



**Textbook**

## 8 Forces and motion

### 8.1 Pressure

1

Force	Area	Pressure
150 N	25 cm <sup>2</sup>	6 N/cm <sup>2</sup>
60 N	15 m <sup>2</sup>	4 N/m <sup>2</sup>
5 N	0.1 cm <sup>2</sup>	50 N/cm <sup>2</sup>

2 3 N

3 30 cm<sup>2</sup>

4 Each foot is 0.04 m<sup>2</sup>

### 8.2 The effects of pressure

1 The feet of camels and wading birds are wide and flat to reduce the amount of pressure they put on the ground. This means they can walk over sand and wade in mud without sinking.

2 The bird with the larger feet would produce less pressure on the ground.

3 A road bike has a very thin tyre and would produce more pressure than a mountain bike with a wide tyre. It would sink into the soft surface.

4 Horse A would produce a greater mass on the ground because it has a larger mass spread over the same area.

### **8.3 Pressure in liquids**

- 1** Liquid pressure is due to the force between the particles of the liquid and the surfaces of a container.
- 2** Pressure is higher at the bottom of the Pacific Ocean than near the surface due to the weight of the water above pushing down on the water at the bottom of the ocean.
- 3a** Hole at the bottom – it is under greater pressure due to the pressure of the weight of water above.
- b** The pressure is acting at right angles to the surface of the bottle, so the water will move in this direction.
- c** It slows down because there is less force acting on the water because there is less water.

### **8.5 Pressure in gases**

- 1** Gas pressure is caused by particles in the gas colliding with the walls of a container.
- 2** It is possible to compress a gas because the particles are far apart. The particles in a liquid are too close together to be compressed.
- 3** When you pump up a tyre you are increasing the number of gas particles inside the tyre. These collide with the walls of the tyre more often and the pressure increases.
- 4** Aircraft cabins have to be pressurised to allow the passengers to breathe. At high altitudes the atmospheric pressure decreases because there are fewer particles in the air, humans are used to the air pressure on the Earth's surface, so we would not survive if the aircraft cabin was not pressurised.

## Workbook

# 8 Forces and motion

## 8.1 Pressure

- 1 Missing words in order: force, area, bigger, smaller, force divided by area, pascals.
- 2a  $50 \text{ N}/5 \text{ m}^2 = 10 \text{ N/m}^2$
- b  $100 \text{ N}/5 \text{ m}^2 = 20 \text{ N/m}^2$
- c  $300 \text{ N}/0.5 \text{ m}^2 = 600 \text{ N/m}^2$
- 3a  $10 \text{ N/cm}^2$  – when it is stood on the end with the smallest area  $5 \text{ cm} \times 2 \text{ cm}$ .
- b  $0.4 \text{ N/cm}^2$  – when it is stood on the end with the largest area  $10 \text{ cm} \times 5 \text{ cm}$ .

## 8.2 The effects of pressure

### Extension:

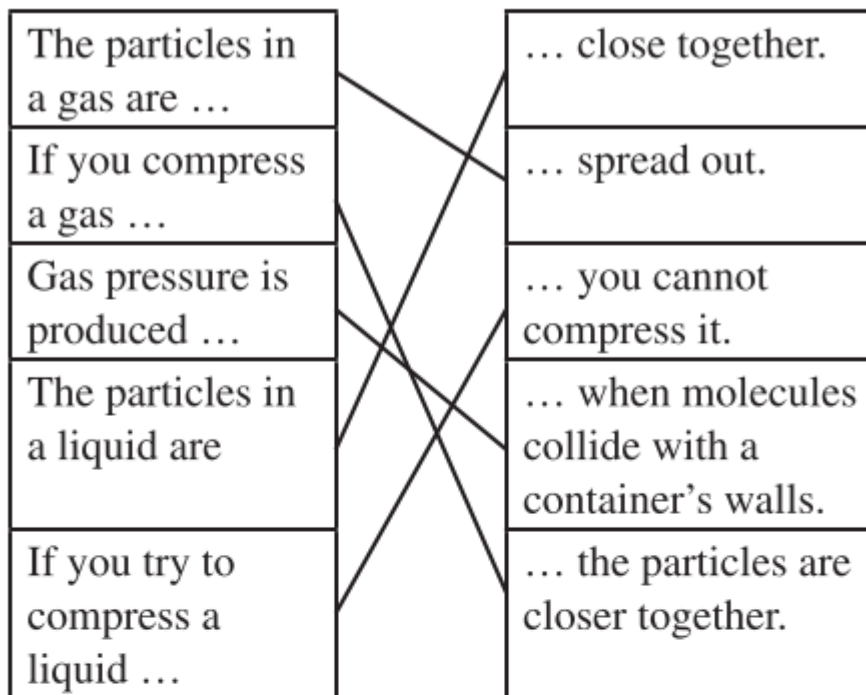
- a  $15 \text{ cm} \times 0.05 \text{ cm} = 0.75 \text{ cm}^2$
- b Pressure =  $15 \text{ N}/0.75 \text{ cm}^2 = 20 \text{ N/cm}^2$
- c  $15 \text{ cm} \times 0.15 \text{ cm} = 2.25 \text{ cm}^2$
- d Pressure =  $15 \text{ N}/2.25 \text{ cm}^2 = 6.667 \text{ N/cm}^2$
- e The cook must use more force to cut with the blunt knife now.

## 8.3 Pressure in liquids

- 1a T
- b F – The upthrust is the same.
- c F – the bottom of a dam is wider than the top of a dam.
- d T
- 2a Water cannot be compressed, so under pressure it is forced out of the holes.
- b She will not be able to push down because water cannot be compressed and there are no holes for it to escape from.

## 8.5 Pressure in gases

1



2 B – atmospheric pressure is greatest at B because it is the lowest point and there is more gas exerting pressure above it than any other point.

3 a decreases

b There are fewer particles in the can because they escaped as steam when the water boiled, so when the gas cools there are fewer collisions with the walls of the can and the can collapses inwards.

c The can collapses because there are fewer collisions between the gas inside the can and the walls of the can. The walls collapse because the pressure outside the can has not changed and is now greater than inside.