

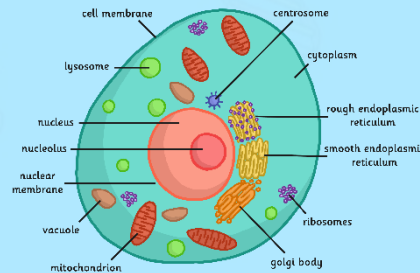
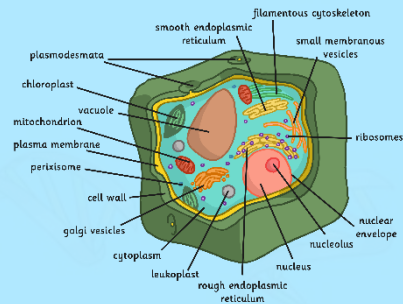
The background of the entire image is a light blue color, covered with a repeating pattern of DNA double helix structures. Each helix is rendered with two grey ribbons forming the sugar-phosphate backbone, twisted around each other. Between the ribbons are horizontal lines representing the nitrogenous base pairs, colored in red, yellow, and green. The helices are scattered across the page in various orientations and sizes.

Inheritance

Cells, Chromosomes, DNA and Genes

While you will not be examining these in detail, it is helpful to know about the building blocks of life for this unit.

Cells



Cells are the building blocks of all living things. All living things are made up of cells. Amoebas have one cell. Humans have trillions of cells!

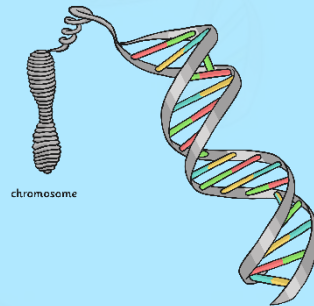
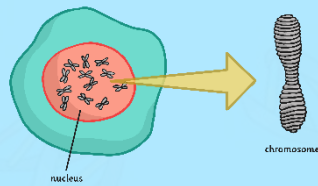
Chromosomes



DNA



Genes



The nucleus of a cell contains chromosomes, which are made up of DNA.

DNA carries the characteristics that we inherit. It is located in two places in the cell: the nucleus and the mitochondria. DNA can replicate and make copies of itself. When cells divide, each cell needs to have an exact copy of the DNA in the old cell.

Genes are short sections of DNA that contain specific information. This is often called the genetic code. All the genes in the whole cell are called the genome.

Variation



What does variation mean?

What causes variation?

Inheritance

These are characteristics that are passed on to offspring from their parents.



Adaptation

These are characteristics that are influenced by the environment the living thing lives in.



Inheritance

When we talk about inheritance, we often mean things that are passed on to us when one of our relatives or friends has died. Inherited items are sometimes houses or important objects.



Inheritance

CLICK

In science, inheritance refers to the genes that are passed on from parents to offspring. When we refer to inherited characteristics we tend to focus on physical characteristics as these are easy to spot but inherited characteristics include abilities such as taste and smell.

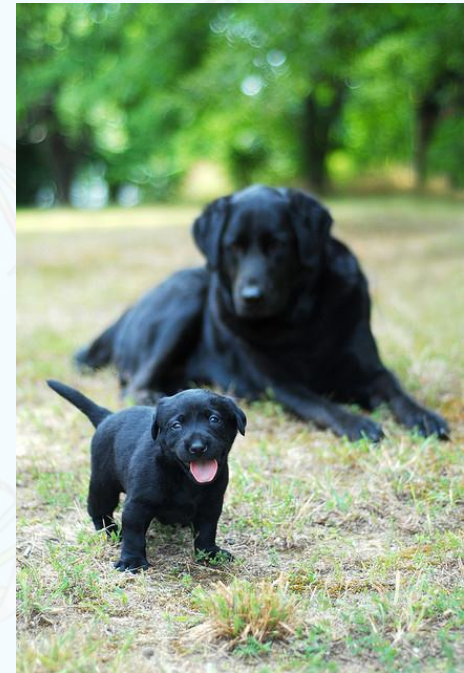


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Parents and Offspring



Match the parent with its offspring.



How did you match the parents and offspring?
What are the inherited characteristics that you could see?

Photo courtesy of Courtney McCutchen, Steve Skater, Airwolfhound, Dan (catching up) and Tony Fischer (@flickr.com) - granted under creative commons licence - attribution

Parents and Offspring



MISCONCEPTION ALERT!

While offspring does mean child, it does not mean that you are only offspring when you are children! The inherited characteristics you gain from your parents are part of your DNA for life.

Even when you are an adult you are your parents' child!



Photo courtesy of Randen Pederson and Benh LIEU SONG (@flickr.com) - granted under creative commons licence – attribution

Inheritance and Variation

How can inherited characteristics (similarities between parent and offspring) result in variation (differences)?

Well the majority of living things are the result of sexual reproduction so they have two parents. You inherit the characteristics from both parents but the way they combine makes the offspring unique.



The inherited characteristics can combine in different ways, which is the reason why siblings inherit the same characteristics but are not identical to each other.

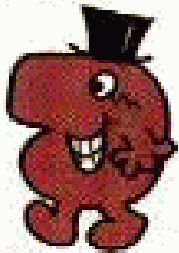
Even identical twins that share the exact same combination of DNA are not 100% the same! This is due to the fact that genes develop separately when the twins are embryos or during later development.

Variation and Inheritance

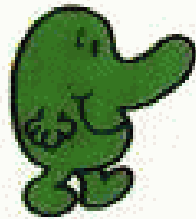
WILF: To learn how
characteristics can vary.

with...

The Mr Men Match.



11 Mr
Uppity



4 Mr
Nosey



2 Mr
Greedy



5 Little Miss
Tiny



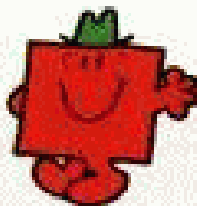
4 Little Miss
Sunshine



30 Little Miss
Sporty



12 Mr
Small



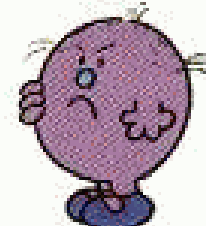
26 Mr
Strong



5 Mr
Sneeze



13 Little Miss
Chatterbox

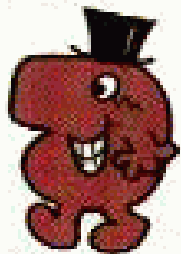


26 Little Miss
Stubborn

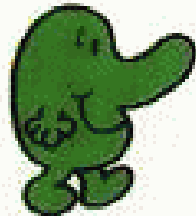


19 Little Miss
Busy

Meet our Mr Men



11 Mr
Uppity



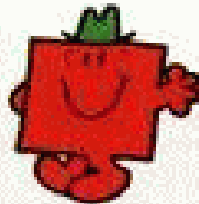
4 Mr
Nosey



2 Mr
Greedy



12 Mr
Small



26 Mr
Strong



5 Mr
Sneeze

And our Little Misses



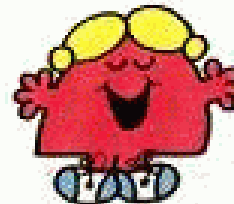
5 Little Miss
Tiny



4 Little Miss
Sunshine



30 Little Miss
Sporty



13 Little Miss
Chatterbox

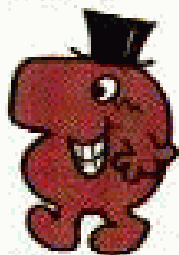


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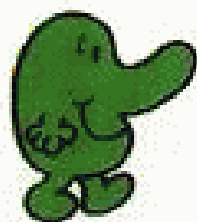


19 Little Miss
Busy

Now lets meet their children!



11 Mr
Uppity



4 Mr
Nosey



2 Mr
Greedy



5 Little Miss
Tiny



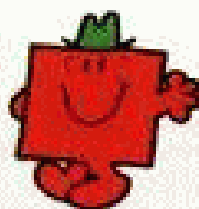
4 Little Miss
Sunshine



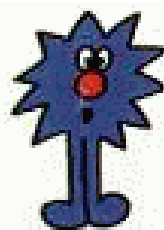
30 Little Miss
Sporty



12 Mr
Small



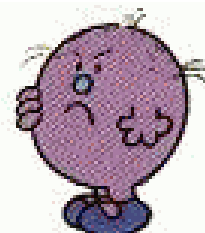
26 Mr
Strong



5 Mr
Sneeze



13 Little Miss
Chatterbox

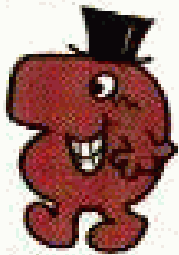


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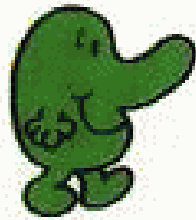


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Greedy



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Tiny



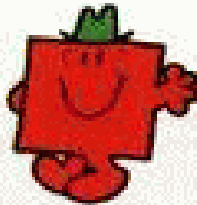
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30 Little Miss
Sporty



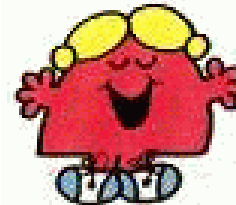
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Strong



5 Mr
Sneeze



13 Little Miss
Chatterbox



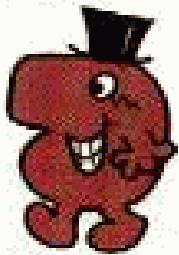
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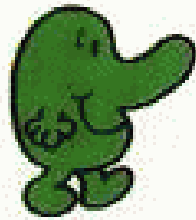
19 Little Miss
Busy

Who do you think
are his parents?





11 Mr
Uppity



4 Mr
Nosey



2 Mr
Greedy



5 Little Miss
Tiny



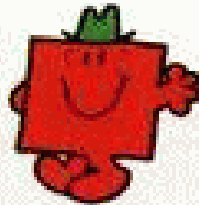
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Sporty



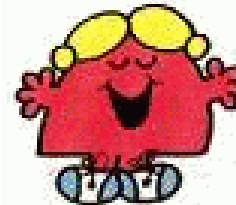
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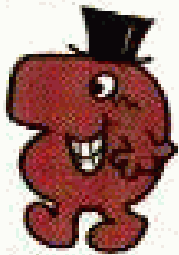
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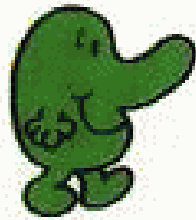
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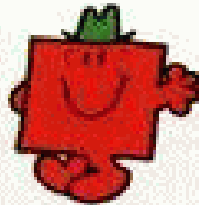
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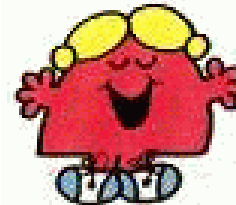
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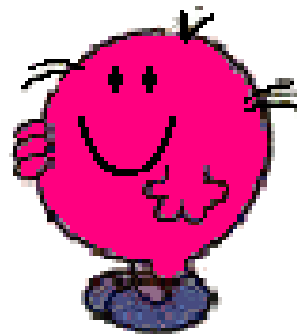


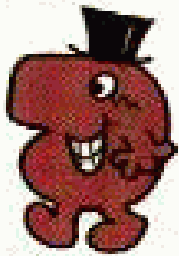
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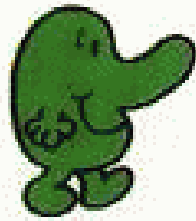
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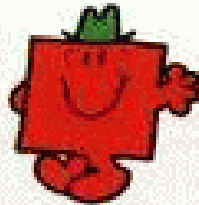
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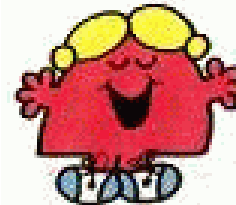
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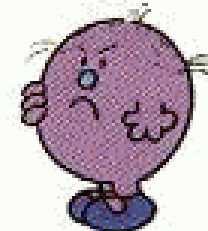
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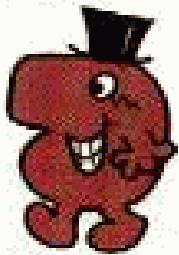
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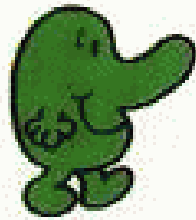
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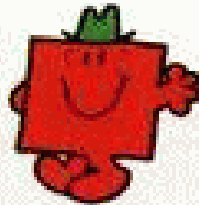
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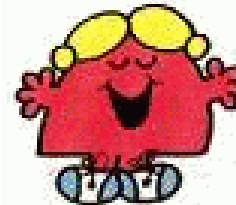
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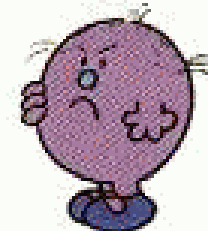
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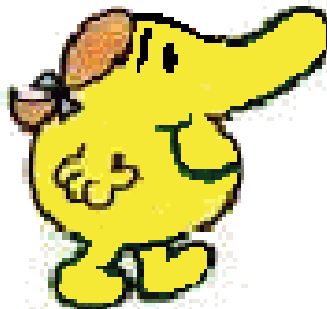


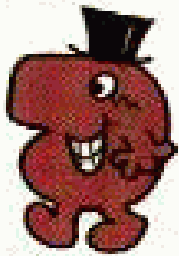
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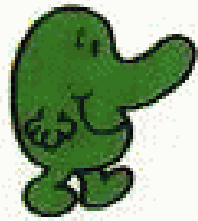
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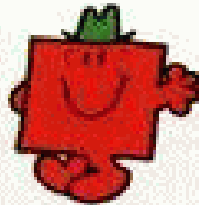
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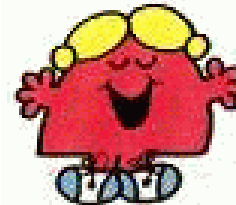
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Chatterbox



26 Little Miss
Stubborn



19 Little Miss
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Who do you think
are her parents?





What did we learn from this?



- Children inherit features from their parents
- If two parents have a certain characteristic then their child may show it even more (e.g. Mr Small + Little Miss Tiny = Mr Very Small!)
- Some things such as glasses, scars and muscles we get from our environment, they are not inherited.



Genetic information

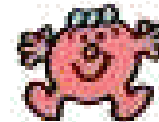
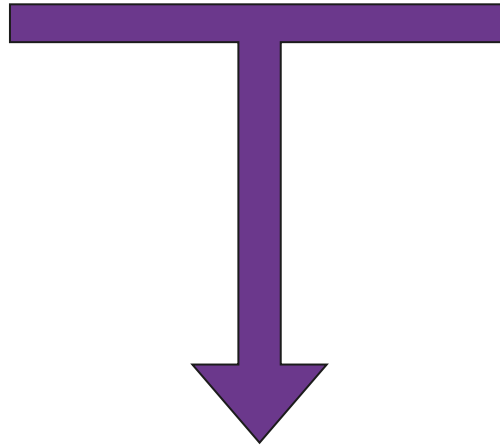


- The instructions that make up a plant or animal comes from their **parents**.
- $\frac{1}{2}$ comes from the **sperm** and $\frac{1}{2}$ from the **egg**
- These instructions are found in the **nucleus** of the cells.
- The instructions for each characteristic are called **GENES**.

We saw that when Mr Small and Little Miss Tiny produced a child it was even smaller.



12 Mr
Small



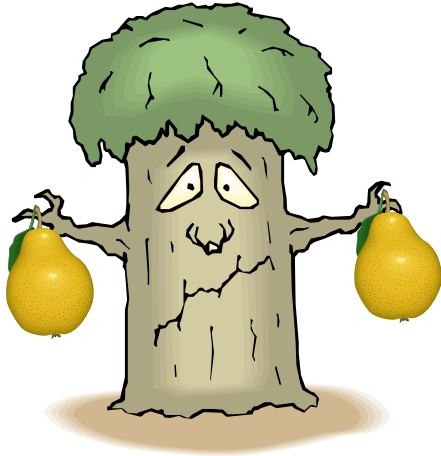
5 Little Miss
Tiny



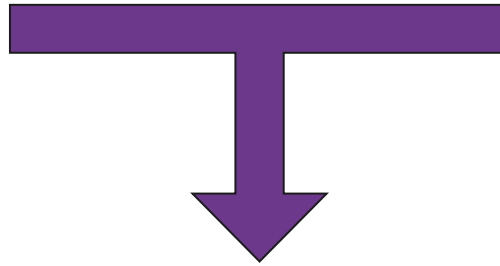
What would happen if Mr Very Small had a child with
Little Miss Miniscule??



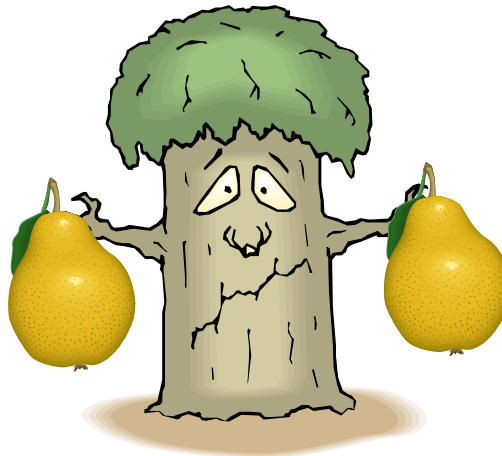
This is called selective breeding and can be used to make larger animals and crops that produce more fruit



Large fruited Dad



Large fruited Mum



Very large fruited child!

Inherited Characteristics



We often talk about inheriting characteristics from our parents. However, it is not always the case that these are passed on through DNA. Some are learnt as we grow up.

Using the Inherited Characteristics Cards place the characteristics into two groups.

Inherited Characteristics

Acquired Characteristics

Discuss each card in your group and each group member needs to give reasons for why they think it belongs to a particular category. How do they know it is inherited or acquired?

Inherited Characteristics



Inherited Characteristics



Tongue



Hair



Eye Colour



Cleft chin



Freckles



Mustache



Playing a musical instrument



Swimming



Drawing



Reading



Riding a bike

Now, it's your turn.

Using the Mr Men and Little Miss, you need to predict what their offspring may look like. Which characteristics with your offspring inherit from either parent?

In your books, write the name of the parents and then draw and name their child.

