

Being a Scientist

- **Science:** Is the study of the natural and physical world.

العلم هو دراسة العالم المادي والطبيعي.

Scientists ask questions about the natural world and try to answer those questions using the information they gather (Scientific inquiry).

يسأل العلماء أسئلة عن العالم المحيط و يقومون ببحث عن أجوبة لهذه الأسئلة و هذا ما يعرف بالبحث العلمي.

Scientific inquiry starts with an observation!!

- **Observation:** Is using one or more of your senses to learn about something.

استخدام حاسة او اكثر من الحواس ال5 للتعلم عن أي شيء.

- **Inference:** Is a conclusion formed from available information.

هي النتيجة المتكونة من المعلومات المتاحة لدينا , حيث تم الحصول عليها عن طريق الملاحظة.

Questions:

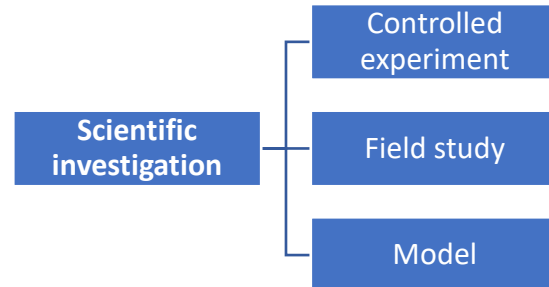
- Scientific inference is a conclusion made using (Observation)
- Explain the difference between inference and observation?

Observation is using your senses to learn whereas inference is a conclusion made from the observation made.

Scientific investigation: Is a way of answering a scientific question.

التحقيق/البحث العلمي هو وسيلة لإجابة الأسئلة العلمية.

There are three types for the scientific investigation



- **Controlled experiment:** An experiment that involves changing one element **only** and observe the effect.

هي تجربة تقوم على تغيير عنصر واحد فقط مع إبقاء باقي العناصر ثابتة و ملاحظة الأثر.

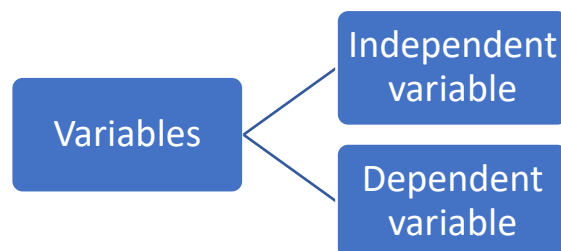
- **Field study:** An investigation in which scientists make observations **outside** the laboratory.

بحث علمي يقوم فيه العلماء بالملاحظات و الدراسات خارج المختبر.

- **Model:** Is a representation of an object or event that is used for understating the natural world.

هو تمثيل لغرض/حدث ما يساعد في تسهيل فهم العالم المحيط بنا.

We have two types of variables



1- Independent variable **العامل المستقل**

Is the variable that is changed in the experiment.

هو العامل الذي يتم تغييره خلال التجربة

2- Dependent variable العامل المعتمد

The variable that is measured in the experiment.

هو العامل الذي يتم قياسه خلال التجربة

A controlled experiment must have two groups:

1- Control group

Is the group that doesn't have any change in the variables.

المجموعة الثابتة لا يحصل عليها تغيير

2- Experimental group

Is the group that is changed in the experiment (using the independent variable)

المجموعة التي يحصل عليها تغيير بواسطة العامل المستقل (عند تغييره خلال التجربة)

Questions:

- Which is the independent variable in an experiment investigating the effect sugar on the taste of a cup of tea. (Sugar)

Scientists often publish their work in:

- 1- Internet
- 2- Books
- 3- Journals علمية مجلات
- 4- Meetings مؤتمرات

Scientific explanations must be based on information not opinions.

- **Scientific theory:** An attempt to explain a pattern observed repeatedly in the natural world.

هي محاولة لتفسير نمط متكرر الحدوث في العالم المحيط.

Scientific theories are not guessing or opinions.

Theories are supported using observations and results.

Theories may change as new information become available.

- **Scientific law:** Is a rule that describes a pattern in nature.

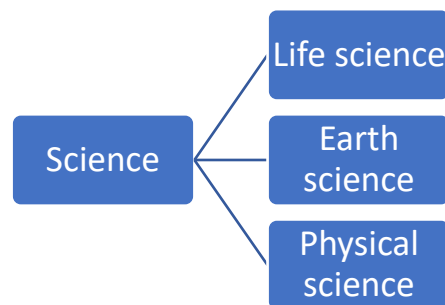
A law doesn't attempt to explain why something happens, it only describes a pattern.

- **Technology:** Is the practical use of science.

هي التطبيق العملي للعلم.

Technology is the way we use tools, techniques and instruments to learn about the world.

There are three branches of science:



- **Life science:** Is the study of living things.

العلم الذي يدرس الكائنات الحية.

- **Earth science:** The study of earth, science and weather.

العلم الذي يدرس الأرض، الفضاء و الجو.

- **Physical science:** The study of matter and energy.

العلم الذي يدرس المادة و الطاقة.

- Matter: Anything that takes up space and has mass.

أي شيء يملأ الفراغ (يشغل حيز) وله كتلة.

Physical science is divided into two fields: Chemistry and physics.

Safety equipment



units of measurement in their correct order from largest to smallest.

kilometer (km)

hectometer (hm)

decameter (dam)

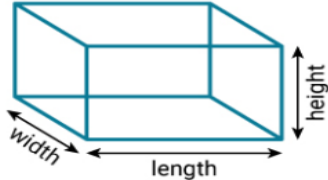

meter (m)

decimeter (dm)





centimeter (cm)

millimeter (mm)


Length, width and height

Definition	Units	Tools
<ul style="list-style-type: none"> Length is the measurement of something from end to end along its longest side. Width is the measurement of something from side to side. Height is the measurement of something from its base to the top. 	 <p>The basic unit for measuring length, width, and height is the meter.</p>	 <p>Common tools used to measure length, height, and width are:</p> <ul style="list-style-type: none"> measuring tapes or metric rulers



Volume

Definition	Units	Tools
<p>Volume is the amount of space that a substance or object takes up.</p>	 <p>The unit for measuring the volume of a solid is cubic centimeters (cm³).</p>  <p>The unit for measuring the volume of a liquid is milliliters (mL) or liters (L).</p>	 <p>Metric rulers are used to measure the volume of some solid objects.</p>  <p>Graduated cylinders are used to measure the volume of a liquid.</p>



Temperature

Definition	Units	Tools
<p>Temperature is the amount of heat present in a substance or object.</p>	<p>The SI unit for measuring temperature is kelvin (K).</p> <p>More common units for measuring temperature:</p> <ul style="list-style-type: none"> • Celsius (°C) • Fahrenheit (°F). 	 <p>A thermometer is used for measuring temperature.</p>

Mass and weight

Definition	Units	Tools
<p>Mass is the amount of matter in an object.</p>	<p>The SI unit for measuring mass is the kilogram (kg).</p>	 <p>The metric balance is used to measure an object's mass.</p>
<p>Weight is a measure of the pull of Earth's gravity on an object.</p>	<p>The SI unit for weight is the newton (N).</p>	 <p>The spring scale is used to measure an object's weight.</p>

Examine the table to see the differences between mass and weight.

You can compare mass and weight by:	Mass	Weight
• what they measure	• the amount of matter in an object	• the pull of gravity on an object
• their SI unit	• measured in kilogram (kg)	• measured in newtons (N)
• how they change	• stays the same in all locations	• can change with location depending on gravity
• the tool used to measure them	• balance 	• spring scale 

End of Being a scientist lesson