حل مراجعة الوحدة الخامسة Matter of States منهج انسباير Inspire

تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ⇐ المناهج الإماراتية ⇐ الصف الثاني عشر المتقدم ⇐ فيزياء ⇐ الفصل الثاني ⇐ ملفات متنوعة ⇐ الملف	

تاريخ إضافة الملف على موقع المناهج: 2026-02-25 13:11:13

المزيد من مادة فيزياء:	ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس
	إعداد: ثانوية التكنولوجيا التطبيقية

التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم

صفحة المناهج الإماراتية على فيسبوك					

المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة فيزياء في الفصل الثاني

1	حل مراجعة الوحدة الرابعة Energy Thermal منهج انسباير Inspire
2	المراجعة النهائية محاكاة للهيكل منهج بريدج Bridge
3	مراجعة Transfer Heat and Energy Thermal وغيرها للامتحان النهائي منهج انسباير Inspire
4	ملخص وتدريبات الوحدة 12 حالات المادة Matter of States باللغتين العربية والانجليزية
5	ملخص وتدريبات الوحدة 11 الطاقة الحرارية Energy Thermal باللغتين العربية والانجليزية

ID Resources: Topic 5– States of Matter

Subtopic 5.1: Properties of Fluids

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1. Which of the following is/are the unit of pressure?
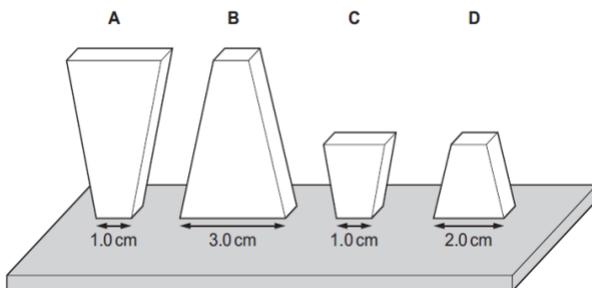   - I.   Pascal (Pa)
   - II. Newton/meter ^{2} (N/m²)
   - III. Joule (J)

   - A. I only
   - B. II only
   - √ C. I and II
   - D. I and III

2. Which of the following is the correct equation for the pressure?

   - A. $P = FA$
   - √ B. $P = F/A$
   - C. $P = A/F$
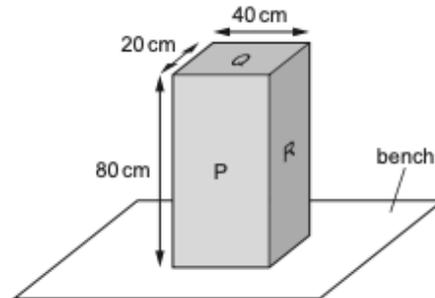   - D. $P = F + A$

3. The diagram shows four solid pieces of the same metal. Each piece has the same thickness and stands on a bench as shown.

Which piece of metal produces the greatest pressure on the bench?

   - √ A. A
   - B. B
   - C. C
   - D. D

4. The diagram shows a solid block resting on a bench. The dimensions of the block are shown.

On which labelled surface should the block rest to produce the smallest pressure on the bench?

   - √ A. P
   - B. Q
   - C. R
   - D. Any of P, Q, or R

5. The table gives four forces and the surface area on which each force acts. Which row gives the largest pressure on the surface?

	Force / N	Area / m²
A.	20	2
√ B.	40	2
C.	20	4
D.	40	4

6. A box weighing 360 N rests on the ground. The bottom of the box measures 0.30 m by 0.20 m. How much pressure does the box exert on the ground?

   - A. $3.2 \times 10^3 \ Pa$
   - B. $4.0 \times 10^3 \ Pa$
   - C. $5.0 \times 10^3 \ Pa$
   - √ D. $6.0 \times 10^3 \ Pa$

7. The atmospheric pressure on the surface of the Earth is about _____.

    A.   10 kPa

√ B.   100 kPa

    C.   1000 kPa

    D.   100 000 kPa

8. Which of the following is equal to the absolute zero?

√ A.   −273°C

    B.   0°C

    C.   100°C

    D.   273°C

9. The temperature of a gas in a cylinder is increased at constant pressure. What can you say about its volume?

√ A.   The volume of the gas will increase

    B.   The volume of the gas will decrease

    C.   The volume of the gas will remain constant

    D.   The volume of the gas will increase to a certain limit and then decrease

10. _____ states that the volume of a sample of gas varies directly as its Kelvin temperature.

    A.   Boyle's law

√ B.   Charles's law

    C.   Archimedes' principle

    D.   Pascal's principle

11. Gas with a volume of 10.0 L is trapped in an expandable cylinder. If the pressure is tripled and the temperature is increased by 80.0 percent (as measured in Kelvin scale), what will be the new volume of the gas?

    A.   2.70 L

√ B.   8.00 L

    C.   16.7 L

    D.   54.0 L

12. Nitrogen gas at standard atmospheric pressure, 101.3 kPa, has a volume of 0.080 m^3. If there are 3.6 mol of the gas, what is the temperature?

    A.   0.27 K

√ B.   270 K

    C.   0.27 °C

    D.   270 °C

13. The figure below shows two canisters filled with different gases. Each container has the same number of gas particles. What is the temperature of the second gas?
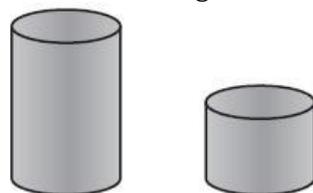
$V_1 = 20.0$ L $V_2 = 10.0$ L
$P_1 = 100.0$ kPa $P_2 = 160.0$ kPa
$T_1 = 282$ K $T_2 = ?$

    A.   176 K

√ B.   226 K

    C.   353 K

    D.   451 K

Free Response:

1. True or False?

   a. Absolute zero is the temperature at which all molecular motions cease and a gas would have zero volume. (True)

   b. Boyle's law states that the pressure of an ideal gas is inversely proportional to its volume at constant temperature; or the product; PV = constant. (True)

   c. Charles' law states that the volume of an ideal gas is directly proportional to its absolute temperature at constant pressure; or the ratio V/T = constant. (True)

   d. Gay-Laussac's law states that the pressure of an ideal gas is inversely proportional to its volume at constant temperature; or the product; PV = constant (False)

2. The table below shows the force exerted on four different surfaces A, B, C and D. Rank the pressure acting on them from the largest to the smallest.

$P_A = \dfrac{30}{0.25} = 120 \; Pa$

$P_B = \dfrac{30}{0.75} = 40 \; Pa$

$P_C = \dfrac{60}{2.00} = 30 \; Pa$

$P_D = \dfrac{60}{0.25} = 240 \; Pa$

$P_D > P_A > P_B > P_C$

	Force (N)	Area (m^2)
A	30	0.25
B	30	0.75
C	60	2.00
D	60	0.25

3. Match the descriptions to the correct equations in the table below.

_4_	Boyle's law	1	$PV = nRT$
_3_	Charles' law	2	$\dfrac{P_1 V_1}{T_1} = \dfrac{P_2 V_2}{T_2}$
_2_	The combined gas law	3	$\dfrac{V_1}{T_1} = \dfrac{V_2}{T_2}$
_1_	The ideal gas law	4	$P_1 V_1 = P_2 V_2$

4. A nitrogen gas of volume 0.022 m³, at a pressure of 10 000 Pa is compressed at constant temperature. If the new pressure is 9000 Pa, what is its new volume?

$P_1 V_1 = P_2 V_2$
$(10\,000 \; Pa)(0.022 \; m^3) = (9000 \; Pa)(V_2)$
$V_2 = 0.024 \; m^3$

5. A gas of volume 6.00 L at a temperature of 20.0 °C is compressed to a volume of 4.00 L at a constant pressure. What is its new temperature?

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\frac{6.00\ L}{(273 + 20.0)K} = \frac{4.00\ L}{T_2}$$

$$T_2 = 195.3\ K = -77.7^0 C$$

6. A gas is at a pressure of $2.0 \times 10^5\ Pa$ at a temperature of $27^0 C$. At what temperature will the gas pressure increase to $3.0 \times 10^5\ Pa$, if the volume is constant?

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{2.0 \times 10^5\ Pa}{(273 + 27.0)K} = \frac{3.0 \times 10^5\ Pa}{T_2}$$

$$T_2 = 450\ K = 177°C$$

7. In a certain internal-combustion engine, 0.0021 m³ of air at atmospheric pressure and 303 K is rapidly compressed to a pressure of 20.1 x 10⁵ Pa and a volume of 0.0003 m³ . What is the final temperature of the compressed gas?

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \Rightarrow T_2 = \frac{P_2 V_2 T_1}{P_1 V_1}$$

$$T_2 = \frac{(20.1 \times 10^5\ Pa)(0.0003\ m^3)(303\ K)}{(1.01 \times 10^5\ Pa)(0.0021\ m^3)}$$

$$T_2 = 861\ K$$

8. 10.0 moles of an ideal gas is at a temperature of 250 K and a pressure of 80 Pa. What is the volume of the gas?

$$PV = nRT \Rightarrow V = \frac{nRT}{P}$$

$$V = \frac{(10.0\ moles)(8.31\ Pa \cdot m^3/mol \cdot K)(250\ K)}{80\ Pa} = 260\ m^3$$

9. An ideal gas has a volume of 20.0 m³ at a pressure of 101 kPa and a temperature of 300 K. How many moles of the gas are in the cylinder?

$$n = \frac{PV}{RT}$$

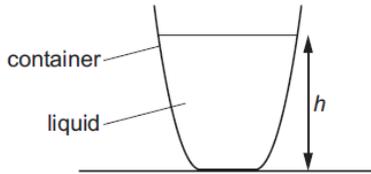$$n = \frac{(101\ 000\ Pa)(20.0\ m^3)}{(8.31\ Pa \cdot m^3/(mol \cdot K))(300\ K)}$$

$$n = 810\ mol$$

Subtopic 5.3: Fluids at Rest and in Motion

1. Which of the following does pressure in fluids NOT depend on?

- A. Depth
- B. Density
- √ C. Shape
- D. Gravity

2. A container is filled with liquid to a certain depth h.

The pressure of the liquid at the bottom of the container depends on several factors. Which is one factor on which the pressure does **not** depend?

- A. the strength of the Earth's gravitational field
- B. the density of the liquid
- C. the depth of the liquid
- √ D. the strength of the Earth's magnetic field

3. The pressure exerted by a column of liquid is independent of the _____.

- A. density of the liquid
- B. depth of the liquid
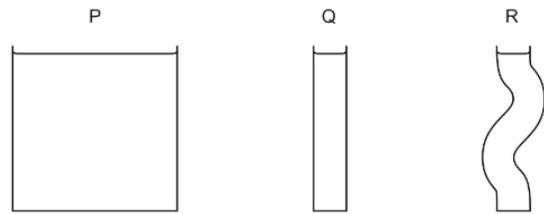- √ C. shape of the container
- D. weight of the liquid

4. The diagram shows three vases each with the same base area. Each vase contains water of the same depth.
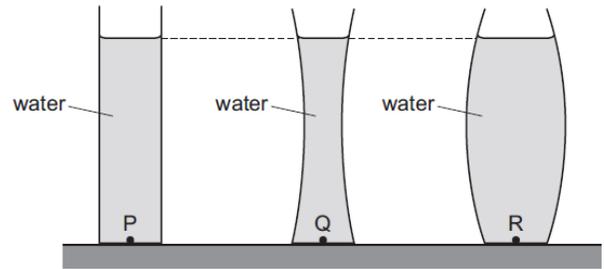
Which statement about the water pressures at points P, Q and R is correct?

- A. The pressure at point P is the greatest.
- B. The pressure at point Q is the least.
- C. The pressure at point R is the greatest.
- √ D. The pressures at point P, Q and R are the same

5. The diagrams show three containers, P, Q and R. Each container contains the same liquid. The depth of the liquid is the same in each container.
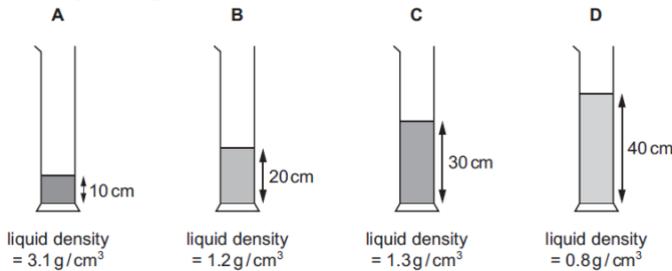

Which statement about the pressure of the liquid at the bottom of the container is correct?

- A. The pressure of the liquid at the base of P is greatest
- B. The pressure of the liquid at the base of Q is greatest
- C. The pressure of the liquid at the base of R is greatest
- √ D. The pressures of the liquid at the bases of P, Q and R are the same

6. If the density of water is 1.00 ×10³ kg/m³, how much pressure is exerted on an object by a 50.0 m column if water?

    A. $5.00 \times 10^4 \, Pa$

    B. $5.10 \times 10^4 \, Pa$

    C. $1.96 \times 10^5 \, Pa$

√ D. $4.90 \times 10^5 \, Pa$

7. Four different liquids are poured into four containers. The diagrams show the depth and the density of liquid in each container.

A	B	C	D
10 cm	20 cm	30 cm	40 cm
liquid density = 3.1 g/cm³	liquid density = 1.2 g/cm³	liquid density = 1.3 g/cm³	liquid density = 0.8 g/cm³

In which container is the pressure on its base the greatest?

    A.   A

    B.   B

√ C.   C

    D.   D

8. Four identical beakers are filled with equal volumes of liquids P or Q, as shown. Liquid P is more dense than liquid Q.
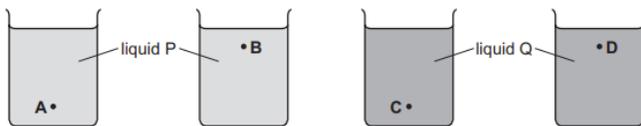
At which point is the pressure the least?

    A.   A

    B.   B

    C.   C

√ D.   D

9. The buoyant force is in which direction?

√ A.   Upward

    B.   Downward

    C.   Circular

    D.   Toward higher pressures

10. The difference in pressure between the top and bottom of a submerged object produces a force known as ___ .

    A.   weight

    B.   gravity

    C.   density

√ D.   buoyancy

11. _____ pushes an ice cube to the top of a glass of water.

√ A.   Buoyant force

    B.   A sinking object

    C.   Density

    D.   Compressed air

12. The buoyant force on an object does NOT depend on the_____.

    A.   density of the displaced liquid

    B.   acceleration due to gravity

√ C.   depth of the submerged object

    D.   volume of the displaced liquid

13. A block of metal is thrown into a lake. What happens to the buoyant force as it sinks deeper in the water?

    A.   Increases

    B.   Decreases

√ C.   Remains the same

    D.   Increases and then decreases

14. A ball of volume V_b and density ρ_b is released in a volume V_1 of liquid with density ρ_1. The upthrust on the ball is given by ___.

- A. $V_b\rho_b g$
- √ B. $V_b\rho_1 g$
- C. $V_1\rho_b g$
- D. $V_1\rho_1 g$
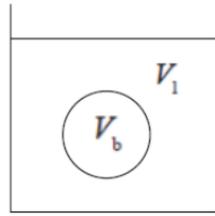
15. The magnitude of the buoyant force is equal to the weight of fluid displaced by the object ___.

- √ A. for every object submerged partially or completely in a fluid
- B. only for an object that floats
- C. only for an object that sinks
- D. for no object submerged in a fluid

16. The magnitude of the buoyant force equals the weight of the object ___.

- A. for every object submerged partially or completely in a fluid
- √ B. only for an object that floats
- C. only for an object that sinks
- D. for no object submerged in a fluid

17. A ball floats, submerged halfway, in a liquid. Which of the statement is true?

- A. Ball's density is the same as the liquid's density
- √ B. Ball's weight is equal to the weight of the fluid displaced
- C. Buoyant force on the ball is less than the weight of the ball
- D. Buoyant force on the ball is greater than the weight of the ball

18. What is true about the volume of the displaced fluid for an object that is completely submerged?

- A. The volume of displaced fluid is less than the object's volume
- B. The volume of displaced fluid is greater than the object's volume
- √ C. The volume of displaced fluid is equal to the object's volume
- D. The volume of displaced fluid is not related to the object's volume

19. A 5.0 kg object displaces a volume of water with a weight of 20 N. What is the buoyant force on the object?
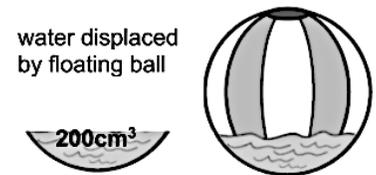
- A. $15\ N$
- √ B. $20\ N$
- C. $30\ N$
- D. $70N$

20. What is the magnitude of the buoyant force on a $20\ N$ ball that is floating in a liquid of density $800\ kg/m^3$.

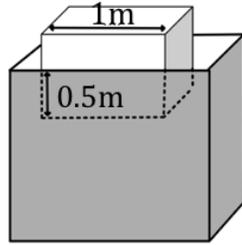- √ A. $20\ N$
- B. $40\ N$
- C. $800\ N$
- D. $16000\ N$

21. The beach ball in the figure below displaces $200\ cm^3$ of water. What is the weight of the ball?

- √ A. $2\ N$
- B. $20\ N$
- C. $100\ N$
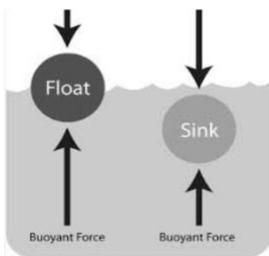- D. $200\ N$

water displaced by floating ball

200cm³

22. Calculate the buoyancy force on a cube that is partially submerged in water as shown in the figure below.

A. 500

B. 1000 N

√ C. 5000 N

D. 10000N

23. A 50 cm^3 block of wood is floating on water, and a 50 cm^3 chunk of iron is totally submerged in the water as shown below. Which one has the greater buoyant force on it?

A. The wood

√ B. The iron

C. They both experience the same buoyant force

D. Cannot say without knowing their densities

24. What is the buoyant force on a 20 kg box that displaces 4 m^3 of water?

A. 8×10^2 N

√ B. 4×10^4 N

C. 5×10^4 N

D. 2×10^5 N

25. If an object weighing 70.0 N displaces a volume of water with a weight of 20.0 N, what is the buoyant force on the object?

√ A. 20.0 N

B. 50.0 N

C. 70.0 N

D. 90.0 N

26. Three cubes of same size and different masses are placed in three different beakers of water. The length of the arrows in the diagram shows the magnitudes of the forces acting on the cubes.
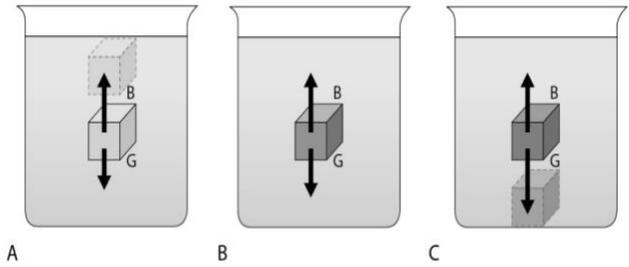
Which of the statements is/are true?
I. B is neutrally buoyant
II. $density_{cube\ C} < density_{cube\ B} = density_{cube\ A}$
III. Volume of water displaced by each cube is the same

A. I only

B. II only

C. III only

√ D. I and III

27. A 5.0 N stone is dropped in a lake and it sinks. Which of the relationships below is true for the buoyant force on the stone?

A. $F_b = 0$

B. $F_b = 5N$

√ C. $F_b < 5N$

D. $F_b > 5N$

28. Three blocks, made of aluminum, iron and lead of equal volumes are completely submerged into water. Which of the following is correct regarding the buoyant force on each of the block?
($\rho_{aluminum} < \rho_{iron} < \rho_{lead}$)

A. $F_{aluminum} > F_{iron} > F_{lead}$

B. $F_{aluminum} < F_{iron} < F_{lead}$

C. $F_{aluminum} < F_{iron} > F_{lead}$

√ D. $F_{aluminum} = F_{iron} = F_{lead}$

29. Three equal sized balls of volume 10 cm^3 each are made of cork, aluminum and lead with their respective masses of $2g, 27g$ and $113g$. They are submerged in water as shown in the figure below.
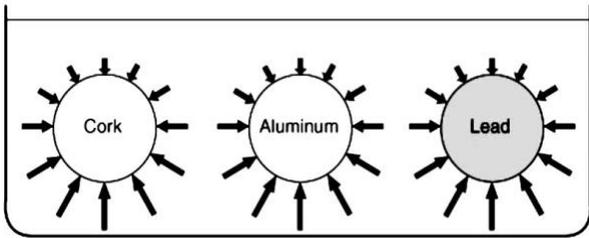
Which of the statements below is **incorrect**?

A. The cork would rise up and float

√ B. Buoyant force on lead is the largest

C. Lead and aluminum would both sink

D. Each ball would displace the same volume of water

30. According to Archimedes' principle, an object immersed in a fluid has an upward force on it equal to _____.

√ A. the weight of the fluid displaced

B. the weight of all the fluid in the container

C. the weight of the fluid displaced minus the weight of the object

D. the weight of the object

31. Which of the following statements is correct according to Archimedes' principle?

A. The buoyant force depends on the weight of the object only

B. The buoyant force is equal to the net force on a submerged object

√ C. The buoyant force depends on the weight of the displaced fluid only

D. The upward force is equal to the net force on a partially submerged object

32. A 5.0 kg object is totally submerged in water. If the apparent weight of the object is 45 N. Calculate the buoyant force on the object.
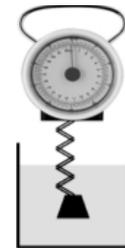
√ A. 5.0 N

B. 40 N

C. 50 N

D. 90 N

33. Find the tension in the wire supporting a 120 kg object of volume $0.1m^3$ submerged in water as shown in the figure below.

√ A. 196 N

B. 392 N

C. 880 N

D. 2200 N
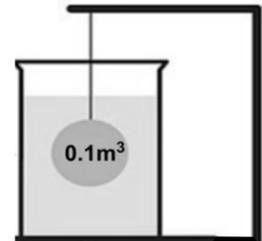
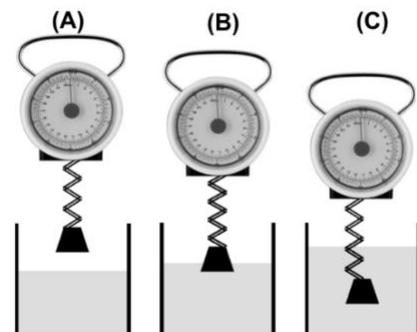34. A 8.0 kg object is totally submerged in water and the scale reading is 60 N. Calculate the buoyant force on the object.

√ A. 20 N

B. 52 N

C. 68 N

D. 140 N
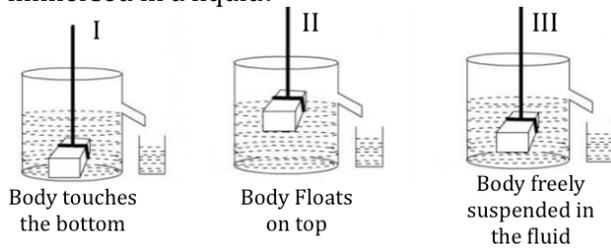

35. Rank the reading of the scales in the figure below from lowest to greatest?

A. $A < B < C$

√ B. $C < B < A$

C. $B < C < A$

D. $C < A < B$

36. Which is the best set-up of an experiment for measuring the loss of total weight of a body immersed in a liquid?

I — Body touches the bottom
II — Body Floats on top
III — Body freely suspended in the fluid

    A. I only

    B. II only

√ C. III only

    D. I and III

37. Which explains why ships can be made of steel and still float?

    A. Boyle's law

    B. Pascal's principle

    C. Bernoulli's principle

√ D. Archimedes' principle

38. Why does ice float?

    A. It is an amorphous solid

    B. It has strong cohesive properties

√ C. It has a lower density than water

    D. It has a higher density than water

39. If an object sinks in a fluid, _____.

    A. the density of the fluid is greater than the density of the object

√ B. the density of the fluid is less than the density of the object

    C. the density of the fluid is equal to the density of the object

    D. density has nothing to do with whether an object sinks or floats, only which state of matter the object is

40. An object will be in equilibrium in a fluid if __.

    A. the weight of an object is greater than the buoyant force

    B. the weight of an object is less than the buoyant force

√ C. the weight of an object is equal to the buoyant force

    D. the weight doesn't affect if an object sinks, only its state of matter

41. An object will NOT sink if its weight is _____ the buoyant force.

√ A. Less than or equal to

    B. Greater than or equal to

    C. Similar to and almost equal

    D. Different from and almost equal

42. Which of the following statements is/are correct about neutral buoyancy?
I. The object is lighter than the fluid it displaces
II. The object is denser than the fluid it displaces
III. The object's weight is equal to the fluid it displaces

    A. I only

    B. II only

√ C. III only

    D. II and III only

43. The density of water is 1.0 g/cm³. Which of the following substance will float on water?

Substance	Density
1	5.0 g/cm³
2	2.0 g/cm³
3	1.5 g/cm³
4	0.50 g/cm³

    A. Substance 1

    B. Substance 2

    C. Substance 3

√ D. Substance 4

Free Response:

1. The pressure due to the liquid on an object immersed in that liquid is 4500 Pa. The density of the liquid is 900 kg /m³. What is the depth of the object below the surface of the liquid?

$P = h\rho g$
$4500 \, Pa = (h)(900 \, kg/m^3)(9.8 \, N/kg)$
$h = 0.51 \, m$

2. An object is 60 cm below the surface of a liquid. The pressure due to the liquid at this depth is 9000 Pa. What is the density of the liquid?

$P = h\rho g$
$9000 \, Pa = (0.60 \, m)(\rho)(9.8 \, N/kg)$
$\rho = 1531 \, kg/m^3$

3. An object of mass 20 kg displaces 0.004 m^3 of water when it is fully immersed in a water tank.

   a. What is the weight of the object when in air?
      $F_g = mg = 20kg \times 10 \, N/kg = 200N$

   b. What is the buoyant force on the object immersed in water?
      $F_{buoyant} = \rho V g = (1000kg/m^3)(0.004m^3)(10N/kg) = 40N$

   c. What is the magnitude of the net force acting on the object immersed in water?
      $F_{net} = F_g - F_{buoyant} = 200N - 40N = 160N$

   d. What is the density of the object?
      $\rho = \dfrac{m}{V} = \dfrac{20 \, kg}{0.004 \, m^3} = 5000 \, kg/m^3$

4. A 2.5 kg block of metal with a volume of $2 \times 10^{-3} m^3$ is totally submerged in water.

   a. Calculate the buoyant force on the block.
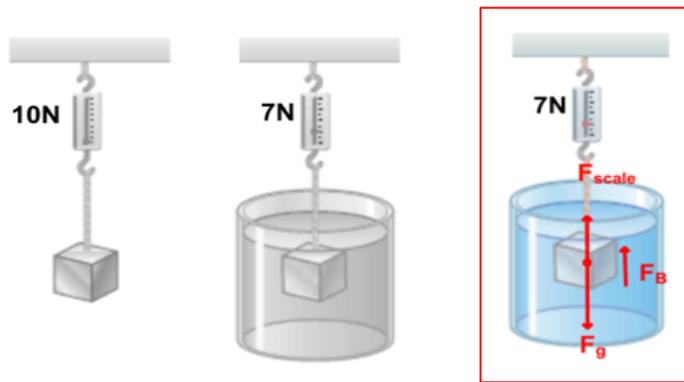 $F_b = V\rho g = (2 \times 10^{-3}m^3)(1000)(10) = 20 \, N$

   b. What is the net force acting on the object?
      $F_{net} = F_g - F_b = (2.5 \times 10) - 20 \, N = 25 - 20 = 5 \, N$

   c. Explain if the object will sink or float?
      It will sink, because the buoyant force is lesser than its weight

5. The figure below shows the weight of a metallic cube in air and water.

a. Draw on the diagram above, all the forces acting on the cube when immersed in water.

b. Find the buoyant force.

$F_{bouyant} = F_g - F_{net} = 10 - 7 = 3\ N$

c. Calculate the volume of the metallic cube.

$F_{bouyant} = \rho_{water} V g$

$V = \dfrac{F_{bouyant}}{g\rho_{water}} = \dfrac{3}{10 \times 1000} = 3 \times 10^{-4} m^3$

6. A metal ring of mass 1.5 kg is first suspended in air and then immersed completely in water. The scale reads 8.0 N when the ring is in water.
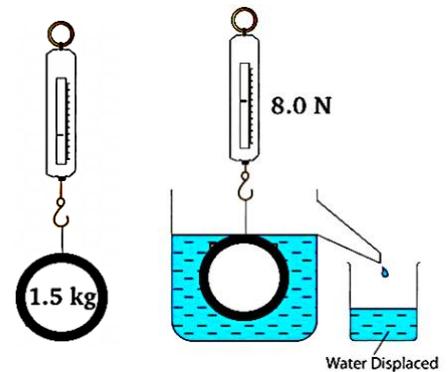

a. What is the reading of the scale when the ring is in air?

$F_g = mg = 1.5\ kg \times 10N/kg = 15\ N$

b. What is the buoyant force on the ring when immersed in water?

$F_{net} = F_g - F_{buoyant}$

$F_{buoyant} = F_g - F_{net} = 15\ N - 8.0\ N = \mathbf{7.0N}$
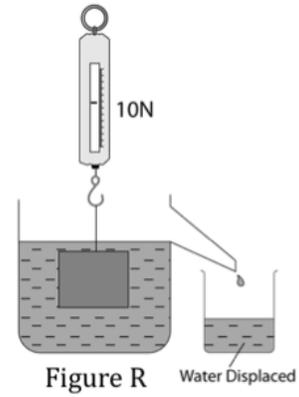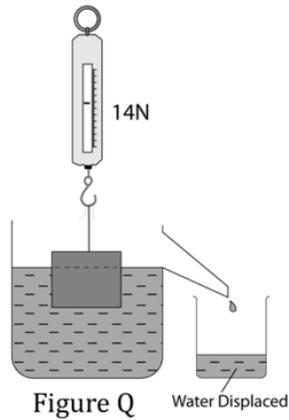
c. What is the volume of the ring?

$V = \dfrac{F_{buoyant}}{\rho g} = \dfrac{7.0\ N}{(1000 kg/m^3)(10\ N/kg)} = 7.0 \times 10^{-4} m^3$

d. What is the density of the ring?

$\rho = \dfrac{m}{V} = \dfrac{1.5\ kg}{7.0 \times 10^{-4} m^3} = 2143\ kg/m^3$

7. A metal block is first supported by a spring balance as in figure P and then submerged in water. Use the diagrams (P, Q & R) to answer the questions (a to c).

Figure P

Figure Q   Water Displaced

Figure R   Water Displaced

a. What is the mass of the metal block?

$$m = \frac{F_g}{g}$$

$$m = \frac{20N}{10N/kg} = 2kg$$

b. Figure Q shows the block partially immersed in water. The reading of the balance changes to 14N.

    i. What is the buoyant force on the block?
$$F_b = 20N - 14N$$
$$F_b = 6N$$

    ii. What is the weight of the water displaced?
$$Weight\ of\ the\ water\ displaced = Buoyant\ force = 6N$$

c. Figure R shows the block fully immersed in water. The reading of the spring balance became 10N.

    i. Calculate the volume of the block.
$$F_{buoyant} = V\rho g \Rightarrow V = \frac{F_{buoyant}}{\rho g}$$
$$V = \frac{20N - 10N}{\frac{1000kg}{m^3} \times 10}$$
$$V = 1.0 \times 10^{-3} m^3$$

    ii. What is the density of the metal block?
$$\rho = \frac{m}{V}$$
$$\rho = \frac{2kg}{1.0 \times 10^{-3} m^3} = 2.0 \times 10^3 kg/m^3$$
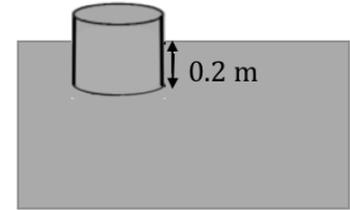
8. A cylindrical ice cube of radius 0.1 m is partially submerged in water as shown in the figure below.

    a. Calculate the upward force acting on the ice (consider π=3).
$F_b = weight\ of\ the\ liquid\ displaced = \rho_{water}Vg$
$F_b = 1000 \times (\pi r^2 h) \times 10$
$F_b = 1000 \times 3 \times 0.1^2 \times 0.2 \times 10 = 60\ N$

0.2 m

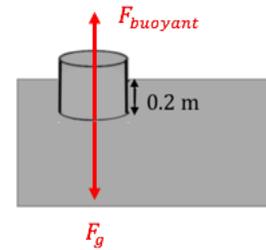   b. Indicate on the figure the forces acting on the ice.

    c. What is the mass of the ice?
$m = \dfrac{F_g}{g}$
$m = \dfrac{60\ N}{10N/kg} = 6\ kg$

$F_{buoyant}$
0.2 m
F_g

    d. When the ice melts, explain what happens to the level of water?

The weight of the ice is equal to the weight of the water that would fill the submerged volume of the ice. When the ice melt into water the volume of melted water is exactly equal to the volume of water that the ice was displacing. So, the level of water remains the same.

9. Figures I, II and III below show the position of a body immersed in different liquids.
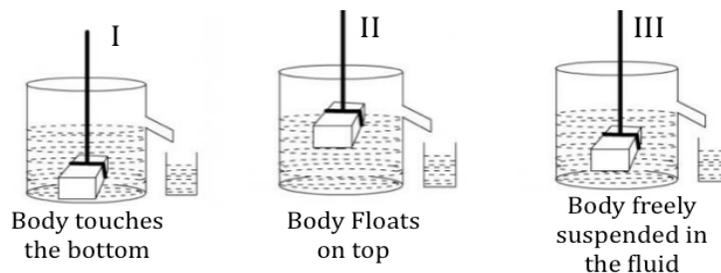
    a. Identify if the statements in the table below are true for I, II, III or ALL the figures above.

Statement	Which figure? I, II, III or ALL
The magnitude of the buoyant force is equal to the weight of fluid displaced by the object	All
Normal force acts on the body	I
The density of the object is less than the density of the fluid	II
The magnitude of the buoyant force is equal to the weight of the amount of fluid that has the same volume as the object	III

    b. In figure III, the body is fully submerged in water and displaces 200 g of water. What is the buoyant force on the body?
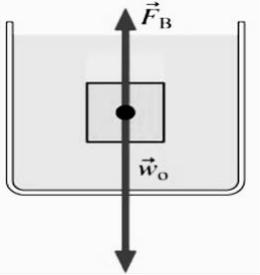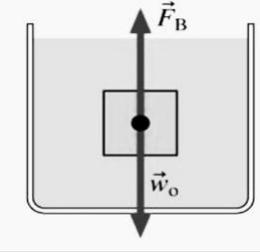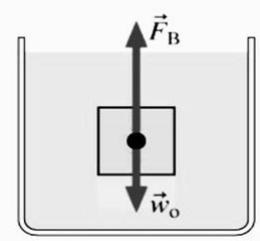$F_{buoyant} = weight\ of\ the\ liquid\ displaced$
$F_{buoyant} = \left(\dfrac{200}{1000}kg\right)(10\ N/kg)$
$F_{buoyant} = 2.0\ N$

c. What is the volume of the body?

$$V = \frac{F_{buoyant}}{\rho g}$$

$$V = \frac{2.0\ N}{1000\ kg/m^3 \times 10} = 2.0 \times 10^{-4}\ m^3$$

10. Identify with reasons if the objects below are sinking, neutral or floating.

|		
		Sinking The weight of the object W_0, is much greater than the buoyant force F_B. There is a net downward force, so the block will sink to the bottom of the tank.
		Neutral Buoyancy The weight of the object W_0, the same as the weight of the water displaced F_B. There is, therefore, no net force, and the can will remain wherever it is placed in the water.
		Floating The weight of the object W_0 is less than the buoyant force F_B, so there is a net upward force, and the object will rise.

14. Beaker A is filled to the brim with water. Beaker B is the same size and contains a small block of wood, which floats when the beaker is filled with water to the brim.

a. State Archimedes' Principle.

The buoyant force on an object is equal to the weight of the fluid displaced by the object

b. Explain which beaker, if any, weighs more?

Since the wood is in equilibrium, the weight of the water displaced by the wood is equal to the weight of the wood. Therefore, the beakers will weigh the same).
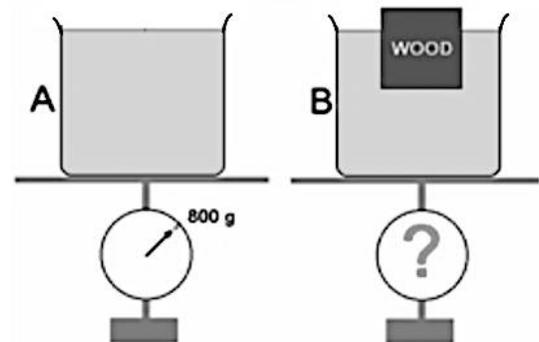
12. An object weighs 25N in air. Will the object weigh more or less when it is immersed in water? Explain your answer?

The object's apparent weight is less when it is immersed in water than when it is in air.

$$F_{net} = F_g - F_B$$

its weight (downward force) will decrease by the value of the buoyant force (upward force).

13. What determines if the object will float or sink when placed in a liquid?

The buoyant force determines if the object floats or sinks. If $F_B > F_g$ the object floats and if $F_B < F_g$ the object sinks, OR, the object's density should be less than the liquid's density

14. A ship made of dense metal can float on water. Explain.

Although the metal is denser than water, it floats due to its shape as it just depends on whether the ship weighs more or less than the amount of water that would fill the same space. Real ships have lots of air inside, so they weigh less than the same volume of water, so they float.

15. Use Archimedes' principle to explain how a hot air balloon rises up.

The upward buoyant force acting on a hot air balloon is equal to the weight of the cooler surrounding air displaced by the hot air balloon. The air inside the balloon is hot and less dense than the surrounding cool air. Therefore, the buoyant force due to the cooler surrounding air is greater than the weight of the hot air inside the balloon, causing the lift.

16. Use Archimedes' principle to explain how a submarine sinks and floats.

The submarine sinks by pumping water into its chambers so that its average density is greater than that of water and so will move downward

The submarine floats by pumping water out its chambers so that its average density is less than that of water and so will rise.

17. Explain how fish apply Archimedes' principle in their movement through water.

Fish use Archimedes' principle to control their depths. To move upward in the water, the fish expands its swim bladder by filling it with gas to displace more water and increase the buoyant force. The fish moves downward by contracting the volume of its swim bladder.