

## Science 1.1 AS 90940 Demonstrate understanding of aspects of mechanics

### Writing Excellence answers to Pressure questions

Pressure QUESTION	
<p><b>Question: Q 1:</b> The chair (15.0 kg) has four legs in contact with the floor, whereas the base of the footstool (15.0 kg) does not have legs and is entirely in contact with the floor. The area of each chair leg in contact with the floor is 0.001 m<sup>2</sup>. Calculate the pressure that the chair (mass 15.0 kg) exerts on the carpet.</p> <p>In your answer you must determine:</p> <ul style="list-style-type: none"> <li>the area of the chair legs in contact with the floor</li> <li>the weight force of the chair</li> <li>the pressure acting on the carpet.</li> </ul> <p>A person sat on the chair and then sat on the footstool for the same period of time. They noticed that the chair legs left deeper marks in the carpet than the footstool did, although both the chair and footstool have the same mass. Explain these differences in terms of pressure, force, and surface area.</p>	
ANSWER	
1. calculate the <b>surface area</b> of the chair (remember units and multiply by number of legs)	<p>Surface area of the chair legs:  <math>4 \times 0.001 = 0.004 \text{ m}^2</math></p> <p>Surface Area must be in m<sup>2</sup></p>
2. calculate the <b>weight</b> of the chair $F_w = m \times g$	<p>Weight of chair:  <math>F_w = m \times g = 15 \times 10 = 150 \text{ N}</math></p>
3. calculate the <b>pressure</b> of the chair with units $P = F/A$ (some questions may ask you to calculate 2 objects)	<p>Pressure exerted:  <math>P = F/A = 150 / 0.004 = 37\,500 \text{ Pa (Nm}^{-2}\text{)}</math></p>
4. state the <b>surface area</b> of both and compare	The footstool has a much larger surface area in contact with the floor than the chair.
5. state the <b>weight</b> of both and compare	The force applied to both the chair and the footstool are the same because the same person sits on both. (150N)
6. explain the $P = F/A$ in words	$P = F/A$ , so if Area is bigger then the pressure must be smaller (or vice versa).
7. link <b>pressure</b> to the situation in the question	The larger pressure of the chair causes the chair legs to leave deeper marks in the carpet than the footstool did, which exerted less pressure on the carpet

**NOTE:** The white column is how your answer would appear on your test paper so make sure you **write out complete sentences**. The grey area is just to help you structure your answer and would not appear in the question.