

Worksheet on Force and Pressure

- 1. A person holds a balloon at sea level and then releases it at a high altitude. What change would be observed in the balloon's size as it ascends?
 - a. The balloon expands.
 - b. The balloon contracts.
 - c. The balloon remains the same size.
 - d. The balloon pops due to low pressure.
- 2. A book weighing 40 N is placed on a table. If the length and breadth of the book in contact with the table is 15 cm and 10 cm respectively, what is the pressure exerted by the book on the table?
 - a. 4000 N/cm²
 - b. 2665 N/m²
 - c. 2666 N/cm²
 - d. 2400 N/m²
- 3. The diagram shows forces with equal magnitude acting on two boxes A and B. Which of the following statements is true regarding the resultant force acting on the boxes?



- a. Box A experiences a net force of 5 N, while Box B experiences a net force of 10 N.
- b. Box A experiences a net force of 5 N, while Box B experiences a net force of 20 N.
- c. Box A experiences a net force of 0 N, while Box B experiences a net force of 10N.
- d. Both boxes experience a net force of 5 N in the same direction.
- 4. In the following question, you will find an assertion and a reason. Select the appropriate option that applies.

Assertion: Objects with larger surface areas experience higher air resistance when moving through the air.

Reason: Air resistance is caused by the collision of air molecules with the surface of the moving object. Larger surface areas lead to more frequent collisions, resulting in higher air resistance.

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- a. Both the assertion and reason are correct, and the reason explains the assertion.
- b. Both the assertion and reason are correct, but the reason does not explain the assertion.
- c. The assertion is correct, but the reason is incorrect.
- d. The assertion is incorrect, but the reason is correct.

5. A person walks on deep snow wearing snowshoes and then without them. In which case will the pressure exerted on the snow be less?

- a. With snowshoes
- b. Without snowshoes
- c. Pressure will be the same in both cases
- d. Cannot be determined without more information.



Answer Key

- 1. a When the atmospheric pressure decreases, as it does at higher altitudes, the gas molecules experience reduced external pressure pushing on them. This reduction in pressure allows the gas molecules to spread out and occupy a larger volume, leading to an increase in the volume of the gas inside the balloon and causing it to expand.
- 2. b To calculate the pressure exerted by the book on the table, we'll use the formula: Pressure = Force / Area Given: Weight of the book = 40 N Length of the book in contact with the table = 15 cm = 0.15 m Breadth of the book in contact with the table = 10 cm = 0.1 m First, let's calculate the area of the book in contact with the table: Area = Length × Breadth Area = 0.15 m × 0.1 m = 0.015 m² Now, we can calculate the pressure: Pressure = Force / Area Pressure = 40 N / 0.015 m² Pressure = 2666.67 N/m² Therefore, the pressure exerted by the book on the table is approximately 2665 N/m².
- 3. c In box A, the forces of 5 N are acting in opposite directions. Since their magnitudes are equal and they are in opposite directions, they cancel each other out, resulting in a net force of 0 N. Similarly, the forces of 10 N acting on boxes A and B also cancel each other out. In box B, the remaining two forces of 5N are acting in the same direction and will have an additive effect on the box. As a result, the net force on box B is 10 N (5 N + 5 N).
- **4.** a The assertion is correct and the reason provided accurately explains the relationship between surface area and air resistance. When an object moves through the air, it collides with air molecules. These collisions create a force known as air resistance, which opposes the object's motion. The larger the surface area of the object that comes into contact with the air molecules, the more collisions will occur during its motion.
- 5. a Snowshoes are designed to distribute the weight of a person over a larger area, which effectively reduces the pressure exerted on the snow. When a person walks on deep snow without snowshoes, their weight is concentrated on a smaller area (the soles of their feet), resulting in higher pressure on the snow. Snowshoes help to prevent sinking into the snow by increasing the surface area in contact with the snow, thus reducing the pressure and allowing the person to walk more easily on soft or deep snow.

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