

Constant Velocity

Velocity is constant, or does not change, when an object's speed and direction of movement do not change. If you use an arrow to describe velocity, you can divide the arrow into segments to show whether velocity is constant. Look at the skateboarding arrow in **Figure 4**. Each segment of the arrow shows the distance and the direction of move in a given unit of time. Because each segment is the same length, you are moving the same distance and in the same direction during each interval of time. Because both your speed and direction of movement are constant, you are moving at a constant velocity.

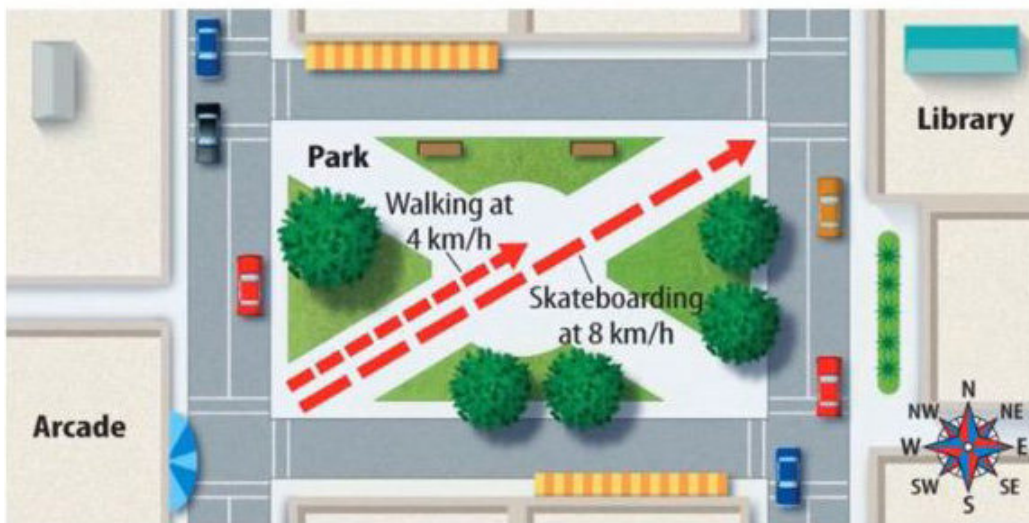


Figure 4 Your skateboarding velocity is greater than your walking velocity. Both velocities are constant because they represent a constant speed in a constant direction.

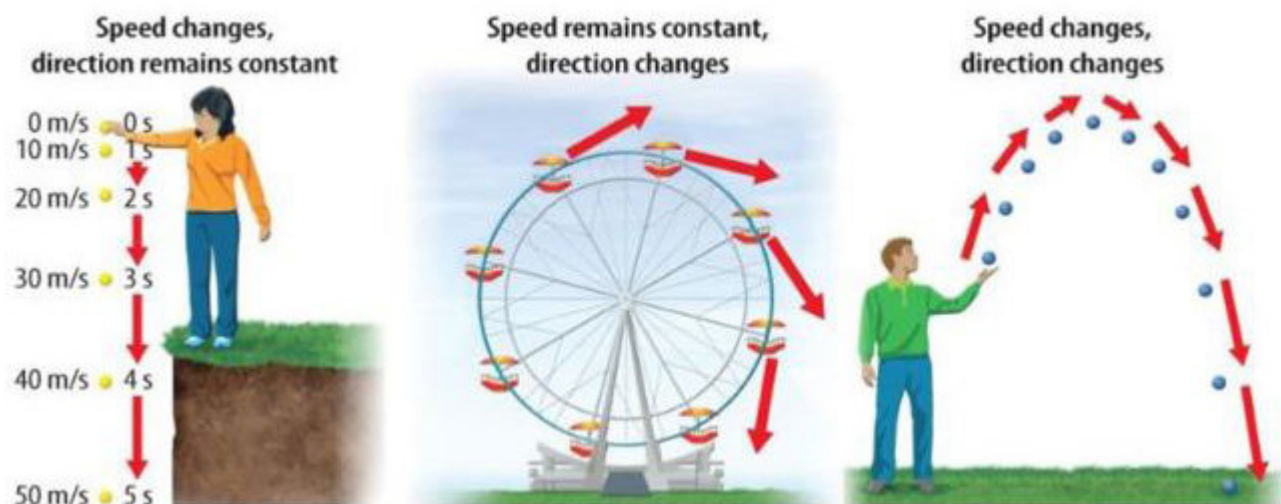


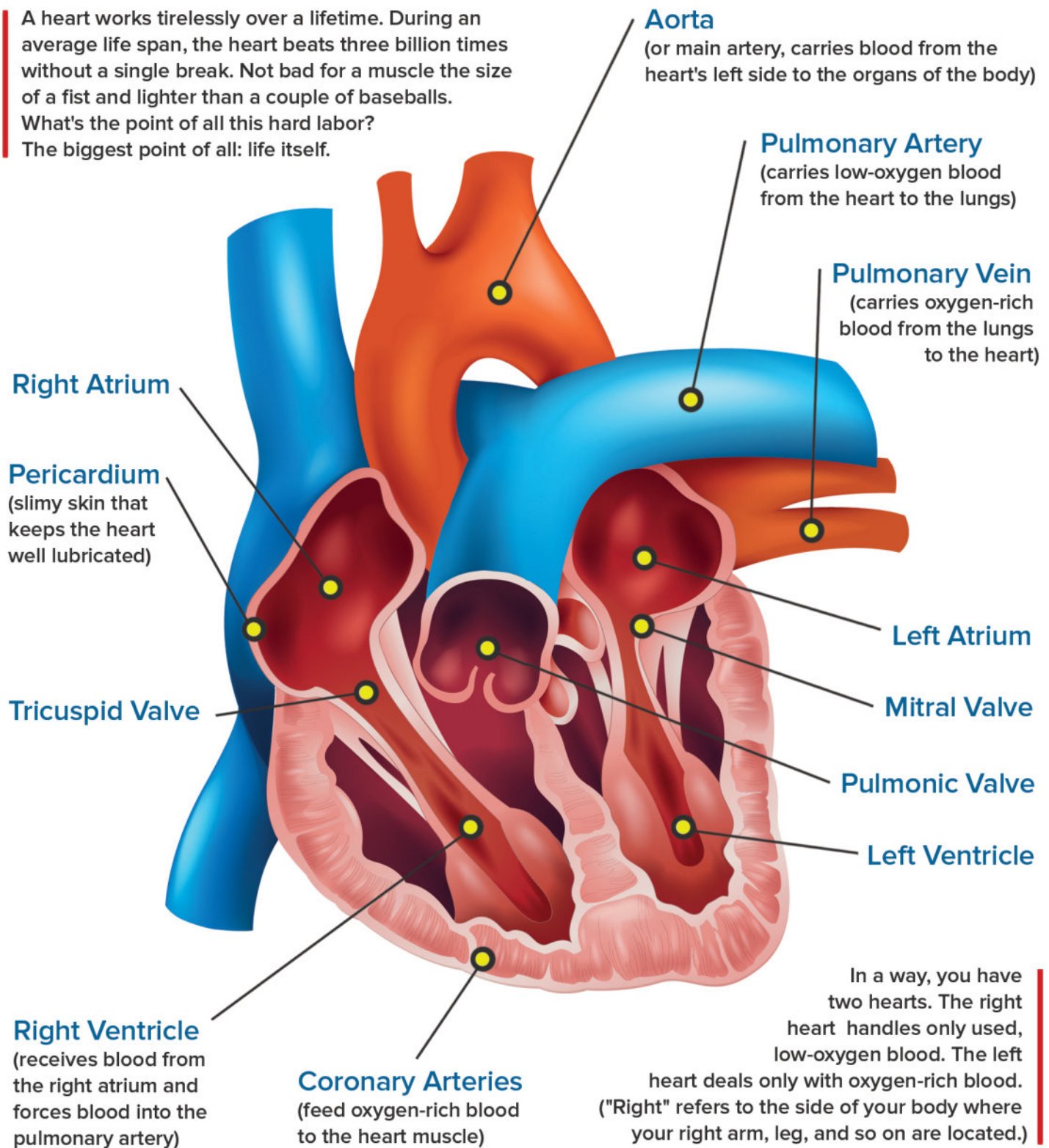
Figure 5 The velocity of an object changes if the speed changes, the direction changes, or both the speed and the direction change.

Anatomy of a Human HEART

As you read this, your heart is pumping about five quarts of blood throughout your body. The blood is traveling through more than 60,000 miles of blood vessels (arteries, veins, capillaries). That's enough to circle the equator twice, and then some!



A heart works tirelessly over a lifetime. During an average life span, the heart beats three billion times without a single break. Not bad for a muscle the size of a fist and lighter than a couple of baseballs. What's the point of all this hard labor? The biggest point of all: life itself.



Advantages

Clean Energy

Obtaining energy from the wind emits zero emissions into the atmosphere, providing a clean alternative to fossil fuels, which contribute significantly to dangerously high levels of atmospheric CO₂.

Less Space is Needed

Wind turbines take up much less space than what is required for a single power station, and the surrounding land can continue to be used for other purposes including agriculture.

Renewable Energy

Unlike fossil fuels, the wind will not run out, and can provide the planet with a limitless supply of "free" power.

Generate Energy in Remote Locations

In remote mountainous or countryside regions, utilising wind power can provide a much cheaper and convenient source of energy.

Do the advantages outweigh the disadvantages?



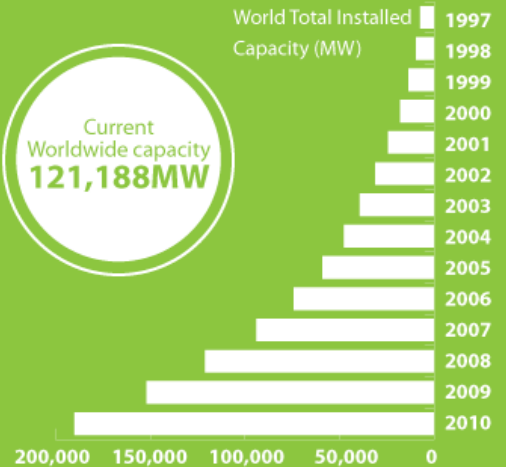
The US accounts for **32%** of new installed wind capacity in 2008



Wind Power provides **1.5%** of total electricity consumed



In-shore farms could produce up to **40x** the world's total electricity



Disadvantages

Unreliability

The main issue concerned with power from the wind, is that of its **unreliability**. Wind strength cannot be controlled and in some areas it is just not a viable source of power.

Lower Electricity Output

Wind power generates significantly less electricity than its fossil fuel equivalent, meaning more turbines are required to generate the same amount of power. Wind turbines are also highly inefficient in terms of output capacity.

Expensive Construction Process

Wind turbines are costly to build with one turbine costing up to **\$1million per MW** of nameplate capacity installed.

Costly to surrounding wildlife

With demand for renewable and cleaner energy sources growing it is likely that the need for land for windfarms will increase, which will potentially damage a high percentage of local wildlife in the process. It is also estimated that each wind turbine **kills over 4 birds a year**.

Noise Pollution

The noise produced from a singular wind turbine is similar to that of a **small jet engine** and can be a cause of major concern for those living near a windfarm.



Wind Power Advantages and Disadvantages

Sources: Clean Energy Ideas and AWEA