

Use with textbook pages 324–331.

## Fluids at rest and fluids in motion

Vocabulary	
fluid	liquid
gas	pneumatics
hydraulics	pneumatic system
hydraulic system	pressure
hydraulic multiplication	pumps

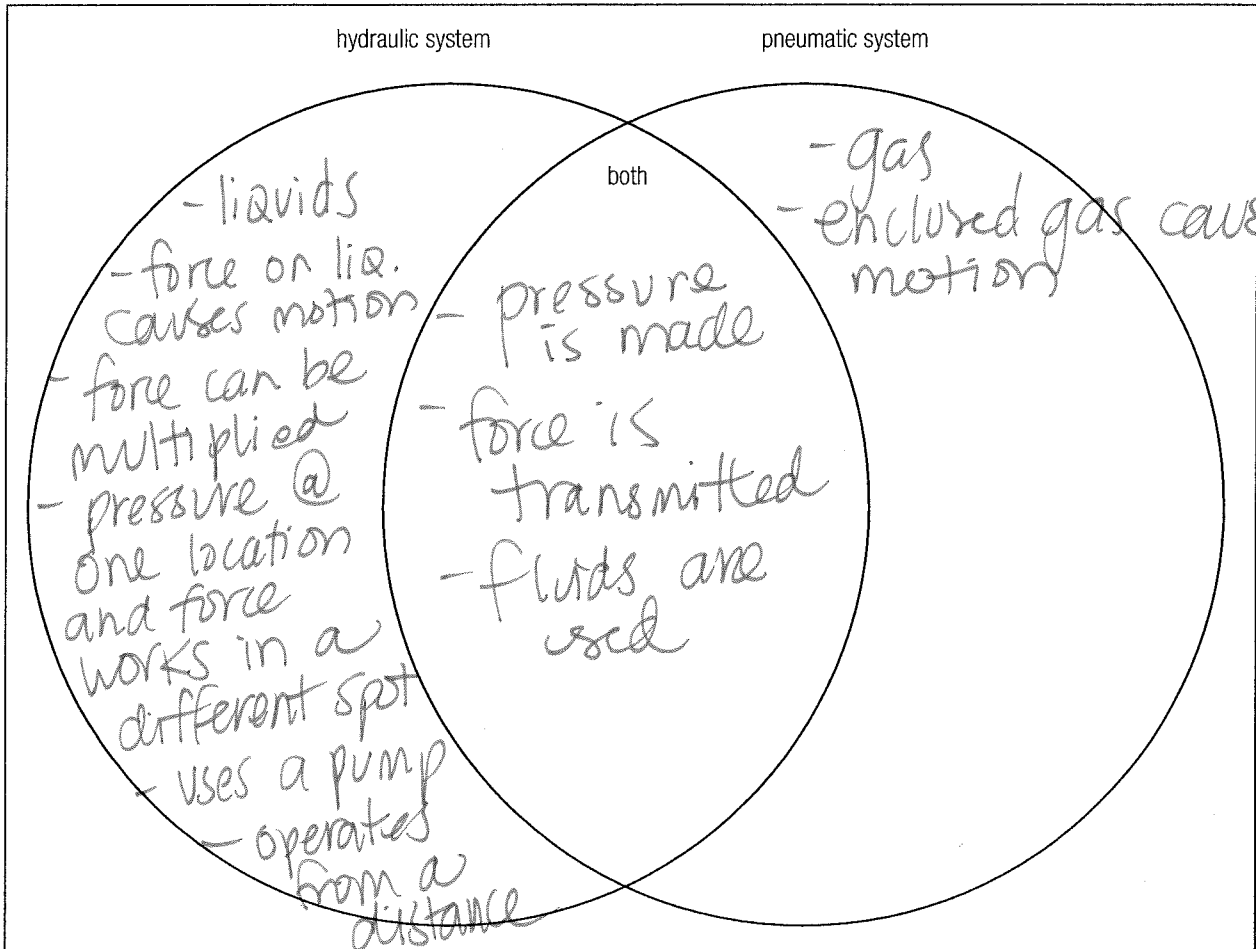
Use the terms in the vocabulary box above to fill in the blanks. You can use each term as many times as necessary. You will not need to use all the terms.

1. A fluid system is something that makes use of a gas or a liquid to perform tasks.
2. The study of how liquids act when they are under pressure is called hydraulics.
3. A device that uses pressure to apply a force through a liquid to move something else is called a hydraulic system.
4. You use a hydraulic system when you turn on a hose or a water tap.
5. In many hydraulic systems, PUMPS are used to put the liquid under pressure.
6. The pipes that bring water to your home are below the ground. The water must be put under pressure to move it against the force of gravity up to your sink.
7. In a hydraulic system, you put a liquid under pressure so it can move something else at the other end.
8. Mechanics depend on hydraulic systems to lift cars and other heavy objects. They use hydraulic multiplication to increase and transmit a force through a liquid from one place to another.
9. The study of how gases act when they are under pressure is called pneumatics.
10. A device that uses pressure to apply a force through a gas to move something else is called a pneumatic system.

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## Comparing systems

1. Use a Venn diagram to help you compare two concepts. On the left side of the Venn diagram, write the things that are only true of hydraulic systems. On the right side, write the things that are only true of pneumatic systems. In the middle, write the things that are true of both systems.



2. List two uses for each type of system.

Hydraulic system:

pipes, toothpaste tube, hose, dentist's chair,  
piston.

Pneumatic system:

drills @ dentist, air in tires, jackhammer,  
air brake.

Key

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Date \_\_\_\_\_

**Comprehension**  
**Section 9.2**

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### True or false?

Read the statements given below. If the statement is true, write “T” on the line in front of the sentence. If it is false, write “F” and then rewrite the statement so it is true.

1. F Hydraulics is the study of pressure in solids.  
LIQUIDS.
2. F Hydraulic systems produce pressure that moves through a gas.  
Pneumatic
3. T Water usually flows downwards due to the force of gravity, but it can also flow upwards if it is placed under pressure.
4. F A hydraulic system uses a device to compress the air so pressure builds up.  
Pneumatic
5. F Pumps are important parts of pneumatic systems.  
hydraulic
6. T Hydraulic multiplication is used to increase and transmit a force through a liquid from one place to another.
7. F Pneumatic systems use liquid in an enclosed system under pressure.  
gas

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## Constructed fluid systems

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.		
Term		Descriptor
1. <u>B</u> hydraulics		<b>A.</b> a system in which an enclosed gas transmits a force, causing motion
2. <u>D</u> pneumatics		<b>B.</b> the study of pressure in liquids
3. <u>C</u> hydraulic system		<b>C.</b> a device that transmits an applied force using a liquid under pressure
4. <u>A</u> pneumatic system		<b>D.</b> the study of pressure in gases
5. <u>F</u> hydraulic multiplication		<b>E.</b> something that makes use of gas or liquid to perform tasks
		<b>F.</b> using a liquid to increase and transmit a force from one point to another

Circle the letter of the best answer.

6. Which of the following describes what happens when pressure is applied at one point to a fluid in an enclosed system?
- A.** that pressure is increased at the other end of the system
- B.** that pressure is decreased at the other end of the system
- C.** the pressure at the other end of the system does not change
- D.** you cannot apply pressure to a fluid in an enclosed system

7. Which of the following is created when an enclosed fluid is squeezed?
- A.** buoyancy
- B.** convection
- C.** pressure
- D.** gravity

8. Which of the following are usually important parts of hydraulic systems?

I.	pipes
II.	pumps
III.	compressors

- A.** II only
- B.** III only
- C.** I and II only
- D.** I, II, and III
9. What allows a pump to raise fluids in pipes?

- A.** area
- B.** force
- C.** gravity
- D.** pressure

10. Which of the following could cause a loss of pressure in a hydraulics system?

I.	a crack in a pipe
II.	a hole in pipe
III.	a blockage in a pipe

- A.** I and II only
- B.** II and III only
- C.** I and III only
- D.** I, II, and III

Name \_\_\_\_\_

Date \_\_\_\_\_

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## Fluid systems puzzle

1 B R E A T H I N G

2 E  
S  
P  
I  
R  
A  
T  
O  
R  
Y

3 B  
L  
O  
O  
D

4 B  
L  
O  
O  
D  
V  
E  
S  
S  
E  
L

5 C  
I  
R  
C  
U  
L  
A  
T  
O  
R  
Y

6 N  
F  
E  
C  
T  
I  
O  
N

7 D  
I  
A  
P  
H  
R  
A  
G  
M

8 A  
S  
T  
H  
M  
A

9 H  
E  
A  
R  
T

10 A  
R  
T  
E  
R  
Y

11 S  
P  
H  
Y  
G  
M  
O  
M  
A  
N  
O  
M  
E  
T  
E  
R

12 B  
L  
O  
C  
K  
E  
D

13 S  
T  
R  
O  
T  
H

14 B  
L  
O  
O  
D  
P  
R  
E  
S  
S  
U  
R  
E

Across	Down
1. involves changes in air pressure inside and outside your body	2. system that brings air into the body
5. system that transports blood	3. liquid flowing in blood vessels
11. measures blood pressure	4. carry blood through the body
12. pressure can increase when arteries are _____	6. can cause passages to swell
13. increases and decreases between heartbeats	7. muscle in chest
	8. disease that makes it hard to breathe
	9. pumps blood around the body
	10. carry blood under high pressure

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## Pressure in the human body

### Vocabulary

blood	higher
blood pressure	inhale
blood vessels	lower
breathing	pressure
circulatory	pump
diaphragm	respiratory
exhale	sphygmomanometer
heart	

Use the terms in the vocabulary box to fill in the blanks. You can use each term as many times as necessary. You will not need to use all the terms.

- The circulatory system transports blood through the body.
- The circulatory system is made up of the heart, blood vessels, and blood.
- The heart is a pump that keeps blood moving through blood vessels.
- Blood must be kept under pressure so it can reach all parts of the body.
- Blood pressure is measured with a sphygmomanometer.
- Arteries are blood vessels that carry blood away from the heart. If arteries become blocked, blood pressure can get too high or too low.
- The respiratory system is the body system that brings air into the body and removes carbon dioxide from the body.
- breathing involves changes in air pressure inside and outside your body.
- When you inhale, your chest expands because muscles between your ribs push the ribs apart. A sheet of muscle in the lower chest called the diaphragm moves downward to make a bigger space.
- The bigger space in your chest makes the air pressure inside your lungs lower. The air outside your body is higher in pressure. So the air rushes into your body and into your lungs.

Name \_\_\_\_\_

Date \_\_\_\_\_

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## Natural fluid systems

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.	
Term	Descriptor
1. <u>B</u> diaphragm	A. moves blood around the body
2. <u>D</u> blood pressure	B. a sheet of muscle that helps breathing
3. <u>A</u> circulatory system	C. measures blood pressure
4. <u>E</u> respiratory system	D. increases and decreases between heartbeats
5. <u>C</u> sphygmomanometer	E. brings air into the body and removes carbon dioxide from blood
	F. carries blood under high pressure away for the heart

Circle the letter of the best answer.

6. Which of the following is not a part or an example of a natural fluid system?

- A. heart
- B. lungs
- C. hurricane
- D. car brakes

7. Which of the following is correct about the heart and lungs?

I.	the heart: part of a hydraulic system ✓
II.	the lungs: part of a hydraulic system
III.	the heart: part of a pneumatic system
IV.	the lungs: part of a pneumatic system ✓

- A. I and II
- B. I and IV
- C. II and III
- D. III and IV

8. Which of the following has a similar purpose to a pump in a hydraulic system?

- A. the heart
- B. the lungs
- C. the blood
- D. the diaphragm

9. What happens when your chest expands as you inhale?

- A. the volume of the lungs increases and the pressure inside rises
- B. the volume of the lungs decreases and the pressure inside rises
- C. the volume of the lung decreases and the pressure inside lowers
- D. the volume of the lungs increases and the pressure inside lowers

10. What happens when you exhale?

- A. the air pressure inside your lungs gets higher, so air is pushed out of your lungs
- B. the air pressure inside your lungs gets lower, so air is pushed out of your lungs
- C. the air pressure inside your lungs gets higher, so air is pulled into your lungs
- D. the air pressure inside your lungs gets lower, so air is pulled into your lungs

11. Which of the following describes what an asthma attack does to the pathway to the lungs?

- A. causes it to lengthen
- B. causes it to widen
- C. causes it to narrow
- D. causes it to fill up with fluid

