

Gravity and Bats

This fruit bat is sleeping comfortably while hanging from a tree branch. Imagine trying to do that yourself! As soon as you relaxed and fell asleep, your grip would loosen and you would start to fall. Earth would pull you down to the ground with the force of gravity.

Forces are pushes and pulls that can change the motion of an object. Some forces require that objects touch. For example, if you're climbing a tree you might pull a branch down close to you so you can climb up. To exert the force that pulls the branch down, you need to touch the branch. Other forces, like gravity, can act at a distance. That means you don't need to be touching Earth for gravity to affect you. Gravity is an attractive force between all objects that have mass. The more mass an object has, the more strongly it pulls other objects toward it through the force of gravity. Earth is the most massive object near us, so its pull on us is strong. The force of gravity between you and Earth can be explained by Earth's gravitational field. A gravitational field is space around an object where that object can exert gravity on other objects. Gravity is always a pulling force—it always attracts objects together.

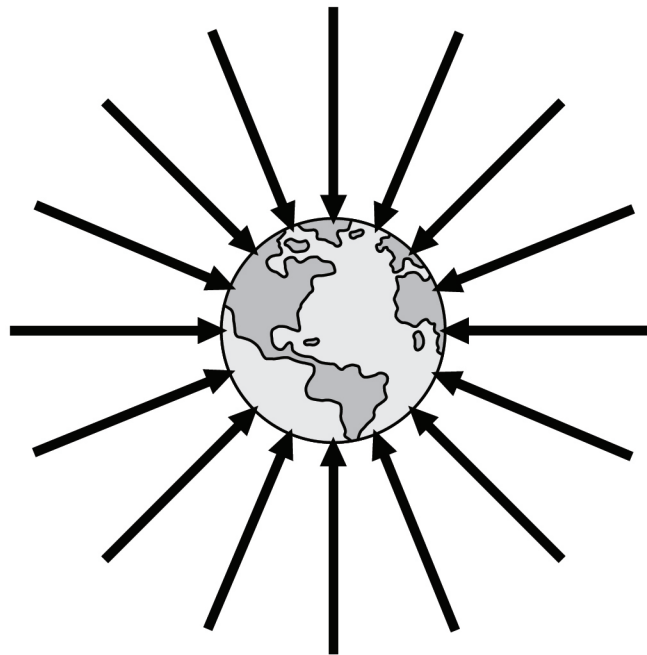
What about the hanging bat? Some people might imagine that, because bats can fly, they must not be affected by gravity. However, that's not true: the force of gravity acts on any object within Earth's gravitational field, even if that object is not touching Earth. As a bat flies, Earth is still pulling it downward, so the bat has to flap its wings to stay in the air. Even astronauts in space are within Earth's gravitational field, so they are affected by Earth's gravitational pull. However, Earth's gravitational field gets weaker with distance. The closer an object is to Earth, the stronger the force of gravity on that object.



Fruit bats sleep while hanging upside down from branches.

If the fruit bat is affected by gravity, how is it able to hang from a tree branch in its sleep? A fruit bat has claws that grip closed when they are relaxed. Humans have to tighten their hand muscles to grip a branch, but a fruit bat can grip while its muscles are completely relaxed. Even though Earth is always pulling the bat down with the force of gravity, the bat can relax and sleep as it hangs on to the branch.

Earth's Gravitational Field



The area where Earth's gravitational force can act on objects is called Earth's gravitational field. The field is invisible, of course, but you can map it as arrows pointing inward toward Earth, showing the direction of the force of gravity.