Name: ——————————————— Block: ———

Pressure

1. A man wearing snow shoes does not sink into the snow of the tundra, whereas the same man without snow shoes sinks into the snow. Explain?

2. A balloon is inflated to a pressure of $0.2\,\text{bar}$. A $5.0\,\text{kg}$ book is balanced on top of the balloon. With what surface area does the balloon contact the book? (*Hint: Remember that* $1\ \text{bar} = 100\,000\ \text{Pa}$.)

$\boxed{0.00245\,\text{m}^2}$

3. A carton of paper has a mass of $22.7\,\text{kg}$. The area of the bottom is $0.119\,\text{m}^2$. What is the pressure between the carton and the floor?

$\boxed{1\,869\ \text{Pa}}$

4. A $1\overline{0}00\,\text{kg}$ car rests on four tires, each inflated to $2.2\,\text{bar}$. What surface area does each tire have in contact with the ground? (Assume the weight is evenly distributed on each wheel.)

$\boxed{0.0111\,\text{m}^2}$

5. A student with a mass of 75.0 kg is sitting on 4-legged lab stool that has a mass of 3.0 kg. Each leg of the stool is circular and has a diameter of 2.50 cm. Find the pressure under each leg of the stool. (*Hints: (1) Remember to convert* cm² *to* m² *for the area of the legs of the stool. (2) Remember that the stool has four legs. (3) Note that the problem gives the diameter of the legs of the stool, not the radius.*)

389 305 Pa

6. The average person has a surface area of 1.5–2.0 m². If the person is lying on flat ground, let's assume that about 40% of the person's surface area is in contact with the ground, which would be about 0.6–0.8 m².

(a) A student with a mass of 50. kg is lying on the floor of the classroom. The area of the student that is in contact with the floor is 0.6 m². What is the pressure between the student and the floor?

817 Pa

(b) Mr. Bigler's bed of nails was built with approximately 3 300 nails evenly spread over an area of 1.11 m². The head of each nail has an area of approximately 0.1 mm² = 1×10^{-7} m². Based on these numbers and the surface area of contact for the student in part #6a, what is the pressure between the student and each of the nails?

2.7×10^6 Pa