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 COPY 1  
 ANSWER ! \* ! \* ! ! ! \* ! ! ! \* ! ! \*\* ! \*\* ! !  
 QUESTION ! 1 ! 2 ! 3 ! 4 ! 5 ! 6 ! 7 ! 8 ! 9 ! 10 ! 11 ! 12 !

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PHYSICS 1B FINAL

PLEASE EXPLAIN LOTS !!!!!!!!!!!!!!!!!!!!!

1. ISOTHERMAL

what is the relation between work done and heat added for isothermal process (no change in T)?

2. CONTINUITY

Derive the equation of Continuity:  $A_1 * v_1 = A_2 * v_2$

3. FLOAT

How many cubic meters of a solid are required to make a just keeps you out of a liquid assuming you weigh 410 newtons solid has a density of 1,000 kg/m cubed and the liquid has a 1,500?

A. .0259, B. .0837, C. .174, D. .238, E. .294

4. ICE BOUND

Your ship is stuck in 840 kg of arctic ice at zero degree centigrade. How many red hot cannon balls must you fire into to free your ship? For a red hot cannon ball: mass=11 kg, T degrees C, C=0.1 cal/gm deg

A. 147, B. 266, C. 367, D. 416, E. 641

5. KEPLER: RADIUS AND PERIOD

Derive Kepler's relation between the period of a planet distance from the sun.

6. HOT

How many degrees Celsius must nitrogen molecules be to m fast as hydrogen molecules move at 26 Celsius?

A. 4,180, B. 19.1, C. 364, D. 3,910, E. 6

7. SIMPLE FHM

what mass in kg will give the maximum amplitude in a sys forced harmonic motion if: force= $440 \cos(15 t)$  newtons, spri constant=110 nt/m, resistance = 210 nt/(m/s)?

A. .0778, B. 7.33, C. 3.07, D. .489, E. 2

8. DERIVE DOPPLER

Derive the equation for the Doppler Effect. Explain!!

9. DARTH VADER

Darth Vader is running toward you in the pitch black nig plan to calculate his approach velocity by mixing the sound o breathing (known to be 51 Hz) with a 51 Hz frequency source i carry with you at all times. If you count 7.8 beats/sec what approach velocity in m/s? The speed of sound is 300 m/s. The answers depending on whether you add or subtract the beat fre add.

A. 9.96, B. 39.8, C. 80.6, D. 91.9, E. 133

10. SPHERE AND HEAT

Assuming k is constant, show that the radial rate of flow in a substance between two concentric spheres is given by  $H = \frac{4\pi R_1 R_2 (T_1 - T_2)}{k(R_2 - R_1)}$  where the inner sphere has radius  $R_1$  and temperature  $T_1$ , and the outer sphere has a radius  $R_2$  and temperature  $T_2$ .

11. CARNOT

Explain why the Carnot cycle is as efficient as any cycle. Be sure to include the second law.

12. SQUARE CYCLE

Gas inside a cylinder starts at a pressure 96 Pa and a volume 1.0 cubic m. 1. The pressure increases to  $2 \times 96$  Pa while the volume is constant. 2. The volume increases to  $3 \times 3.6$  cubic meters while the pressure is constant. 3. The pressure returns to 96 Pa while the volume is constant. 4. The volume returns to 3.6 cubic meters while the pressure is constant.

How many Joules of work did the gas do? Explain and sketch carefully.

A. 64.1, B. 230, C. 578, D. 691, E. 65,800

13. DERIVE CRITICAL DAMPING

Derive critical damping. You can start with the equation describing damped harmonic motion.

14. ENTROPY AND EFFICIENCY

Starting from the entropy statement of the second law derive the efficiency of a Carnot cycle.

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ANSWERS FOR PHYSICS 1B FINAL ON 8/14/14  
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