

Fluids

Make a Summary

At the start of this unit, you created a table with some classmates to activate your knowledge of fluids (what they are, where they are found, how they are used, and some harmful effects of and to fluids). You have also developed a concept map as you worked through the material in the chapters. You will now use that table and initial concept map to finish examining and summarizing what you have learned since then.

Concept Mapping

1. With your group, review the table you made at the start of the unit. Discuss any changes you would make to the paper now that you have completed this unit.
2. Record the changes either on the paper or in your notes.
3. Use your revised table to continue developing your concept map. Include what you have learned about
 - the properties of fluids
 - how fluids are used by humans and other living things
 - how our use of fluids affects society and the environment
4. Extend the concept map by creating a special code or symbol to indicate skills you feel you gained during the unit.

Unit C Review Questions

What Do You Remember?

The following icons indicate the Achievement Chart categories:

K/U Knowledge/Understanding
 T/I Thinking/Investigation
C Communication
 A Application

1. Identify each of the following statements as either true or false. If false, explain why. K/U
 - (a) Viscosity is a measure of how easily a fluid flows.
 - (b) Although important, fluids are not essential to many living things.
 - (c) A meniscus forms when water particles adhere to the sides of their container.
 - (d) Buoyancy, like water pressure, acts in all directions.
2. Describe the relationship between mass, volume, and density of matter. K/U
3. Use the particle theory to explain the differences between solids, liquids, and gases. K/U
4. Comment on the accuracy of the statement below. Describe some exceptions to the statement if there are any. K/U

In general, solids are more dense than liquids, and liquids are more dense than gases.
5. Use the particle theory to explain why changing the temperature of a fluid can also change its density. K/U
6. The density of a fluid usually decreases as the temperature rises. Explain how the behaviour of water differs from this pattern. K/U
7. What is a hydrometer and what is it used for? Describe how to use a hydrometer. K/U
8. Do hydrometers float higher in liquids that are more dense or less dense? K/U

9. Using the particle theory, describe the relationship between temperature and the viscosity of a fluid. Explain any exceptions to the rule. **K/U**
10. (a) What is the purpose of a valve?
 (b) Choose a type of valve and draw at least two sketches to show how that valve works. **K/U C**
11. Describe the location of valves in the heart and explain their role. Use a diagram, if you find it helpful. **K/U C**
12. List six devices or machines that use fluid power. State whether each is a hydraulic system, a pneumatic system, or a combination of both. If any are a combination, describe which parts are hydraulic and which are pneumatic. **K/U A**
13. Describe how water striders and other small insects are able to walk across the surface of water. **K/U**
14. Why are wind tunnels useful in studying fluid flow? **K/U A**
15. In your notebook, complete Table 1 to show how each property changes when the temperature changes. An upward arrow ↑ means “increasing,” and a downward arrow ↓ means “decreasing.” **K/U**

Table 1

	Volume	Density	Viscosity
Temperature ↑	?	↓	?
Temperature ↓	?	?	?

What Do You Understand?

16. When the mustard container in Figure 1 is squeezed, on which part of the container does the mustard exert the greatest force? **K/U A**



Figure 1

17. In what ways does human use of fluids have a positive effect on society and the environment? In what ways does it have a negative effect? **T/I A**
18. Describe, or show using a graphic organizer (for example, a Venn diagram), the relationship between fluid mechanics, fluid dynamics, aerodynamics, and hydrodynamics. **K/U C**
19. People who have poor circulation should not sit with their legs crossed. Consider what you have learned about fluid flow and explain why this is so. **T/I A**
20. Would you prefer turbulent flow or laminar flow in your blood vessels? Explain. **K/U A**
21. Explain how the difference in compressibility between liquids and gases affects their use in fluid systems. **K/U**
22. Explain why scuba divers use weight belts when diving. Would they require more or less weight when diving in colder waters? Explain your answer. **T/I A**

23. Cars use a hydraulic braking system. If the system used air instead of hydraulic brake fluid, how different might pushing on the brake pedal feel? Explain. **K/U A**
24. During the production of a batch of maple syrup, a hydrometer is placed in four test samples taken at different times throughout the evaporation process (Figure 2).
- Rank the liquids from least dense to most dense.
 - Which sample was collected earliest in the evaporating process? How do you know?
 - Which sample would taste the sweetest? Explain. **T/I A**

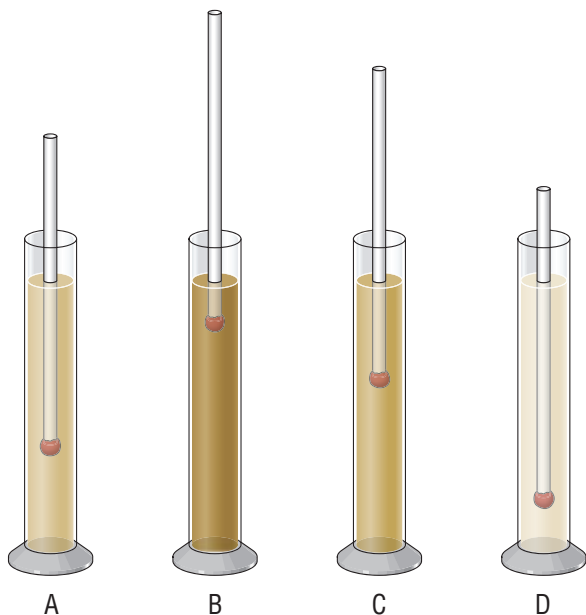


Figure 2

25. Research an object that uses valves to control fluid flow. Make a simple drawing to show how the valve works. **T/I C**

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26. Figure 3 shows water coming from a bottle with three punctures. Describe why the water is flowing the way it does. **K/U**



Figure 3

27. When a person donates blood, doctors can use the various components of that blood for different purposes. Research and describe how blood is separated into its components.

T/I A

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Solve a Problem!

28. You have seen that ice cubes float on water. How do you explain what is happening in Figure 4? **T/I A**



Figure 4

29. The mass of four different liquids was measured and then recorded in Table 2.

Table 2

Liquid	Mass (g)	Volume (mL)
A	50	20
B	50	50
C	30	40
D	10	40

- (a) Determine the mass-to-volume ratio of each fluid.
 (b) Show this information in a line graph.
 (c) Make a sketch of what you would expect to see if equal volumes of these fluids were poured into a single tall, narrow cylinder.

T/I A C

30. In Figure 5, plunger A has an area of 5 cm^2 and plunger B has an area of 15 cm^2 . How much more force can be exerted by plunger B? T/I A

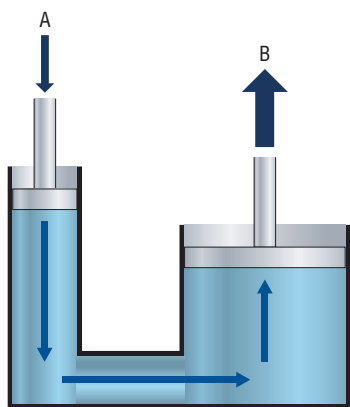


Figure 5

31. Design an experiment to determine how the flow rate of a fluid is affected by changing the diameter of the tube through which it is poured. T/I A

Create and Evaluate!

32. Which is of greater importance, the benefits that dams bring or the damage that they do? Explain your reasoning. T/I A
33. Choose a living thing and a human-built object that both use fluids in a similar way. Create an interesting way of showing how these systems are similar and how they are different in the way they use fluids. Evaluate how well your method shows what you want it to show. T/I C
34. Choose an idea in the unit that interests you. Clearly identify the concept or idea, and then create a poem, short story, or cartoon that describes or explains the idea. How useful is this form of writing in describing the idea to others? T/I A C
35. Dialysis and blood separation techniques save lives, but come with substantial costs. Research one of these techniques and the costs associated with it. Report on (a) what the costs are; (b) whether, in your opinion, the benefits are worth the costs; and (c) who should be responsible for paying the costs.

T/I A C

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Reflect on Your Learning

36. Describe the idea about fluids that you found most challenging in this unit. What did you do to help you understand this idea better?
37. What was the most useful idea you learned in this unit? Why?