

Fluids and Dynamics Unit Study Guide

Vocabulary: You should be able to define each of these terms:

Matter, solid, liquid, gas, mass, volume, kinetic energy, thermal expansion, thermal contraction, thermal energy, heat, temperature, density, displacement, evaporation, melting, solidification, sublimation, condensation, deposition, fluid, force, newtons, contact force, tension, friction, elastic force, action-at-a-distance force, gravity, electrostatic force, magnetic force, normal force, applied force, weight, balanced force, unbalanced force, pressure, compression, deformation, pascals, kilopascals, implosion, explosion, viscosity, adhesion, cohesion, flow rate, surface tension, buoyancy, static pressure, hydraulic system, pneumatic system, hydraulic multiplication, circulatory system, respiratory system, blood pressure, asthma.

Questions: You should be able to answer each of these questions fully:

1. List the three common states of matter.
2. Give an example of something which is not matter.
3. Explain why when 25ml of ethanol is poured into 25ml of water, the resulting mixture does not measure 50ml.
4. List the four principles of the kinetic theory of matter.
5. Describe the differences between each of the states of matter in terms of how the particles in them move.
6. Label a diagram with the six different changes of state.
7. What is absolute zero in terms of the motion of particles?
8. Give an example of two objects where one has a higher thermal energy but lower temperature than the other.
9. Describe the heat transfer involved in various situations (ex. Holding a cold glass of water)
10. Explain the difference between heat and temperature.
11. Generally when objects are heated do they expand or contract?
12. If an object expands what happens to its volume? What if it contracts?
13. Give a mathematical description of density using mass and volume.
14. What happens to the density of most objects when they are heated? What about when they are cooled? Give one common exception to this rule.
15. Describe the three methods we used to find density.
16. Calculate the density of an object given its volume and mass, match this with a chart to determine what the object is. (ex. 50ml of a liquid has a mass of 677.5g, use pg 262)
17. Given several substances and their densities predict which will float on top of which (ex. Machine oil at 0.9g/ml, Alcohol at 0.79g/ml, seawater at 1.03g/ml)
18. What is the density of water?
19. When people climb very high mountains they often bring oxygen tanks to breathe. Explain why this is necessary.
20. Explain why solids are not fluids.
21. Explain the difference between mass and weight.
22. Given a mass of an object calculate its weight on earth (ex. What is the weight of a 500 kilogram object on Earth?)
23. Given a mass of an object calculate its weight in space (ex. What is the weight of a 500 kilogram object in space?)
24. Explain the difference between contact and action at a distance forces.
25. Give 3 examples of contact forces, briefly describe each.
26. Give 3 example of action at a distance forces, briefly describe each.
27. Explain why a balance scale would measure mass correctly on another planet while a spring scale would not.
28. Create a force arrow diagram of an object speeding up as it falls with gravitation force and air friction labeled with arrows of appropriate length.

29. Create a force arrow diagram of an object resting on the ground with gravitation force and normal force labeled with arrows of appropriate length.
30. Create a force arrow diagram of two equally strong people playing tug-of-war, labeling both applied forces with arrows of appropriate length.
31. Create a force arrow diagram of one person who is stronger than another playing tug-of-war, labelling both applied forces with arrows of appropriate length.
32. Create a force arrow diagram of a person being pulled up by a bungee cord, labeling gravitation, elastic and air friction forces with arrows of appropriate length.
33. If balanced forces act on an object can it be moving? If so what can you say about the motion?
34. List 4 things which an unbalanced force can do to the motion of an object.
35. Judge if the forces acting on an object are balanced or unbalanced (ex. A car slows down as it approaches a red light)
36. Explain the difference between compression and deformation.
37. Explain what happens to the particles in a gas when it is compressed.
38. Explain how an implosion could occur, use the term **pressure**.
39. Explain how an explosion could occur, use the term **pressure**.
40. Why are solids and liquids incompressible but gases are compressible?
41. A helium balloon floats upwards and eventually pops, explain why it pops.
42. List 3 fluids with higher viscosity than water.
43. How are flow rate and viscosity related?
44. How is temperature and viscosity of a liquid related?
45. Give an example of adhesion.
46. Give an example of cohesion.
47. Explain the difference between adhesion and cohesion.
48. Explain how certain insects and lizards are able to walk or run across water.
49. Give a mathematical description of pressure using force and area.
50. Give the atmospheric pressure at sea level in kilopascals.
51. Explain how air pressure changes with elevation.
52. Explain why it will be difficult to open a car door if the car is underwater, be sure to refer to the pressure inside the car and the pressure outside the car.
53. In terms of pressure, what is a vacuum?
54. Explain how a hot air balloon moves upwards, use the terms **density** and **buoyant force**.
55. Explain why clay shaped like a boat floats in water while a flat piece of clay sinks.
56. Explain what is happening when your ears "pop".
57. Draw a diagram of a hydraulic system which uses hydraulic multiplication to lift a car.
58. Explain the difference between pneumatic and hydraulic systems.
59. Explain why gasses in a pneumatic system must be compressed.
60. Give an example of a natural hydraulic system.
61. Give an example of a natural pneumatic system.
62. Blood pressure readings give two numbers, what does each number represent?
63. Explain why high blood pressure could be a problem.
64. Explain why low blood pressure could be a problem.
65. Draw a diagram of a blood vessel with high blood pressure, low blood pressure and normal blood pressure.
66. Explain what happens when you breathe in using the terms, **diaphragm**, **lower pressure**, and **higher pressure**.
67. Explain what happens when you breathe out using the terms, **diaphragm**, **lower pressure**, and **higher pressure**.
68. Explain what happens during an asthma attack.