Buoyancy

Activity 1: Paragraph Completion
Question Group 1
Question 1

Fluid pressure _____ as the depth below the surface increases. For an object submerged in water, the water pushes with _____ force on its bottom than its top side. This causes a _____ force that can be calculated as the _____ the force on its top and bottom side. When objects are submerged in water, the water is moved aside. According to _____ Principle, the net upward force on the submerged object is equal to the _____. A 2.0-L rock (density = 5.0 kg/L) completely submerged in water will _____ 2.0 L of water. The resulting upward force on the rock is equal to _____.

Answer Options for Blanks:

increases, decreases, is unchanged
the same, more, less
gravitational, drag, equilibrium, buoyant
average of, sum of, difference between
Bernoulli's, Aristotle's, Archimede's, Pascal's
weight of the object, volume of the object, weight of the displaced water, density of the object
densify, displace, destroy, compress
(2.0 L)*(5.0 kg/L)*(9.8 N/kg), the rock's weight, (2.0 L)*(1.0 kg/L)*(9.8 N/kg), nonsense! Nobody can know this.

Activity 2: The Buoyant Force
Question Group 2
Question 2
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The rock weighs _____ N.

The buoyant force is _____ N.

The volume of displaced H_2O is ~_____ L.

Diagram A

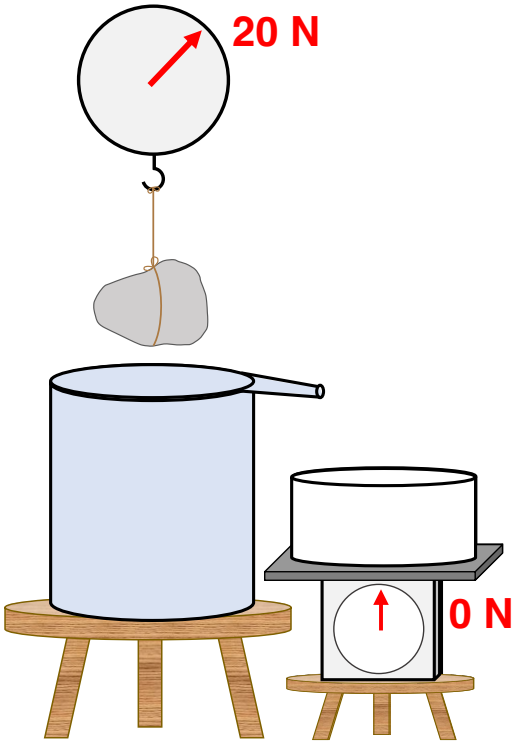
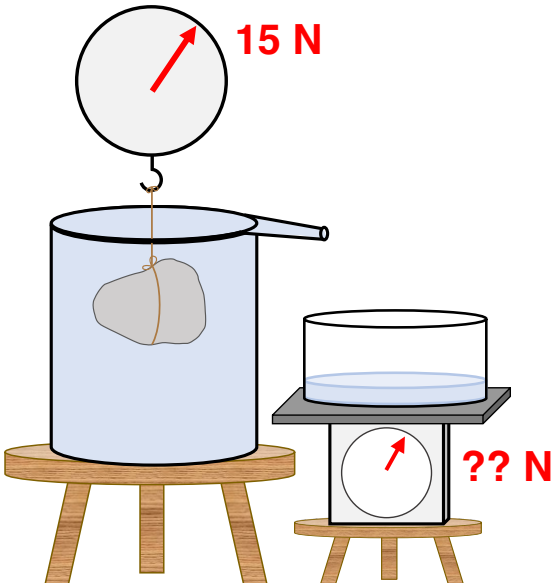


Diagram B



Question 3
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The rock weighs _____ N.

The buoyant force is _____ N.

The volume of displaced H_2O is ~_____ L.

Diagram A

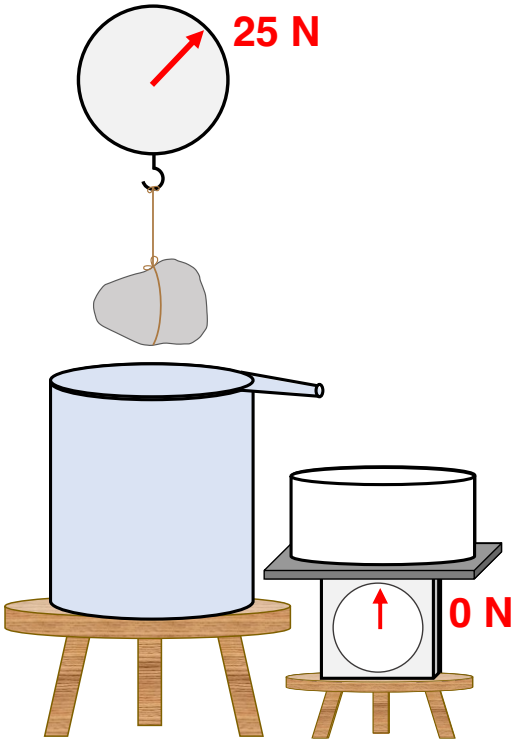
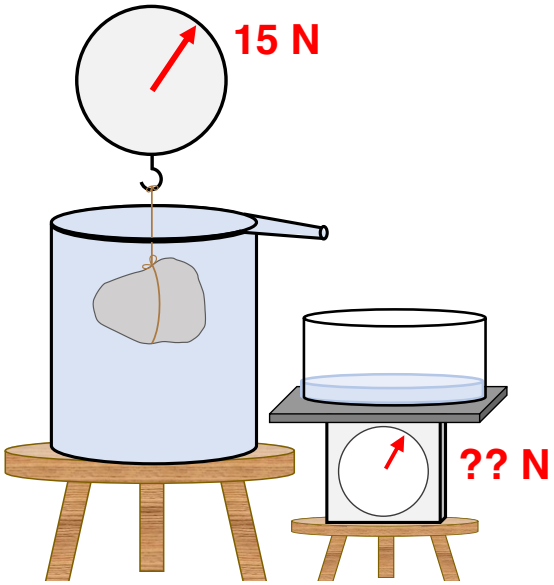


Diagram B



Question 4
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The rock weighs _____ N.

The buoyant force is _____ N.

The volume of displaced H_2O is ~_____ L.

Diagram A

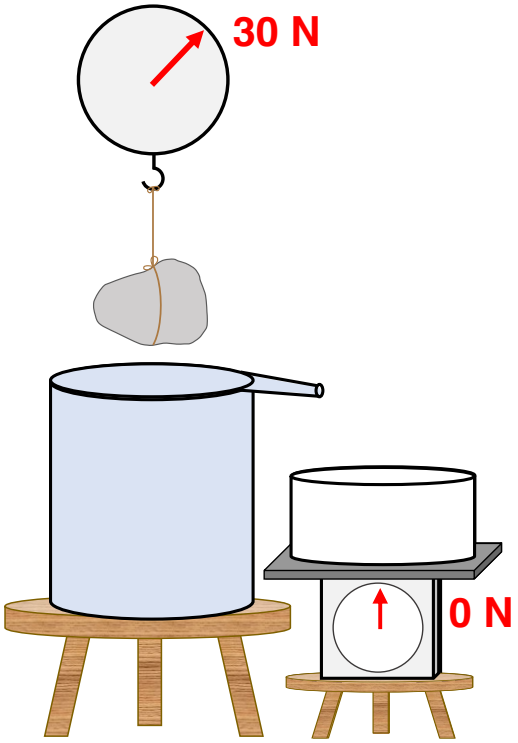
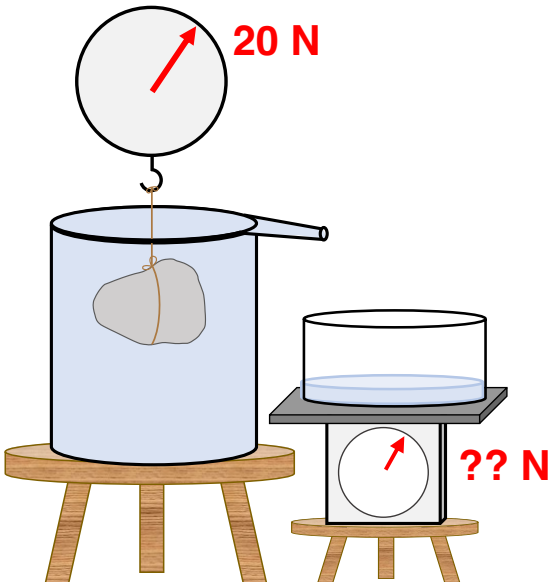


Diagram B



Question 5
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The rock weighs _____ N.

The buoyant force is _____ N.

The volume of displaced H_2O is ~_____ L.

Diagram A

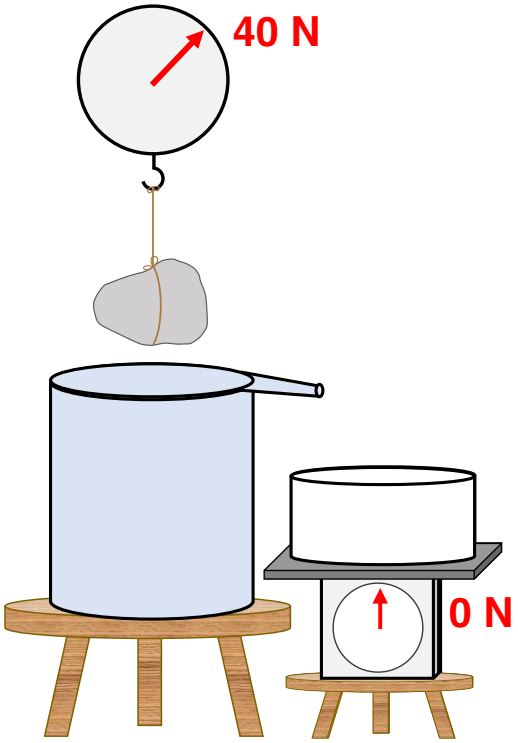
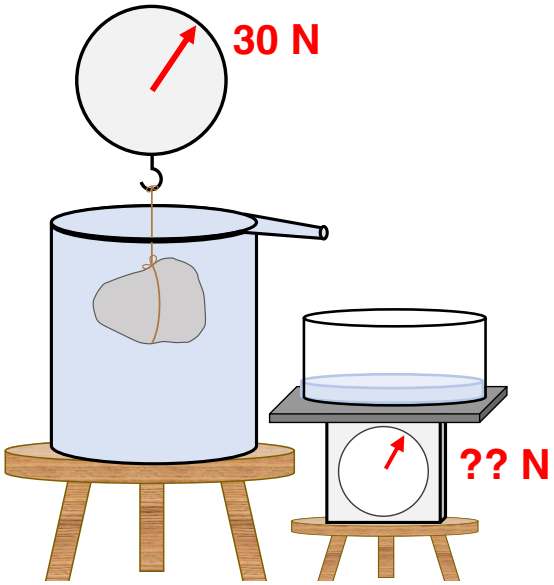


Diagram B



Question Group 3
Question 6
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The mass of the rock is _____ kg.

The buoyant force is _____ N.

The weight of displaced H_2O is ~_____ N.

Diagram A

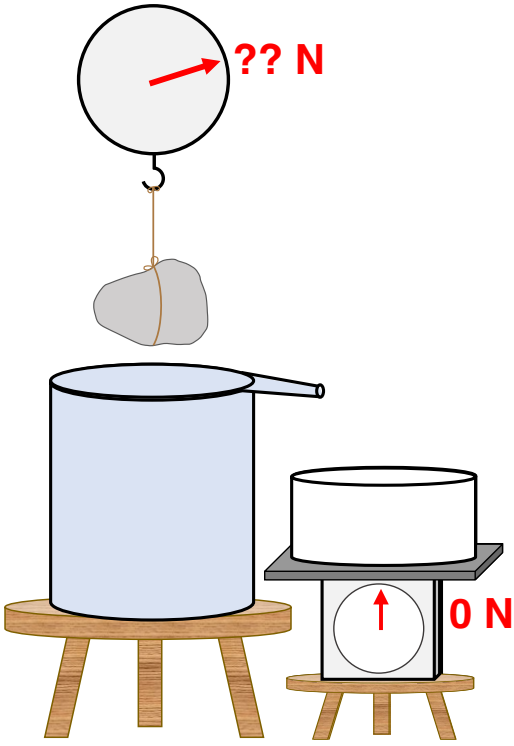
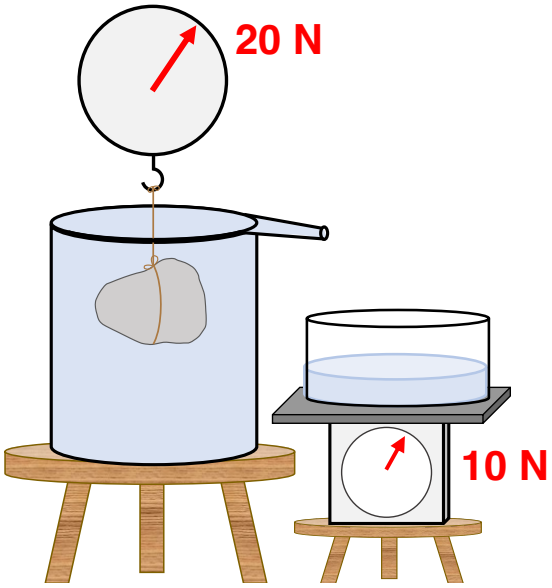


Diagram B



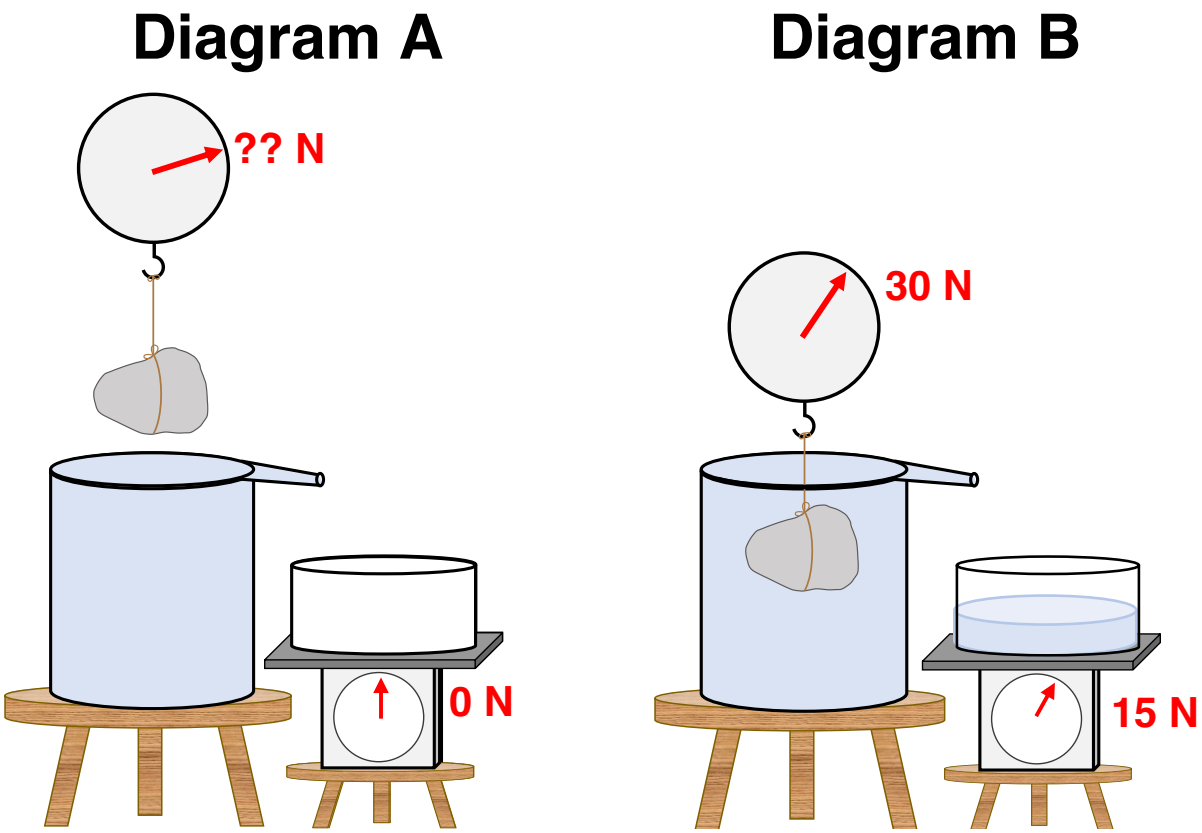
Question 7
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The mass of the rock is _____ kg.

The buoyant force is _____ N.

The weight of displaced H_2O is ~_____ N.



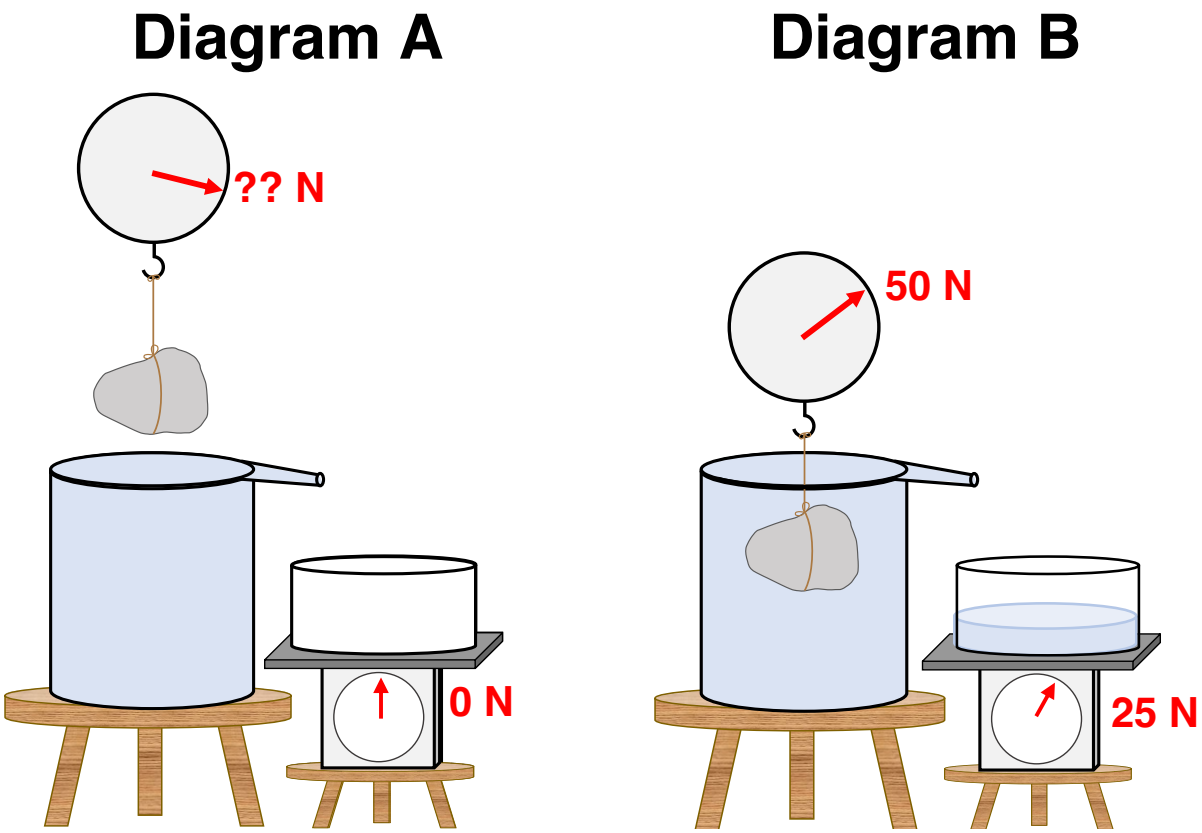
Question 8
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The mass of the rock is _____ kg.

The buoyant force is _____ N.

The weight of displaced H_2O is ~_____ N.



Question 9
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The mass of the rock is _____ kg.

The buoyant force is _____ N.

The weight of displaced H_2O is ~_____ N.

Diagram A

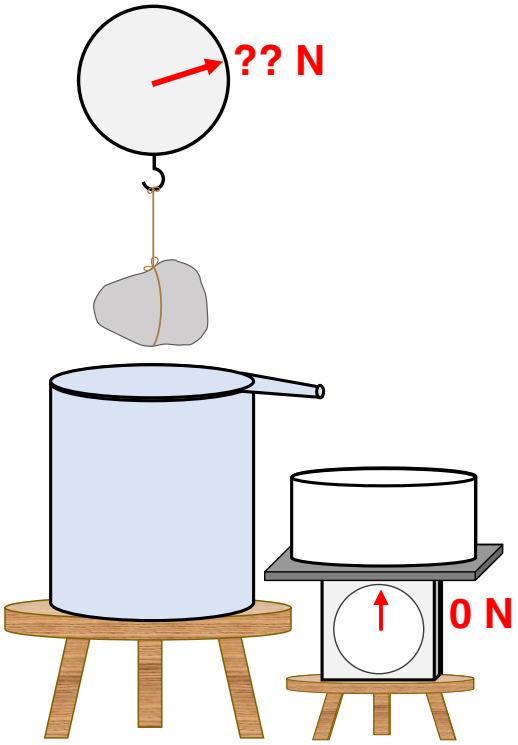
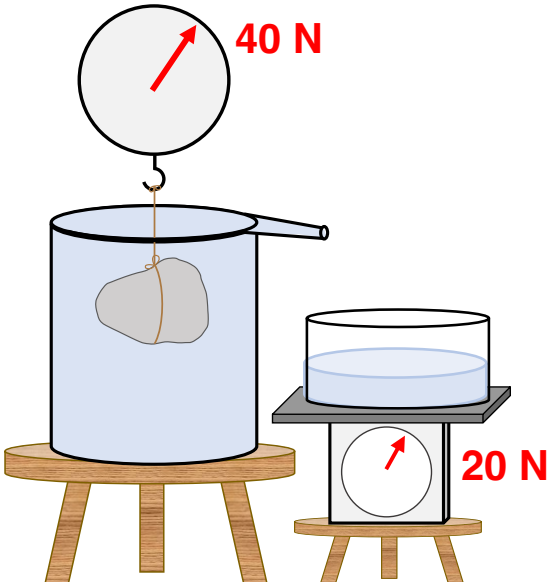


Diagram B



Question Group 4
Question 10
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The volume of the rock is _____ L.

The rock's apparent weight in H_2O is _____ N.

The weight of displaced H_2O is ~_____ N.

Diagram A

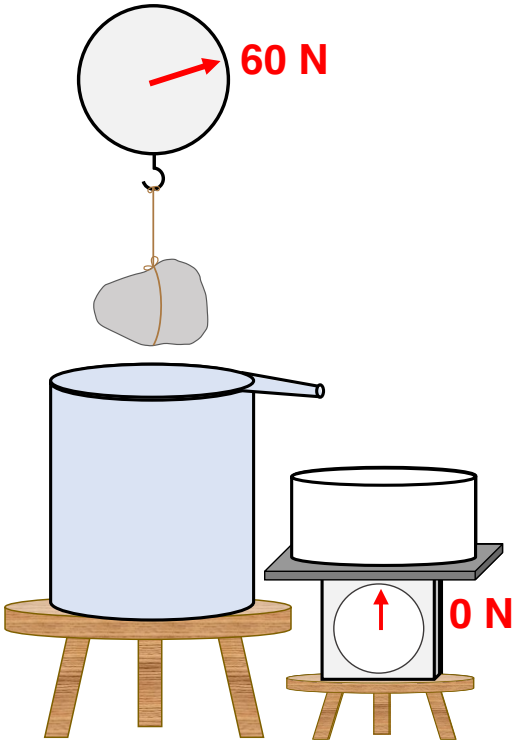
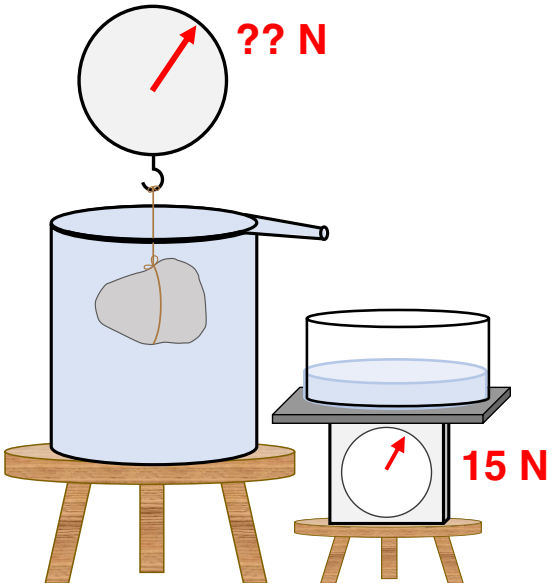


Diagram B



Question 11
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The volume of the rock is _____ L.

The rock's *apparent weight* in H_2O is _____ N.

The weight of displaced H_2O is ~_____ N.

Diagram A

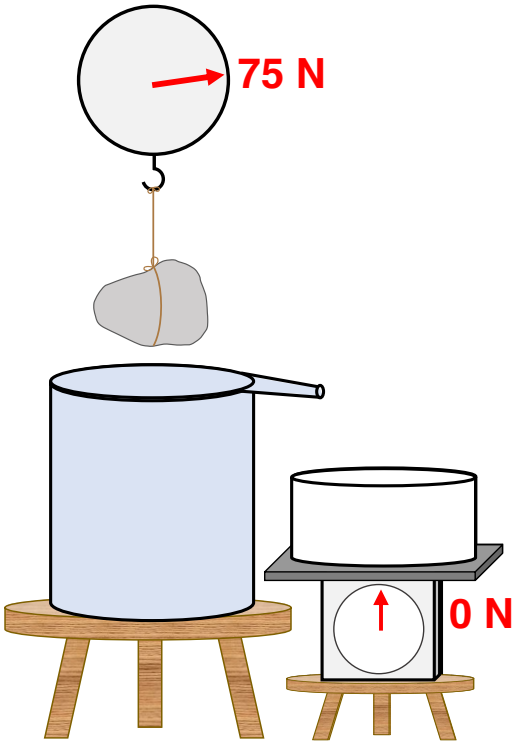
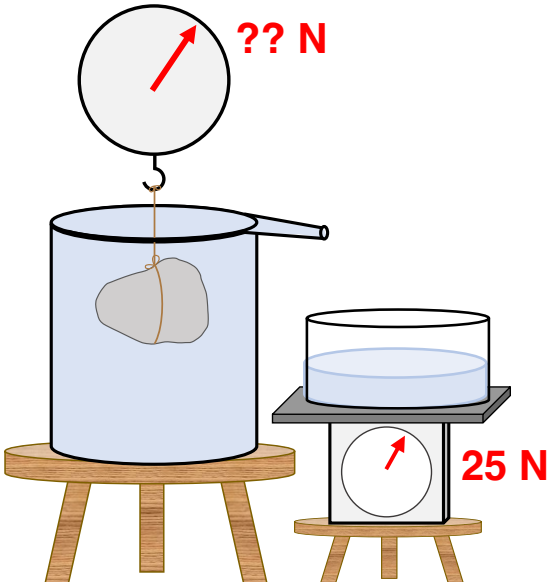


Diagram B



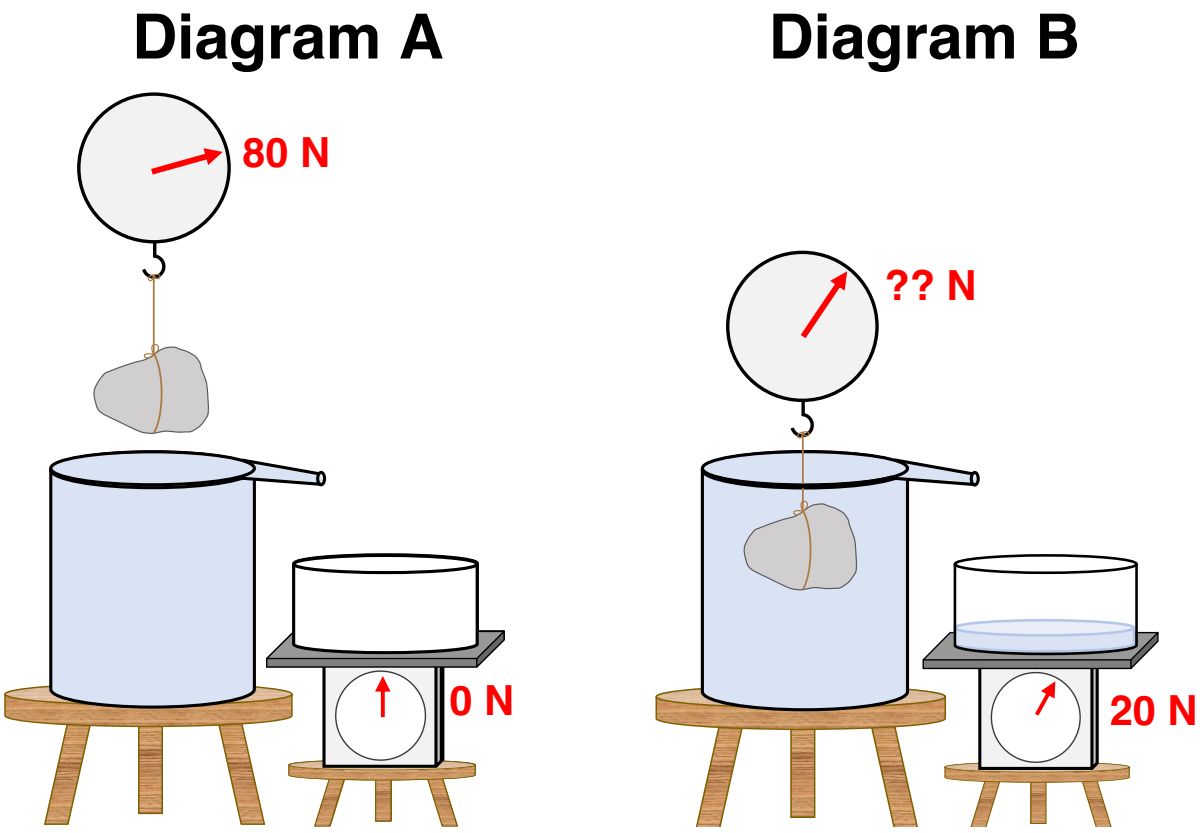
Question 12
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The volume of the rock is _____ L.

The rock's apparent weight in H_2O is _____ N.

The weight of displaced H_2O is ~_____ N.



Question 13
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The volume of the rock is _____ L.

The rock's apparent weight in H_2O is _____ N.

The weight of displaced H_2O is ~_____ N.

Diagram A

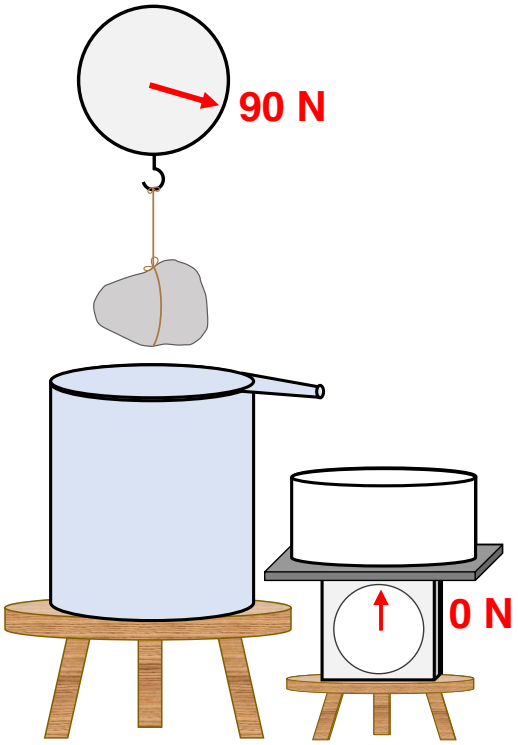
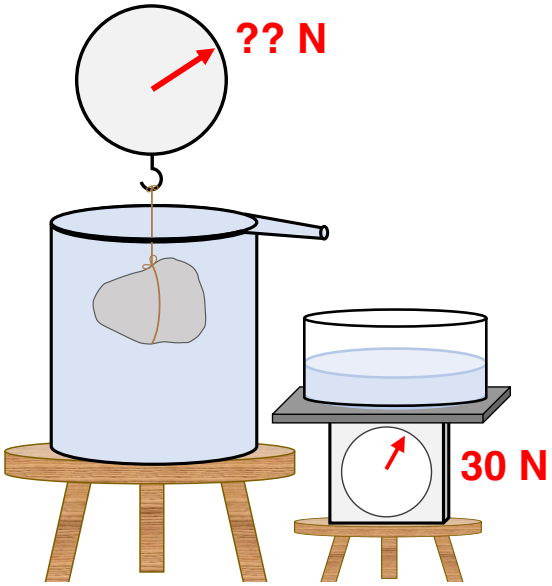


Diagram B



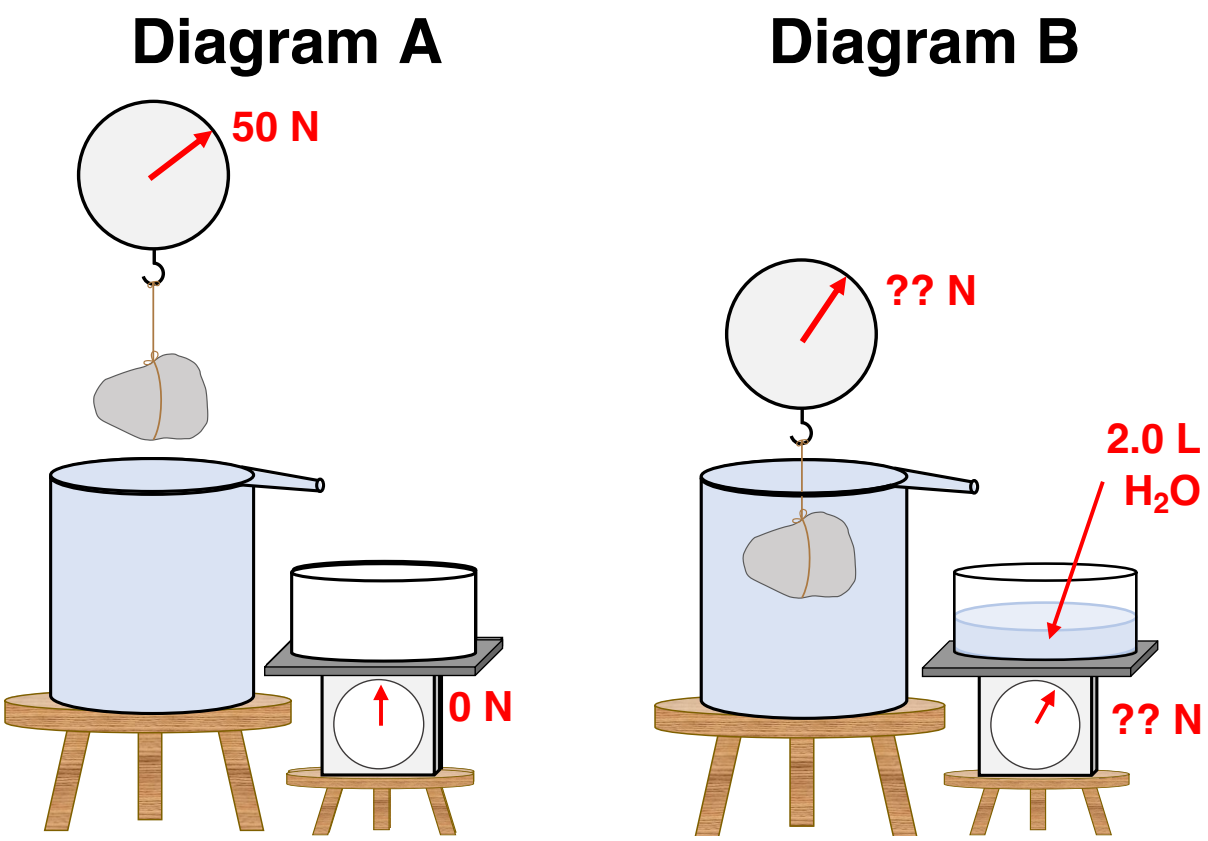
Question Group 5
Question 14
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The weight of the rock is _____ N.

The rock's apparent weight in H_2O is _____ N.

The buoyant force is _____ N.



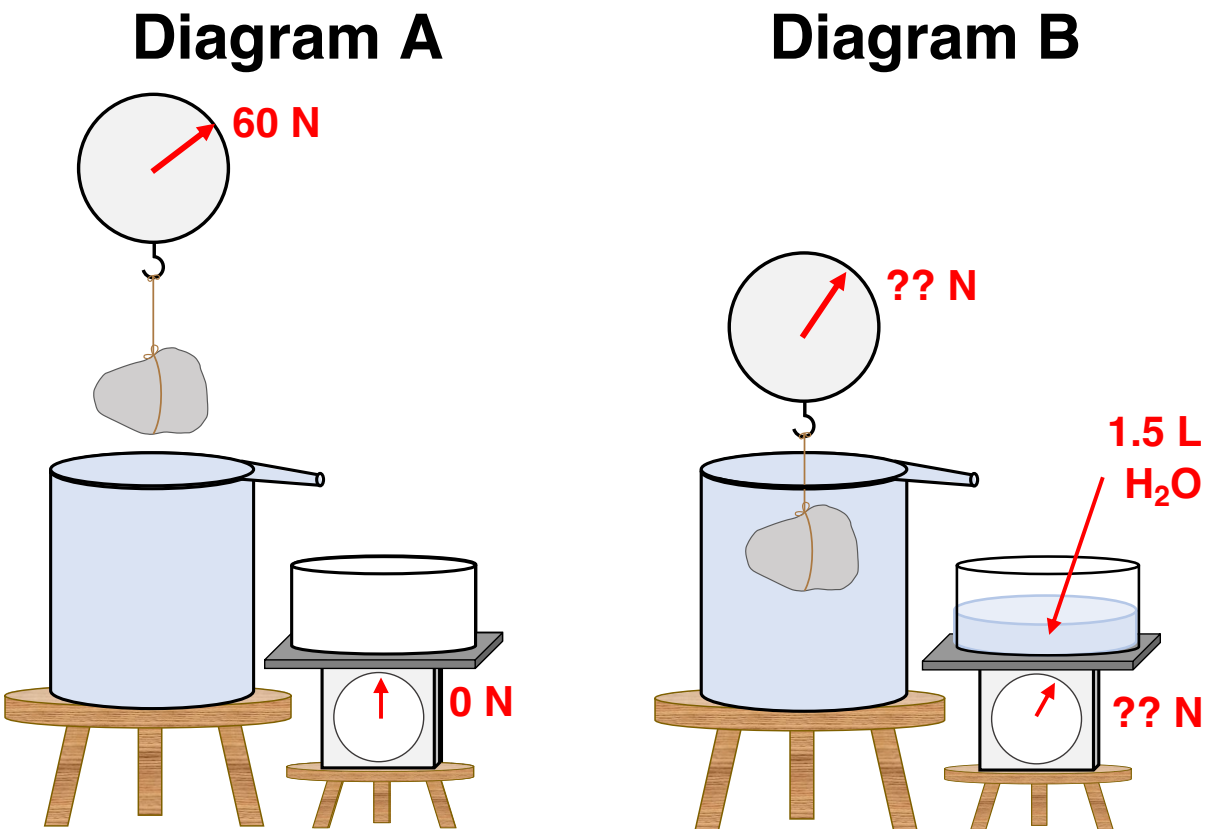
Question 15
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The weight of the rock is _____ N.

The rock's apparent weight in H_2O is _____ N.

The buoyant force is _____ N.



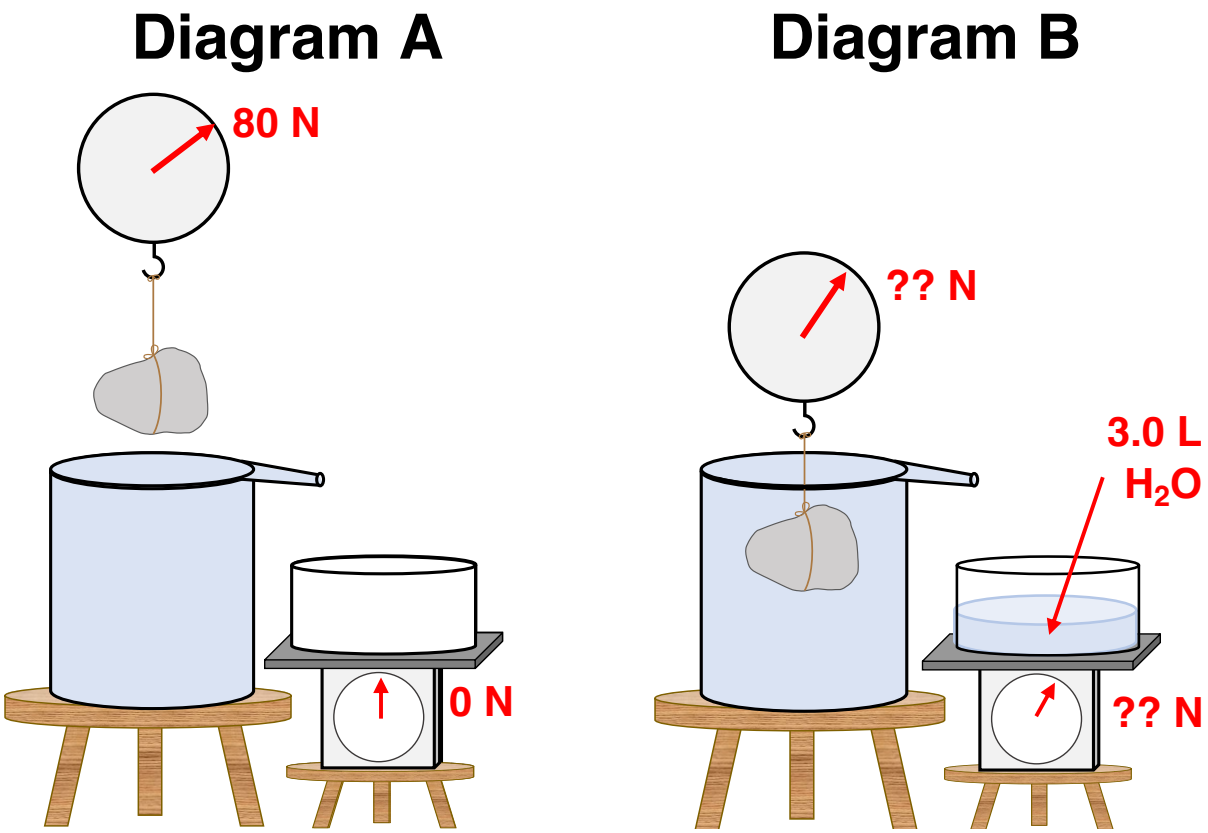
Question 16
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The weight of the rock is _____ N.

The rock's apparent weight in H_2O is _____ N.

The buoyant force is _____ N.



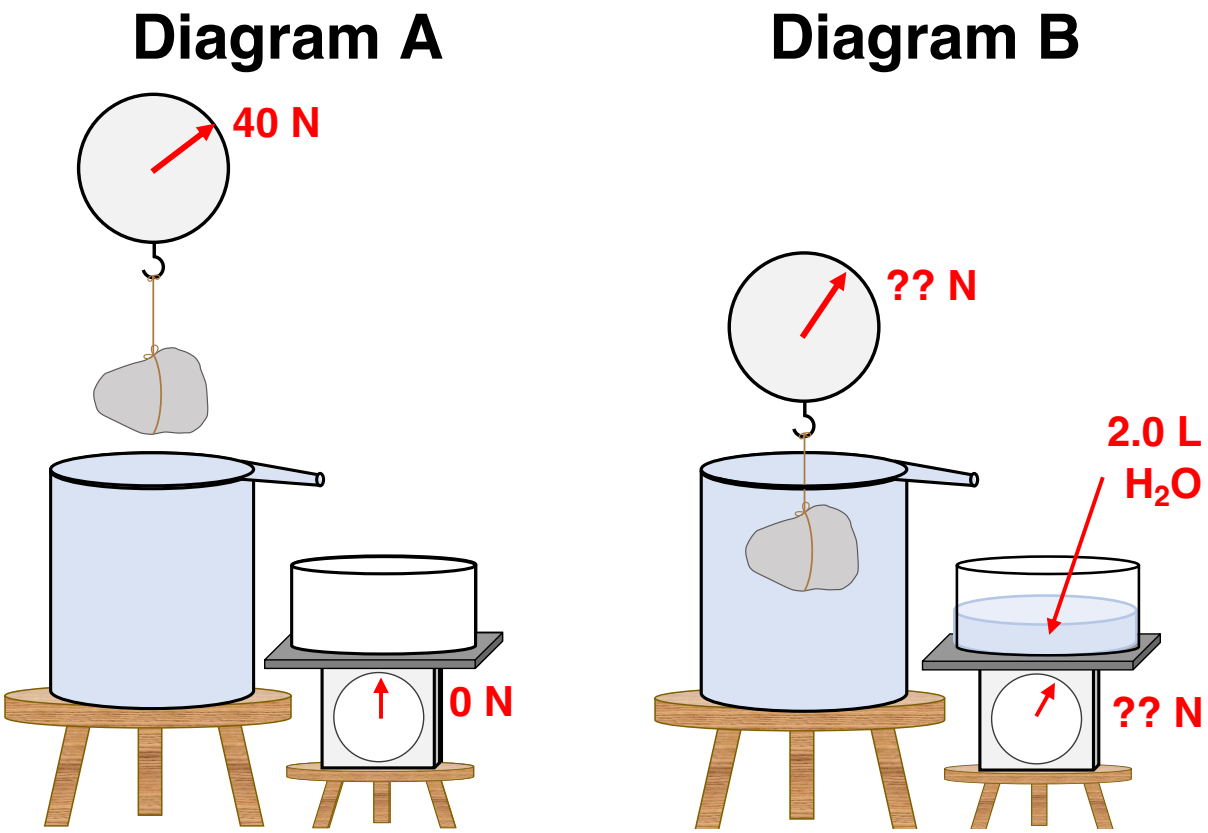
Question 17
Diagram A: A rock is attached to a spring scale and suspended above a container filled to the rim with water.
Diagram B: The rock is fully submerged in the water. The displaced water is collected and weighed.

Complete the sentences. (ρ_{water} = 1 kg/L; g = ~10 N/kg)

The weight of the rock is _____ N.

The rock's apparent weight in H_2O is _____ N.

The buoyant force is _____ N.



Activity 3: Which One Doesn't Belong?
Question Group 6
Question 18
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The object weighs 50 N.	The buoyant force is 15 N.
The object displaces 15 L of water.	The apparent weight is 35 N.

Question 19
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The apparent weight is 40 N.	The object weighs 60 N.
The buoyant force is 20 N.	The object displaces 20 L of water.

Question 20
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The object displaces 25 L of water.	The apparent weight is 50 N.
The object weighs 75 N.	The buoyant force is 25 N.

Question 21
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The buoyant force is 30 N.	The object displaces 30 L of water.
The apparent weight is 50 N.	The object weighs 80 N.

Question Group 7
Question 22
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The buoyant force is 50 N.	The object weighs 90 N.
The submerged object has a volume of 4 L.	The apparent weight is 50 N.

Question 23
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The apparent weight is 30 N.	The buoyant force is 30 N.
The object weighs 90 N.	The submerged object has a volume of 6 L.

Question 24
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The apparent weight is 50 N.	The submerged object has a volume of 3 L.
The buoyant force is 50 N.	The object weighs 80 N.

Question 25
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The submerged object has a volume of 5 L.	The apparent weight is 70 N.
The object weighs 120 N.	The buoyant force is 70 N.

Question Group 8
Question 26
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The submerged object has a volume of 3.0 L.	The apparent weight is 27 N less than the actual weight.
The object displaces 3.0 kg of water.	The buoyant force is 30 N.

Question 27
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The buoyant force is 40 N.	The submerged object has a volume of 4.0 L.
The apparent weight is 36 N less than the actual weight.	The object displaces 4.0 kg of water.

Question 28
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The buoyant force is 50 N.	The object displaces 5.0 kg of water.
The submerged object has a volume of 5.0 L.	The apparent weight is 45 N less than the actual weight.

Question 29
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The apparent weight is 54 N less than the actual weight.	The object displaces 6.0 kg of water.
The buoyant force is 60 N.	The submerged object has a volume of 6.0 L.

Question Group 9
Question 30
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The object displaces 2.0 kg of water.	The object has a volume of 2.0 L.
The buoyant force is 20 N.	The apparent weight is 20 N greater than the actual weight.

Question 31
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The apparent weight is 25 N greater than the actual weight.	The object displaces 2.5 kg of water.
The object has a volume of 2.5 L.	The buoyant force is 25 N.

Question 32
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The buoyant force is 30 N.	The apparent weight is 30 N greater than the actual weight.
The object displaces 3.0 kg of water.	The object has a volume of 3.0 L.

Question 33
An object is fully submerged in water. It displaces a given **volume of water**, resulting in an upward **buoyant force** and giving it an **apparent weight** that is different than its **actual weight**. (ρ_{water} = 1.0 kg/L, g = ~10 N/kg)

Four statements are given to describe the situation. One of them is not consistent with the others. Which one doesn't belong?

The object has a volume of 4.0 L.	The buoyant force is 40 N.
The apparent weight is 40 N greater than the actual weight.	The object displaces 4.0 kg of water.