

Part D: How do living things reproduce?

Key 46

Reproduction is a word used to explain how living things make more of themselves (have babies!). There are two main kinds of reproduction:

Sexual

The key to sexual reproduction is that it "takes two." Sexual reproduction usually involves a male and a female of the same species.

Asexual

The key to asexual reproduction is that it can be done alone. Living things that reproduce asexually don't usually have a male and female in the species because they are able to reproduce by themselves without the help of another plant or animal of the same species.

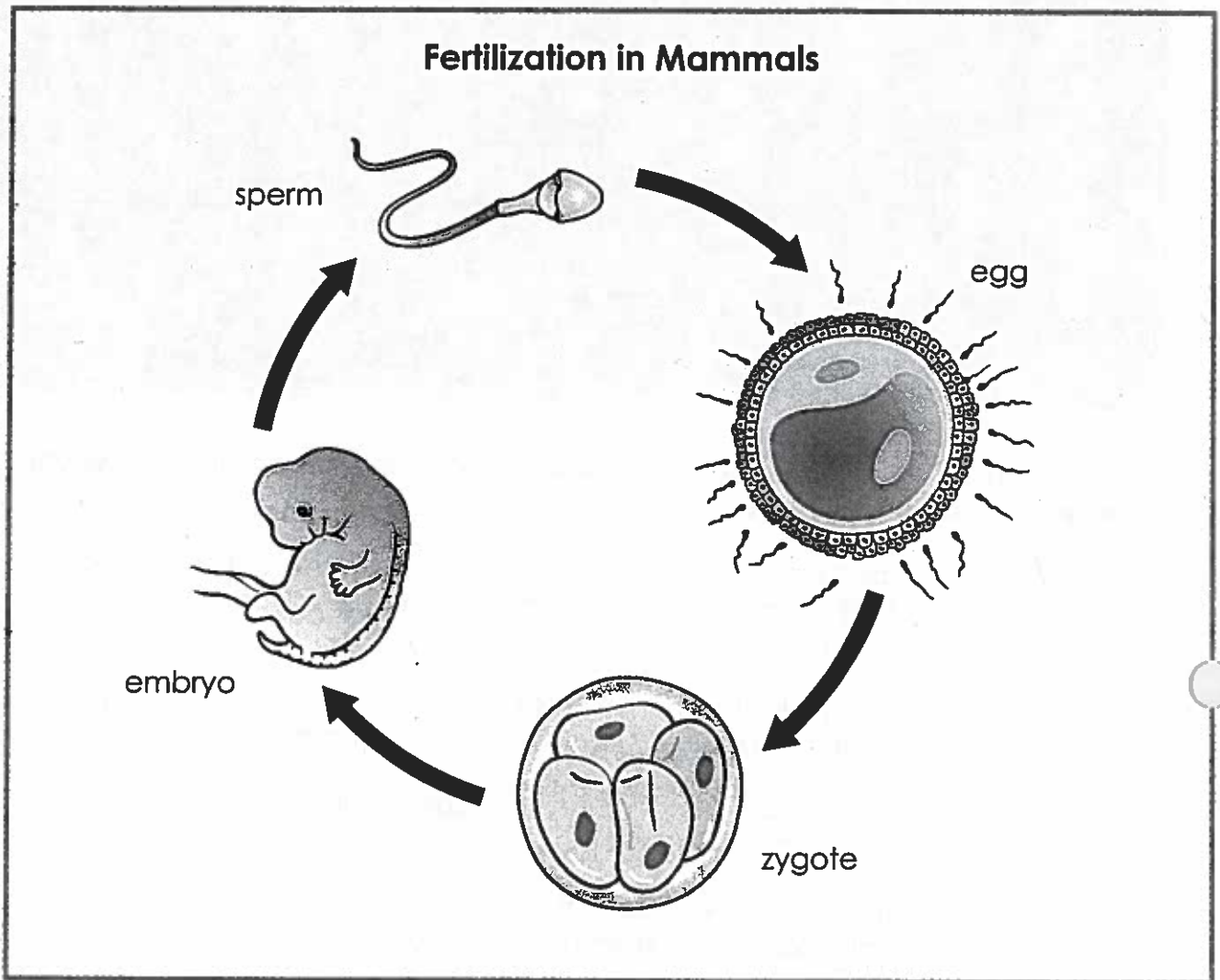
Some rare plants and animals are able to reproduce both sexually and asexually. This gives the species a greater chance of surviving, even if environmental conditions change.

Beside each of the following examples, write whether it is an example of **sexual** or **asexual** reproduction or **both**.

1. A most kinds of hydra (jellyfish) grow tiny buds out of their skin that eventually (after a long time) break off and grow as a new hydra
2. S many plants have flowers that produce seeds after the pollen from one plant fertilizes the flower in another plant
3. S most kinds of female fish lay eggs that lie in the water waiting for a male fish to swim by and fertilize
4. A amoeba (one-celled organisms that live in the water) split in half exactly and then grow as two separate organisms
5. A mushrooms produce spores and release them into the air to float away and grow as new mushrooms
6. A many trees grow suckers (long arms) under the ground that poke up to sprout a new tree
7. S female mammals carry eggs inside that must be fertilized by the sperm of a male mammal of the same species in order to grow into a new animal
8. Both some plants are able to produce seeds when their flowers are fertilized or runners (long arms) that grow along the ground sprout new plants

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Study the diagram and then complete the passage below in a way that makes sense.



The female has eggs₁ inside that are fertilized by sperm₂ from the male

of the species. Once the sperm penetrates (sticks into) the egg, a zygote₃ is

formed. The cells in the zygote₄ duplicate by splitting in half to make exact

copies. Soon, an embryo₅ grows that is a tiny version of the parent organisms.

Part E: How do living things start to vary (become different)?

Differences in living things in the same group (species) fit into two different categories:

Discrete Variations

Differences where a living thing can be described as being one way or another.

Continuous Variations

Differences where a living thing can be described as having any one of a range of possible characteristics.

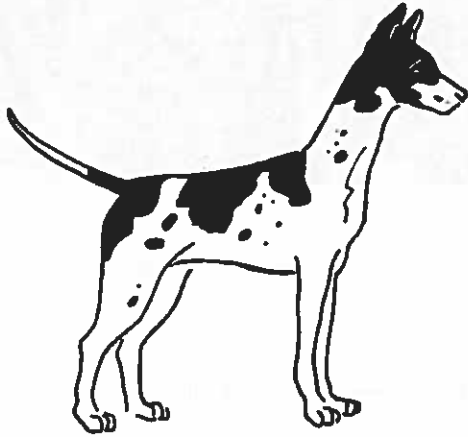
Beside each of the following examples, write whether it shows **discrete** or **continuous** variation.

1. C Adult humans grow to between 1.2m and 2.1m tall.
2. D Humans have earlobes that are either attached at the bottom or not.
3. C Most humans have blue, brown, green or hazel coloured eyes.
4. D Humans have eyebrows that either grow together or grow separately.
5. D Humans naturally clasp (put together) their hands with either the right or left thumb on top.
6. C Humans get their molars (back teeth) anywhere between the ages of 6 and 25.
7. C Humans have between 90,000 and 140,000 hairs on their head.

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Part F: How do living things pass on their characteristics?

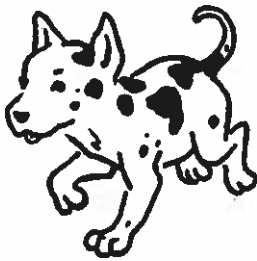
Look carefully at the characteristics of the "parent" dogs compared to their puppies, then complete the activity on the next page.



Mom



Dad



Rex



Daisy



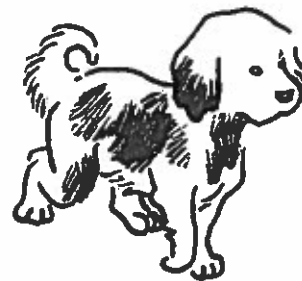
Hank



Buddy



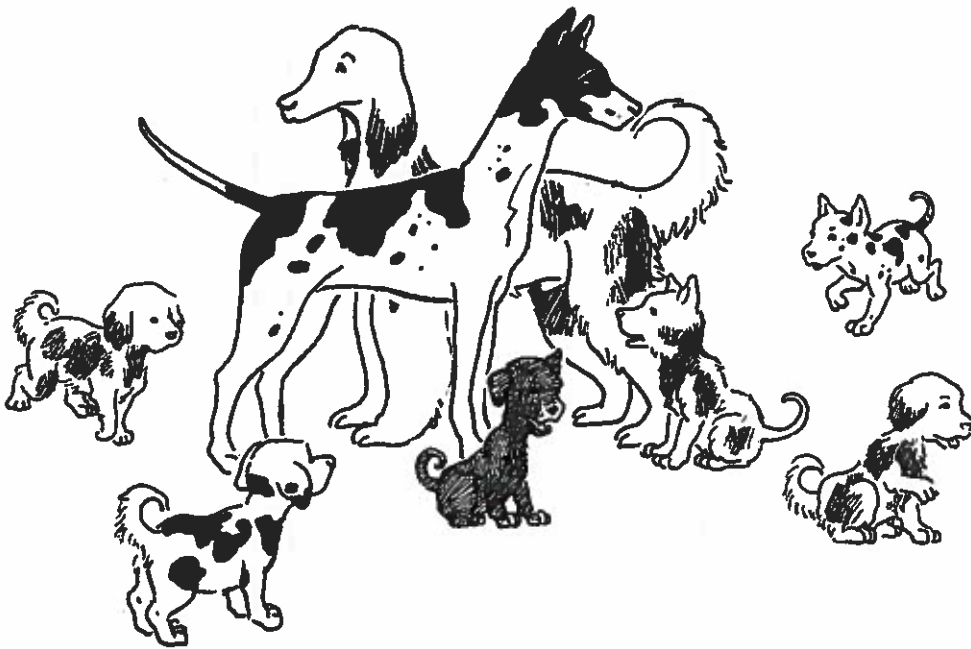
Max



Molly

Complete each of the following sentences by writing in the name of a puppy from page 10 that best fits the description of which parent they inherited their ears, fur, and tail from.

1. Rex inherited all of the mother's characteristics but none of the father's.
2. ~~Max~~ Buddy inherited all of the father's characteristics but none of the mother's.
3. Max inherited an equal amount of each parent's characteristics.
4. Molly inherited some of each parent's characteristics but more of the father's than the mother's.
5. Hank inherited some of each parent's characteristics but more of the mother's than the father's.
6. Daisy didn't obviously inherit either parent's features.



The Nature vs. Nurture Debate

Some characteristics can be inherited (copied from one or both parents), but other characteristics are a result of what happens to us in life. There is often a lot of debate (a difference of opinion) about whether certain characteristics or behaviours are a result of nature (heredity) or nurture (environment or experience).

Complete the following chart to show where you think many of your characteristics came from—either parent, or from the environment you live in or the experiences you have had. You can also complete this activity by interviewing someone else about their characteristics if you prefer.

| From mother... | From father... | From environment or experiences... |
|-------------------|-------------------|---|
| 3 Physical Traits | 3 Physical Traits | - Likes - Dislikes - Personalities - Behaviours. |

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1/3

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Part G: How does heredity work?

Heredity (her-eh-dih-tee)

Heredity is the passing on of characteristics from one generation (set of parents), to another (their offspring or kids).

Genes (jeenz)

Genes are the tiny sections (parts) that make up chromosomes. Genes are responsible for passing on a specific characteristic from one generation to the next.

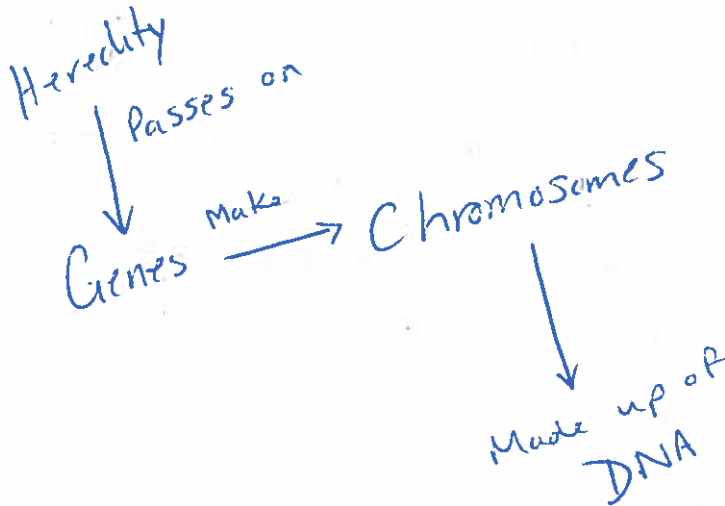
Chromosomes (kroh-mo-zohmz)

Chromosomes are the tiny strips of material stored in the nucleus of every cell that contain genes.

DNA

DNA stands for deoxyribonucleic acid and it is what genes and chromosomes are made of.

Use the information above to help you draw a diagram to show how genetic material (things related to heredity) are related. For example, what makes up what, what does what, etc.



Read the following information and then sort the ideas below into the chart on the next page.

Hereditry begins with cell division. All cells "reproduce" to create new versions of themselves. Before cells divide, they make a "copy" of the genetic material they contain. Once the cells have the DNA copies, there are two different ways they can divide:

Mitosis (my-toe-sis)

Mitosis is when a cell divides in half equally making two cells that are exactly the same and have a complete set of DNA (genetic material). Asexual reproduction (can be done by one organism alone) happens as a result of mitosis and creates a new organism that is exactly the same as the parent. Growth is also a result of mitosis.

Meiosis (my-oh-sis)

Meiosis is when a cell divides in half and then each new cell divides in half again to make four cells that each have only half a set of DNA. Without joining with another cell, they cannot pass on the genetic material. Sexual reproduction (takes two parents) begins with meiosis and through fertilization (a male cell uniting with a female cell) creates a new organism with a complete set of chromosomes that has some of the characteristics of each parent. Often the strongest characteristics of either parent "win" and are inherited by the offspring (baby).

- ✓ results in offspring with a variety of possible characteristics
- can result in improvements (positive changes) to a species over time
- ✓ can happen in environments where an organism lives alone without any others of its species around
- ✓ depends on being around other organisms of its own species in order to reproduce
- how offspring will look/behave can be accurately predicted
- how offspring will look/behave cannot be accurately predicted
- cannot result in improvements (positive changes) to a species over time

Identify the advantages (good things) and disadvantages (bad things) about sexual and asexual reproduction by sorting the ideas from page 14 into the chart below. Add one idea of your own to each box.

Advantages of Sexual Reproduction

- Results in offspring with a variety of possible characteristics.
- can result in improvements to a species over time.

Disadvantages of Sexual Reproduction

- depends on being around another organism of its own species in order to reproduce.
- how offspring will look/ behave ~~can~~ cannot be accurately predicted.

Advantages of Asexual Reproduction

- can happen in environments where an organism lives alone without any other species around.
- how offspring will look/ behave can be accurately predicted.

Disadvantages of Asexual Reproduction

- cannot result in improvements to a species over time.

Did You Know?

Genes can be either dominant or recessive. Dominant genes (the "stronger" ones) win out against the recessive genes (the "weaker" ones). Recessive genes only "win" when both parents pass along a recessive gene.

Independent Research

Learn more about dominant and recessive genes by researching how our parents' genes determine (decide) the colour of our hair or eyes. For example, blue eyes and blonde hair.



The first part of the paper -
 was written in the summer
 of 1942 - 1943.

The second part of the paper
 was written in the winter
 of 1943 - 1944.

The third part of the paper
 was written in the spring
 of 1944.

1942

1943

1944

1945

