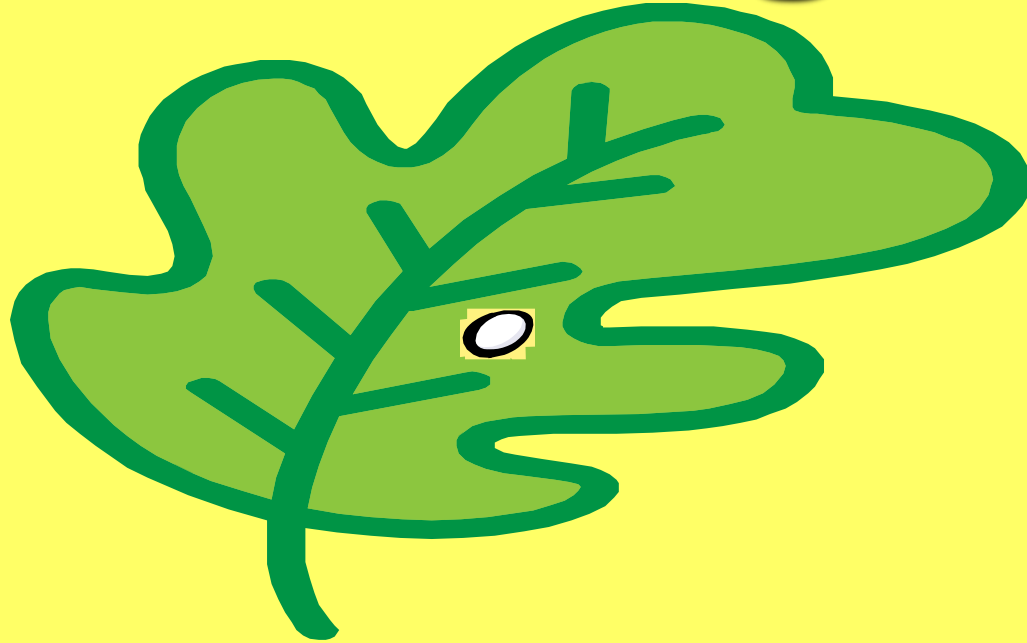
grass



trees



That's right!



Butterflies lay their eggs on
leaves.

How long before the butterfly egg hatches?

5 days

10 days

15 days

20 days

That's right!



The egg hatches after about
10 days.

What do caterpillars eat?

fruit



vegetables



leaves



chocolate



That's right!



Caterpillars eat leaves to
grow.

What creatures like to eat caterpillars?

spiders



bees



cats



birds



wasps



beetles



That's right!



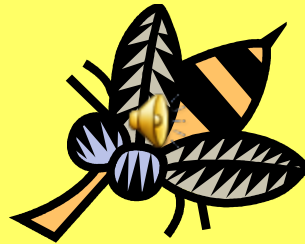
Spiders like to eat
caterpillars.

That's right!



Birds like to eat caterpillars.

That's right!



Wasps like to eat
caterpillars.

How long does the caterpillar
stay inside the pupa for?

1 week

2 weeks

3 weeks

4 weeks

That's right!



A caterpillar stays in the pupa for about 3 weeks.

How long do butterflies live?

1-2
months

2-3
months

3-4
months

4-5
months

That's right!



Butterflies can live between
4-5 months.

Well Done!



You answered all the questions correctly.



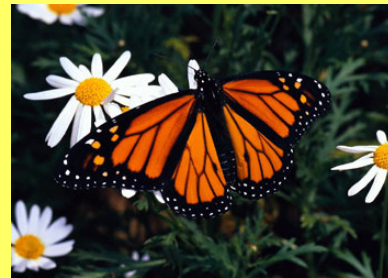
Ladybird Life Cycle.flv

Insect Growth and Development

* Insects eat a lot, so they grow very fast. As they grow, insects may molt and grow new exoskeletons, or they may change completely.

* A huge change in appearance is called metamorphosis.

* There are two kinds of metamorphosis:
complete and incomplete.



Complete Metamorphosis

- * In complete metamorphosis, insects like butterflies and moths have four stages of development.
- * The first stage makes an egg.
- * During the second stage, the egg hatches and a larva comes out.
- * A caterpillar is the larva of an insect that will become a butterfly or a moth.



Complete Metamorphosis

- * During the third stage, a pupa is made.
- * A pupa is sometimes wrapped in a cocoon or in a chrysalis.
- * A cocoon is the pupa of a moth.
A cocoon is made of silk.
- * A chrysalis is the pupa of a butterfly.
- * In the last stage, the insect is finally an adult.

From Caterpillar to Butterfly



Larva



Pupa



Chrysalis



Emerging butterfly



Monarch butterfly

Incomplete Metamorphosis

- * Incomplete metamorphosis happens in grasshoppers, termites, and dragonflies.
- * In incomplete metamorphosis, young animals that look like the adult hatch from eggs.
- * As the young animals grow, they keep molting, shedding their exoskeletons, and getting larger.



Insect Behavior

- * Most insects live alone. But, some insects are social and cannot survive alone.
- * These insects live in colonies or hives.
- * A colony is a group of insects living together.
The insects do different jobs and are very organized.



Insect Behavior

- * An amazing example of a colony is a beehive.
- * A beehive is a very organized colony of bees.



Mosquito life cycle.flv

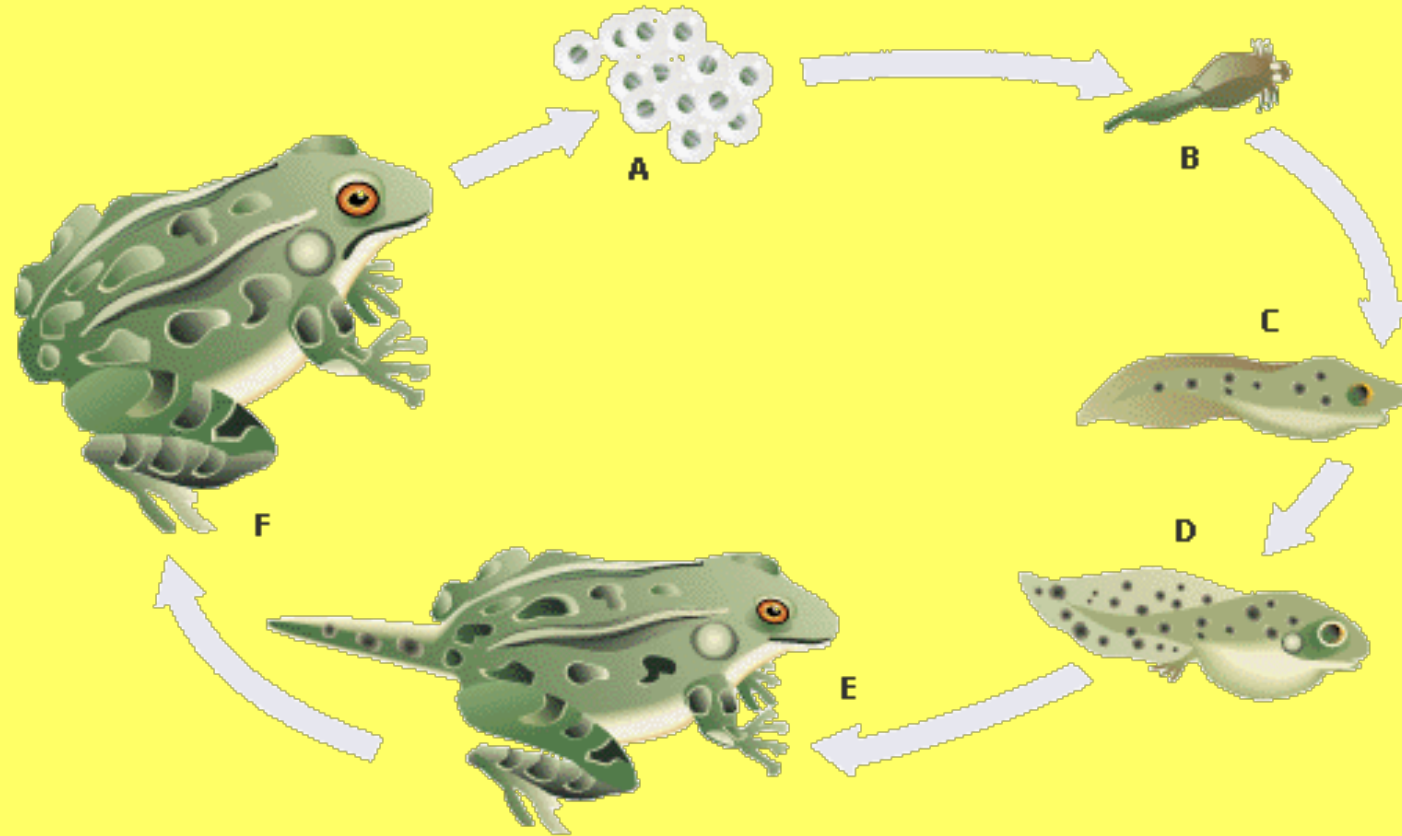
Importance of Insects:

- **Pollination agents of most fruits and vegetables**
- **Serve as food for birds, fish, animals and man**
- **Destroy dangerous insects provide useful food and materials for man e.g. honey, wax, silk and other products assist in the decomposition and recycling of organic matter; dead plant and animal matter**

Negative Effects of Insects:

- **Transmit diseases of humans, domestic animals, and plants**
- **Compete with humans and other animals for food feed on crops and ornamental plants**
- **Responsible for significant public health and economic impact on individuals, communities, populations, and nations**

Life Cycle of a Frog



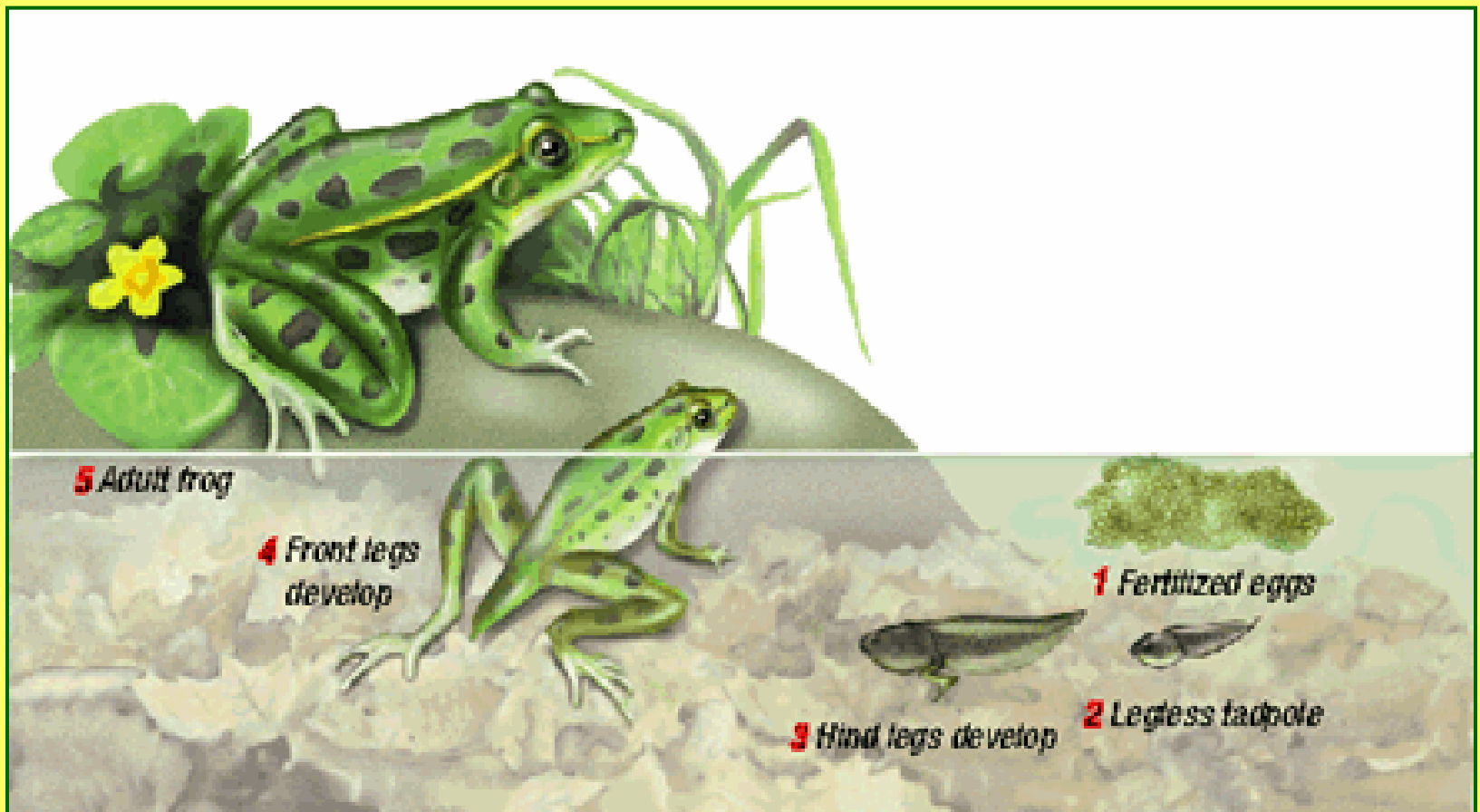
Metamorphosis

- Metamorphosis is the changes that a frog goes through during its life cycle.
- There are four main stages in the life cycle of a frog.



**Metamorphosis means
change.**

- Frogs have a life cycle with two parts, living in water as tadpoles and on land as adults.



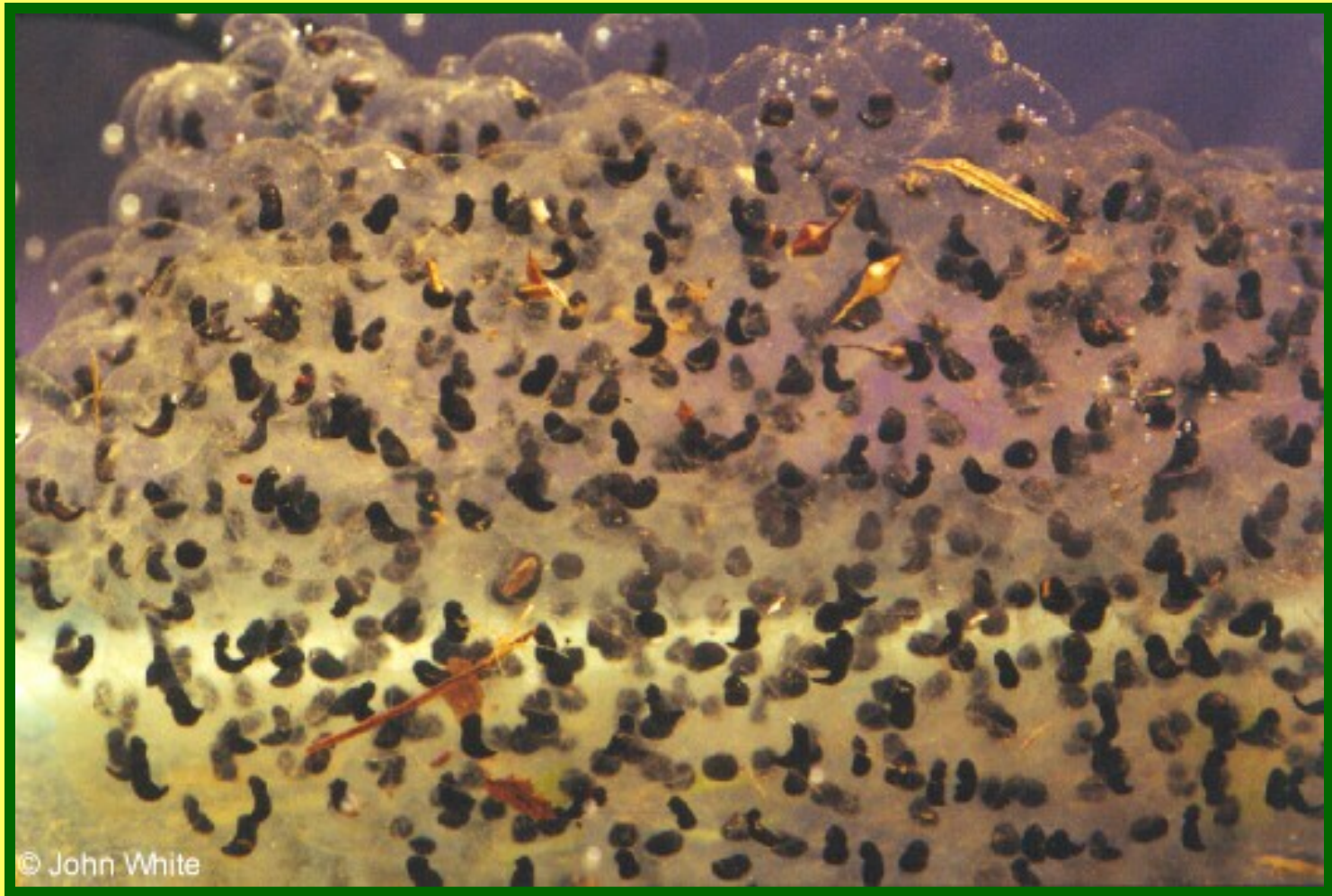
What is the first
stage of the
frog life cycle?

Egg

- The first stage in the life cycle of the frog is the *egg*.
- A frog lays many eggs at one time.
- The eggs are covered with a jellylike coating.



Frog Eggs



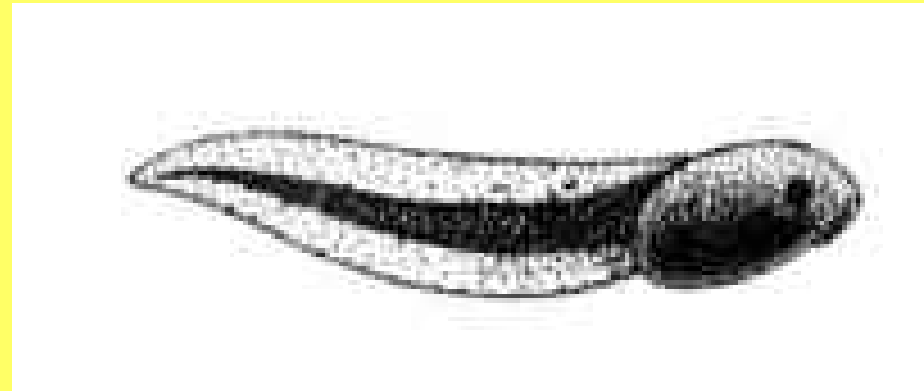
Eggs in a Pond



What is the next
stage of the
frog life cycle?

Tadpole

- The second stage of the frog life cycle is the **tadpole**.
- Hatched tadpoles have **gills** for breathing in the water.
- They have a tail, but no legs.



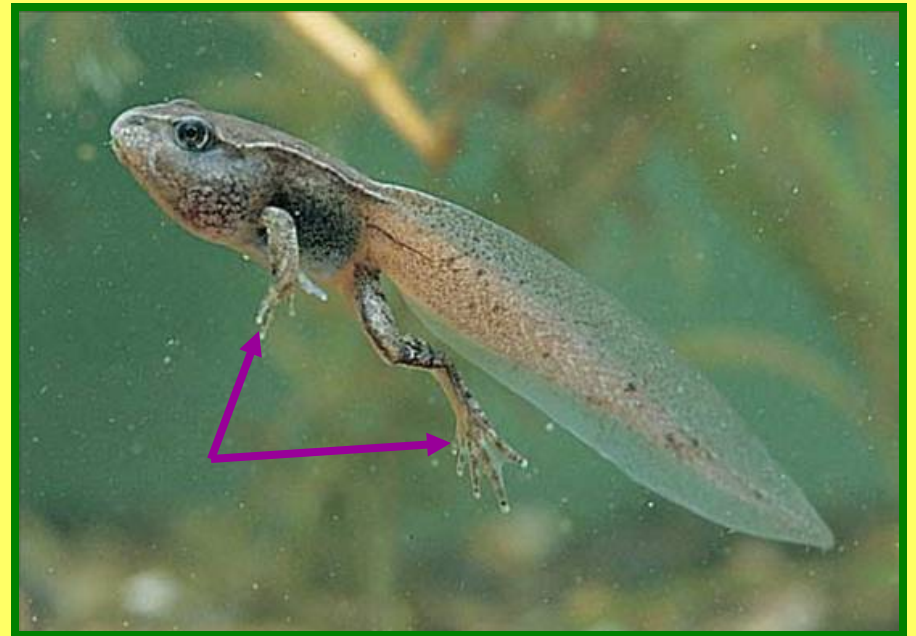
**As a tadpole grows,
lungs begin to form.**

**Back and front
legs begin to
grow. These
parts allow
the adult frog
to live on
land.**



Froglet

- The next stage of the frog life cycle is the **froglet**.
- These legs help the frog on land.



What is the last
stage of the
frog life cycle?

Adult Frog

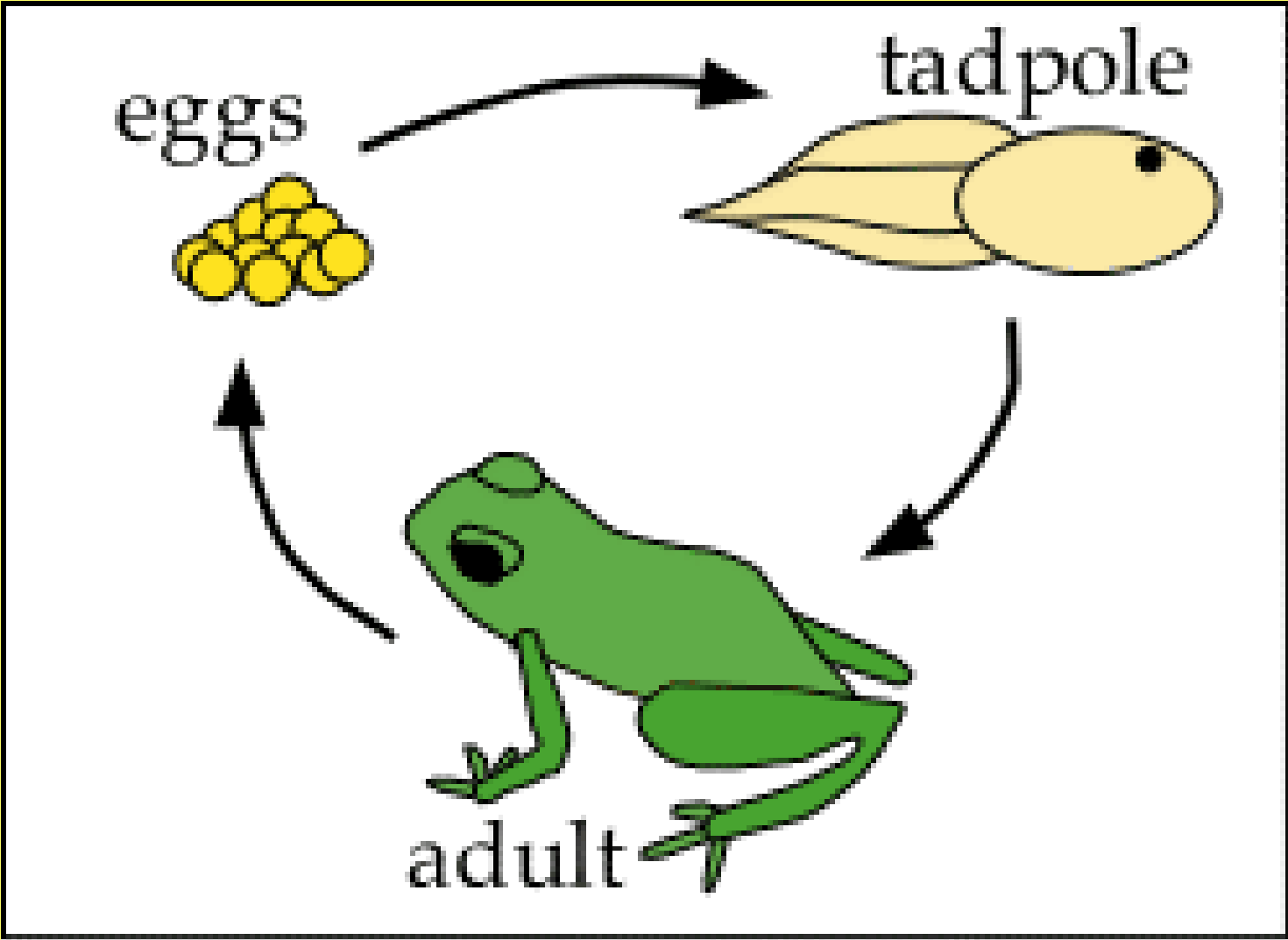
- Once the lungs form and begin to work, the **gills** and **tail** disappear.



The adult **frog** is now ready to live on land.

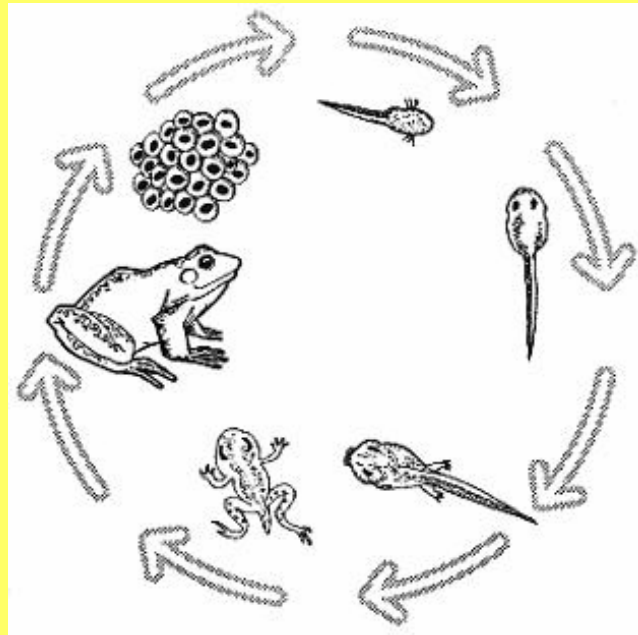


**...and the life cycle begins
again.**



Life Cycle of a Frog2.flv

QUESTION



Identify the lifecycle of the frog as complete or incomplete metamorphosis.



Frog Riddles



Q: Why are frogs always happy?

A: Because they always eat what bugs them!

Q: What kind of frog do you find on a farm?

A: A bullfrog!



More Frogs!

