Pressure On Solids

KS3 Physics · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

A 100 N box rests on an area of 2 m². Find the pressure.

Step 1 · Formula

Pressure = force ÷ area.

Step 2 · Calculate

100 ÷ 2 = 50 N/m² = 50 Pa.

Answer: 50 Pa

Check: 1 pascal (Pa) = 1 N/m².

2. Now try one with the steps

Why does a sharp knife cut better than a blunt one?

Step 1 · Same force

Step 2 · Area

Step 3 · Pressure

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Write the equation for pressure. [1]

2. What is the unit of pressure when force is in N and area in m²? [1]

3. A force of 100 N acts on an area of 2 m². What is the pressure, in Pa? [1]

4. A 30 N brick rests on a face of area 50 cm². What is the pressure, in N/cm²? [1]

5. A person weighs 600 N. Both feet together have an area of 0.05 m^2. What pressure do they exert, in Pa? [2]

6. Why do tractors have very wide tyres? [2]

7. Explain why a drawing pin goes into a board point first, not head first. [2]

8. An elephant weighs 50 000 N and stands on four feet, each of area 0.1 m^2. What is the pressure on the ground, in Pa? [2]

9. A 600 N load is placed on an area of 0.04 m^2. What pressure does it exert, in Pa? [1]

10. A 500 N crate must not exert more than 2000 Pa on a floor. What is the smallest area it can stand on, in m^2? [2]

11. A 24 N brick measures 20 cm × 10 cm × 5 cm. What is the greatest pressure it can exert, in N/cm^2? [3]

12. Why should you lie flat rather than stand if you need to cross thin ice to help someone? [2]

13. How many cm^2 are in 1 m^2? [1]

14. A 600 N person balances on one stiletto heel of area 1 cm^2. What pressure is that, in N/cm^2? How does it compare with standing on one trainer of area 150 cm^2? [3]

4. Before you hand it in

Pressure = area ÷ force.
Pressure = force ÷ area. A smaller area should give a BIGGER pressure.

Using the area of one foot when standing on two.
Add up all the areas touching the surface.

Mixing cm^2 and m^2 in one calculation.
Keep units consistent: N/cm^2 with cm^2, or Pa (N/m^2) with m^2.