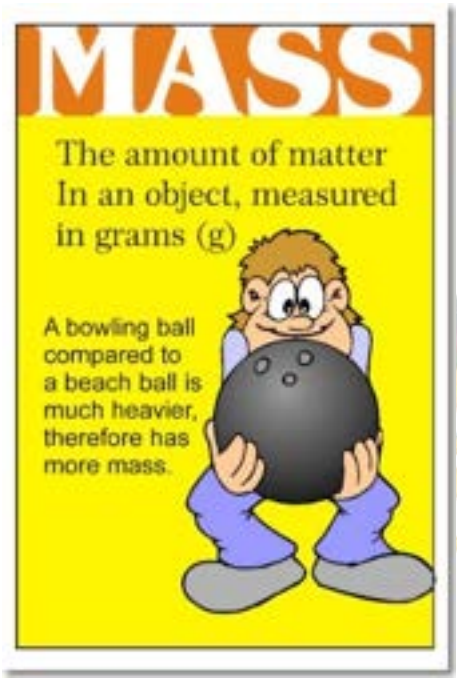
E2. Mass

Mass



Have you ever wondered why some objects are heavier than others? It's because of their mass! Mass is a measure of how much stuff, or matter, is in an object. Let's learn more about mass and how we can measure it.

What is Mass?
Mass is a property of matter that tells us how much stuff is in an object. Everything around us has mass, including ourselves! Even the smallest things, like a grain of sand, have mass.

How is Mass Different from Weight?
Sometimes people confuse mass with weight, but they are not the same thing. Mass is the amount of matter in an object, while weight is the force of gravity acting on an object's mass. Weight can change depending on the strength of gravity, but mass remains the same no matter where you are in the universe.

Measuring Mass
We measure mass using a balance or a scale. A balance has two pans, and we place the object we want to measure on one side and known weights on the other side until the balance is even. A scale works similarly, but it gives us the mass in numbers instead of a balance. The unit of mass we use most commonly is the gram (g).

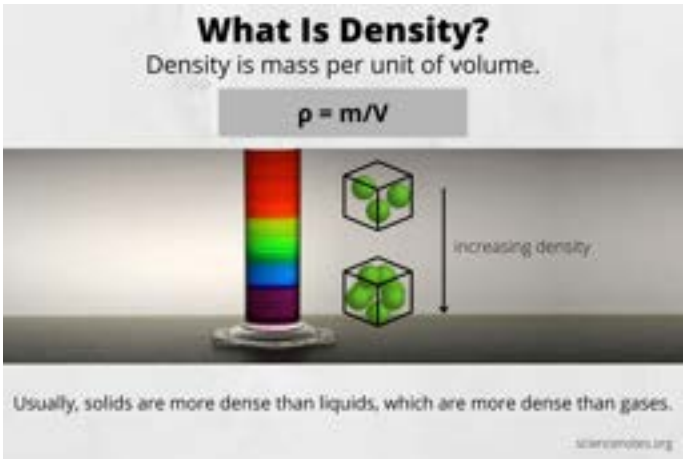
Comparing Mass
We use mass to compare how heavy objects are. If two objects have the same mass, they weigh the same too. For example, a small apple and a small orange might have the same mass. But if we compare a large watermelon to a small apple, the watermelon will have a much greater mass.

Mass and Volume
An object's mass is related to its volume, which is the amount of space it takes up. Objects with the same volume can have different masses. For example, a small piece of

clay and a small rubber ball may have the same volume, but the clay will have more mass because it is denser.

What is Density?

Density is a measure of how much mass is packed into a certain volume. An object with higher density will have more mass in a smaller space, while an object with lower density will have less mass spread out over a larger space. For example, a piece of iron is denser than a piece of foam because the iron has more mass packed into the same volume.



Using Mass in Everyday Life

Mass is used in many aspects of our daily lives.
In the kitchen, we use mass to measure ingredients for recipes. We use mass to weigh ourselves to see if we have grown taller or if we are carrying heavy bags. Mass is also essential in science and engineering when building structures or designing vehicles.

1. What is mass?
   A) A measure of how much stuff is in an object
   B) The force of gravity acting on an object
   C) The amount of space an object takes up
   D) The weight of an object

2. How is mass different from weight?
   A) Weight depends on the strength of gravity, while mass remains the same everywhere.
   B) Mass and weight are the same things.
   C) Mass can change depending on location, while weight stays constant.
   D) Mass is measured in kilograms, while weight is measured in grams.

3. How do we measure mass?
   A) Using a balance or a scale
   B) Using a ruler
   C) Using a thermometer
   D) Using a measuring cup

4. What unit is commonly used to measure mass?
   A) Kilogram
   B) Meter
   C) Liter
   D) Gram

5. If two objects have the same mass, what can we say about their weight?
   A) They have different weights.
   B) They weigh more than each other.

C) They have the same weight.
D) We cannot say anything about their weight until we know the strength of gravity acting on each of the objects

6. What is volume?
   A) The amount of stuff in an object
   B) The force of gravity acting on an object
   C) The amount of space an object takes up
   D) The weight of an object

7. How is mass related to volume?
   A) Objects with higher volume have higher mass.
   B) Objects with the same volume have lower masses.
   C) Mass and volume are unrelated.
   D) Objects with higher mass have higher volume.

8. What is density?
   A) A measure of how much mass is in a certain volume
   B) A measure of the weight of an object
   C) The amount of space an object takes up
   D) The measure of an object's length

9. If more mass is added to an object without changing the amount of space it takes up, then what happens to its density?
   A) Density decreases
   B) Density stays the same
   C) Density increases
   D) The density cannot be determined

10. In which field is mass commonly used?
    A) Science and engineering
    B) Music and arts
    C) Cooking and baking
    D) Sports and games

ANSWERS & EXPLANATIONS

1. A - A measure of how much stuff is in an object.
    - Mass is a measure of how much stuff, or matter, is in an object.

2. A - Weight depends on the strength of gravity, while mass remains the same everywhere.
    - Mass is a measure of the amount of matter in an object and stays constant everywhere. Weight is the force of gravity acting on an object's mass and changes based on the strength of gravity.

3. A - Using a balance or a scale.
    - We measure mass using a balance or a scale.

4. D - Gram.
    - The unit of mass we use most commonly is the gram (g).

5. D- We cannot say anything about their weight until we know the strength of gravity acting on each of the objects
    - Weight depends on the strength of the force of gravity on an object. Therefore, even if we know the masses of two objects are the same, we have to know the force of gravity acting on each of the objects to determine their weights.

6. C - The amount of space an object takes up.
    - Volume is the amount of space an object occupies.

7. C- Mass and volume are unrelated
    - The mass and volume of an object do not depend on one another.

8. A - A measure of how much mass is in a certain volume.
    - Density is a measure of how much mass is packed into a certain volume.

9. C - Density increases
    - An object with more mass packed into a smaller space has a higher density.

10. A - Science and engineering.
    - Mass is commonly used in science and engineering when building structures or designing vehicles.