مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

d) ..... when a ... that is proportional to the displacement. ... are a resorting ...

e) ..... measure of degree of deformation.

b) Using the dimensional analysis check that this equation

$$x = \frac{1}{2} a t^2$$

is correct, where x is the distance, a is the acceleration and t is the time.

..... (1marks)

.....

c) A spring is 0.30 m long when it is pulled by a force of 3 N it stretches to 0.40m what is the spring constant? (1marks)

.....

.....

.....

.....

d) Express the vectors coordinates below as ordered pairs in simplest radical form

(1 mark)

Q3: A steel rod has a length of 15 m at temperature 10 °C, what is the length of the rod at temperature of 90 °C, knowing that α steel = $11 \times 10^{-6}\ C^{-1}$.

$L_1 = 15$
$t_1 = 10$
$L_2 = ?$
$T_2 = 90$
$\alpha = 11 \times 10^{-6}$

$\Delta t = t_2 - t_1$
$= 90 - 10 = 80$

$\Delta L = \alpha . L . \Delta t = 11 \times 10^{-6} . 15 . 80$
$\Delta L = 0.0132\ m$

$L_2 = L_1 + \Delta L$
$= 15 + 0.0132$
$= 15.0132\ m$

Q4: The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorbed? c for water = 4.18 J/g°C

$\Delta T = T_2 - T_1$
$26.4 - 24.6 = 1.9^{\circ}C$
$Q = c . m . \Delta T$
$= 4.18 \times 335 \times 1.9$
$= 2660.57\ J$

Q5: What is the specific heat of lead if it takes 96J to raise the temperature of a 75g block by

AFaF

1

Exercises of chapter (5-6)

Q1-Choose the appropriate concept to complete the sentence below:

Thermometer - Heat Capacity - Specific Heat - First Law of Thermodynamics - Zeroth Law of Thermodynamics - Barometer – Thermal Radiation -

1-First law of Thermodynamics.....change in the internal energy of a closed system is equal to the amount of heat supplied to the system, minus the amount of work performed by the system on its surroundings

2-Thermal radiation.....an energy transfer via the emission of electromagnetic energy.

3-Zeroth law of Thermodynamics.....If bodies A and B are each in thermal equilibrium with a third body C (the thermometer), then A and B are in thermal equilibrium with each other.

4-Thermometer.....is a device that measures the temperature of things.

5-Heat capacity..... is defined as the amount of heat energy needed to raise the temperature of a sample by 1 degree.

6-Specific heat.....is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius.

Q2- A circular hole of volume 2.00 cm^3 is made in an aluminium plate at 0 C^0 .what will be the volume at 100 C^0

Linear expansion for aluminium = $2.3 * 10^3 / C^0$ $\beta = 3(\alpha)$ $\times 3$

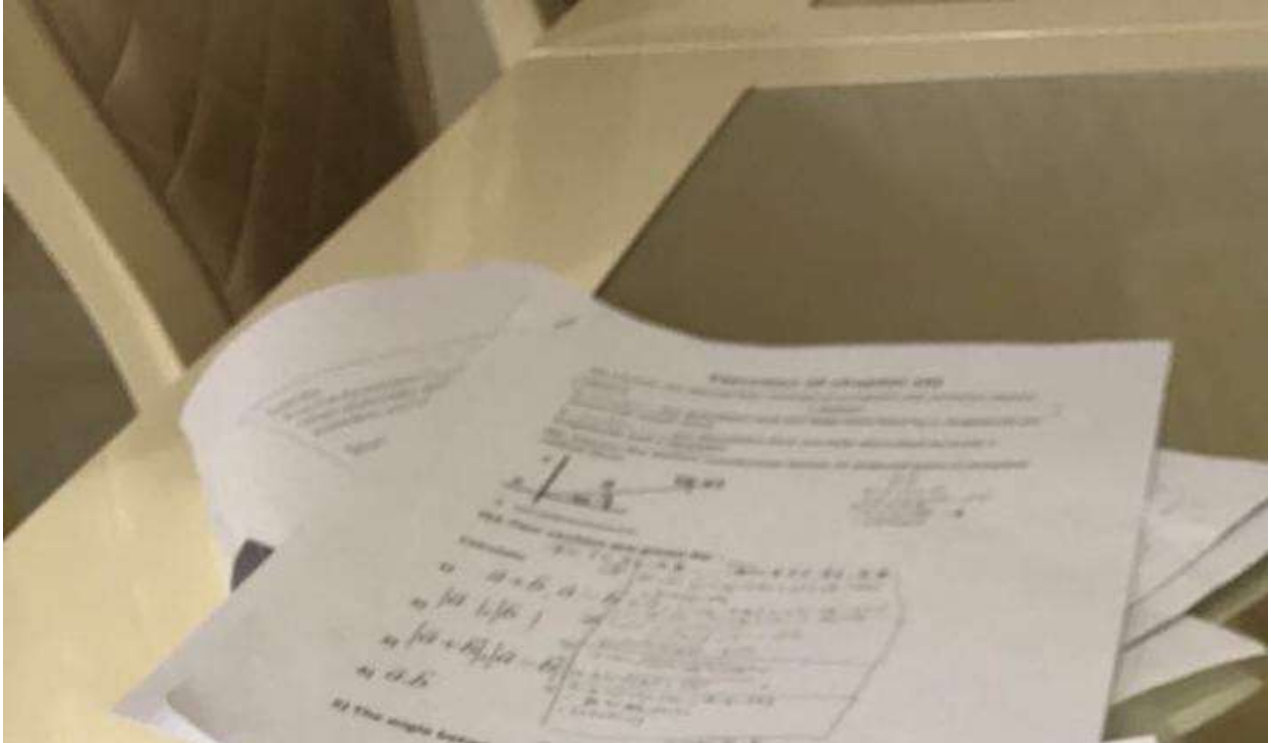
$\Delta V = \beta V \Delta T = (2.3 \times 10^3 \times 3)(2)(100)$

$\Delta V = 1380000\ cm^3$

$\Delta V = V_1 + V_2$ $V_2 = 1380000 + 2$

$V_1 = \Delta V + V_1$ $V_2 = 1380002\ cm^3$

Nermeen Ahmed



Chapter 3: Elasticity

Q1: Choose the correct answer:

1. Deforming force per unit area is called:
   a. stress b. strain c. modulus

Q2: True or False:

- The spring constant **k** is a property of the spring ( )
- Hooke's Law is "a restoring force that is proportional to the displacement" ( )
- The spring constant **k** is a measure of the elasticity of the spring ( )

Q3:

A spring is 0.38m long. when it is pulled by a force of 2.0 N, it stretches to 0.42 m, what is the spring constant?

Q4:

A vertical steel girder with a cross-sectional area of 0.15 m^2 has a 1550 kg sign hanging from its end.

(a) What is the stress within the girder?

(b) What is the strain on the girder?

(c) If the girder is 9.50 m long, how much is it lengthened?

Q5: Match the correct sentence to its picture:

Question 1: Choose the correct answer:.....

1- The scientific notation of 0.00000086 is :

a/ 86×10^{-8} b/ 86×10^{-6} c/ 8.6×10^{-9} d/ 8.6×10^{-7}

2- Which of the following is not a base quantity:

a/ length b/ time c/ mass d/ volume

3- The dimension of density is :

a/ $M.L^{-2}$ b/ M/L^3 c/ Kg/m^3 d/ Kg/m^2

4- Consider the two vectors represented in the drawing. Which of the following options is the correct way to add graphically vectors $\vec{a}$ and $\vec{b}$

a/

b/

c/

d/

5- A spring has a spring constant that is equal to 3.5 N/m. The force that will make it stretch 4 cm is

a/ 1.4 N b/ 1.4m c/ 0. 14N d/ 0. 14 m

6- Work in SI Unit system has a unit equal to :

a/ $kg.m^2.s^2$ b/ $kg.m^2.s^{-2}$ c/ $kg.m.s^{-2}$ d/ $kg.m.s^{-1}$

Question 2: Write True or false:.....

2

1- Two vectors A and B are equal if they have the same magnitude. (..T...)

2- An elastic material is one that returns to its original shape after a deformation. (..T..)

3- Stress is deforming force per unit area. (..T..)

4- The prefix of 10^{-9} is micro. (..F...)

F → C → K

2/2

Question 2: Convert:.....

1- 300°C = ... °F = ... °K

2- ..... °C = ... °F = 50°K

2/3

Question3: Write True or false::.....

1 - The specific heat capacity is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius (.....).

2- The Triple point of water is the point in which solid ice, liquid water, and water vapor coexist in thermal equilibrium. (This does not occur at normal atmospheric pressure.(.....)

3- β is the coefficient of linear expansion. (.....)

4 - Convection occurs when temperature differences cause an energy transfer by motion within a fluid. (.....)

5- Pressure at a Given Depth is Constant(.....).

6- Absolute zero is the highest possible temperature where nothing could be colder and no heat energy remains in a substance. (.....)

Exercise

Ch5: Temperature, Heat, and the First Law of Thermodynamics

Q1: Fill the blank with the correct answer:

Specific heat capacity	**Absolute zero**	**Thermometer**	**Thermodynamics**
Heat capacity	**The Zeroth Law of Thermodynamics**		

1. ..... A device that measures the temperature of things.
2. ..... Defined as the amount of heat energy needed to raise the temperature of a sample by 1 degree Celsius.
3. ..... The study and application of the thermal of systems.
4. ..... If bodies A and B are each in thermal equilibrium with a third body T, then A and B are in thermal equilibrium with each other.
5. ..... Defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius.
6. ..... The lowest possible temperature where nothing could be colder and no heat energy remains in a substance.

Q2:

a) Convert 37 °C to °F.

$T_F = \frac{9}{5} T_c + 32$

$T_F = \frac{9}{5} \cdot 37 + 32 =$

b) Convert 254 K to °C

$254 - 273 = -21\,^\circ C$

c) Convert 78 °F to K

① $T_c = \frac{5}{9} T_F - 32$

$T_c = \frac{5}{9} 78 - 32 = 25.6^\circ$

② $T_K = T_c + 273$

$T_K = 25.6 + 273$

$= 298.6\ K$

ρ_f 1200

c) A swimming pool of width 9.0 m and length 24.0 m is filled with water to a depth of 3.0 m.

L:24 h=3
w= 9

1- Calculate pressure on the bottom of the pool due to the water. For water the density is $\rho = 1000\ kg/m^3$.

2- What is the total force on the bottom of the pool due to the water ? (2marks)

(1)

$P = \frac{m}{V}$

$m = \rho V$

$m = 1000(9 \times 24 \times 3)$

$m = 648000\ Kg$

$P = \frac{F}{A}$ → $F = mga$

$F = 648000(9.8)$

$F = 635040\ N$

$P = \frac{635040}{(9)(24)}$

$P = 291.85\ N/m^2$

(2)

$F = mg$

$F = 648000(9.8)$

$F = 635040\ N$

($F = ma$) ← قانون القوة Force

unit = N

(2)

Q.3 solve the following problems : **(6 marks)**

6

a) What gauge pressure must a machine produce in order to suck mud of density 1800 kg/m^3 up a tube by a height of 2.0 m?

$\rho = 1800\ kg/m^3$ ..... $P = \rho g h$ 2

$h = 2\ m$ ..... $= 1800 \times 9.8 \times 2$ .....

$g = 9.8$ $P = 35280\ N/m^2$ / Pa or Kal 2 marks

P

---

b) The length of a bar is 150 cm at 40C°, what will be its length at 100 C°, if thermal expansion for the bar $\alpha = 19 \times 10^{-6}$ /K°?

$L_1 = 150\ cm$ ..... $\Delta L = L \alpha \Delta T$ .....

$\Delta T = 100 - 40 = 60$ ..... $= 150 \times 19 \times 10^{-6} \times 60$ 2

$\alpha = 19 \times 10^{-6}$ $\Delta L = 0.171\ cm$

.....

$L_2 = L_1 + \Delta L$

$L_2 = 150 + 0.171 = 150.171\ cm$ 2 marks

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c) How much heat energy is needed to change 2.0 kg of ice at 0°C to water at 0°C?

Where the latent heat of water $l_f = 3.3 \times 10^5$ j/kg

$E = 2.0 \times 3.3 \times 10^5$ .....

$E = 6.6 \times 10^5\ j/kg$ ..... 1 mark

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e) It takes 487.5 J to heat 25 grams of copper from 25 °C to 75 °C.

What is the specific heat in Joules/g·°C?

$Q = 487.5\ J$ $Q = mc\Delta T$

$m = 25\ g$ ..... $C = \frac{Q}{m\Delta T} = \frac{487.5}{25 \times 50} = 0.39\ J/gC$ .....

$\Delta T = 75 - 25 = 50$ ..... 1 mark

$C = ?$

A swimming pool of width 9.0 m and length 24.0 m is filled with water to a depth of 3.0 m.

1- Calculate pressure on the bottom of the pool due to the water. For water the density is $\rho = 1000\ kg/m^3$. **(2marks)**

2- What is the total force on the bottom of the pool due to the water ?

-1 $\Delta P = \rho h g$ $\Delta P = (1000\ kg/m^3)(3.0\ m)(9.8\ m/s^2)$

$\Delta P = 29400\ kg\ m2 / m3\ s^2$

-2 $F = PA$

$F = (29400\ Pa)(9.0\ m \times 24.0\ m)$

$F = 6.35 \times 106\ N$

4

Third question

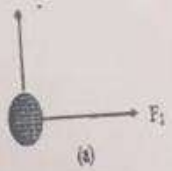
a) Two forces, F1 and F2, act on a 5-kg mass. If $F_1 = 20$ N and $F_2 = 15$ N, find the acceleration in the fig (a) **(1 marks)**

Solution

(a) $\sum F = F_1 + F_2 = (20i + 15j)\ N$

$\sum F = ma \therefore 20i + 15j = 5a$

$a = (4i + 3j)$ or $a = \sqrt{16 + 9} = \sqrt{25}$ $a = 5 m/s^2$



(a)

b) A block of density ρ= 800 kg/m3 floats face down in a fluid of density ρ_f= 1200 kg/m3 . The block has height H=6.0 cm.
(a) by what depth h is the block submerged? **(2 marks)**

$F_b = m_f g = \rho_f V_f g = \rho_f l w h g$

$F_g = m_b g = \rho_b V_b g = \rho_b l w H g$

$F_b = F_g$

$h = \rho_b H / \rho_f$

$800 \times 6.0 / 1200 = 4\ cm$

c) A swimming pool of width 9.0 m and length 24.0 m is filled with water to a depth of 3.0 m.

1- Calculate pressure on the bottom of the pool due to the water. For water the density is $\rho = 1000\ kg / m^3$.

2- What is the total force on the bottom of the pool due to the water ?

(2marks)

$P = P_0 + \rho_w g L$

$P = P_0 + \rho_x g (L + d)$

$P_x = P_w \frac{L}{L+d}$

$1000 \frac{24}{24+3} = 888.8\ N$

e) 5.0 g/cm³

4- A long U-tube contains mercury (density = 14×10^3 kg/m³). When 10 cm of water (density = 1.0×10^3 kg/m³) is poured into the left arm, the mercury in the right arm rises above its original level by:

a) 0.36 cm
b) 0.72 cm
c) 14 cm
d) 35 cm
e) 70 cm

5- To obtain the absolute pressure from the gauge pressure:

a) subtract atmospheric pressure
b) add atmospheric pressure
c) subtract 273
d) add 273
e) convert to N/m²

$P_g = P - P_0$

$P = P_g - P_0$

6- Mercury is a convenient liquid to use in a barometer because:

a) it is a metal
b) it has a high boiling point
c) it expands little with temperature
d) it has a high density
e) it looks silvery

7- To measure moderately low pressures oil with a density of 8.5×10^2 kg/m³ is used in place of mercury in a barometer. A change in the oil column of 1.0 mm indicates a change in pressure of about:

a) 1.2×10^{-3} Pa
b) 1.2×10^{-5} Pa
c) 0.85 Pa
d) 1.2 Pa
e) 8.3 Pa

$P = \rho g h$

$= 8.5 \times 10^2 \times 9.8 \times 1 \times 10^{-3}$

$= 8.37$ Pa

8- Which of the following statements about Pascal's principle is true?

a) It is valid only for incompressible fluids
b) It explains why light objects float
c) It explains why the pressure is greater at the bottom of a lake than at the surface
d) It is valid only for objects that are less dense than water
e) None of the above is true

Q1(a) Write true or false in front of the following sentence:

1-A sound wave, traveling through a long air-filled tube with speed v, consists of a moving, periodic pattern of expansions only of the air.(F)

2-The bigger the amplitude, the more energy the wave carries.(T)

3- Infrasonic waves have frequency greater than 20 kHz.(F)

(b) Write the correct concept to complete the definitions below.

1. Amplitude....maximum displacement of particle of the medium from its equilibrium point.

2. Longitudinal waves.. involve oscillations parallel to the direction of wave travel.

3. Frequency....The number of cycles passing by in a given time.

(c) Solve the following:

1-What is bulk modulus of water the density of water is 1.0×10^3 kg/m^3 and the speed of sound in water 1483.2 m/s?

$\rho = 1.0 \times 10^3$

$V = 1483.2$

$B = ?$

$V^2 = \sqrt{\frac{B}{\rho}}^2$

$V^2 = \frac{B}{\rho}$

$B = V^2 \times \rho$

$= 1483.2 \times 1.0 \times 10^3$

$= 22 \times 10^8$ N/m^2

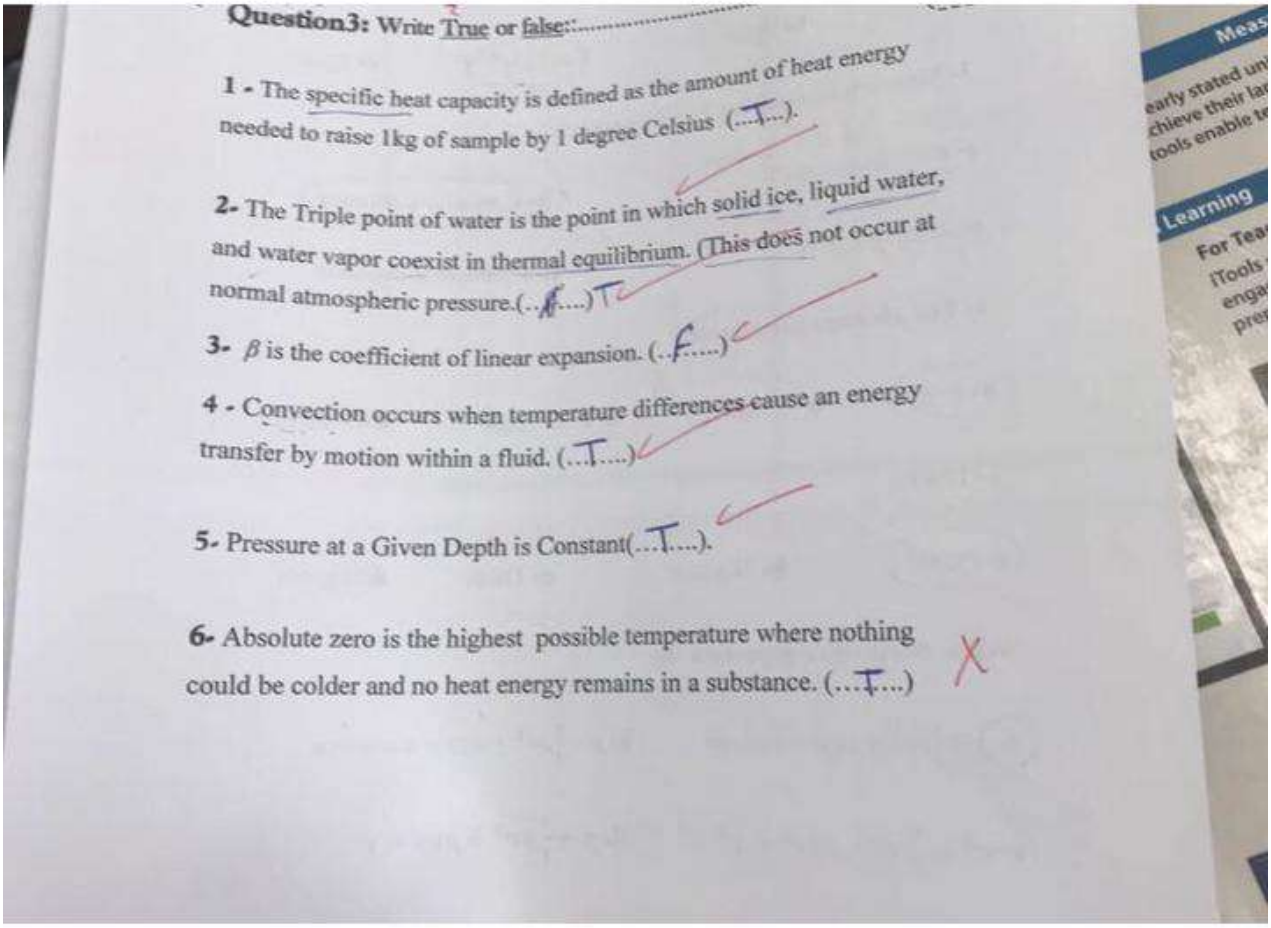
2- What is the speed of sound if the sound has a frequency of 410 Hz and a wavelength of 0.84 meters?

$V = f \lambda$

$V = (410)(0.84)$

$V = 344.4$ m/s

Solve problem 1(a) p85



Question3: Write True or false:

1 - The specific heat capacity is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius (...T...).

2- The Triple point of water is the point in which solid ice, liquid water, and water vapor coexist in thermal equilibrium. (This does not occur at normal atmospheric pressure.(...F....)T

3- β is the coefficient of linear expansion. (...F.....)

4 - Convection occurs when temperature differences cause an energy transfer by motion within a fluid. (...T....)

5- Pressure at a Given Depth is Constant(...T....).

6- Absolute zero is the highest possible temperature where nothing could be colder and no heat energy remains in a substance. (...T...) X

فاطمه هذي الورقه مو عندك كامله؟ لان اللي فوق ذاك اللي يلخبط الفهرنهايت والسيليلوز وذا💔ناسيه شلون جا

Q3: A steel rod has a length of 15 m at temperature 10 °C, what is the length of the rod at temperature of 90 °C, knowing that $\alpha_{steel} = 11 \times 10^{-6}\ C^{-1}$

$L_1 = 15$
$T_1 = 10$
$T_2 = 90$
$L_2 = ?$, $\alpha = 11 \times 10^{-6}$

$\Delta T = T_2 - T_1 = 90 - 10 = 80\ C^\circ$
$\Delta L = \alpha . L . \Delta T$
$\Delta L = (11 \times 10^{-6})(15)(80)$
$\Delta L = 0.0132\ m$

$L_2 = L_1 + \Delta L$
$L_2 = 15 + 0.0132$
$L_2 = 15.0132\ m$

Q4: The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorbed? c for water = 4.18 J/g°C

$\Delta T = T_2 - T_1$
$= 26.4 - 24.5$
$\Delta T = 1.9\ C^\circ$

$Q = m . c . \Delta T$
$Q = (335)(4.18)(1.9)$
$Q = 2660.57\ J$

Q5: What is the specific heat of lead if it takes 96J to raise the temperature of a 75g block by 10°C?

$Q = m\ c . \Delta T$
$c = \frac{Q}{m . \Delta T} = \frac{96}{75(10)} = 0.128\ J/g\ C^\circ$

Solve from the textbook: 33 and 59 (Volume expansion), 52 (linear expansion), 58 (latent heat), 2.a (heat capacity)

(52)
$L = 50\ m$
$\Delta T = 15$
$\Delta L = ?$
$\Delta L = L \alpha \Delta T$
$\Delta L = 50 \times 23 \times 15$
$\Delta L = 0.0350\ m$

52) $Q = 50.2\ kJ$
$m = 240\ g$
$Q = m . L_f$
$L = \frac{Q}{m}$
$L = \frac{50.2 \times 10^3}{240}$
$L = 2091.66\ J/g$

59)
$\Delta T = 60 - 20$
$\Delta T = 40$
$\alpha = 24$
$\beta = 24 \times 3$
$\Delta V = V_0 \beta \Delta T$
$\Delta V = V_0 . 3480$
$V = V_0 + \Delta V$
$33.58 = V_0 + V_0 . 3480$
$33.58 = 3481 V_0$
$V_0 = \frac{33.58}{3481} = 9.6 \times 10^{-3}\ m^3$

First question

a) Put (√) in front of the correct sentence or (x) in front of the wrong one : (3 marks)

1- Work is positive when F is opposite of displacement (X)

2- Thermometer works through a property of changing color with increasing temperature is called Radiation Thermometer. (✓)

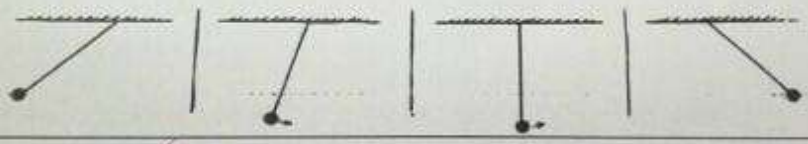
3-more mass means more inertia. (✓)

4-The low of conservation energy means that when the kinetic energy increased the potential energy increased. (X)

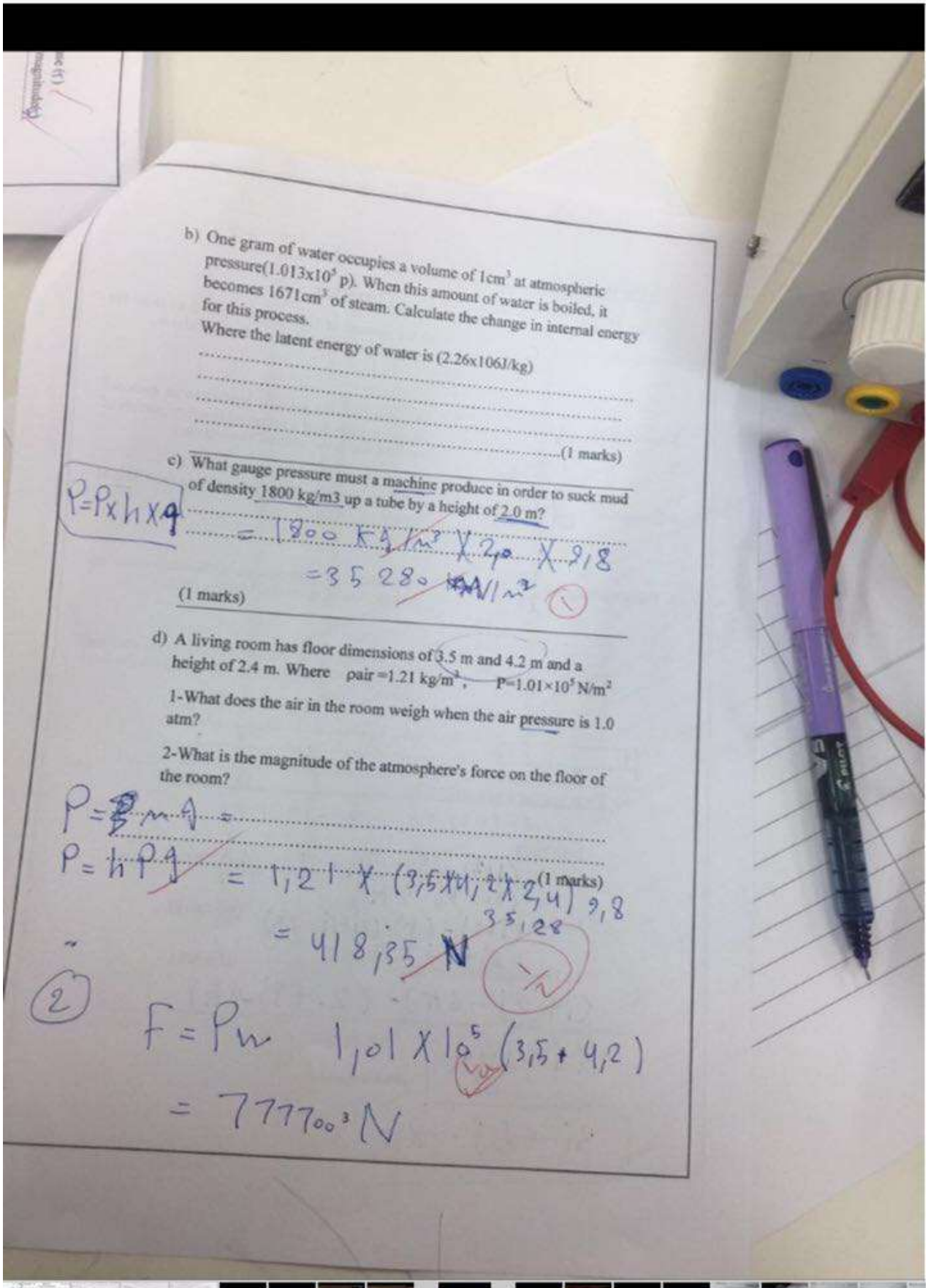
5- Heat capacity is defined as "the amount of heat energy needed to raise 1 Kg by degree Celsius". (X)

6- Higher change in temperature higher the expansion. (✓)

b) *Explain The law of conservation of mechanical energy through each case of pendulum.*
(2 marks)



Potential energy | Potential energy + kinetic energy | kinetic energy | Potential energy



b) One gram of water occupies a volume of $1cm^3$ at atmospheric pressure($1.013x10^5$ p). When this amount of water is boiled, it becomes $1671cm^3$ of steam. Calculate the change in internal energy for this process.
Where the latent energy of water is (2.26x106J/kg)

.....

.....

.....

.....(1 marks)

c) What gauge pressure must a machine produce in order to suck mud of density 1800 kg/m3 up a tube by a height of 2.0 m?

P=PxhxG

= 1800 Kg/m³ X 2,0 X 9,8

= 35280 N/m²

(1 marks)

d) A living room has floor dimensions of 3.5 m and 4.2 m and a height of 2.4 m. Where $\rho air = 1.21\ kg/m^3$, $P=1.01\times10^5\ N/m^2$

1-What does the air in the room weigh when the air pressure is 1.0 atm?

2-What is the magnitude of the atmosphere's force on the floor of the room?

P = F/A .....

P = hρg = 1,21 X (3,5X4,2X2,4) 9,8

35,28

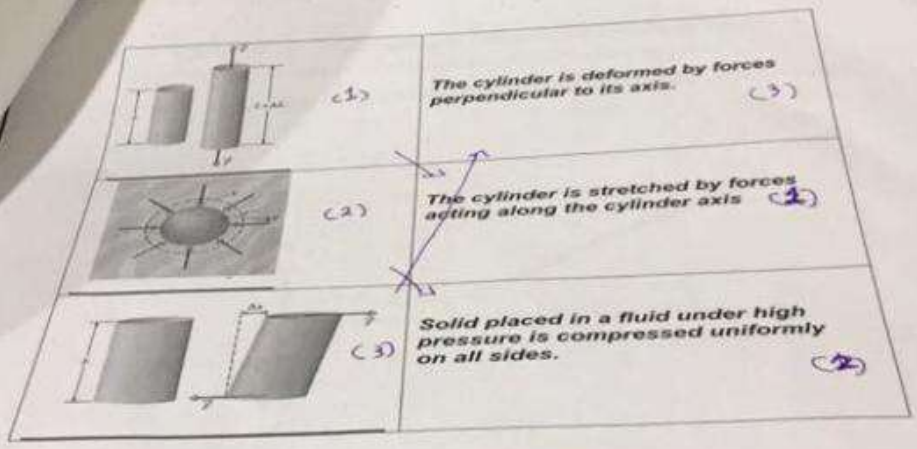
= 418,85 N

(1 marks)

(2)

F = Pw 1,01 X 10^5 (3,5 + 4,2)

= 777700 N



(1)	The cylinder is deformed by forces perpendicular to its axis. (3)
(2)	The cylinder is stretched by forces acting along the cylinder axis (1)
(3)	Solid placed in a fluid under high pressure is compressed uniformly on all sides. (2)

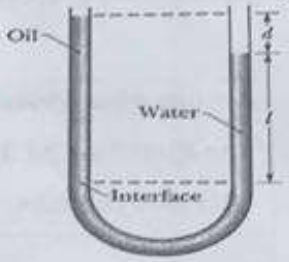
Q6: Choose from the box a suitable scientific expresion for following defination.

Stress - elastic material - inelastic (plastic) material - Shearing Stress

1. Stress ..... deforming force per unit area.
2. elastic material ..... is one that returns to its original shape after a deformation.
3. Shearing stress ... the cylinder is deformed by forces perpendicular to its axis.

2

2- The U-tube in Figure contains two liquids in static equilibrium: Water of density ($\rho_w = 998$ kg/m^3) is in the right arm and oil of unknown density ρ_x is in the left. Measurement gives $l = 135$ mm and $d = 12.3$ mm.



What is the density of the oil?

$P_{int} = P_{at} + \rho g h$ (right arm)

$P_{int} = P_{at} + \rho g h$ (left arm)

$P_x = P_w \frac{1}{1+d}$ $P_x = \frac{998(135)}{135+12.3} = 914.6\ kg/m^3$

1

3- It takes 487.5 J to heat 25 grams of copper from 25 °C to 75 °C. What is the specific heat in Joules/g·°C?

$Q = 487.5\ J$ $m = 25\ g$ $\Delta t = (T_2 - T_1) = (75 - 25) = 50\ °C$ c ?

$c = \frac{Q}{m \Delta t}$

$c = \frac{487.5}{(25)(50)} = 0.39\ J/g\cdot°C$

The End

All the best for your Exams

Question 2: Convert:..... 1.5 / 2

1- 300°C = 597.6 °F= 573 °K

2- -223 °C= -343.8 °F= 50°K

$T_K = 300 + 273 = 573\,K^\circ$

$T_F = \frac{9}{5}\{300 + 32\} = 597.6\,F^\circ$

$T_C = 50 - 273 = -223\,C^\circ$

$T_F = \frac{9}{5}\{-223 + 32\} = -343.8\,F^\circ$

Question3: Write True or false:..... 1 / 3

1 - The specific heat capacity is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius (..T...).

2- The Triple point of water is the point in which solid ice, liquid water, and water vapor coexist in thermal equilibrium. (This does not occur at normal atmospheric pressure.(...F....) ✗

3- β is the coefficient of linear expansion. (...T....) ✗

4 - Convection occurs when temperature differences cause an energy transfer by motion within a fluid. (..F....) ✗

5- Pressure at a Given Depth is Constant(..T....). ✓

6- Absolute zero is the highest possible temperature where nothing could be colder and no heat energy remains in a substance. (...T....) ✗

b/ check the dimension of this equation: 05mark

$\frac{L}{T^2} = \frac{L}{T} \cdot T + \frac{L^3}{T^2} \rightarrow \frac{L}{T^2} = \frac{L}{T} + \frac{L^2}{T^2} \rightarrow \frac{L}{T^2} = \frac{L^3}{T^2}$

$\frac{L}{T^2} \neq \frac{L^3}{T^3}$

3- A displacement vector $\vec{r}$ in the xy plane is 12m long and directed at angle $\theta = 30°$. **Determine:** 2 / 1

a/ the x component of the vector 0.5mark

$x = r\cos\theta = 12\cos 30 = 6\sqrt{3} = 10.39$

b/ the y component of the vector 0.5mark

$y = r\sin\theta = 12\sin 30 = 6$

4- A vertical steel girder with a cross-sectional area of 0.15 m^2 has a 1550 kg sign hanging from its end. 1.5 / 1.5

a/ What is the stress within the girder? 0.5mark

$F = mg = 1550(9.8) = 15190\ N$

$Stress = \frac{F}{A} = \frac{15190}{0.15} = 1\times10^5\ N/m^2$

b/ What is the strain on the girder if the Young's Modulus $E = 200\times10^9\ N/m^2$ 0.5mark

$Strain = \frac{stress}{y} = \frac{1\times10^5}{2\times10^{11}} = 5\times10^{-7}$

c/ If the girder is 9.50 m long, how much is it lengthened? 0.5mark

$\Delta L = L \cdot strain = 9.50(5\times10^{-7}) = 4.75\times10^{-6}\ m$

BEST WISHES

Question 1: Choose the correct answer:.....

3

3

1- The scientific notation of 0.00000086 is :

a/ 86×10^{-8} **b/** 86×10^{-6} **c/** 8.6×10^{-9} **d/** 8.6×10^{-7}

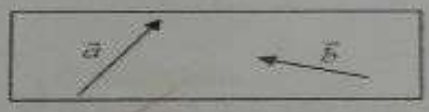
2- Which of the following is not a base quantity:

a/ length **b/** time **c/** mass **d/** volume

3- The dimension of density is :

a/ $M.L^{-2}$ **b/** M/L^{3} **c/** Kg/m^{3} **d/** Kg/m^{2}

4- Consider the two vectors represented in the drawing. Which of the following options is the correct way to add graphically vectors $\vec{a}$ *and* $\vec{b}$



a/ **b/** **c/** **d/**

11- The prefix giga equals
a- 10^1 b- 10^3 c- 10^6 d- 10^9

12- The dimension of acceleration is
a- $[LT^{-3}]$ b- $[M^{-2}T]$ c- $[ML^{-3}]$ d- $[LT^{-2}]$

13- The dimension of force is
a- $[MLT^{-2}]$ b- $[M^{-2}TL]$ c- $[ML^{-3}T^2]$ d- $[MLT^2]$

14- The dimension of velocity is.
a- $[LT]$ b- $[L^{-1}T]$ c- $[MT^{-1}]$ d- $[LT^{-1}]$

Q_2) : Check the validity of the following equation using the dimensions (2 marks)

$$v_f = v_i + at$$

where V_f :final velocity V_i: intial velocity, a:acceleration and t : time

Q3) For the following equation find the values of n and m using the dimensions

$$a = K r^n v^m$$

where a : acceleration, k :constant , r: radius and v: velocity (2 marks)

permanently deformed.

Chapter 3: Elasticity

Q1: Choose the correct answer:

1. Deforming force per unit area is called:
   a. stress b. strain c. modulus

Q2: True or False:

- The spring constant **k** is a property of the spring (T)
- Hooke's Law is "a restoring force that is proportional to the displacement" (T)
- The spring constant **k** is a measure of the elasticity of the spring (T)

Q3:

A spring is 0.38m long, when it is pulled by a force of 2.0 N, it stretches to 0.42 m, what is the spring constant?

Q4:

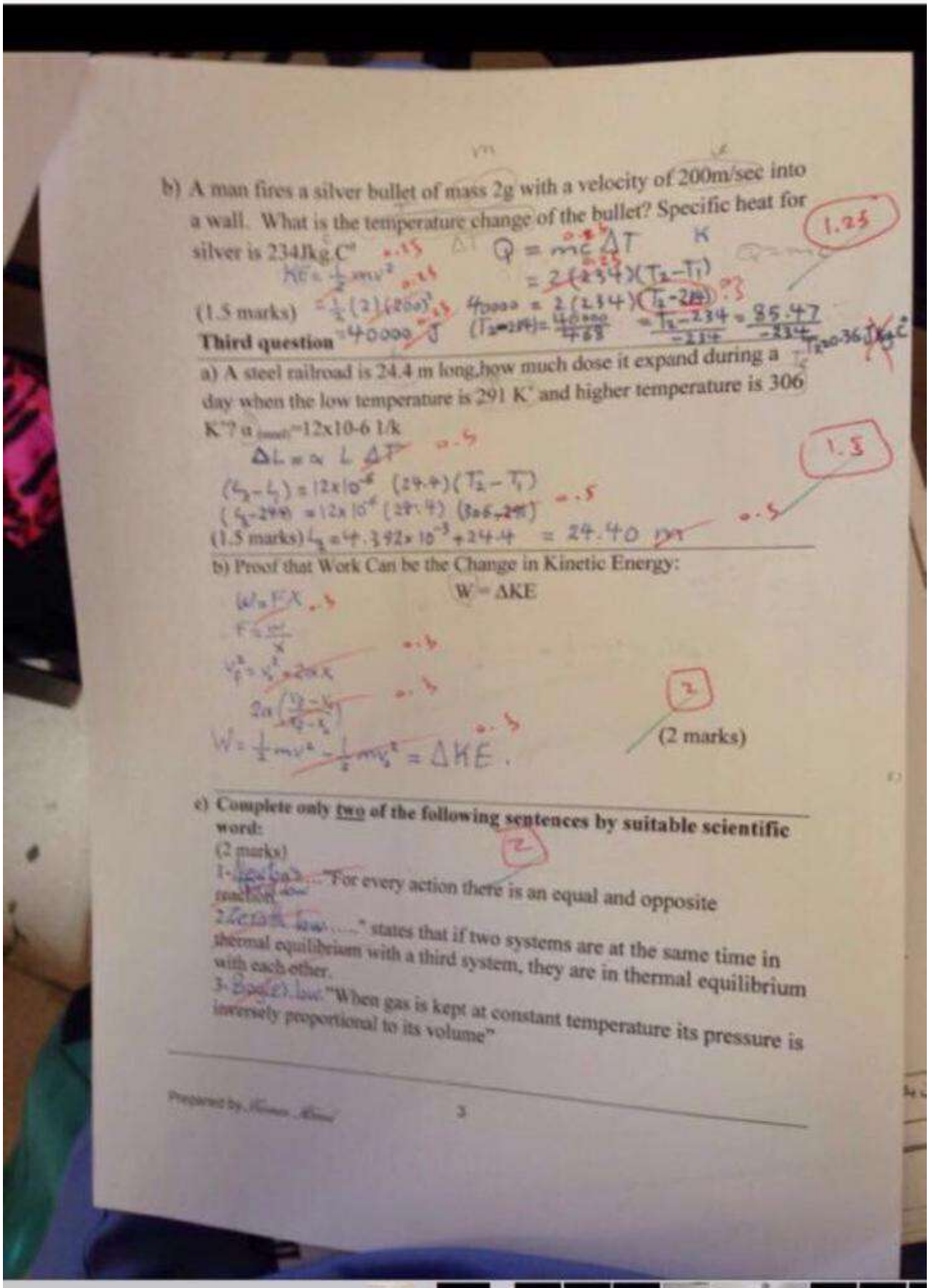
A vertical steel girder with a cross-sectional area of 0.15 m^2 has a 1550 kg sign hanging from its end.

(a) What is the stress within the girder?

(b) What is the strain on the girder?

(c) If the girder is 9.50 m long, how much is it lengthened?

Q5: Match the correct sentence to its picture:



b) A man fires a silver bullet of mass 2g with a velocity of 200m/sec into a wall. What is the temperature change of the bullet? Specific heat for silver is 234J/kg.C°

(1.5 marks)

Third question

a) A steel railroad is 24.4 m long,how much dose it expand during a day when the low temperature is 291 K° and higher temperature is 306 K°? α_{steel}=12x10-6 1/k

b) Proof that Work Can be the Change in Kinetic Energy:

$$W = \Delta KE$$

(2 marks)

c) **Complete only two of the following sentences by suitable scientific word:**

(2 marks)

1- ..... "For every action there is an equal and opposite reaction"

2- ..... " states that if two systems are at the same time in thermal equilibrium with a third system, they are in thermal equilibrium with each other.

3- ..... "When gas is kept at constant temperature its pressure is inversely proportional to its volume"

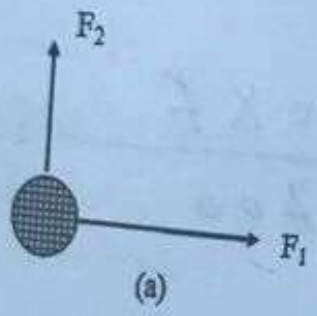
? { Solve from the textbook: 33 and 59 (Volume expansion), 52 (linear expansion), 58 (latent heat), 2.a (heat capacity)

Third question

$f_1 = 20$
$f_2 = 15$
$m = 5$

4/4

a) Two forces, F1 and F2, act on a 5-kg mass. If F_1 =20 N and F_2 =15 N, find the acceleration in the fig (a) **(1 marks)**



(a)

$f = ma$

$f_1 + f_2 = ma$

$(20i + 15j) = 5a$

$\frac{20i}{5} + \frac{15j}{5} = a$

$= 4i + 3j \rightarrow \sqrt{(4)^2 + (3)^2}$

$= 5\ m/s$

b) **Complete three only from the following** **(3marks)**

1- Newton.... first "an object at rest tends to stay at rest and an object in motion tends to stay in motion unless acted upon by an unbalanced force.

2-Newton..... third " For every action there is an equal and opposite reaction".

3 w.ieht. "is the amount of mass of an object, it is dependent upon gravity."

4 archimedsarchimes principle state that "a change in pressure applied to an enclosed incompressible fluid is transmitted undiminished to every portion of the fluid and to the walls of the container.

3

The End

With best wishes

b) A man fires a silver bullet of mass 2g with a velocity of 200m/sec into a wall. What is the temperature change of the bullet? Specific heat for silver is 234J/kg.C°

(1.5 marks)

Third question

a) A steel railroad is 24.4 m long,how much dose it expand during a day when the low temperature is 291 K° and higher temperature is 306 K°? $\alpha_{(steel)}$=12x10-6 1/k

(1.5 marks)

b) Proof that Work Can be the Change in Kinetic Energy:

$$W = \Delta KE$$

(2 marks)

c) **Complete only <u>two</u> of the following sentences by suitable scientific word:**

(2 marks)

1-Newton's third Law "For every action there is an equal and opposite reaction."

2.Zeroth Law "states that if two systems are at the same time in thermal equilibrium with a third system, they are in thermal equilibrium with each other.

3- Boyle's Law "When gas is kept at constant temperature its pressure is inversely proportional to its volume"

4-5
5

a) Choose the correct answer: (3 marks)

1. The work will be zero when the force is ....
   a) in opposite direction with displacement
   b) in the same direction with displacement
   c) perpendicular to the displacement
   d) both choices a) and c)

2. Which one of the following equations is associated with Newton's second law?
   a) $F = m\,a$
   b) $\vec{F}_1 = -\vec{F}_2$
   c) $p = m\,v$
   d) $a = \frac{k}{m} x^2$

2-½

3. When the elevator moves to the top the acceleration will be.....
   a) positive.
   b) negative
   c) zero
   d) Gravitational acceleration

4. $(P + ½\,\rho\,v^2 + \rho\,g\,y = \text{constant})$ is..... Equation.
   a) Archimedes
   b) Continuity
   c) Bernoulli
   d) Other answer

5. the work done by a 45N force in pulling the luggage carrier at an angle 50° for a distance d = 75m is equal.....
   a) 2169J
   b) 3245J
   c) 5500J
   d) 6756J

Q.4-1 Complete the following table by Comparison of Temperature Scales **2 marks**

$T_C = T_K - 273 \rightarrow T_K = T_C + 273$

Celsius	Kelvin	Fahrenheit
20 °C	$T_K = T_C + 273 = 293K$	$T_F = \frac{9}{5} T_C + 32 = 68F$
$T_C = T_K - 273 = -73°C$	200K	$T_F = \frac{9}{5} \times -73 + 32 = -99.4F$

$T_C = T_K - 273$

$= -73C°$

$T_F = \frac{9}{5} \times -73 + 32$

Q.4-2 Write true or false **2 marks**

1- Thermal Conduction is an energy transfer via the emission of electromagnetic energy (X)

2- Higher change in temperature higher the expansion. (X)

3- A thermometer is a device that measures the temperature of things. (✓)

4- Convection occurs when temperature differences cause an energy transfer by motion within a fluid. (✓)

The End

With best wishes

Question 4: Solve all problems..... 5/6

1- Consider two vectors: 2/2

$$\vec{a} = 5\vec{i} - 4\vec{j} + 2\vec{k} \text{ and } \vec{b} = -2\vec{i} + 2\vec{j} + 5\vec{k}$$

Find:

i/ $\vec{a} + \vec{b}$ **0.5marks**

$(5\vec{i} - 4\vec{j} + 2\vec{k}) + (-2\vec{i} + 2\vec{j} + 5\vec{k}) = 3\vec{i} - 2\vec{j} + 7\vec{k}$

ii/ $|\vec{a}|$ and $|\vec{b}|$. **0.5marks**

$|a| = \sqrt{(5)^2 + (-4)^2 + (2)^2} = 3\sqrt{5}$

$|b| = \sqrt{(-2)^2 + (2)^2 + (5)^2} = \sqrt{33}$

iii/ $\vec{a}.\vec{b}$. **0.5marks**

$5(-2) + (-4)(2) + 2(5) = 8$

iv/ The angle between $\vec{a}$ and $\vec{b}$. **0.5marks**

$\cos\theta = \frac{A \cdot B}{|A||B|}$ $\cos^{-1} = 8$ $3\sqrt{5} \cdot \sqrt{33}$ 1029°

2- Using the dimension analysis check the dimension of this equation: 0.5/1.5

$$a = V_0 t + 1/2\ V^2$$

a/ Write the dimension of all quantities : **1mark**

[a] L

[V] L

Question4: Complete the sentences from the box..... 2/2

~~Archimedes' Principle~~ – Pascal's Principle - ~~The heat capacity~~- ~~The First Law of Thermodynamics~~ - The zeroth Law of Thermodynamics

1- The heat capacity is defined as the amount of heat energy needed to raise the temperature of a sample by 1 degree Celsius. J/°C

2- The first Law of Thermodynamics..... change in the internal energy of a closed system is equal to the amount of heat supplied to the system, minus the amount of work performed by the system on its surroundings.

3- Archimedes' Principle When a body is fully or partially submerged in a fluid, a buoyant force F_b from the surrounding fluid acts on the body. The force is directed upward and has magnitude equal to the weight mg of the fluid that has been displaced by the body.

4- Pascals principle.....A Change in the pressure applied to an enclosed incompressible fluid is transmitted undiminished to every portion of the fluid and to the walls of its container

Question5: Solve all problems:..... 5/5

1- One gram of water occupies a volume of $1cm^3$ at atmospheric pressure. When this amount of water is boiled, it becomes $1671cm^3$ of steam. Calculate the change in internal energy for this process. Where the latent energy of water is (2.26×10^6 J/kg). 2/2

m = 1g $V_1 = 1cm^3$ V_2

$P_a = 1.01 \times 10^5 Pa$

$Q = mL = 1 \times 2.26 \times 10^6 \times 10^{-6} = 2.26 J$

$W = P(V_f - V_i) = 1.01 \times 10^5 (1671 - 1) = 168.6 J$

$\Delta E = Q - W = 2.26 - 1.686 = -168.374 J$

Q.2 Choose the correct answer: **(2 marks)**

1- Mercury barometers is a device used to measure .....

a) atmosphere pressure.

b) temperature

c) voltage

d) electric filed

2- Heat has the same units as:

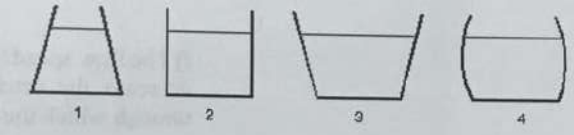
a) temperature

b) work

c) power

d) heat capacity

3- The vessels shown below all contain water to the same height. Which of them has the greatest pressure exerted by the water on the vessel bottoms?



a) 1

b) 2

c) 3

d) 4

e) All pressures are the same

4-What does the zeroth law of thermodynamics concern?

a) if bodies A and B are in thermal equilibrium with a third body T then A and B are in thermal equilibrium with each other.

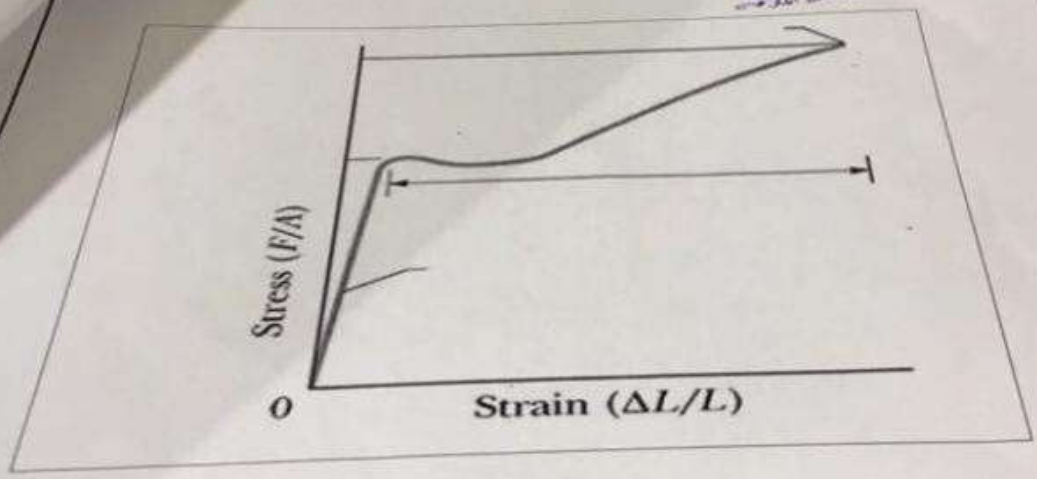
b) the rate of energy flow from one system to another.

c) the definition of the Kelvin temperature scale

d) the amount of work done on or by a system.

Q/: Put the suitable definition at the following figure which shows the relation between Stress and Strain in case of Tensile Stress.

Yield Strength- Ultimate Strength- Rapture- Range of Permanent Deformation



Solve the following Problems from the book:

A) Poblem (20) page 25

اخر مثال بالمحاضره

$$E = \frac{\text{stress}}{\text{strain}}$$

$$E = \frac{400 \times 16^6}{0,004} = 1 \times 10^{11}\ N/m^2$$

$= 1800 \times 9.8 \times 2.0$

$= 35.28 \times 10^3$ Pa

2- The U-tube in Figure contains two liquids in static equilibrium: Water of density ($\rho w = 998$ kg/m^3) is in the right arm and oil of unknown density ρx is in the left. Measurement gives $l = 135$ mm and $d = 12.3$ mm. What is the density of the oil?

$P = P_o + \rho_x g h_x$

$P = P_o + \rho_w g h_w$

$P_o + \rho_w g h_w = P_o + \rho_x g h_x$

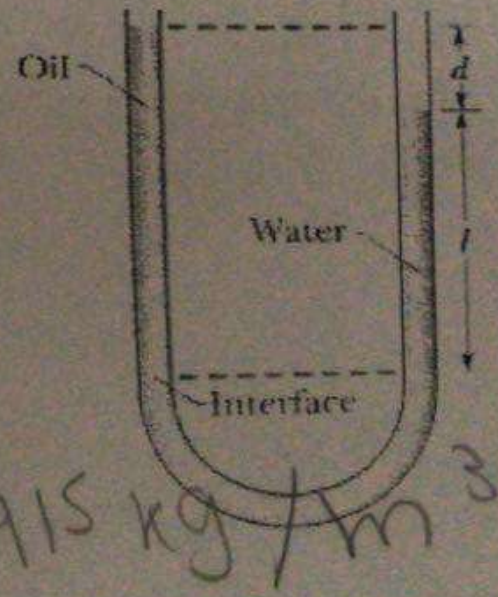
$\rho_w h_w = \rho_x h_x$

$\rho_w (l) = \rho_x (L \times d)$

$\rho_x = \dfrac{\rho_w L}{(L \times d)}$

$\dfrac{998 \times 135}{135 \times 12.3}$

$= 915$ kg/m^3



b) One gram of water occupies a volume of $1cm^3$ at atmospheric pressure($1.013x10^5$ p). When this amount of water is boiled, it becomes $1671cm^3$ of steam. Calculate the change in internal energy for this process.
Where the latent energy of water is (2.26x106J/kg)

.....

.....

.....

.....(1 marks)

c) What gauge pressure must a machine produce in order to suck mud of density 1800 kg/m3 up a tube by a height of 2.0 m?

P=PxhxG

.....

= 1800 Kg/m³ X 2,0 X 9,8

= 35 280 N/m²

(1 marks)

d) A living room has floor dimensions of 3.5 m and 4.2 m and a height of 2.4 m. Where $\rho air = 1.21\ kg/m^3$, $P = 1.01 \times 10^5\ N/m^2$

1-What does the air in the room weigh when the air pressure is 1.0 atm?

2-What is the magnitude of the atmosphere's force on the floor of the room?

P = ρ m A = ...

P = h ρ g = 1,21 X (3,5 X 4,2 X 2,4) 9,8

.....(1 marks)

= 418,85 N

35,28

(2)

F = Pw 1,01 X 10^5 (3,5 + 4,2)

= 777700 N

Q3: A steel rod has a length of 15 m at temperature 10 °C, what is the length of the rod at temperature of 90 °C, knowing that α steel = 11×10^{-6} °C^{-1}

$L_1 = 15$
$T_1 = 10$
$T_2 = 90$
$L_2 = ?$ $\alpha = 11 \times 10^{-6}$

$\Delta T = T_2 - T_1 = 90 - 10 = 80\,C^\circ$
$\Delta L = \alpha . L . \Delta T$
$\Delta L = (11 \times 10^{-6})(15)(80)$
$\Delta L = 0.0132\,m$

$L_2 = L_1 + \Delta L$
$L_2 = 15 + 0.0132$
$L_2 = 15.0132\,m$

Q4: The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorbed? c for water = 4.18 J/g°C

$\Delta t = T_2 - T_1$
$\Delta t = 26.4 - 24.5$
$\Delta t = 1.9\,C^\circ$

$Q = m . c . \Delta T$
$Q = (335)(4.18)(1.9)$
$Q = 2660.57\,J$

Q5: What is the specific heat of lead if it takes 96J to raise the temperature of a 75g block by 10°C?

$Q = m . c . \Delta T$
$c = \frac{Q}{m . \Delta t} = \frac{96}{75(10)} = 0.128\,J/g\,C^\circ$

Solve from the textbook: 33 and 59 (Volume expansion), 52 (linear expansion), 58 (latent heat), 2.a (heat capacity)

(52)
$L = 50m$
$\Delta T = 15$
$\Delta L = ?$
$\Delta L = L . \alpha . \Delta T$
$\Delta L = 50 \times 23 \times 15$
$\Delta L = 0.0345\,m$

(58) a) $Q = 50.2\,kJ = 50.2 \times 10^3\,J$
$m = 240\,g$
$Q = m . L_f$
$L = \frac{Q}{m}$
$L = \frac{50.2 \times 10^3}{240}$
$L = 209.16\,J/g$

(59)
$\Delta t = 60 - 20$
$\Delta T = 40$
$\alpha = 29$
$\beta = 29 \times 3$
$\Delta V = V_0 . \beta . \Delta T$
$\Delta V = V_0 . 3480$
$V = V_0 + \Delta V$
$33.58 = V_0 + V_0 . 3480$
$33.58 = 3481 V_0$
$V_0 = \frac{33.58}{3481} = 9.6 \times 10^{-3}\,m^3$

Question 1: Choose the correct answer:..... 2.5/3

1- The term fluid refers to :

a- gases b- gases and liquids c- liquids d- none of them

2- SI Unit of the density is:

a- g/m^3 b- kg/m^2 c- kg/m^3 d- kg/m

3- Mercury barometers Use to measure:

a- absolute pressure b- Atmosphere pressure

c- Gauge pressure d- Hydrostatic pressure

4- The absolute pressure is:

a- $P=P_s$ b- $P=\rho gh$ c- $P=P_s+\rho gh$ d- $P= F/A$

5- 1Pa is:

a- $1N/m^2$ b- 1kg/m.s c- 1N/m d- $1kg.m/s^2$

6-The Bernoulli's Equation is:

a- $p+\frac{1}{2}\rho v^2+\rho gy = a\ cstant$ b- $p-\frac{1}{2}\rho v^2-\rho gy = a\ constant$

c- $p^2+\frac{1}{2}\rho v+\rho gy^2 = p^2$ d- $p+\frac{1}{2}\rho v^2+\rho gy = y^2$

6. special *name of the SI unit for* power is.....

a) joule

b) watt

c) coulomb

d)volt

(b) proof that **(2marks)**

"**The** net WORK done on an object is equal to the change in kinetic energy of the object."

W=ΔK

① $w = F \times$, $F = ma$

② $w = ma x$

③ $V^2 = V_0^2 + 2a(x - x_0) \rightarrow \frac{V^2 - V_0^2}{2}$

③ $w = m\left(\frac{V^2 - V_0^2}{2}\right) \rightarrow \frac{1}{2} m V^2 - \frac{1}{2} m V_0^2$

$w = E_k - E_k \rightarrow w = \Delta k$

Second question

$\frac{4\frac{1}{2}}{6}$

a) Explain The law of conservation of mechanical energy through each case of pendulum. **(2 marks)**

it has only Potantal energy

it has Both Potantal Enagy and kinetic energy

it has only kinetic energy

it has only Potantal energy

First question

5

a) **Choose the correct answer:** (3 marks)

1. The work will be zero when the force is ....
   a) in opposite direction with displacement
   b) in the same direction with displacement
   c) perpendicular to the displacement
   d) both choices a) and c)

2. Which one of the following equations is associated with Newton's second law?
   a) $F = m\,a$
   b) $\vec{F}_1 = -\vec{F}_2$
   c) $p = m\,v$
   d) $a = \frac{k}{m} x^2$

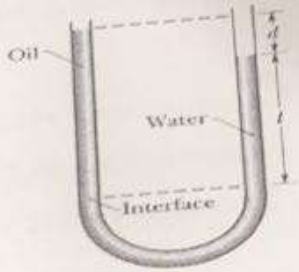
3. When the elevator moves to the top the acceleration will be.....
   a) positive.
   b) negative
   c) zero
   d) Gravitational acceleration

4. $(P + \frac{1}{2}\rho v^2 + \rho g y = \text{constant})$ is..... Equation.
   a) Archimedes
   b) Continuity
   c) Bernoulli
   d) Other answer

5. the work done by a 45N force in pulling the luggage carrier at an angle 50° for a distance d = 75m is equal.....
   a) 2169J
   b)3245J
   c)5500J
   d) 6756J

2

2- The U-tube in Figure contains two liquids in static equilibrium: Water of density ($\rho_w = 998$ kg/m^3) is in the right arm and oil of unknown density ρ_x is in the left. Measurement gives l = 135 mm and d = 12.3 mm.



What is the density of the oil?

$\rho_x = \rho_w \frac{l}{l+d} = 998 \frac{135}{135+12.3}$

$= 914.7$ kg/m^3

1

3- It takes 487.5 J to heat 25 grams of copper from 25 °C to 75 °C. What is the specific heat in Joules/g·°C?

$Q = m c \Delta t$

$c = \frac{Q}{m \Delta t} = \frac{487}{25(75-25)} = 0.389$ J/g·°C

The End

All the best for your Exams

Question4: Complete the sentences from the box..... 1.5/2

Archimedes' Principle – Pascal's Principle - ~~The heat capacity~~ - ~~The First Law of Thermodynamics~~ - ~~The zeroth Law of Thermodynamics~~

1-. The...heat...capacity is defined as the amount of heat energy needed to raise the temperature of a sample by 1 degree Celsius. J/°C

2-. The...First...Law...of... Thermodynamics change in the internal energy of a closed system is equal to the amount of heat supplied to the system, minus the amount of work performed by the system on its surroundings.

3-. The...Zeroth...Law...of... Thermodynamics When a body is fully or partially submerged in a fluid, a buoyant force F_b from the surrounding fluid acts on the body. The force is directed upward and has magnitude equal to the weight $m_f g$ of the fluid that has been displaced by the body.

4-. Pascal's...Principle A Change in the pressure applied to an enclosed incompressible fluid is transmitted undiminished to every portion of the fluid and to the walls of its container

Question5: Solve all problems:..... $P_o = 1.01 \times 10^5$ 3/5

1- One gram of water occupies a volume of $1cm^3$ at atmospheric pressure. When this amount of water is boiled, it becomes $1671cm^3$ of steam. Calculate the change in internal energy for this process. Where the latent energy of water is ($2.26 \times 10^6 J/kg$). 0/2

$1.01 \times 1 \times 10^5 \times 2.26 \times 10^6 \times 1 \times 1671$

$= 3.81 \times 10^{14} N/m^2$

6. special *name of the SI unit for* power is.....

a) joule

b) watt

c) coulomb

d)volt

(b) proof that **(2marks)**

"**The** net WORK done on an object is equal to the change in kinetic energy of the object."

$W=\Delta K$

Second question

6

a) Explain The law of conservation of mechanical energy through each case of pendulum. **(2 marks)**

$= 2660.57\ J$

Q5: What is the specific heat of lead if it takes 96J to raise the temperature of a 75g block by 10°C?

$$Q = C \cdot m \cdot \Delta T$$

$$C = \frac{Q}{m \cdot \Delta T}$$

$$C = \frac{96}{75 \cdot 10} = \quad J/g \cdot C$$

Solve from the textbook: 33 and 59 (Volume expansion), 52 (linear expansion), 58 (latent heat), 2.a (heat capacity)

$Q = 32$

$m = 30\ g$

$\Delta T = 45 - 25 = 20$

$$Q = m \cdot C \cdot \Delta T$$

$$C = \frac{Q}{m \Delta T}$$

$$= \frac{325}{30 \times 20} = \quad J/g \cdot C$$

$r = 20\ cm$

$\Delta V = 347$

$\Delta T = ?$

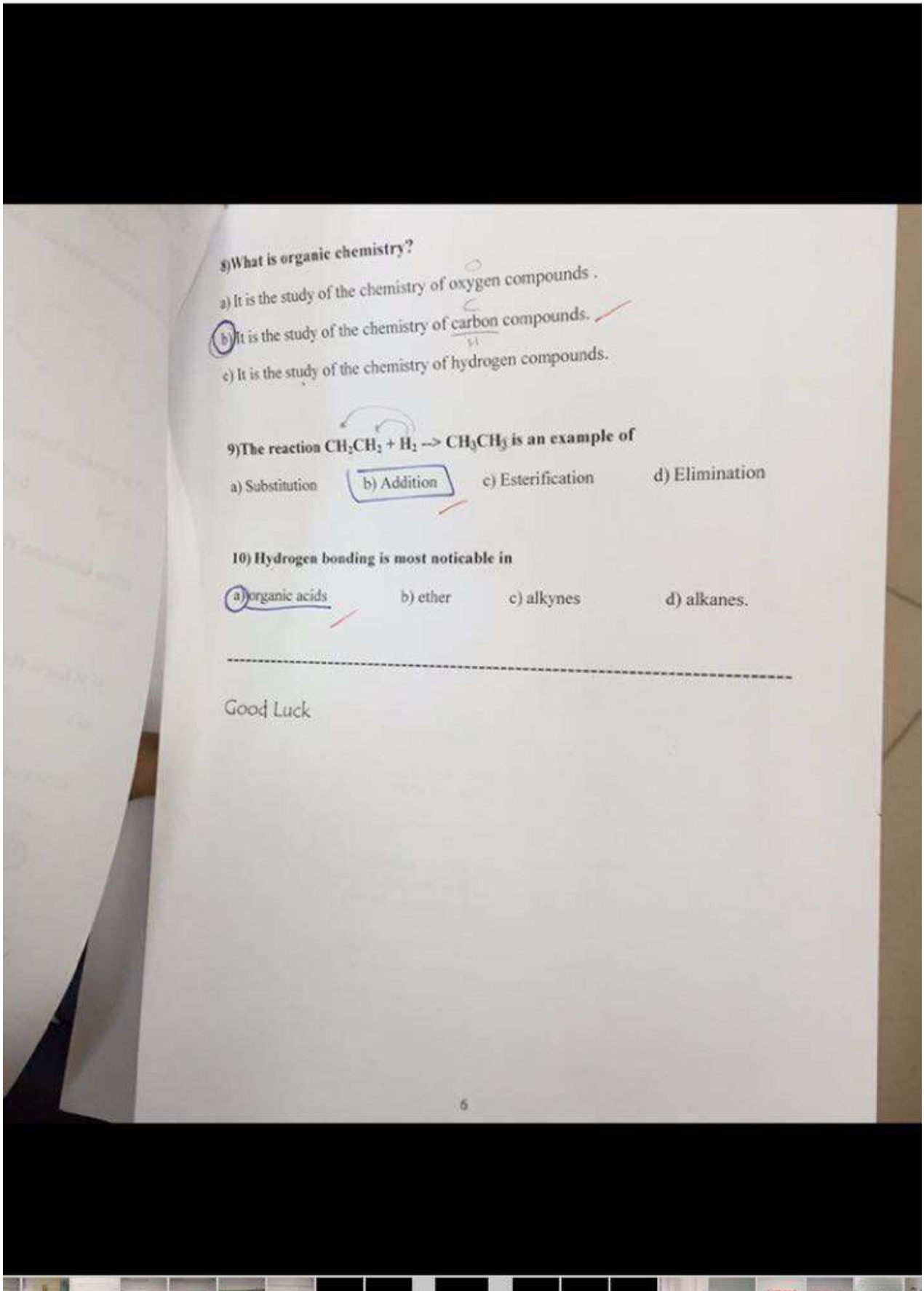
$$\Delta V = V_0 \beta \Delta T$$

$$\Delta T = \frac{\Delta V}{V_0 \beta} \Longrightarrow \Delta T = \frac{347}{33493.3 \times 23 \times 3}$$

$$V_0 = \frac{4}{3} \pi r^3$$

$$\Delta T = 1.5 \times 10^{-4}\ C^\circ$$

$$= \frac{4}{3} \pi\ 20^3 = 33493.3$$



8)What is organic chemistry?

a) It is the study of the chemistry of oxygen compounds .

b) It is the study of the chemistry of carbon compounds.

c) It is the study of the chemistry of hydrogen compounds.

9)The reaction $CH_2CH_2 + H_2 \rightarrow CH_3CH_3$ is an example of

a) Substitution b) Addition c) Esterification d) Elimination

10) Hydrogen bonding is most noticable in

a) organic acids b) ether c) alkynes d) alkanes.

Good Luck

6

4) Two vectors are given by

$\vec{a} = 2\vec{i} + 3\vec{j} - 1$, $\vec{b} = 4\vec{i} - 6\vec{j} - 5$

Calculate

1) $\vec{a} + \vec{b}$ $a = 2i + 3j$ $b = 4i - 6j$ $a + b = 6i - 3j$

2) $\vec{a} - \vec{b}$ $-2i + 9j$

3) $|\vec{a}|$, magnitude of $\vec{a}$ $\sqrt{(2)^2 + (3)^2} = \sqrt{4+9}$

4) $|a^- + b^-|$ $\sqrt{(6)^2 + (-3)^2} = \sqrt{36+9} = \sqrt{}$

5) $|\vec{a} - b^-|$ $= \sqrt{(-2)^2 + (9)^2} = \sqrt{4+18}$

6) $\vec{a}.\vec{b}$ $8 \times -18 = -10$

7) Direction of $\vec{a}$ $\tan\theta = \frac{y}{x}$

8) Direction of $a^- + b^-$ and $\vec{a} - b^-$ $\theta a = \tan^{-1}\frac{y}{x}$

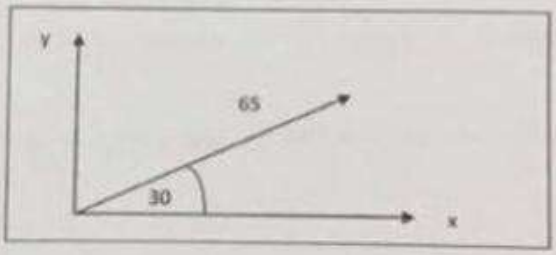
9) The angle between $\vec{a}$ and $\vec{b}$ $\tan^{-1}\frac{3}{2}$

$\cos\theta = \frac{a.b}{|A||B|} = \frac{10}{\sqrt{13}\sqrt{5}2}$

5) Express the vectors coordinates below as ordered pairs in simplest radical form :

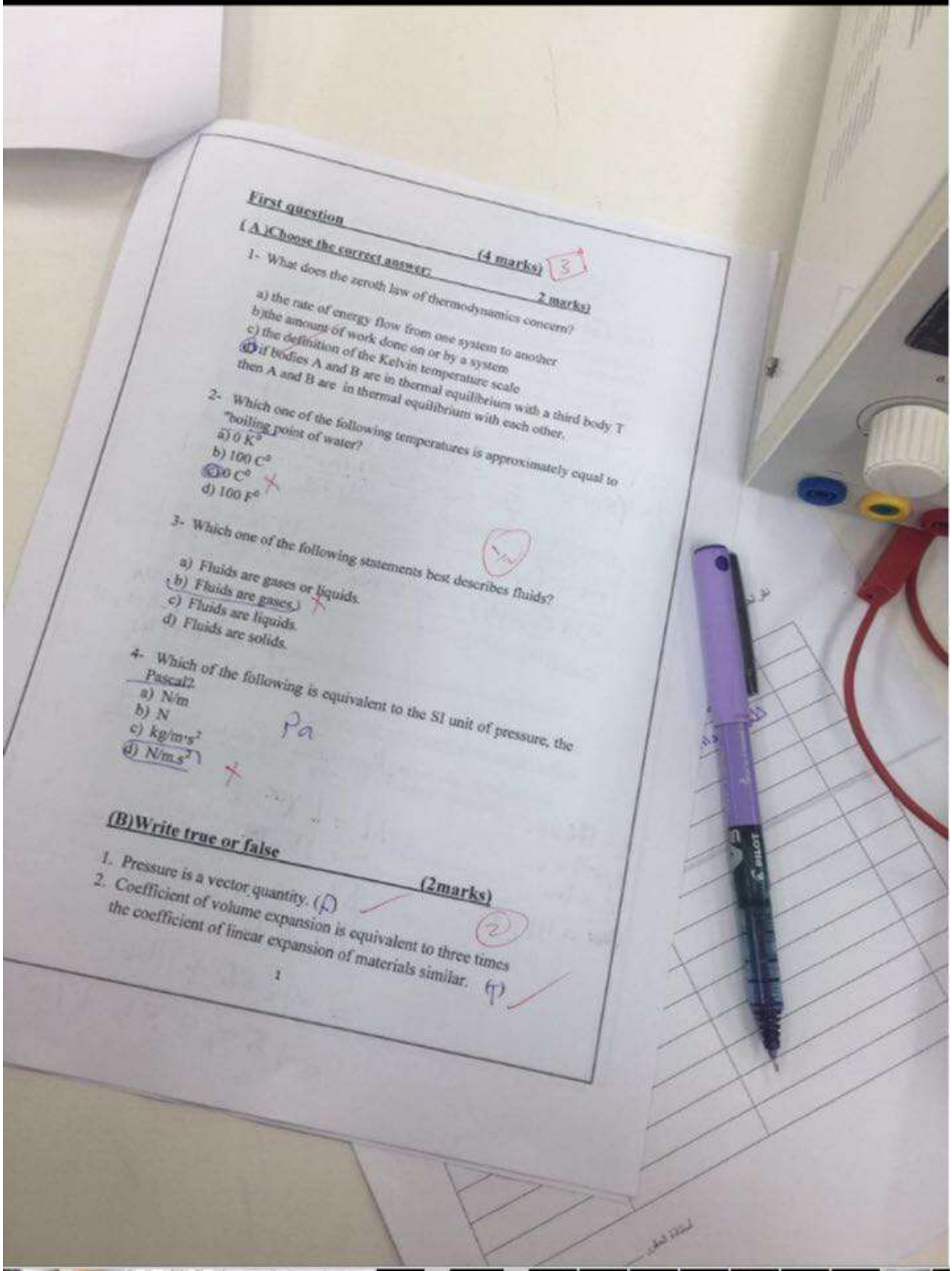
$x = r\cos\theta$

$y = r\sin\theta$



Good luck,

L: Manar Abu Zayed



First question

(A)Choose the correct answer: (4 marks) 3

1- What does the zeroth law of thermodynamics concern? 2 marks)

a) the rate of energy flow from one system to another
b)the amount of work done on or by a system
c) the definition of the Kelvin temperature scale
d) if bodies A and B are in thermal equilibrium with a third body T then A and B are in thermal equilibrium with each other.

2- Which one of the following temperatures is approximately equal to "boiling point of water?

a) 0 K^o
b) 100 C^o
c) 0 C^o X
d) 100 F^o

3- Which one of the following statements best describes fluids?

a) Fluids are gases or liquids.
b) Fluids are gases. X
c) Fluids are liquids.
d) Fluids are solids.

4- Which of the following is equivalent to the SI unit of pressure, the Pascal?

a) N/m
b) N Pa
c) $kg/m \cdot s^2$
d) $N/m.s^2$ X

(B)Write true or false (2marks) 2

1. Pressure is a vector quantity. (F)
2. Coefficient of volume expansion is equivalent to three times the coefficient of linear expansion of materials similar. (T)

1

Question 4: Solve all problems.....

1- Consider two vectors:

$\vec{a} = 5\vec{i} - 4\vec{j} + 2\vec{k}$ *and* $\vec{b} = -2\vec{i} + 2\vec{j} + 5\vec{k}$

Find:

i/ $\vec{a} + \vec{b}$ **0.5marks**

ii/ $|\vec{a}|$ *and* $|\vec{b}|$. **0.5marks**

iii/ $\vec{a}.\vec{b}$. **0.5marks**

iv/ The angle between $\vec{a}$ *and* $\vec{b}$. **0.5marks**

2- Using the dimension analysis check the dimension of this equation:

$$a = V_0 t + 1/2\ V^2$$

a/ Write the dimension of all quantities : **1mark**

[a]=...., [V_0]=...., [t] =....,

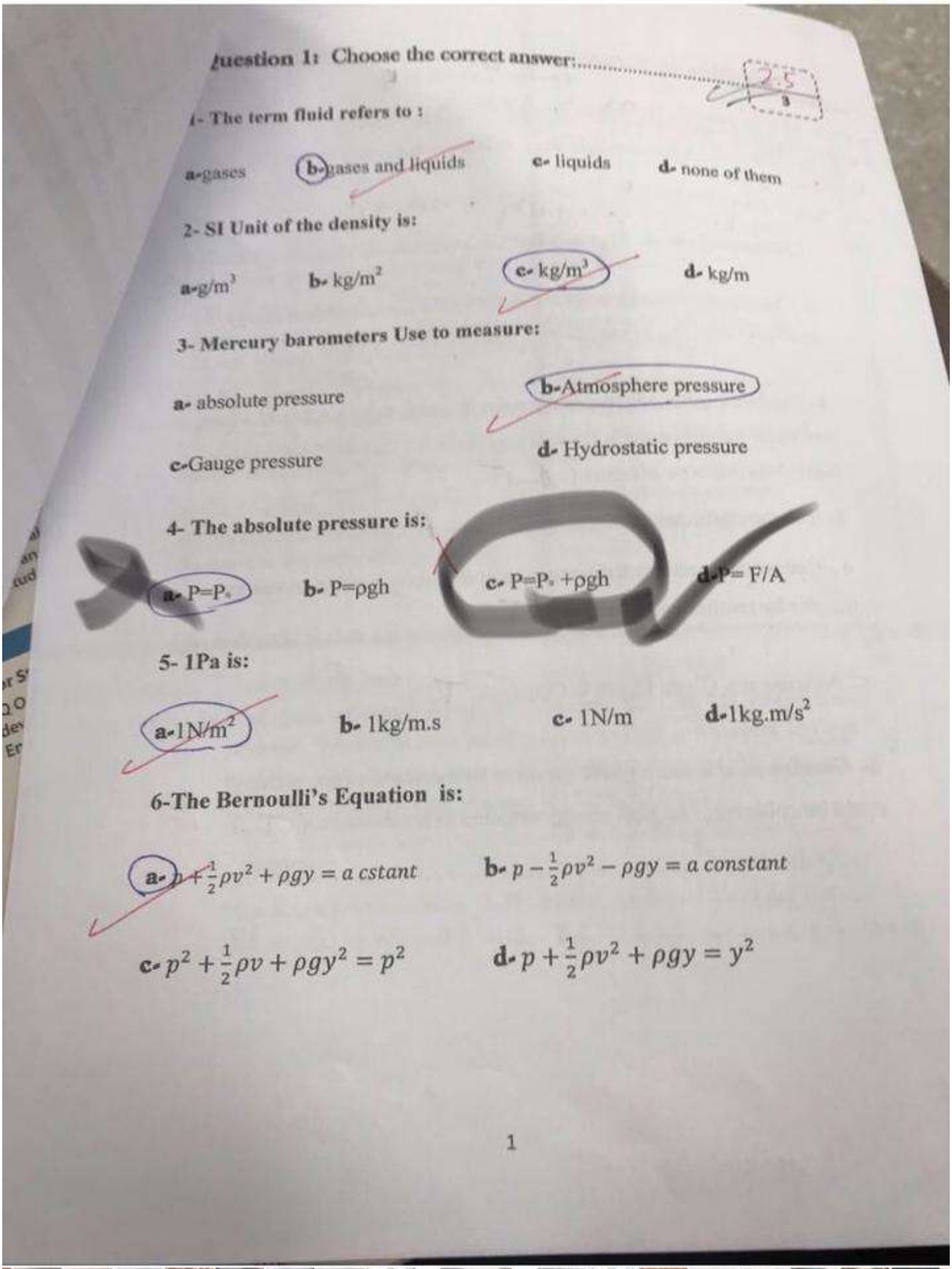
[V]=...., [1/2]=....

Question 3: Match the correct answers :.....

4 / 4

1-Strain	**a/** are physical quantities derived from combination of base quantities through multiplication or division or both.
2- Derived quantities	**b/** is the amount of matter per unit volume
3-Hook's law	**c/** When a spring is stretched, there is a restoring force that is proportional to the displacement
4-Scalar	**d/** is a measure of the degree of deformation.
	e/ quantity that have magnitude only.

1/ d	2/ a	3/ c	4/ e



Question 1: Choose the correct answer: 2.5

1- The term fluid refers to :

a- gases b- gases and liquids c- liquids d- none of them

2- SI Unit of the density is:

a- g/m^3 b- kg/m^2 c- kg/m^3 d- kg/m

3- Mercury barometers Use to measure:

a- absolute pressure b- Atmosphere pressure

c- Gauge pressure d- Hydrostatic pressure

4- The absolute pressure is:

a- $P=P_0$ b- $P=\rho gh$ c- $P=P_0+\rho gh$ d- $P=F/A$

5- 1Pa is:

a- $1N/m^2$ b- 1kg/m.s c- 1N/m d- $1kg.m/s^2$

6-The Bernoulli's Equation is:

a- $p+\frac{1}{2}\rho v^2+\rho gy = a\ cstant$ b- $p-\frac{1}{2}\rho v^2-\rho gy = a\ constant$

c- $p^2+\frac{1}{2}\rho v+\rho gy^2 = p^2$ d- $p+\frac{1}{2}\rho v^2+\rho gy = y^2$

1

Question 3: Match the correct answers :.....

1-Strain	**a/** are physical quantities derived from combination of base quantities through multiplication or division or both.
2- Derived quantities	**b/** is the amount of matter per unit volume
3-Hook's law	**c/** When a spring is stretched, there is a restoring force that is proportional to the displacement
4-Scalar	**d/** is a measure of the degree of deformation.
	e/ quantity that have magnitude only.

1/ d	2/ a	3/ c	4/ e

Question 4: Solve all problems..... 6 / 6

1- Consider two vectors: 2 / 2

$$\vec{a} = 5\vec{i} - 4\vec{j} + 2\vec{k} \text{ and } \vec{b} = -2\vec{i} + 2\vec{j} + 5\vec{k}$$

Find:

i/ $\vec{a} + \vec{b}$ **0.5marks**

$= (5i - 4j + 2k) + (-2i + 2j + 5k)$

$= 3i - 2j + 7k$

ii/ $|\vec{a}|$ and $|\vec{b}|$. **0.5marks**

$|a| = \sqrt{5^2 + (-4)^2 + 2^2} = \sqrt{25 + 16 + 4} = \sqrt{45} = 6.70$

$|b| = \sqrt{(-2)^2 + 2^2 + 5^2} = \sqrt{4 + 4 + 25} = \sqrt{33} = 5.74$

iii/ $\vec{a}.\vec{b}$. **0.5marks**

$(5 - 4 + 2).(-2 + 2 + 5) = -10 - 8 + 10 = -8$

iv/ The angle between $\vec{a}$ and $\vec{b}$. **0.5marks**

$\theta = \cos^{-1} \frac{a\,b}{|a||b|} = \frac{-8}{6.45 \cdot 5.33} = 101.78°$

2- Using the dimension analysis check the dimension of this equation: 1.5 / 1.5

$$a = V_0 t + 1/2\ V^2$$

a/ Write the dimension of all quantities : **1mark**

$[a] = \frac{L}{T^2}$, $[V_0] = \frac{L}{T}$, $[t] = T$,

$[V] = \frac{L}{T}$, $[1/2] =$ less

$V^2 = \frac{L^2}{T^2}$

Q3: A steel rod has a length of 15 m at temperature 10 °C, what is the length of the rod at temperature of 90 °C, knowing that α steel = $11 \times 10^{-6}\ C^{-1}$.

$\Delta L = L \alpha \Delta T$

$= 15 \times 11 \times 10^{-6} \times (90 - 10) = 0.0132$

$* L = 15 + 0.0132 = 15.0132 m$

Q4: The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorbed? c for water = 4.18 J/g°C

$Q = mc\Delta T$

$= 335 \times 4.18 \times (26.4 - 24.5)$

$= 1402.2\ J$ #

Q5: What is the specific heat of lead if it takes 96J to raise the temperature of a 75g block by 10°C?

$Q = mc\Delta T$

$\frac{96}{75 \times 10} = \frac{75 \times c \times 10}{75 \times 10}$

Solve from the textbook: 33 and 59 (Volume expansion), 52 (linear expansion), 58 (latent heat), 2.a (heat capacity)

5- A spring has a spring constant that is equal to 3.5 N/m. The force that will make it stretch 4 cm is

a/ 1.4 N b/ 1.4m c/ 0. 14N d/ 0. 14 m

6- Work in SI Unit system has a unit equal to :

a/ $kg.m^2.s^2$ b/ $kg.m^2.s^{-2}$ c/ $kg.m.s^{-2}$ d/ $kg.m.s^{-1}$

Question 2: Write True or false:..... 2/2

1- Two vectors A and B are equal if they have the same magnitude. (..F...)

2- An elastic material is one that returns to its original shape after a deformation. (..T..)

3- Stress is deforming force per unit area. (..T...)

4- The prefix of 10^{-9} is micro. (..F..)

First question

4
5

a) **Choose the correct answer:** **(3 marks)**

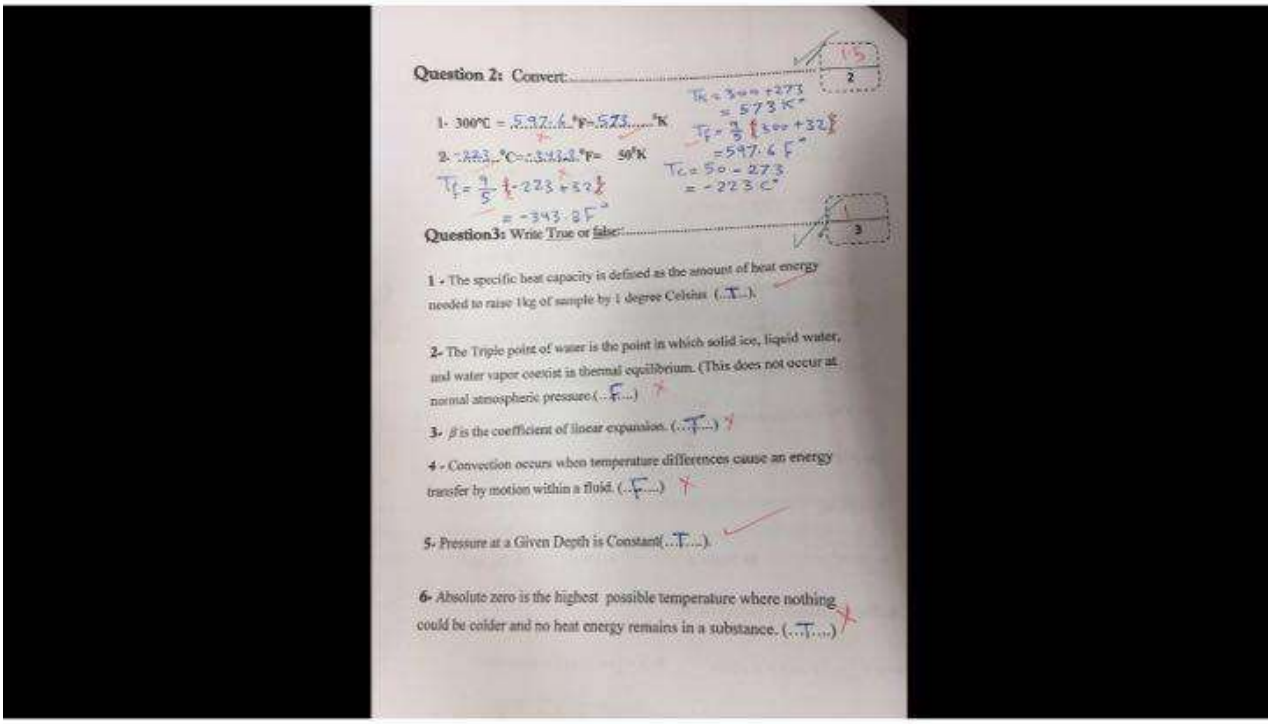
1. The work will be zero when the force is ....
   a) in opposite direction with displacement
   b) in the same direction with displacement
   c) perpendicular to the displacement
   d) both choices a) and c)

2. Which one of the following equations is associated with Newton's second law?
   a) $F = m\,a$
   b) $\vec{F}_1 = -\vec{F}_2$
   c) $p = m\,v$
   d) $a = \frac{k}{m} x^2$

3. When the elevator moves to the top the acceleration will be.....
   a) positive.
   b) negative
   c) zero
   d) Gravitational acceleration

4. $(P + \frac{1}{2}\rho v^2 + \rho g y = \text{constant})$ is..... Equation.
   a) Archimedes
   b) Continuity
   c) Bernoulli
   d) Other answer

5. the work done by a 45N force in pulling the luggage carrier at an angle 50° for a distance d = 75m is equal.....
   a) 2169J
   b) 3245J
   c) 5500J
   d) 6756J



Question 2: Convert:

1- 300°C = 572.6 °F = 573 °K

2- -223 °C = -349.8 °F = 50 °K

$T_K = 300 + 273 = 573K$

$T_F = \frac{9}{5}(300 + 32) = 597.6F$

$T_C = 50 - 273 = -223C$

$T_F = \frac{9}{5}(-223 + 32) = -349.8F$

Question3: Write True or false:

1 - The specific heat capacity is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius (..T..).

2- The Triple point of water is the point in which solid ice, liquid water, and water vapor coexist in thermal equilibrium. (This does not occur at normal atmospheric pressure (..F..)

3- β is the coefficient of linear expansion. (..T..)

4 - Convection occurs when temperature differences cause an energy transfer by motion within a fluid. (..T..)

5- Pressure at a Given Depth is Constant(..T..).

6- Absolute zero is the highest possible temperature where nothing could be colder and no heat energy remains in a substance. (..T..)

Question One

Write down True or False :

1. **Statistics** is a field of study concerned with Collection, Organization, Summarization and analysis of data (T)
2. The **Sample** is a largest collection of entities (F)
3. The **raw** material of Statistics is data (T)
4. **Mean** is the value with highest frequency (F)
5. The data analyzed from the biological science is called **biostatistics** (T)

Question two :

Choose the correct answer (a,b,c,or d):

1. Such data are available from one or more of the following **sources:**

a. Routinely kept records b. Experiments

c. Surveys (d.) All of them

2. The **Relative Frequency =**

(a.) $\frac{f}{n}$ b. $\frac{n}{f}$ c. $\frac{x}{f}$ d. None of them

3. To graph **frequency polygon** we use ..... with frequency:

(a.) Mid point b. True class intervals

c. Class intervals d. None of them

4. The **Sample** Mean is:

a. n (b.) $\bar{x}$ c. μ d. F

5. The **Largest collection** of people or things is:

(a.) population b. Sample c. variable d. None of them

3-A block of density $\rho = 800\ kg/m^3$ floats face down in a fluid of density $\rho_f = 1200\ kg/m^3$. The block has height H=6.0 cm what depth h is the block submerged?

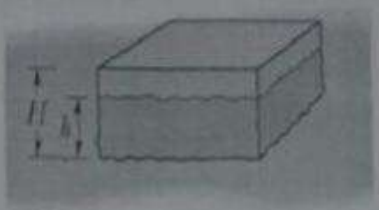
$F_b = F_g$

$\rho_f L W h g = \rho L W H g$

$\rho_f h = \rho H$

$h = \frac{\rho H}{\rho_f}$

$h = \frac{(800)(6)}{1200} = 4\ cm$

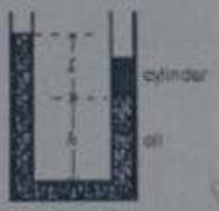


Q2 choose the correct answer:

1- Several cans of different sizes and shapes are all filled with the same liquid to the same depth. Then:

a) the weight of the liquid is the same for all cans
b) the force of the liquid on the bottom of each can is the same
c) the least pressure is at the bottom of the can with the largest bottom area
d) the greatest pressure is at the bottom of the can with the largest bottom area
e) the pressure on the bottom of each can is the same.

2-The diagram shows a U-tube having cross-sectional area A and partially filled with oil of density ρ. A solid cylinder, which fits the tube tightly but can slide without friction, is placed in the right arm. The system reaches equilibrium. The weight of the cylinder is:



a) ρAL
b) $L^2 \rho g$
c) $A\rho L + hg$
d) $A\rho L - hg$
e) none of these

3- The density of water is 1.0 g/cm3. If h = 20 cm, the density of the oil in the left column of the U-tube shown below is:

a) 0.20 g/cm^3
b) 0.90 g/cm^3
c) 1.0 g/cm^3
d) 1.3 g/cm^3

Exercises of chapter (4)

Q1-(a) Write true or false in front of the following sentence:

1-Pressure at a Given Depth is not Constant.(F)
2-Open-tube Manometer use to measure gauge pressure.(T)

(b) Write the appropriate concept to complete the sentence below:

1. Archimedes' law the upward buoyant force on object is equal to the weight of the displaced fluid.
2. Fluids .....is a substance that can flow , like water or air, and conform to a container.
3. Gauge Pressure .....is The difference between absolute pressure and atmospheric pressure.

(c) Solve the following:

1- What gauge pressure must a machine produce in order to suck mud of density 1800 kg/m^3 up a tube by a height of 2.0 m?

$\rho = 1800\ kg/m^3$, $h = 2\ m$

$P = \rho g h$

$P = 1800 \times 9.8 \times 2$

$P = 35.28 \times 10^3\ N/m^2$

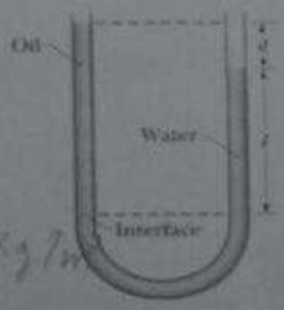
2- The U-tube in Figure contains two liquids in static equilibrium: Water of density (ρ_w = 998 kg/m^3) is in the right arm and oil of unknown density ρ_x is in the left. Measurement gives l = 135 mm and d = 12.3 mm. What is the density of the oil?

(water - right arm) $P_{int} = P_0 + \rho_w g h$

(oil - left arm) $P_{int} = P_0 + \rho_x g (l + d)$

$P = P_0 + \frac{l}{(+d)}$

$\rho_x = 998 \frac{135}{135 + 12.3} = 915\ kg/m^3$



Second Question

a)Choose the correct answer: (3 marks)

1- work done equal to zero (W=0) if the angle between force and displacement (θ) equal.....

a) 180° b) 360^-2 c) 90° d)0°

2- the work done by a 45N force in pulling the luggage carrier at an angle 50° for a distance $d = 75$m is equal =.....

a) 2169J b)3245J c)5500J d) 6756J

3- special *name of the SI unit for* power is.....

a)joule b)watt c)coulomb d)volt

4- At what temperature will 0.654 moles of neon gas occupy 12.30 liters at 1.95 atmospheres (R= 0.08206 L atm $mol^{-1} K^{-1}$) .....

a) 447K b)240K c)447C d)141K

5- In the case of water the density increases with temperature when temperature is at .....

a) *under 5C°* b) *up to 4C°* c) 0C° to 4C° d) at 0C°

6 -How much heat energy is needed to change 0.50 kg of water at 100°C to steam at 100°C?where $\ell v = 2.3X10^6$ j/kg

a) $1.15x10^{-6}$ j b) $2.2x10^3$ j c) $1.15x10^6$ j d) $217x10^6$ j

Q 8- A system receives 575 J of heat from and delivers 325 J of work to its surroundings. What is the change in internal energy of the system?

A. +900 J

B. +250 J

C. -250 J

D. -900 J

Q 9 – True or false

1- for an isolated system (the universe), U is constant. (T)

2- Higher change in temperature higher the expansion. (T)

3- A thermometer is a device that measures the pressure of things. (F)

4- heat capacity is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius. (F)

9- A hydraulic press has one piston of diameter 2.0 cm and the other piston of diameter 8.0 cm. What force must be applied to the smaller piston to obtain a force of 1600 N at the larger piston:

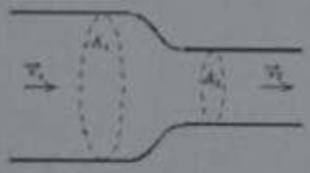
a) 100 N
b) 400 N
c) 1600 N
d) 6400 N
e) 26000 N

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$\frac{1600}{\pi r^2} = \frac{F_2}{\pi r^2} \quad \frac{1600}{(4)^2} = \frac{F_2}{(1)^2}$$

$$F_2 = \frac{1600}{16} = 100\,N$$

10-An incompressible liquid flows along the pipe as shown. The ratio of the speeds v_2/v_1 is:



a) A_1/A_2
b) A_2/A_1
c) $\sqrt{A_1/A_2}$
d) $\sqrt{A_2/A_1}$
e) v_1/v_2

Q.1 Match (3 marks)

2

1-spcific heat capacity

2-heat capacity

3-continunity equation

4- Pascal's principle

5- The Triple point

6- Fluids

a) the amount of heat energy needed to raise the temperature of a sample by 1 degree Celsius.

b) a change in the pressure applied to an enclosed incompressible fluid transmitted to every portion of the fluid and to the walls of its container.

c) the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius.

d) Occurs when temperature differences cause an energy transfer by motion within a fluid.

e) is a substance that can flow , like water or air, and conform to a container.

f) The flow speed (v) increases when we decrease the cross-sectional area (A) through which the fluid flows.

g) is the case in which solid ice, liquid water, and water vapor coexist in thermal equilibrium

1	2	3	4	5	6
..c..	..a	..b	.d.	.g..	.e.

b) **complete three only of the following** **(3marks)**

1- NEWTON FIRST LAW. "an object at rest tends to stay at rest and an object in motion tends to stay in motion unless acted upon by an unbalanced force.

2- NEWTON THIRD LAW "For every action there is an equal and opposite reaction".

3- WEIGHT "is the amount of mass of an object, it is dependent upon gravity."

4- PASCAL principle state that "a change in pressure applied to an enclosed incompressible fluid is transmitted undiminished to every portion of the fluid and to the walls of the container.

THE END

With best wishes

Q3- the length of a bar is 150 cm at 40C, what will be its length at 100 C°

If α=19 x 10-6 /K°

L_1 T_1 $L_2=?$ T_2

$\Delta T = 100 - 40 = 60C$

$L_2 = \Delta L + L$

$L_2 = 0.171 + 150$

$L_2 = 150.171 cm$

$\Delta L = L \alpha \Delta T = (150)(19 \times 10^{-6})(60) = 0.171$

Q4- It takes 487.5 J to heat 25 grams of copper from 25 °C to 75 °C.

What is the specific heat in Joules/g·°C?

$\Delta T = 75 - 25 = 50 C°$

$Q = mc\Delta T \quad c = \frac{Q}{m\Delta T} = \frac{487.5}{25 \times 50} = 0.39 J/g.C°$

Q5- Given that the specific heat capacity of water is 11 times that of copper, calculate the mass of copper at a temperature of 100 °C required to raise the temperature of 200 g of water from 20.0 °C to 24.0 °C, assuming no energy is lost to the surroundings.

$m_w c_w \Delta t = m c \Delta t$

$m_{Cu} c_{Cu} (100 - 24) = 200 \times 11 c / c_{Cu} (24 - 20) \quad \frac{m_{Cu} 76}{76} = \frac{2000 \times 1(4)}{76}$

$m_{Cu} = 115.78 g$

Q6- How much heat energy is needed to change 2.0 kg of ice at 0°C to water at 0°C?

Where the latent heat of water $L_f = 3.3 \times 10^5$ j/kg

$Q = m L_f = 2 \times (3.3 \times 10^5) = 6.6 \times 10^5 J$

Q7 convert

Example	Formula
21°C = 294 K	K = C + 273
313 K = 40 °C	C = K - 273
89 °F = 31.6 °C	C = (F - 32) x 5/9
50 °C = 122 °F	F = (C x 9/5) + 32

b/ check the dimension of this equation: 0.5mark

.....

.....

3- A displacement vector $\vec{r}$ in the xy plane is 12m long and directed at angle $\theta = 30°$. Determine:

1

a/ the x component of the vector 0.5mark

$x = r\cos\theta$ ..... $x = 12\cos 30 = 6\sqrt{3} = 10.39$ .....

0.5

b/ the y component of the vector 0.5mark

$y = r\sin\theta$ ..... $y = 12\sin 30 = 6$ .....

0.5

4- A vertical steel girder with a cross-sectional area of 0.15 m^2 has a 1550 kg sign hanging from its end.

1.5

1.5

a/ What is the stress within the girder? 0.5mark

1550 kg
0.15 m²
980

Stress: $\frac{F}{A} = \frac{mg}{A} = \frac{1550 \times 980}{0.15} = 10^7 \times 1.0266667$ .....

.....

0.5

b/ What is the strain on the girder if the Young's Modulus $E = 200 \times 10^9 N/m^2$ 0.5mark

Strain: $\frac{\Delta L}{L} = \frac{\text{stress}}{E} = \frac{10^7 \times 1.0266667}{200 \times 10^9} = 5.0263 \times 10^{-4}$ .....

.....

0.5

c/ If the girder is 9.50 m long, how much is it lengthened? 0.5mark

Stress: $\frac{\Delta L}{L} = 5.0263 \times 9.50 = 4.8.9985 \times 10^{-12} m$ ....

.....

0.5

BEST WISHES

Q4-find the direction of the following vector:

$\vec{c} = 2\vec{i} + 5\vec{j}$

Q5-Choose the correct answer:

1) Vector quantity is.....

a- Length

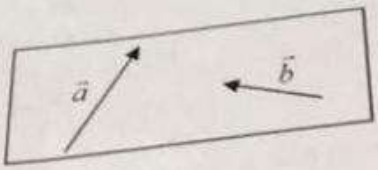
b- Temperature

c- Mass

d- Acceleration

2) Consider the two vectors represented in the drawing. Which of the following options is the correct way to add graphically vectors

$\vec{a}, \vec{b}$?



a)

b)

c)

d)

e)

Question 1: Choose the correct answer:

1- The scientific notation of 0.00000086 is :

a/ 86×10^{-8} b/ 86×10^{-6} c/ 8.6×10^{-9} d/ 8.6×10^{-7}

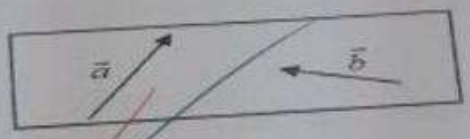
2- Which of the following is not a base quantity:

a/ length b/ time c/ mass d/ volume

3- The dimension of density is :

a/ $M.L^{-2}$ b/ M/L^{3} c/ Kg/m^{3} d/ Kg/m^{2}

4- Consider the two vectors represented in the drawing. Which of the following options is the correct way to add graphically vectors $\vec{a}$ and $\vec{b}$



a/ b/ c/ d/

Question 3: Match the correct answers :.....

4

4

1-Strain	**a/** are physical quantities derived from combination of base quantities through multiplication or division or both.
2- Derived quantities	**b/** is the amount of matter per unit volume
3-Hook's law	**c/** When a spring is stretched, there is a restoring force that is proportional to the displacement
4-Scalar	**d/** is a measure of the degree of deformation.
	e/ quantity that have magnitude only.

1/ d	2/ a	3/ c	4/ e

a) **Choose the correct answer:** **(3 marks)**

4-5
5

1. The work will be zero when the force is ....
   a) in opposite direction with displacement
   b) in the same direction with displacement
   c) perpendicular to the displacement
   d) both choices a) and c)

2. Which one of the following equations is associated with Newton's second law?
   a) $F = m\,a$
   b) $\vec{F}_1 = -\vec{F}_2$
   c) $p = m\,v$
   d) $a = \frac{k}{m} x^2$

2 1/2

3. When the elevator moves to the top the acceleration will be.....
   a) positive.
   b) negative
   c) zero
   d) Gravitational acceleration

4. $(P + \frac{1}{2}\rho v^2 + \rho g y = \text{constant})$ is..... Equation.
   a) Archimedes
   b) Continuity
   c) Bernoulli
   d) Other answer

5. the work done by a 45N force in pulling the luggage carrier at an angle 50° for a distance d = 75m is equal.....
   a) 2169J
   b) 3245J
   c) 5500J
   d) 6756J

Question3: Write True or false::

1 - The specific heat capacity is defined as the amount of heat energy needed to raise 1kg of sample by 1 degree Celsius (....T...).

2- The Triple point of water is the point in which solid ice, liquid water, and water vapor coexist in thermal equilibrium. (This does not occur at normal atmospheric pressure.(..F....)T

3- β is the coefficient of linear expansion. (..F.....)

4 - Convection occurs when temperature differences cause an energy transfer by motion within a fluid. (...T....)

5- Pressure at a Given Depth is Constant(...T....).

6- Absolute zero is the highest possible temperature where nothing could be colder and no heat energy remains in a substance. (...T...) X

6. special *name of the SI unit for* power is.....

a) joule

b) watt

c) coulomb

d)volt

(b) proof that **(2marks)**

"**The** net WORK done on an object is equal to the change in kinetic energy of the object."

W=ΔK

1) $w = F \times$, $F = ma$

2) $w = ma x$

3) $v^2 = v_0^2 + 2a(x - x_0) \rightarrow \frac{v^2 - v_0^2}{2}$

3) $w = m\left(\frac{v^2 - v_0^2}{2}\right) \rightarrow \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$

$w = E_k - E_k \rightarrow w = \Delta k$

Second question

$\frac{4\frac{1}{2}}{6}$

a) Explain The law of conservation of mechanical energy through each case of pendulum. **(2 marks)**

it has only Potantal energy

it has Both Potantal Enargy and kinetic energy

it has only kinetic energy

it has only Potantal energy

2

5- A spring has a spring constant that is equal to 3.5 N/m. The force that will make it stretch 4 cm is

a/ 1.4 N b/ 1.4m c/ 0. 14N d/ 0. 14 m

6- Work in SI Unit system has a unit equal to :

a/ $kg.m^2.s^2$ b/ $kg.m^2.s^{-2}$ c/ $kg.m.s^{-3}$ d/ $kg.m.s^{-1}$

Question 2: Write True or false:.....

1- Two vectors A and B are equal if they have the same magnitude. (False)

2- An elastic material is one that returns to its original shape after a deformation. (True)

3- Stress is deforming force per unit area. (True)

4- The prefix of 10^{-9} is micro. (True)

Quiz1

1/True or False

a- Pressure is vector quantity. (×)

b- Two vectors are equals if they have the same magnitude and same direction. (✓)

c- Force is base quantity. (×)

d- The dimension of density is M/L. (×)

2/Complete the sentences:

a- .....Physics.....is the study of matter and energy and the interaction between them.

b- .....Mass..... is the amount of matter in a body.

c- Vector quantity has both .....magnitude.....and .....direction.....

3/ write the following quantities in scientific notation and the prefix

8000000m = ...8×10^6.....=.....8 Gm.....

0.000000003=.....3×10^{-9}.....=.....3 Nano.....

4/Let U = ⟨3, 7⟩ and V = ⟨−2, −1⟩

Find the angle between two vectors U and V.

$\cos\theta = \frac{u \cdot v}{|u||v|} = \frac{((3\times-2)+(7\times-1))}{|u||v|} = \frac{-13}{\sqrt{58}\cdot\sqrt{5}}$

$|u| = \sqrt{3^2+7^2} = \sqrt{58}$

$|v| = \sqrt{-2^2+7^2} = \sqrt{5}$

$\theta = \cos^{-1}\left(\frac{-13}{\sqrt{58}\cdot\sqrt{5}}\right)$

5/ Check the dimension of this equation

$$a = \frac{v}{t^2} + x$$

Where x is displacement, v is velocity, a is acceleration and t is time.

$[a] = \frac{L}{T^2}$ $\left[\frac{v}{t^2} + x\right] = \frac{L}{T^2} + L$

Not correct $\frac{L}{T^2} + L$

6/ A student throws a set of keys vertically upward to another student in a window 4m above . The keys are caught 1.5s later by the student.

(a) With what initial velocity were the keys thrown?

(b) What was the velocity of the keys just before they were caught?

a) **Choose the correct answer:**

1. The work will be zero when
a) in opposite direction with dis
b) in the same direction with dis
c) perpendicular to the displacer
d) both choices a) and c)

2. Which one of the following e
second law?

a) $F = m\,a$

b) $\vec{F}_1 = -\vec{F}_2$

c) $P = m\,v$

d) $a = \frac{k}{m} x^2$

3. When the elevator moves to the
a) positive.