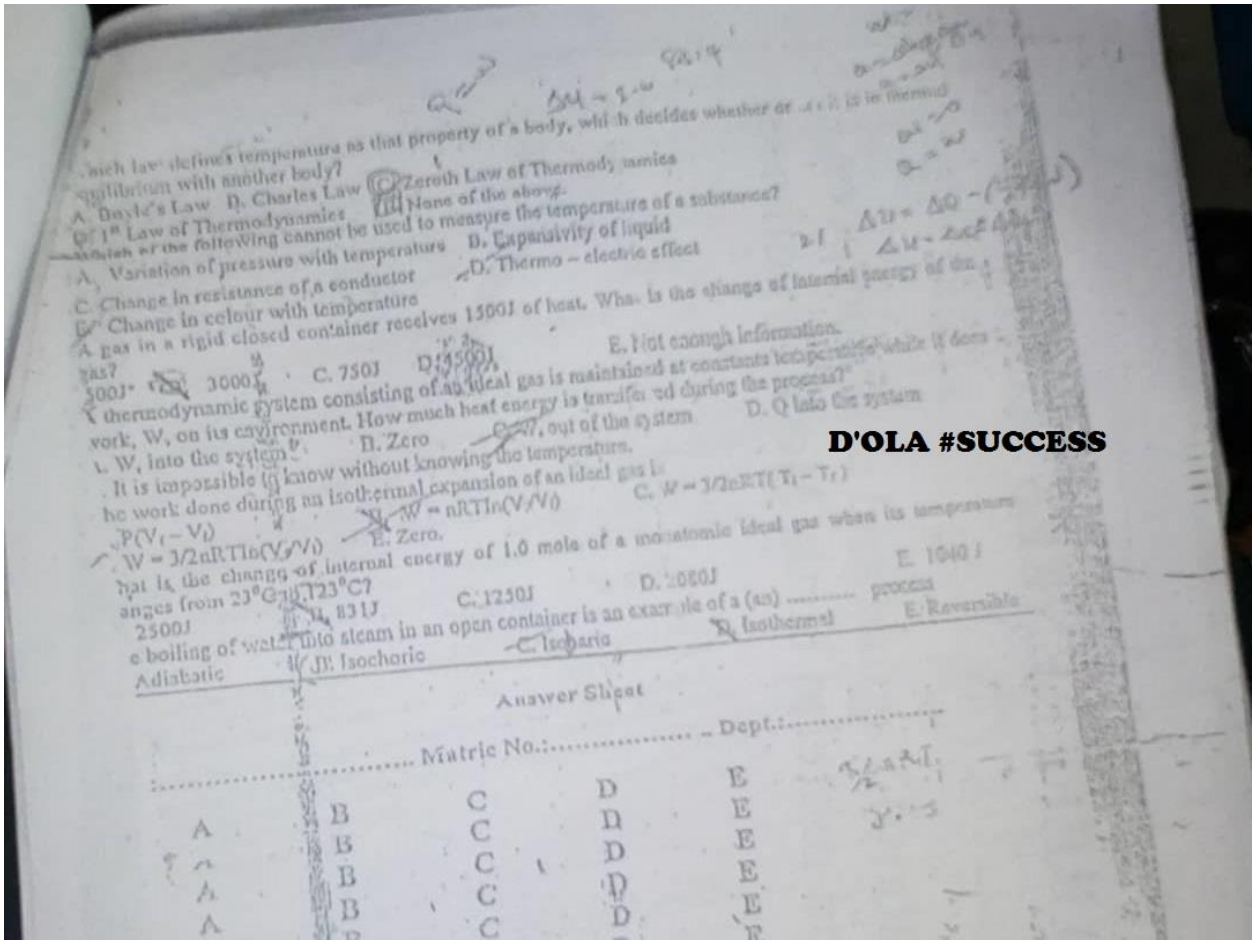
- **FEDERAL UNIVERSITY OF AGRICULTURE ABEOKUTA**

PHS 101 PAST QUESTIONS



which law defines temperature as that property of a body, which decides whether or ... is in thermal equilibrium with another body?
A. Boyle's Law B. Charles Law C. Zeroth Law of Thermodynamics
D. 1st Law of Thermodynamics E. None of the above.
Which of the following cannot be used to measure the temperature of a substance?
A. Variation of pressure with temperature B. Expansivity of liquid
C. Change in resistance of a conductor D. Thermo – electric effect
E. Change in colour with temperature
A gas in a rigid closed container receives 1500J of heat. What is the change of internal energy of the gas?
500J B. 3000J C. 750J D. 1500J E. Not enough information.
A thermodynamic system consisting of an ideal gas is maintained at constants temperature while it does work, W, on its environment. How much heat energy is transferred during the process?
A. W, into the system B. Zero C. W, out of the system D. Q into the system
E. It is impossible to know without knowing the temperature.
The work done during an isothermal expansion of an ideal gas is
A. $P(V_f - V_i)$ B. $W = nRT\ln(V_f/V_i)$ C. $W = 3/2nRT(T_f - T_i)$
D. $W = 3/2nRT\ln(V_f/V_i)$ E. Zero.
What is the change of internal energy of 1.0 mole of a monatomic ideal gas when its temperature changes from 23°C to 123°C?
A. 2500J B. 831J C. 1250J D. 1050J E. 1040 J
The boiling of water into steam in an open container is an example of a (an) ..... process
A. Adiabatic B. Isochoric C. Isobaric D. Isothermal E. Reversible

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Answer Sheet

Matric No.:..... Dept.:.....

A	B	C	D	E
A	B	C	D	E
A	B	C	D	E
A	B	C	D	E
A	B	C	D	E

NAME:

MATRIC NO:

DEPARTMENT:

1. Use dimensional analysis to determine which of the following equations is certainly wrong?
I. $x = vt$ II. $F = mv/t$ III. $F = mv/t$ IV. $h = v^2/2g$ V. $v = (2gh)^{1/2}$
A. I only B. I and II C. II and II D. III, IV and V E. II only

2. A road journey takes 4hours and 30min at 80km/h, including a half hour break for lunch. How much time would be saved by traveling at 100km/h instead?
A. 48min. B. 54min. C. 60min. D. 36min. E. 24min.

3. The position of a particle is given by $x = 5\sin(120t)$ m where t is measured in seconds. Find the instantaneous velocity at 0.5s.
A. 5m/s B. 4m/s C. 520m/s D. 300m/s E. 600m/s

4. A particle has an acceleration of $a = 7i + 2j\ ms^{-2}$ for a period of 5s. After this time the velocity is $v_2 = 5i - 2k$ m/s. What was the initial velocity?
A. $40i - 12k$ B. $17i - 9j$ C. $40i - 10j - 2k$ D. $17i - 7j - 2k$ E. $17i + 7j - 2k$

5. An Olympic athlete completes a long jump of 8.3m with an initial speed of 9 ms^{-1}. What was the maximum increase in height of his waistline?
A. 0.99m B. 1.19m C. 1.10m D. 2.38m E. 2.20m

6. A ball thrown vertically upwards rolls in to its starting in 4s. Find its initial speed.
A. 0ms^{-1} B. 10ms^{-1} C. 2ms^{-1} D. 20ms^{-1} E. 80ms^{-1}

7. How much force does it take to give a 20000kg locomotive an acceleration of 0.5ms^{-2} on a level track with a coefficient of rolling friction of 0.03?
A. 6000N B. 30kN C. 24kN D. 12kN E. 36kN

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8. A 60kg parachutist and her 7kg parachute fall at a constant 6m/s. Find the force on the person due to the chute. A. 657N B. 519N C. 69N D. 588N E. 412N

9. An 80kg person pushes a 20kg crate over a rough surface. Take $\mu_s = 0.8$ for the person and $\mu_k = 0.4$ for the crate. What is the maximum possible acceleration of the crate?
A. 25.3ms^{-2} B. 27.4ms^{-2} C. 9.8ms^{-2} D. 3.92ms^{-2} E. 39.2ms^{-2}

10. A resultant force of 20N gives a body of mass m an acceleration of 8.0ms^{-2}, and a body of mass m' an acceleration of 24ms^{-2}. What acceleration will this force cause the two masses to acquire if fastened together? A. 12.0ms^{-2} B. 6.0ms^{-2} C. 32.0ms^{-2} D. 16.0ms^{-2} E. 8.0ms^{-2}

11. The ice point and the triple point differ by what amount?
A. 273K B. 0.01K C. 0K D. 32K E. 5/9 K

2007/2008 SESSION FIRST [illegible] TEST
PHS 101 GENERAL PHYSICS I

INSTRUCTION: Answer ALL questions
TIME ALLOWED: 30 Minutes *Where necessary, take g = 9.8[illegible]*

NAME:..
MATRIC NO:..
DEPARTMENT:...

1. Use dimensional analysis to determine which of the following equations is certainly wrong: I. $\lambda = v t^2$ II. $F = mv/a$ III. $F = mvg$ IV. $h = v^2/2$ V. $v = (2gh)^{1/2}$ A. I only B. I and II C. I and III D. III, IV and V E. II only
2. A road journey takes 4hours and 30min, at 80km/h, including a half hour break for lunch. How much time would be saved by travelling at 100km/h instead? A. 48min. B. 54min. C. 60min. D. 36min. E. 24min.

Train A has a length of 1km and travels at 50m/s. Train B has a length of 0.5km and starts just as the rear of Train A passes the front of Train B. Train B has an acceleration of $3m/s^2$ and a maximum speed of [illegible]m/s. Use this information to answer questions 3 and 4.

3. When does B pass A, that is, when does the rear of B pass the front of A? A. 180s B. 150s C. 210s D. 330s E. 167s

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4. How far has A travelled in this time? A. [illegible] B. [illegible] C. [illegible] D. [illegible] E. [illegible]
5. The position of a particle is given by x = 5 sin(120t) m where t is measured in seconds. Find the instantaneous velocity at 0.5s. A. [illegible]m/s B. 4m/s C. 520m/s D. 300m/s E. 600m/s
6. A particle has an acceleration of a = (-3i + 2j) m/s² for a period of 3s. At that time the velocity is v_2 = 5i - 2j m/s. What was the initial velocity? A. 40i – 12k B. 17i – 9j C. 40i + 10j – 2k D. 17i – 7j – 2k E. 17i + 7j – 2k
7. An Olympic athlete completes a long jump of 8.3m with an initial speed of 9.7m/s. What was the maximum increase in height of his trajectory? A. 0.99m B. 1.19m C. 1.10m D. 2.38m E. 2.20m
8. A doughnut – shaped space station has an outer rim of radius [illegible]km. With what period should it rotate for a person at the rim to experience an acceleration of g/5? A. 140s B. 140.5s C. 4.44s D. 4.49s E. [illegible]
9. A 2kg particle is subject to two forces that produce a resultant acceleration a = [illegible]i – 2j m/s². If F_1 = [illegible]i + 2j – 3kN, find F_2. A. 9i – 8j – 5kN B. 7i – 4j + 3kN C. 7i – 4j – 3kN D. 3i – 5j – 3kN E. 5i – 5j – 7kN
10. A 60kg parachutist and her 7kg parachute fall at a constant [illegible]. Find the force on the woman due to the chute. A. 657N B. 519N C. 60N D. 588N E. 412N.
11. Two blocks with masses m_A = 0.2kg and m_B = 0.3kg hang on [illegible] either side as shown in figure 1. Find the tensions in the rope. [illegible] A. 4.9N, 2.94N B. 3.9N, 2.34N C. 5.9[illegible]

...9 – 10
...ntile is launched from a point on level ground with velocity 2m/s at an angle α above the

...gle of position α is the vertical height reached a maximum?
...)20° (C)45° (D) 90° (E) 180°
...ngle of projection α is the horizontal ra... maximum?
...)45° (C)15° (D)90° (E)10°

...s 11 – 13
...g at 25m/s undergoes uniform deceleration when the brakes are applied, slowing down to
...2.4s

...e deceleration in ms⁻²?
...) –2.0 (C) 5.2 (D) –5.2 (E) 7.2
...does it travel during this period?
...) 9.0m (C) 45m (D) 4.5m (E) 18.8m
...ch father does it travel before stopping if the deceleration remains constant
...) 2.5m (C) 10.4m (D) 9m (E) 15m

...s 14 – 15
...rolls down from rest from a 14m height

...does it take to reach the ground?
...) 1.69s (C) –2.85s (D) 2.85s (E) 1.6
...he velocity just before striking the grou...?
...s (B) 16.6m/s (C) –17.8m/s (D) 17.8m/s (E) 0.87m/s

...s 16 – 17
...ides to go to a particular point 1200m east and 2100m north of his present position

...he difference in a straight line to the point in question?
... (B) 3300m (C) 900m (D) 3320m (E) 4260m
...ection should he proceed ?
...) 66.3° (C) 60.9° (D) 66.9° (E) 67

...s 18 – 20
...le of mass 1500kg travels in a circular path of radius 20m on a horizontal road surface at a
...m/s

...e frictional force necessary to prevent slipping?
...10⁴N (B) 1.472 x10⁴N (C) 1.284 x10⁴N (D) 1.372 x10⁴N (E) 15.543N
...e normal force between the road and the automobile?
...10⁴N (B) 1.472 x10⁴N (C) 1.284 x10⁴N (D) 1.372 x10⁴N (E) 15.53N
...fficient of friction between tires and ... is required to supply this force?
...) 0.40 (C) 0.60 (D) 0.80 (E) 0.90

...h was not accurately calibrated indicates –0.5°C at the lower fixed
...per fixed point. What temperature does the thermometer register
...re is 60°C?

NAME:.....

MATRIC NO:.....2017/2987..... DEPARTMENT:.....PHYSICS

1. What is the dimension of G (gravitational constant) in this relation, $F = G\frac{Mm}{r^2}$ Where other symbols have their usual meaning. A. $M^{-1}L^3T^{-2}$ B. ML^3T^{-2} C. $M^2L^2T^{-2}$ D. $M^2L^2T^{-2}$

2. What displacement must be added to a 50 cm displacement in the +x-direction to give a resultant displacement of 85 cm at 25°? A. 53 cm at 45° B. 53 cm at 44° C. 45 cm at 50° D. 45 cm at 53°.

3. A body falls freely from rest. Find the distance it falls in 3.0 s. A. 44 m B. 67 m C. 45 m D. 42 m

4. A child holding a wagon from rolling straight back down a driveway that is inclined at 20° to the horizontal. If the wagon weighs 150 N, with what force must the child pull on the handle if the handle is parallel to the incline? A. 48 N B. 51 N C. 49 N D. 60 N

5. A force acts on 2-kg mass and gives it an acceleration of 3 ms^{-2}. What acceleration is produced by the same force when acting on a mass of 4 kg? A. 2 ms^{-2} B. 3 ms^{-2} C. 4 ms^{-2} D. 5 ms^{-2}

6. Compute the work done against gravity by a pump that discharges 600 liters of fuel oil into a tank 20 m above the pump's intake. One cubic centimeter of fuel oil has a mass of 0.82 g.
A. 98.4 kJ B. 98 kJ C. 9800 kJ D. 94.6 kJ

7. Compute the power output of a machine that lifts a 300 kg crate through a height of 20.0 m in a time of 60.0 s. A. 163 W B. 1.63 kW C. 162.3 kW D. 126 W

8. An engine expends 40.0 hp in propelling a car along a level track at a constant speed of 15.0 ms^{-1}. How large is the total retarding force acting on the car.
A. 1.99 kN B. 129 N C. 199 N D. 289 kN

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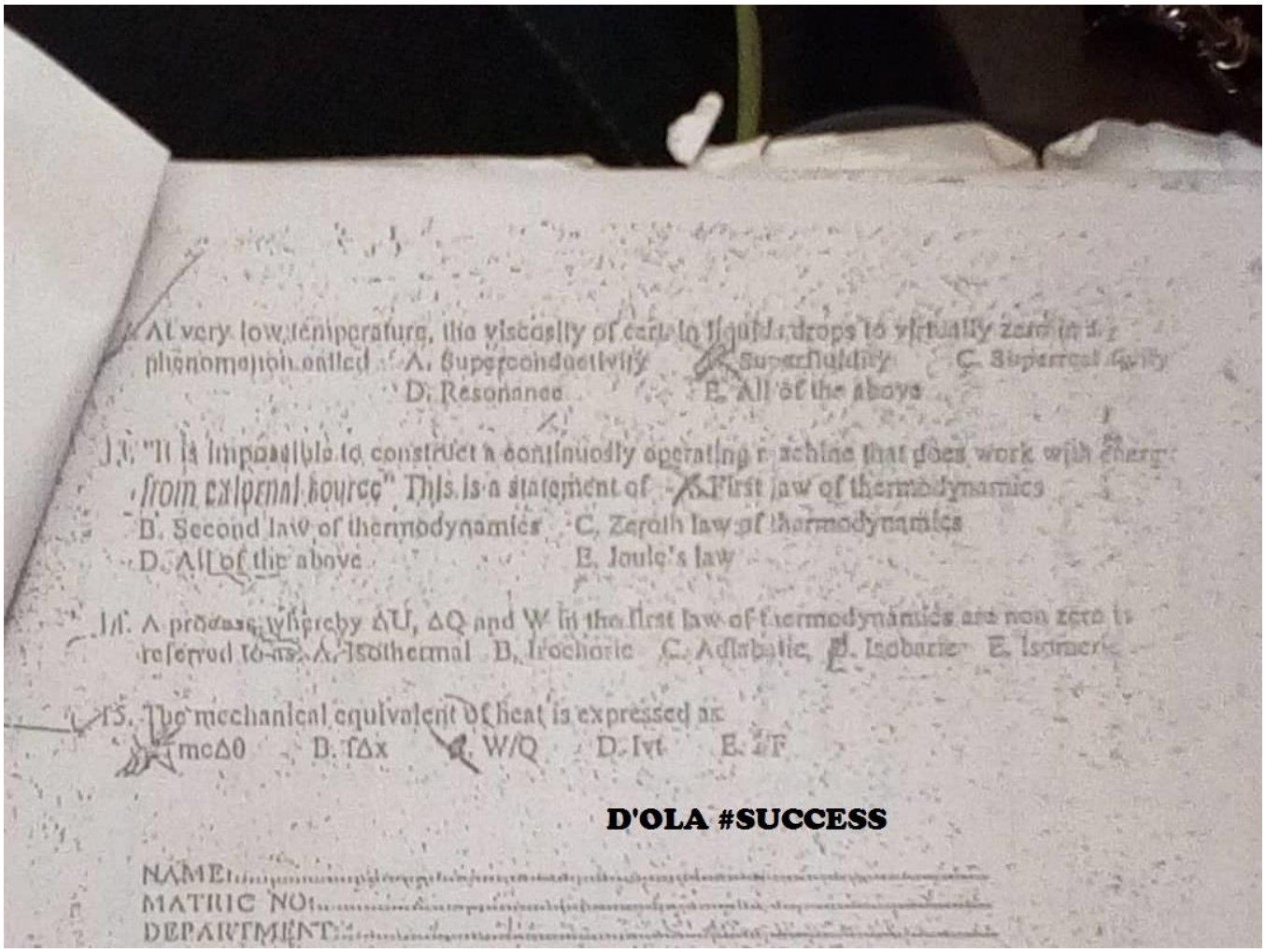
9. A 40 000 kg freight car is coasting at a speed of 5.0 ms^{-1} along a straight track when it strikes a 30 000 kg stationary freight car and couples to it. What will be their combined speed after impact?
A. 3.0 ms^{-1} B. 2.78 ms^{-1} C. 5.0 ms^{-1} D. 2.9 ms^{-1}

10. During collision, which of the following expression represents an inelastic case?
A. $e < 1$ B. $e > 1$ C. $e = 1$ D. $e = 0$

11. At very low temperature, the viscosity of certain liquids drops to virtually zero in a phenomenon called, A. Superconductivity B. Superfluidity C. Superresistivity D. Resonance



At very low temperature, the viscosity of certain liquid drops to virtually zero in a phenomenon called A. Superconductivity B. Superfluidity C. Superreal
D. Resonance E. All of the above

11. "It is impossible to construct a continuously operating machine that does work with energy from external source" This is a statement of A. First law of thermodynamics
B. Second law of thermodynamics C. Zeroth law of thermodynamics
D. All of the above E. Joule's law

14. A process whereby ΔU, ΔQ and W in the first law of thermodynamics are non zero is referred to as A. Isothermal B. Isochoric C. Adiabatic D. Isobaric E. Isomeric

15. The mechanical equivalent of heat is expressed as
A. $mc\Delta\theta$ B. $f\Delta x$ C. W/Q D. Ivt E. ZF

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NAME:.....
MATRIC NO:.....
DEPARTMENT:.....

E: 29-08-2001 SW TIME ALLOWED: 90 Minutes

RUCTIONS: ANSWER ALL QUESTIONS AND SUBMIT THE DETACHED ANSWER SHEET.

For Questions 1-2

To keep an object moving in a circle at constant speed, a force is required given as $F=aM^bV^br^c$ where m=mass, v=velocity and r=radius of its circular path.

Determine the numerical values of a, b and c

A. 1,2 and 3 B. 1,2 and-3 C. -1, -2 and 3 D. 1,2 and -1

E. 3, 2 and -1.

2. Which of the following represent the correct expression for the centripetal force?

A. $F=Km^2v/r$ B. $F=Km^2v/r^2$ C. $F=Kmv^2/r^2$ D. $F=Kmv^2/2r$ E. $F=Kmv^2/r$

3. Which of the following is the correct expression for Kepler's third law?

A. $T^2=4\pi^2/GM$ B. $T=4\pi^2/GM$ C. $T^2=2\pi^2/GM$

D. $T=\pi^2/GM$ E. None of the above.

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For Questions 4-5

A 2.0kg block is attached to a spring for which K=20 N/M. It is held at an extension of 5.0cm and then released at t=0

4. Find the displacement as a function of time.

A. $X=0.5Sin(10t+\pi/2)m$ B. $X=0.05Sin(10t+\pi/2)m$ C. $X=5.0Sin(10t+\pi/2)m$

D. $X=5.0Sin(10t-\pi/2)m$ E. $X=0.5Sin(10t-\pi/2)m$

5. Find the velocity and acceleration when X=+A/2

A. 4.3m/s and $-2.5m/s^2$ B. 0.43m/s and $2.5m/s^2$

C. .043m/s and $-2.5m/s^2$ D. 2.5m/s and $.04m/s^2$ E. None of the above.

6. When the network done on an object is equal to the change in its kinetic energy, we have:

A. Conservation of linear momentum B. Conservation of energy

C. Work-energy theorem D. Mechanical energy E. None of the above

7. A car moving with a velocity of 18km/h accelerates at $1.5m/s^2$. The velocity and position of the car at this time are:

A. 12.5m/s and 20m B. 2.0m/s and 12.5m C. 20m/s and 12.5m

D. 200m/s and 12.5m E. 12.5m/s and 2.0m

8. Two cars, 7km away from each other, move towards each other. The first one has a constant velocity of 54km/h. At what time and where will they meet?

A. 200sec and 300m B. 200sec and 3.0m C. 300sec and 200m

D. 20.0 sec and 500m E. 200sec and 3.00m.

TIME ALLOWED: 30 Minutes Where necessary take g = 10ms²

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NAME
MATRIC NO:
DEPARTMENT:

1. The speed v of a wave on a string depends on the tension F in the string and the mass per unit length $\frac{m}{l}$ of the string. If it is known that [P] = [ML][T]$^{-2}$, find the constants a and b in the equation for the speed of a wave on a string: v = constant F^{a}($\frac{m}{l}$)^{b}
A. 1, 2 B. 1, ½ C. ½, ½ D. 2, ½ E. ½, -½

For Q2-Q3
A car is accelerating uniformly as it passes two checkpoints that are 30m apart. The time taken between checkpoints is 4.0s and the car's speed at the first checkpoint is 5.0ms^{-1}.

2. Find the car's acceleration A. 1.5ms^{-2} B. 7.5ms^{-2} C. 60ms^{-2} D. 3.0ms^{-2} E. 4.5ms^{-2}

3. Find its speed at the second checkpoint. A. 5ms^{-1} B. 10ms^{-1} C. 15ms^{-1} D. 7.5ms^{-1} E. 6.0ms^{-1}

4. A plane starts from rest and accelerates along the ground before takeoff. It moves 600m in 12s. Find the distance moved during the twelfth second.
A. 50m B. 600m C. 96m D. 720m E. 360m

5. A ball thrown vertically upwards returns to its starting in 4s. Find its initial speed.
A. 0ms^{-1} B. 16ms^{-1} C. 2ms^{-1} D. 20ms^{-1} E. 80ms^{-1}

6. How much force does it take to give a 2000kg locomotive an acceleration of 1.5ms^{-2} on a level track with a coefficient of rolling friction of 0.03?
A. 6000N B. 30kN C. 24kN D. 12kN E. 6kN

7. A resultant force of 20N gives a body of mass m an acceleration of 8.0ms^{-2}, and a body of mass 5m an acceleration of 24ms^{-2}. What acceleration will this force cause the two masses to acquire if fastened together? A. 12.0ms^{-2} B. 6.0ms^{-2} C. 32.0ms^{-2} D. 16.0ms^{-2} E. 8.0ms^{-2}

8. A 7kg object is subjected to two forces $F_1 = 20\mathbf{i} + 30\mathbf{j}$N and $F_2 = 8\mathbf{i} - 50\mathbf{j}$N. Find the acceleration of the object. A. $4\mathbf{i} + \frac{20}{7}\mathbf{j}$ B. $\frac{12}{7}\mathbf{i} - \frac{12}{7}\mathbf{j}$ C. $\frac{12}{7}\mathbf{i} - \frac{20}{7}\mathbf{j}$ D. $\frac{20}{7}\mathbf{i} + \frac{30}{7}\mathbf{j}$ E. $\frac{8}{7}\mathbf{i} - \frac{50}{7}\mathbf{j}$

9. In the figure, if F = 20N, $m_1 = m_2 = 3$kg, and the acceleration is 0.50ms^{-2}, what will be the tension in the connecting cord if the frictional forces on the two blocks are equal? How large is the frictional force on either block?
A. 17N, 3N B. 14N, 3N C. 8N, 6N D. 10N, 5.5N E. 14N, 6N

s 9 – 10
ottle is launched from a point on level ground with velocity 3m/s at an angle α above the

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)20° (C)45° (D) 90° (E) 180°
ngle of projection α is the horizontal range maximum?
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s 11 – 13
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2.4s

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B) 66.3° (C) 60.9° (D) 66.9° (E) 6?

s 18 – 20
le of mass 1500kg travels in a circular path of radius 20m on a horizontal road surface at a
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(B) 0.40 (C) 0.60 (D) 0.80 (E) 0.9
... was not accurately calibrated but enters –0.5°C at the lower fixed
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...re is 60°C?

PHS 101

University of Agriculture, Abeokuta.
Department of Physics
2003/2004 Continuous Assessment Test

PHS 101-GENERAL PHYSICS I Time allowed : 30mins

Shade clearly accross only one correct letter option in the spaces provided at the end

(1) All the following physical quatities have derived units except?
A. Acceleration. B. Density. C. Speed. D. Current E. Pressure

(2) To keep an object moving in a circle at a constant speed requires a force called
A. Tangential force. B. Frictional force. C. Centrifugal force.
D. Gravitational force. E. Centripetal force

(3) A uniform ladder 8.0m long weighs 220N, rests on rough ground and is propelled against a vertical rough wall at an angle θ to the horizontal. If μ = 0.4 for the ground and the wall surfaces, find the value of θ when slip is about to take place
A. 46.4° B. 38.7° C. 34.6° D. 43.6° E. 68.7°

(4) A train accelerates uniformly from rest to reach 54km/h in 200seconds, after which the speed remains constant for 300seconds. At the end of this time the train decelerates to rest in 150seconds. Find the total distance traveled.
A. 15.0km B. 7.125km C. 71.25km D. 712.5km E. 150.0km

For Questions 5 and 6
A bullet is fired vertically upwards with an initial velocity of 98m/s from the top of a building 100m high. ($g = 9.8ms^{-2}$)

(5) Find the maximum height reached above the ground.
A. 49.0m B. 4900.0m C. 490.0m D. 98.0m E. 980.0m

(6) Find the total time before reaching the ground as well as the velocity on landing
A. 10sec. And 107.5m/s B. 20.97sec. and 10.75m/s C. 20.97sec. and 107.5m/s
D. 10sec. And 10.75m/s E. 10sec. And 20.97m/s

(7) A body moving with S.H.M has a velocity of 3m/s when 375mm from the midposition and an acceleration of 1m/s2 when 250mm from the midposition. Calculate the periodic time and the amplitude.
A. 3.142sec and 1.55m B. 1.75sec and 1.55m C. 1.57sec and 1.55m
D. 31.42sec and 1.55m E. None of the above.

(8) A body oscillates along a straight line with S.H.M. The frequency is 0.1Hz and the amplitude 300mm. Find the position of maximum displacement.
A. 205.2mm B. 281.1mm C. 299.3mm D. 217.0mm E. 219mm

(9) If at the triple point (273.16K) of water, the resistance of the element in a platinum resistance thermometer is 8.75Ω, what is the resistance at room temperature (301.82K) if the latter is measured on the scale of the resistance thermometer?
A. 7.92Ω B. 9424 Ω C. 9424 Ω D. 9.63Ω E. 94.24Ω

(10) A thermometer which was not accurately calibrated indicates 0.5°C at the lower fixed point and 106°C at the upper fixed point. What is the true temperature when the thermometer registers 63.4°C?
A. 166.7°C B. 59.0°C C. 16.7°C D. 1667.0°C

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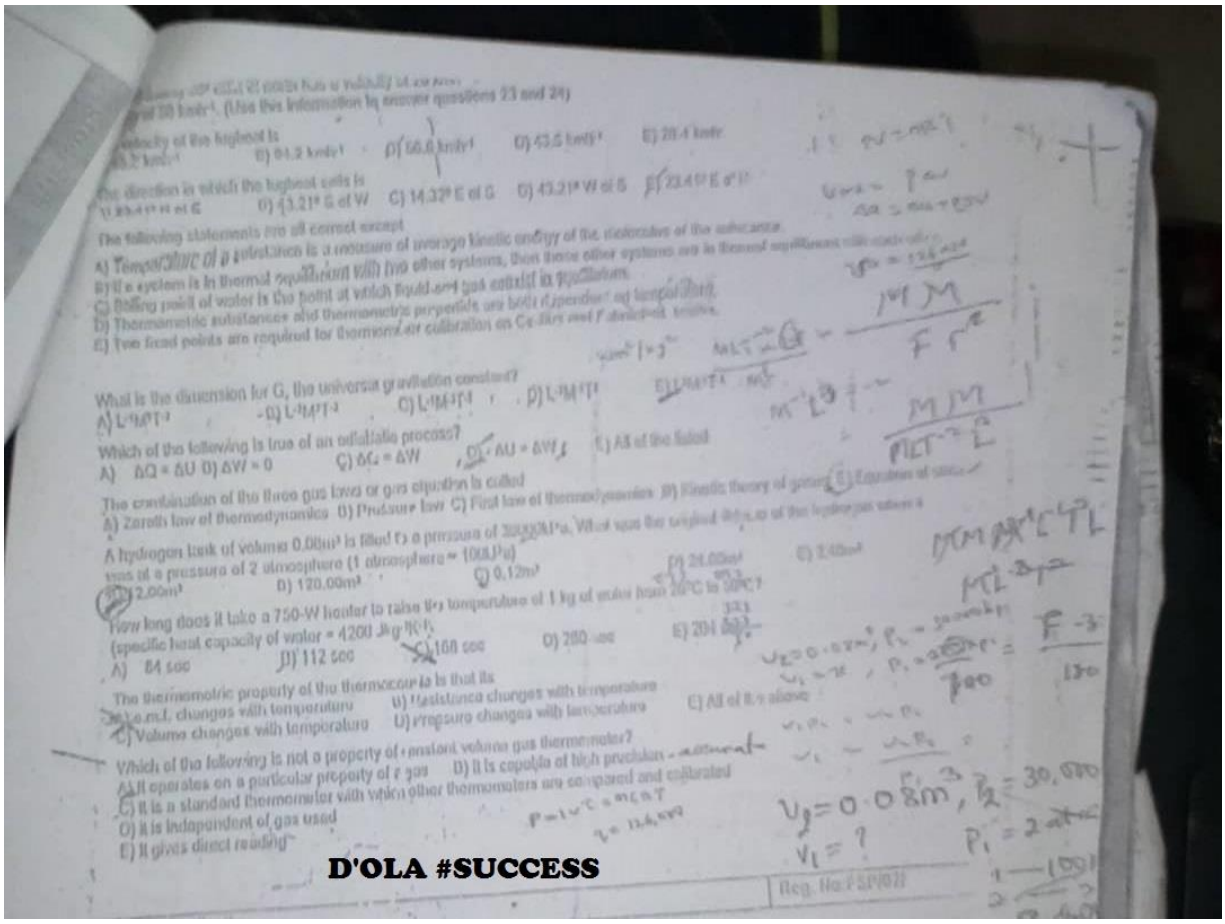

...of 30 kmh⁻¹. (Use this information to answer questions 23 and 24)

...velocity of the highest is
A) 52.2 kmh⁻¹ B) 84.2 kmh⁻¹ C) 56.6 kmh⁻¹ D) 43.6 kmh⁻¹ E) 28.4 kmh⁻¹

...the direction in which the highest cats is
A) 33.43° N of E B) 43.21° S of W C) 14.32° E of S D) 43.21° W of S E) 23.43° E of N

The following statements are all correct except
A) Temperature of a substance is a measure of average kinetic energy of the molecules of the substance
B) If a system is in thermal equilibrium with two other systems, then these other systems are in thermal equilibrium with each other
C) Boiling point of water is the point at which liquid and gas exists in equilibrium
D) Thermometric substances and thermometric properties are both dependent on temperature
E) Two fixed points are required for thermometer calibration on Celsius and Fahrenheit scales

What is the dimension for G, the universal gravitation constant?
A) $L^3M^{-1}T^{-2}$ B) $L^{-3}M^{-1}T^{-2}$ C) $L^3M^{-1}T^{-1}$ D) $L^{-3}M^{-1}T^{1}$ E) $L^{3}M^{1}T^{-1}$

Which of the following is true of an adiabatic process?
A) $\Delta Q = \Delta U$ B) $\Delta W = 0$ C) $\Delta Q = \Delta W$ D) $\Delta U = \Delta W$ E) All of the listed

The combination of the three gas laws or gas equation is called
A) Zeroth law of thermodynamics B) Pressure law C) First law of thermodynamics D) Kinetic theory of gases E) Equation of state

A hydrogen tank of volume 0.08m³ is filled to a pressure of 3000kPa. What was the original volume of the hydrogen when it was at a pressure of 2 atmosphere (1 atmosphere = 100kPa)
A) 2.00m³ B) 120.00m³ C) 0.12m³ D) 24.00m³ E) 2.40m³

How long does it take a 750-W heater to raise the temperature of 1 kg of water from 20°C to 50°C?
(specific heat capacity of water = 4200 Jkg⁻¹K⁻¹)
A) 84 sec B) 112 sec C) 168 sec D) 280 sec E) 294 sec

The thermometric property of the thermocouple is that its
A) e.m.f. changes with temperature B) resistance changes with temperature C) All of the above
D) Volume changes with temperature E) Pressure changes with temperature

Which of the following is not a property of a constant volume gas thermometer?
A) It operates on a particular property of a gas B) It is capable of high precision
C) It is a standard thermometer with which other thermometers are compared and calibrated
D) It is independent of gas used
E) It gives direct reading

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Reg. No: PSP/021

NAME: Ask me again

MATRIC NO:

DEPARTMENT:

1. Use dimensional analysis to determin which of the following equations is certainly wrong
I. $\lambda = v/\nu$ II. $F = m/a$ III. $F = mv/t$ IV. $h = v^2/2g$ V. $v = (2gh)^{1/2}$
A. I only B. I and II C. II and III D. III, IV and V E. II only

2. A road journdy takes 4hours and 30min at 80km/h, including a half hour break for lunch. How much time would be saved by travelling at 100km/h instead?
A. 48min B. 54min C. 60min D. 36min E. 24min

3. The position of a particle is given by $x = 5\sin(120t)$ m where t is measured in seconds. Find the instantaneous velocity at 0.5s.
A. 5m/s B. 4m/s C. 520m/s D. 300m/s E. 600m/s

4. A particle has an acceleration of $a = 7i + 2j\ ms^{-2}$ for a period of 5s. After this time the velocity is $v_2 = 5i - 2k$ m/s. What was the initial velocity?
A. $40i - 12k$ B. $17i - 9j$ C. $40i - 10j - 2k$ D. $17i - 7j - 2k$ E. $17i + j - 2k$

5. An Olympic athlete completes a long jump of 8.3m with an initial speed of 9 ms^{-1}. What was the maximum increase in height of his waistline?
A. 0.99m B. 1.19m C. 1.10m D. 2.35m E. 2.20m

6. A ball thrown vertically upwards returns to its starting in 4s. Find its initial speed.
A. 0ms^{-1} B. 16ms^{-1} C. 2ms^{-1} D. 20ms^{-1} E. 80ms^{-1}

7. How much force does it take to give a 20000kg locomotive an acceleration of 0.5ms^{-2} on a level track with a coefficient of rolling friction of 0.03?
A. 6000N B. 30kN C. 24kN D. 12kN E. 36kN

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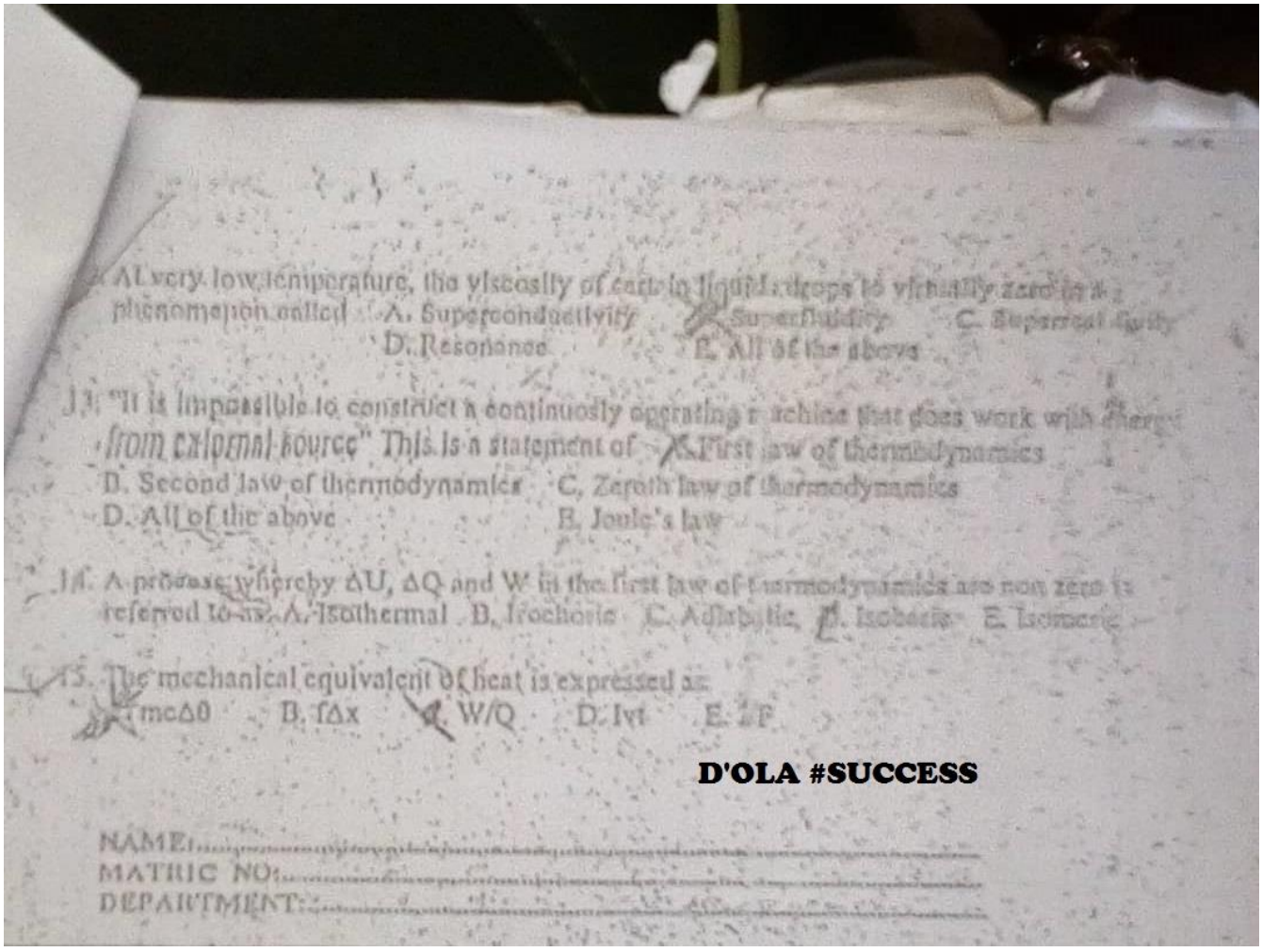
8. A 60kg parachutist and her 7kg parachute fall at a constant 6m/s. Find the force on the woman due to the chute. A. 657N B. 519N C. 69N D. 588N E. 412N

9. An 80kg person pushes a 20kg crate over a rough surface. Take $\mu_s = 0.8$ for the person and $\mu_k = 0.4$ for the crate. What is the maximum possible acceleration of the crate?
A. 29.3ms^{-2} B. 27.4ms^{-2} C. 9.8ms^{-2} D. 3.92ms^{-2} E. 39.2ms^{-2}

10. A resultant force of 20N gives a body of mass m an acceleration of 8.0ms^{-2}, and a body of mass m' an acceleration of 24ms^{-2}. What acceleration will this force cause the two masses to acquire if fastened together? A. 12.0ms^{-2} B. 6.0ms^{-2} C. 32.0ms^{-2} D. 16.0ms^{-2} E. 8.0ms^{-2}

11. The ice point and the triple point differ by what amount?
A. 273K B. 0.01K C. 0K D. 32K E. 5/9 K



At very low temperature, the viscosity of cert in liquid drops to virtually zero in a phenomenon called A. Superconductivity B. Superfluidity C. Supercritical fluidity D. Resonance E. All of the above

13. "It is impossible to construct a continuously operating machine that does work with energy from external source" This is a statement of A. First law of thermodynamics D. Second law of thermodynamics C. Zeroth law of thermodynamics D. All of the above B. Joule's law

14. A process whereby ΔU, ΔQ and W in the first law of thermodynamics are non zero is referred to as A. Isothermal B. Isochoric C. Adiabatic D. Isobaric E. Isomeric

15. The mechanical equivalent of heat is expressed as $mc\Delta\theta$ B. $f\Delta x$ C. W/Q D. Ivt E. $\frac{1}{2}F$

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NAME:.....

MATRIC NO:.....

DEPARTMENT:.....

12. The ice point and the triple point differ by what amount? A. 273 K B. 0.01 K
C. 0 K D. 32 K

13. It is impossible to construct a continuously operating machine that does work with energy from internal source. This is a statement of A. First law of thermodynamics B. second law of thermodynamics C. zeroth law of thermodynamics D. all of the above

14. The process that occur so rapidly that there is no transfer of heat between the system and the environment are known as A. Cyclic processes B. Adiabatic processes
C. Isochoric processes D. Isothermal processes

15. Which of the following is not correct of a cyclic process?
A. $W>0$ and $Q<0$ for counter clockwise cycle B. $W<0$ and $Q>0$ for a clockwise cycle
C. $Q + W = 0$ D. None of the above

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NAME:.....

MATRIC NO:..... DEPARTMENT:.....

	A	B	C	D
1.				
2.				
3.				
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7.				
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15.				

or Questions 9-11

stone is thrown vertically upward with an initial velocity of 12m/s from the top of a building. It takes 3.4 sec. for the stone to hit the ground.

Find the height of the building.

. 170.0m B. 1.70m C. 17.0m D. 1700m E. None of the above

. Find the maximum height reached.

4.2m B. 2.42m C. 242.0m D. 0.242m E. 240.0m

. Find the velocity of the stone when it reaches the ground.

220m/s B. 0.22m/s C. 22.0m/s D. 2.2m/s E. None of the above

. Find the gravitational force the sun exerts on the earth given that the mass of the sun is $M_1=1.99\times10^{30}$kg and mass of the earth is $M_2=5.98\times10^{24}$kg and the mean distance between the sun and the earth is 1.50×10^{11}m

3.53×10^{12} B. 3.53×10^{19} C. 3.53×10^{23} D. 0.35×10^{22} E. 0.353×10^{24}

. Which of the following is/are true of frictional force?

A. Friction always opposes the motion.

B. Friction is always parallel to the surface

C. The maximum value of static friction is $f_{max}=\mu_s N$

D. If the object is sliding $f_k=\mu_k N$

E. All of the above

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or questions14-15:

block is released from rest on a 53° inclined plane. The coefficient of kinetic ction between the block and the surface is 0.7

. The acceleration of the block is:

5.5m/s² B. 38.0m/s² C. 3.8m/s² D. 55m/s² E. 0.38m/s²

The velocity of the block after traveling 4 m is:

3.8m/s B. 5.5m/s C. 0.38m/s D. 55m/s E. None of the above

When a 0.5kg block is hung from a spring and brought to equilibrium, the spring stretches 0.2m. The spring constant of the spring is:

250N/m B. 2.50N/m C. 25N/m D. 0.25N/m E. 0.03N/m

A 0.3m long rod is rotating about an axis through its end with a constant angular velocity of 2 revolutions per second. Find its angular velocity, the velocity of its center and the velocity of its tip.

12.6rad/s, 5.0m/s and 10m/s B. 12.6rad/s, 10m/s and 5.0m/s

10rad/s, 12.6m/s and 10.0m/s D. 10rad/s, 5.0m/s and 12.6m/s

12.6rad/s, 5.0m/s and 10.0m/s

A block is thrown along a horizontal surface with an initial velocity of 3m/s. The coefficient of kinetic friction between the block and the surface is 0.6. How far will the block move before it stops?

11.5m B. 0.675m C. 0.75m D. 0.75.0m E. 13.5m

When a 0.5kg block is hung from a spring and brought to equilibrium, the spring stretches 0.2m. Find the spring constant of the spring.

A. 250N/m B. 25N/m C. 2.5N/m D. 10.0N/m E. 0.1N/m

How much power is required to push a 100kg box along a horizontal surface at a constant speed of 5m/s if the coefficient of kinetic friction between the box and the surface is 0.3?

A. 300W B. 30W C. 1500W D. 150W E. 3000W

Which of the following expression represents Hooke's law?

A. F=-Kx B. F=-1/2Kx² C. F=-μN D. F=-Mx² E. F=Fx

Questions 22-24

Volume of liquid passing per second, V, through a pipe when the flow is steady, given depends on coefficient of viscosity η of the liquid, radius r of the pipe and the pressure gradient P/L cause the flow.

Which of the following is the correct dimensional expression?

A. $L^3T^{-1}=(ML^{-1}T^{-1})^x L^y(ML^{-2}T^{-2})^z$
B. $L^3T^{-1}=(ML^{-1}T^{-2})^x L^y(ML^{-2}T^{-2})^z$
C. $L^3T^{-1}=(ML^{-1}T^{-1})^x L^y(ML^{-2}T^{-2})^z$
D. $L^3T^{-1}=(ML^{-1}T^{-1})^x L^y(ML^{-2}T^{-2})^z$
E. None of the above.

What are the values of x, y, z?

A. x=-1, y=4 and z=1 B. x=-2, y=3 and z=0 C. x=1, y=-4 and z=1
D. x=-1, y=4 and z=-1 E. x=-2, y=-3 and z=1

Which of the following is the correct expression for the volume V?

A. $V=KPr^3/\eta l$ B. $V=KPr^4/\eta l$ C. $V=KPr^2/\eta^2 l$
D. $V=KPr^4/\eta^2 l$ E. $V=KP^2r^3/\eta l^2$

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Questions 25-26:

A block of mass 100g is attached to the end of a spring whose force constant is N/M. The block slides on a horizontal surface for which μ=0.1, and is extended 5cm and then released.

Find the work done by the spring up to the point at which it is compressed by 3cm.

A. 2J B. 0.032J C. 0.078J D. 0.012J E. 0.24J

Find the network done on the block up to this point.

A. 0.032J B. 0.0078J C. 0.024J D. 0.002J E. 0.24J

A block of mass 4kg is dragged 2cm along a horizontal surface by a force 20N acting at angle 53° to the horizontal. The initial speed is 3m/s and μ=1/8. Find the change in kinetic energy and the final speed of the block.

A. 2J and 5m/s B. 32J and 0.5m/s C. 32J and 5m/s
D. 20J and 5m/s E. None of the above.

A. 63.4°C B. 36.4°C C. 46.3°C D. 43.6°C E. 34.6°C

22. The resistance R_θ of platinum wire at temperature $\theta^\circ C$, measured on the gas scale is given by $R_\theta = R_0(1 + a\theta + b\theta^2)$, where $a = 3.8 \times 10^{-3}$, $b = -5.6 \times 10^{-7}$, and $R_0 = 9.8\Omega$. What is the resistance at 100°C?
A. 46.13Ω B. 34.16Ω C. 13.47Ω D. 74.13Ω E. 31.47Ω

23 At what temperature do the Celsius and Fahrenheit scales have the same numerical value?
A. −40°C B. −12°C C. −30°C D. −60°C E. 0°C

24. A container of gas has a volume of $0.10m^3$ at a pressure of $2.0 \times 10^3 Nm^{-2}$ and a temperature of 27°C. Find the new pressure if the gas is heated at constant volume to 87°C.
A. $4.2 \times 10^3 Nm^{-2}$ B. $2.4 \times 10^3 Nm^{-2}$ C. $1.2 \times 10^3 Nm^{-2}$
D. $2.1 \times 10^3 Nm$ E. $5.0 \times 10^4 Nm^{-2}$

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25 In an experiment to verify Newton's law of cooling, it was observed from the cooling curve that at 60°C the rate of cooling of the body was $1.0ks^{-1}$ and at 53.4°C the rate of cooling was $0.8ks^{-1}$. Calculate the room temperature at the time of the experiment.
A. 27°C B. 86.4°C C. 30°C D. 25°C E. 15°C

For Questions 26-29

The first law of thermodynamics may be expressed by the relation $\Delta Q = \Delta U + \Delta W$, where Q is the quantity of heat given to a system of internal energy U and W is the external work done. Assume the system is an ideal gas enclosed in a cylinder with a piston.

1. $\Delta U = \Delta Q - \Delta W$
2. $\Delta W = V\Delta P$, where V is the volume of the gas and P is the pressure
3. $\Delta U = -\Delta W$ – adiabatic
4. $\Delta Q = -\Delta W$ – isothermal
5. $\Delta Q = \Delta U$ – isochoric

26 Which of the following cases 1 – 5 above represent(s) an ISOTHERMAL change?
A. 1 only B. 2 only C. 3 only D. 4 only E. 5 only

27 Which of the cases represent(s) an ISOBARIC change?
A. 1 only B. 2 only C. 3 only D. 4 only E. 5 only

28 Which of the cases represent(s) an ISOCHORIC change?
A. 1 only B. 2 only C. 3 only D. 4 only E. 5 only

29 Which of the cases represent(s) an ADIABATIC change?
A. 1 only B. 2 only C. 3 only D. 4 only E. 5 only

For Questions 30-33

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