

Newton's 2nd Law { $F = m \times a$ }

Name: _____

Calculate the **missing variables** using the necessary **formula and rules**.

Force	Mass	Acceleration
F	m	a
$F = m \times a$	$m = F \div a$	$a = F \div m$
<i>Newtons (N)</i>	<i>kilograms (kg)</i>	<i>metres per second squared (m/s²)</i>
A water-filled balloon with an overall mass of 1 kg undergoes an acceleration of 2 m/s ² . How much force is being applied to the balloon?	A skyrocket is launched with a force of 10 N and accelerates at 20 m/s ² . What is the mass of this skyrocket?	A loaded coal wagon with a total mass of 20 000 kg is pushed by a force of 300 000 N. What was the wagon's acceleration?
A theme park ride carriage with a mass of 1 000 kg needs to be accelerated at 0.5 m/s ² along a track. What force is required to move the carriage?	A 7.5 N force is applied to a football, generating an initial acceleration of 15 m/s ² . Calculate the mass of the football.	A spring balance is used to launch a 0.05 kg foam ball with a force of 5N. What acceleration is produced?
A tractor carrying hay bales has a total mass of 9 100 kg. What force is required to reach an acceleration of 4 m/s ²	A cannonball accelerates at 1000 m/s ² from an applied force of 5000 N. What is the mass of the cannonball?	A 1000 kg satellite in space needs a course correction. To achieve this, one of its rocket motors is fired to apply 100 N of force as thrust. What will be the acceleration due to this thrust?
How much force is needed to accelerate a 2000kg car by 3 m/s ² ?	A tiny aeroplane accelerates at 35 m/s ² with a force of 20 N. What is the mass of the aeroplane?	What would be the acceleration of a projectile with a 6 kg mass being launched by piston force of 500 N?

<p style="text-align: center;">Force</p> <p style="text-align: center;">F</p> <p style="text-align: center;">$F = m \times a$</p> <p style="text-align: center;"><i>Newton's (N)</i></p>	<p style="text-align: center;">Mass</p> <p style="text-align: center;">m</p> <p style="text-align: center;">$m = F \div a$</p> <p style="text-align: center;"><i>kilograms (kg)</i></p>	<p style="text-align: center;">Acceleration</p> <p style="text-align: center;">a</p> <p style="text-align: center;">$a = F \div m$</p> <p style="text-align: center;"><i>metres per second squared (m/s^2)</i></p>
<p>A truck with an overall mass of 6 500 kg is accelerating at 0.3 m/s^2. What force does the engine need to apply in order to do this?</p>	<p>A person is riding a bike and accelerating at 2.8 m/s^2 with a force of 100 N. What is the mass of the rider and bicycle?</p>	<p>A 35 kg child jumps on a trampoline on the moon and becomes airborne. They hit the trampoline safely with a force of 20 N. What was their downwards acceleration?</p>
<p>A carnival bumper car with a mass of 300 kg accelerates at 0.3 m/s^2 towards a wall. What is the force on the car before impact?</p>	<p>A boulder is dropped from a cliff and hits the ground. It's acceleration was 9.81 m/s^2 and the force on the boulder was 300 N. Find the mass of the boulder.</p>	<p>A 1300 kg Tomahawk land attack missile erupts from the water, initially propelled by a solid propellant with a force of 400 000 N. What will be the acceleration due to this propellant?</p>
<p>A 85 kg runner waits at the starting line. What force is required reach an acceleration of 3.4 m/s^2?</p>	<p>A 50.5 N force is applied to a golf ball, generating an initial acceleration of 15 m/s^2. Calculate the mass of the golf ball.</p>	<p>What would be the acceleration of a launched projectile from a trebuchet with a 35 kg mass when the force used is 1 000 N?</p>
<p>A 0.075 kg bullet travels through the barrel of a gun, accelerating at $440\,000 \text{ m/s}^2$, before leaving the barrel. What was the force of launch?</p>	<p>A meteorite accelerates towards a space station at 0.05 m/s^2 from an applied force of 300 N. What is the mass of the meteorite?</p>	<p>A 0.600 kg dynamics trolley has a 1.5 kg load added. It is launched with a force of 10 N. What is the acceleration?</p>