Snowshoes can help you to walk on soft snow without sinking in. Most snowshoes have little spikes underneath to help you to walk on icy ground.

The formula for calculating pressure is:

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Use units of N/cm^2 for all the pressures you calculate on this worksheet.

1   Fran is wearing boots. Her weight (including her clothes and boots) is 500 N. The area of the sole of one of Fran's boots is 170 cm^2.

   a   What is the pressure under Fran when she is standing on one foot?

   b   What is the pressure under Fran's boots when she is standing on both feet?

   c   Which of these two pressures is the most important when you are thinking about whether or not she will sink as she walks in snow? Explain your answer.

2   Fran wants to buy a pair of snowshoes. She has been told that the area of each snowshoe should be about 14 cm^2 for every 10 N of her weight. The table shows some of the snowshoes she could buy.

   a   What area should each of Fran's new snowshoes have? You can ignore the mass of the snowshoes because that is the same for each pair.

   b   What pressure will Fran put on the snow when she is standing on one snowshoe?

Snowshoe	Area (cm^2)
A	300
B	432
C	770
D	1040

   c   Which pair of snowshoes should Fran buy? Explain your answer.

   d   Suggest why it is not a good idea for Fran to buy a pair that is bigger than she needs.

3   Fran's new snowshoes have little spikes underneath. The total area of the spikes on each snowshoe is 1.5 cm^2.

   a   What pressure does Fran put on the ground with one foot when only the spikes are touching the ground?

   b   Why is this high pressure useful?

4   Fran also has a pair of crampons. The total area of all the spikes on each crampon is 0.1 cm^2. How can you tell without doing any calculations that Fran will put more pressure on a sheet of ice with the spikes on her crampons than with the spikes on her snowshoes?

I can…
● calculate pressures.