

INSTRUCTIONS 4 SIMPLE STEPS

This is an **interactive** factsheet that uses **augmented reality** to unlock animations, videos and interactive buttons to enhance and deepen the learning experience. Simply follow the instructions and hold your smart device over the highlighted areas. **Enjoy the experience.**

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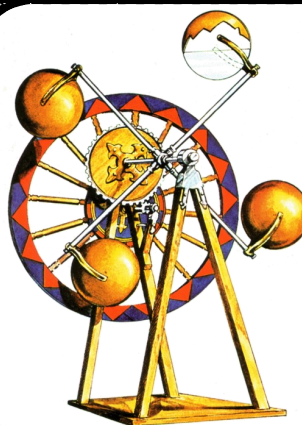
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WHAT IS IT?

Perpetual motion refers to a movement that goes on forever once started without additional energy added. A machine that could be set in motion once, would continue to move forever.

Such a device or system would be against the law of conservation of energy. This law states that energy cannot be created, or destroyed, but one form of energy can be transformed into a different one.

SEE IT IN 3D NOW



This is an example of a perpetual motion machine.

Move around the animation for a better look.

Perpetual Motion in Action



WATCH IT ON VIDEO

RULE BREAKING

A perpetual motion machine of the **first kind** produces energy from nothing. It gives its user unlimited free energy. It violates the law of the conservation of energy.

A perpetual motion machine of the **second kind** spontaneously converts thermal energy into mechanical work. In itself, this does not violate the law of the conservation of energy, because there is the same amount of mechanical work than there was of thermal energy. Such machines violate the Second law of thermodynamics.

UNDERSTAND IT BETTER

SEE WHAT A TEACHER HAS TO SAY ABOUT IT





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TRY ANGLES?

*Look around you. What shapes do you see? Hidden amongst the squares, rectangles, arches and circles are the unsung heroes of construction – the humble **triangle**. Triangles are so ever-present because of their **strength**.*

Triangles are inherently strong because they form a **fixed rigid shape**. A square lacks the rigid strength of a triangle. But by adding **diagonal bracing**, a technique most clearly seen in **cranes** or scaffolding, the structure can again rely on the strength of a triangle to hold its shape.

SEE IT IN 3D NOW



This is an
example of a
crane in
action.

*Move around the
animation for a better look.*



Triangles = Strength

WATCH IT ON VIDEO

Triangles have always been a fundamental tool in architecture and construction, but mathematics has allowed them to be used to construct some of the complex and daring shapes we see in architecture today.

KNOW YOUR TRIANGLES

Equilateral triangle = all three sides are the same length

Isosceles triangle = two sides are the same length

Scalene triangle = none of the sides are the same length

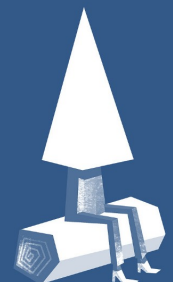
Right triangle = one of the angles is a **right angle** - an angle of 90 degrees

Obtuse triangle = one angle is **greater than a right angle** - it is more than 90 degrees

Acute triangle = all angles are **less than right angles** - each one is less than 90 degrees


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



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INSIDE A COMPUTER

Have you ever looked *inside a computer case* before, or seen pictures of the inside of one?

The small parts may look complicated, but the inside of a computer case really isn't all that mysterious. Like you, a computer has a **brain**, a **body** and **memory**.

Give the brain more '**cores**' and boost the memory, and you'll increase performance!



SEE IT IN 3D NOW



Computers also have a Video Card, Sound Card, Network Card and a Bluetooth Card on-board or slotted onto the motherboard. Speed is measured in GHz and MHz. Size is measured in GB 'Gigabytes' or MB 'Megabytes'.



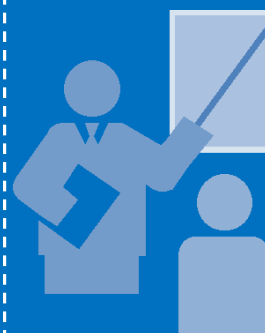
WATCH IT ON VIDEO

WHAT IS WHAT? THE MAIN STUFF

Central Processing Unit (CPU)	The Motherboard	RAM Random Access Memory	The Hard Drive (HDD)
'THE BRAIN' Carries out all the commands and instructions	Connects directly or indirectly to every part of the computer	Short term memory - goes when the computer is off	Where software and documents are installed long term

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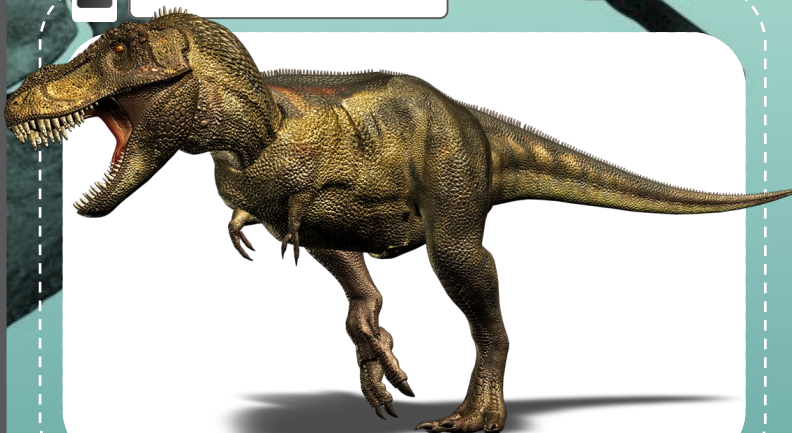
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SIMPLY THE BEST...

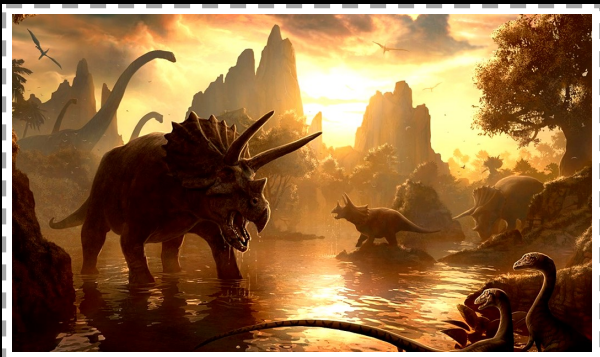
The dinosaurs were among the **most successful animals ever** to live on the Earth. Their reign lasted over 100 million years - and if birds evolved from the dinosaurs, then their descendants are **still alive today**.

The name dinosaur translates as '**terrible or wondrous lizards**' and they certainly evolved in a diverse range of sizes and shapes, from the gigantic plant-eating **sauropods** to the quick meat-eating **tyrannosaurs**.

SEE IT IN 3D NOW



Tyrannosaurus rex is possibly the most well known dinosaur due to its huge size, **ferocious nature** and regular appearances in popular media. Thanks to a number of well preserved fossils, the T-Rex has been studied in detail by **palaeontologists** all around the world.



WATCH IT ON VIDEO

T-REX FACTS

'Tyrannosaurus' comes from the Greek words meaning '**tyrant lizard**', while the word 'rex' means '**king**' in Latin.

T-rex lived in an area of the Earth that now makes up western North America. T-rex measured up to 13m (42ft) in length, 4m (13ft) at the hip and could weigh up to **7 tons!**

T-rex lived in the late **Cretaceous Period**, around **66 million years ago**.

Average estimates suggest a max running speed of around **40kph** (25mph).

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TICK TOCK, TICK TOCK...

We might have smart watches today that use Android Wear, but original time-telling devices were all about **"the movement"** - the **mechanism** that measures the passage of time and displays the current time - the heart of any clock.

A mechanical watch is driven by a **mainspring** which must be wound periodically. Its force is transmitted through a series of gears to power the **balance wheel**, a weighted wheel which *oscillates* back and forth at a constant rate. A device called an **escapement** releases the watch's wheels to move forward a small amount with each swing of the balance wheel, moving the watch's hands forward at a constant rate. **This is what makes the characteristic 'ticking' sound.**

SEE IT IN 3D NOW



DID YOU KNOW?

The real name of the tower that houses the clock is simply **'The Clock Tower'**. Big Ben is just the nickname given to the largest bell in the tower, formally known as **'Great Bell'**. However, since the nickname is much more recognizable, **'Big Ben'** has today become much more commonly used across the world.



Meet Britain's Favourite Clock

BIG BEN

WATCH IT ON VIDEO

4 BIG BEN FACTS

1. Big Ben first chimed on the **31st of May, 1859**
2. Big Ben chimes **every 15 minutes** and the sound can be heard for a radius of up to **5 miles**
3. The clock's time is adjusted **every year with an old British penny**. If the clock is fast, a penny is added to the pendulum, and if the clock is slow, one is removed.
4. Did you know that **Big Ben** has a little brother? If you go to **Victoria Station**, you can find **Little Ben**.

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