science Study Guide - quiz

AI-Generated Study Guide

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Study Guide Quiz: Density and Pressure
Grade 11 Science

Multiple Choice Questions

1. What is the formula for density?
a) Density = Mass × Volume
b) Density = Mass ÷ Volume
c) Density = Volume ÷ Mass
d) Density = Mass + Volume

2. The SI unit for density is:
a) g/mL
b) kg/m³
c) lb/ft³
d) Both a and b are correct

3. Which of the following materials typically has the highest density?
a) Water
b) Wood
c) Lead
d) Air

4. Pressure is defined as:

a) Force per unit area

b) Mass per unit volume

c) Weight per unit mass

d) Area per unit force

5. The SI unit for pressure is:

a) Newton (N)

b) Pascal (Pa)

c) Joule (J)

d) Watt (W)

6. As you go deeper underwater, the pressure:

a) Decreases

b) Stays the same

c) Increases

d) Fluctuates randomly

7. Which factor does NOT affect fluid pressure at a given depth?

a) Density of the fluid

b) Depth below the surface

c) Gravitational acceleration

d) Shape of the container

8. A substance with a density less than water will:

a) Sink in water

b) Float on water

c) Dissolve in water

d) React with water

9. Atmospheric pressure at sea level is approximately:
a)

101.3 kPa
b) 760 mmHg
c)

14.7 psi
d) All of the above

10. If you increase the mass of an object while keeping its volume constant, its density will:
a) Increase
b) Decrease
c) Stay the same
d) Cannot be determined

True/False Questions

11. Density is an intensive property that does not depend on the amount of substance present.
True / False

12. Objects with higher density will always sink in fluids with lower density.
True / False

13. Pressure in a fluid increases linearly with depth.
True / False

14. The density of water is exactly

1.0 g/cm³ at all temperatures.
True / False

15. Atmospheric pressure decreases as altitude increases.
True / False

16. Pressure is a vector quantity.
True / False

17. Two objects with the same mass will always have the same density.
True / False

18. Hydraulic systems work based on Pascal's principle.
True / False

19. The density of a gas is significantly affected by temperature and pressure.
True / False

20. Buoyant force depends on the density of the displaced fluid.
True / False

Short Answer Questions

21. Calculate the density of a metal block that has a mass of 156 g and a volume of 20 cm³. Show your work and include appropriate units.

22. Explain why ice floats on water in terms of density. What does this tell us about the density of ice compared to liquid water?

23. A diver experiences a pressure of 405 kPa at a certain depth in freshwater. Calculate the depth of the diver below the surface. (Use: atmospheric pressure =

101.3 kPa, density of water = 1000 kg/m³, g =

9.8 m/s²)

24. Describe three real-world applications where understanding pressure is important. Explain how pressure principles apply in each case.

25. Compare and contrast density and pressure. Include their definitions, units, and at least two ways they are related to each other.

26. A rectangular tank contains oil with a density of 850 kg/m³. If the oil is

2.5 meters deep, calculate the gauge pressure at the bottom of the tank.

27. Explain why atmospheric pressure changes with altitude and how this affects activities like mountain climbing or aviation.

28. A student has three unknown liquids A, B, and C. When mixed, liquid A floats on top of B, and B floats on top of C. Arrange these liquids in order of increasing density and explain your reasoning.

Answer Key

Multiple Choice Answers:

1. b) Density = Mass ÷ Volume

2. b) kg/m³

3. c) Lead

4. a) Force per unit area

5. b) Pascal (Pa)

6. c) Increases

7. d) Shape of the container

8. b) Float on water

9. d) All of the above

10. a) Increase

True/False Answers:

11. True

12. True

13. True

14. False (density of water varies slightly with temperature)

15. True

16. False (pressure is a scalar quantity)

17. False (density also depends on volume)

18. True

19. True

20. True

Short Answer Solutions:

21.
Density = Mass ÷ Volume
Density = 156 g ÷ 20 cm^3 =

7.8 g/cm^3

22.
Ice floats on water because ice has a lower density than liquid water. When water freezes, it expands and becomes less dense (approximately

0.92 g/cm^3 compared to

1.0 g/cm^3 for liquid water). This lower density causes ice to float.

23.
Gauge pressure = Total pressure - Atmospheric pressure
Gauge pressure = 405 kPa -

101.3 kPa =

303.7 kPa = 303,700 Pa
Using $P = \rho gh$: $h = P/(\rho g)$ = 303,700/(1000 ×

9.8) = 31 m

24.
- **Airplane cabins**: Pressurized to maintain comfortable conditions at high altitudes
- **Hydraulic brakes**: Use pressure transmission through fluid to multiply force
- **Weather prediction**: Atmospheric pressure changes indicate weather patterns

25.
Density is mass per unit volume (kg/m³), while pressure is force per unit area (Pa). Density is an intrinsic property of materials, while pressure depends on external forces. They're related through fluid pressure equations and buoyancy principles.

26.
$P = \rho gh = 850\ kg/m^3 \times$

$9.8\ m/s^2 \times$

$2.5\ m = 20{,}825\ Pa =$

20.8 kPa

27.
Atmospheric pressure decreases with altitude because there's less air above pressing down. This affects oxygen availability for climbers and requires aircraft pressurization systems.

28.

Increasing density order: A < B < C

Since A floats on B, A is less dense than B. Since B floats on C, B is less dense than C. Therefore, C is the densest, followed by B, then A.

Study Tips:

- Practice unit conversions between different density and pressure units
- Remember that density is intrinsic to materials while pressure depends on external conditions
- Use dimensional analysis to check your calculations
- Understand the relationship between pressure, depth, and fluid density
- Connect these concepts to real-world applications for better retention