Pressure

Pressure tells us whether a _____ is _____ or _____ over an _____.

When you push a **drawing pin** with your thumb, the _____ of the point has a very _____. This enables it to go into the wall. The flat bit you push has a _____. The _____ is more _____. There is _____ which is why it doesn't go into your thumb.

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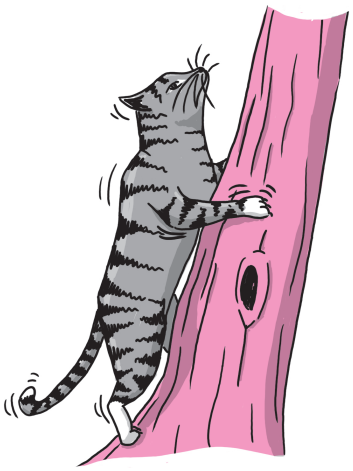
1 Do you want a high or low pressure? How did you decide?

(a) Cat's claws when it climbs a tree

(b) Standing on soft snow when you don't want to sink in

(c) A tractor's wheels in a muddy field

(d) Scissor blades cutting paper



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2 Fill in the gaps to complete the explanation:
A bar of chocolate has six chunks joined with thinner pieces of chocolate. When you try to bend the bar, the _____ is greatest where the bar is _____. This helps you break off one chunk of chocolate at a time.

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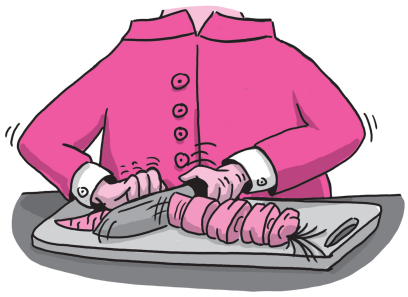
3 A chef is chopping carrots with a sharp knife. Complete the table to compare the force, pressure and area of the knife handle with its blade. Choose from the words **larger**, **smaller** and **equal**.

	On handle compared to blade edge,
Area	area is
Pressure	pressure is
Force	force is



A pressure of 30 N/cm^2 means that there is a force of _____ on each _____.

4 A chair leg makes a pressure of 10 N/cm^2 on the floor.

(a) Complete the sentence: The force on 1 cm^2 of the floor is ☐ newtons.

(b) Work out the force on 6 cm^2 of floor using an equation.

$$\text{force (N)} = \text{pressure (N/cm}^2\text{)} \times \text{area (cm}^2\text{)}$$

$$\square = 10 \times \square$$

(c) Work out the force on the floor due to one 16 cm^2 chair leg using an equation.

force (N)	=	pressure (N/cm^2)	×	area (cm^2)
	=	10	×	—

(d) Work out the force for the total 64 cm^2 area of the chair legs.

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5 Calculate the force on these areas if the pressure is 20 N/cm^2.

(a) 2 cm^2

(c) 30 cm^2

(b) 4 cm^2

(d) 0.04 cm^2

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6 A 200 N force is spread over a 40 cm^2 area.

(a) Force on 1 cm^2 = ☐ ÷ ☐ = ☐ newtons

(b) Complete the sentence: The pressure (in N/cm^2) is ☐.

(c) A 100 N force is applied over 25 cm^2. Work out the pressure using an equation.

force (N)	=	pressure (N/cm^2)	×	area (cm^2)
—	=		×	25

(d) Work out the pressure if 80 N is applied over an area of 20 cm^2.

(e) Work out the pressure when a 30 N TV sits on a base with an area of 600 cm^2.

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7 Calculate the pressure for these forces and areas.

(a) 60 N over 3 cm^2,

(b) 20 N over 0.2 cm^2,

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8 A pump compresses air in a football to a pressure of 10 N/cm^2.

(a) What is the force on 1 cm^2?

(b) The total force on the football is $15\,000$ N. How many 10 N forces is this?

(c) What is the area of the football? Count the 10 N forces (each on 1 cm^2).

(d) Work out the area for a 90 N total force using an equation.

force (N)	=	pressure (N/cm^2)	×	area (cm^2)
___	=	10	×	

(e) Work out the area for a force of 600 N.

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9 A force is 300 N. Calculate the area to make these pressures.

(a) 150 N/cm^2

(b) 30 N/cm^2

(c) 15 N/cm^2

(d) 600 N/cm^2

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10 Complete the word equations using **force**, **pressure** and **area**.

(a) force $=$

(b) pressure $=$

(c) area $=$

11 Rewrite your word equations using symbols.
F is the force, P is the pressure and A is the area.

(a) $F =$

(b) $P =$

(c) $A =$

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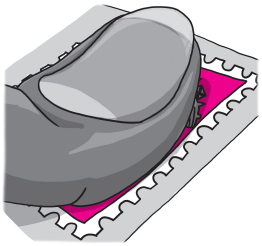
12 Use your understanding of pressure, or the formulae, to calculate

(a) the pressure when a 48 N force squeezes a 1.2 cm^2 stamp,

(b) the force when a 20 N/cm^2 pressure fluid pushes a 5 cm^2 piston,



(c) the area if a 900 N force makes a 90 N/cm^2 pressure.

Areas can also be measured in square metres. 1 m$^2 = 100$ cm $\times 100$ cm $=$ _____ cm^2.

A pressure of $50\,000$ N/m^2 can also be written as $50\,000$ ___ (pascals) or 50 ___ (kilopascals).

13 A van with weight $25\,000$ N is supported by tyres with total area 0.25 m^2. Calculate the

(a) pressure in kPa,

(b) area in cm^2,

(c) pressure in N/cm^2.