

PHY2048 Spring 2019 Exam 3

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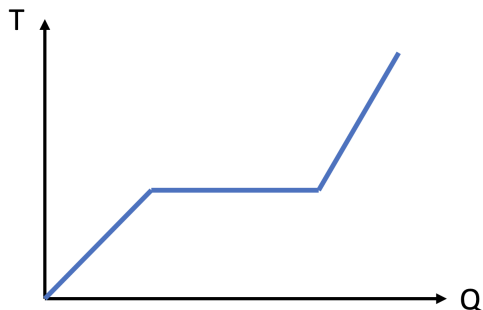
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1. A wheel spinning at 15 rad/s has a brake applied to it, stopping the wheel in 2 revolutions. What angular acceleration did the brake apply on the wheel?
 - (a) -0.60 rad/s
 - (b) -8.95 rad/s
 - (c) -17.9 rad/s
 - (d) -56.2 rad/s
2. A hollow sphere, a solid cylinder, and a hollow cylinder are all released from rest at the top of a ramp. Which object reaches the bottom of the ramp first?
 - (a) The hollow sphere
 - (b) The solid cylinder
 - (c) The hollow cylinder
 - (d) They all reach the bottom of the ramp at the same time
3. What is the formula for the moment of inertia of a hollow cylinder rotating about an axis at its edge?
 - (a) $I = \frac{1}{2}MR^2$
 - (b) $I = MR^2$
 - (c) $I = \frac{3}{2}MR^2$
 - (d) $I = 2MR^2$
4. For any object with a circular cross section (such as a cylinder or a sphere), the kinetic energy can always be expressed by some number c multiplied by $mR^2\omega^2$. For a solid sphere rotating around its edge, what is this number c ?
 - (a) 2/5
 - (b) 2/3
 - (c) 7/10
 - (d) 7/5

5. A meter stick is held such that it rotates at its end. If the meter stick has a mass of 100g, how much torque does gravity produce?
- (a) 0 Nm
 - (b) 0.5 Nm
 - (c) 0.75 Nm
 - (d) 1 Nm
6. A wheel is placed at the top of an incline. What force acting on the wheel produces the torque responsible for rolling the wheel down the incline?
- (a) Gravity
 - (b) Friction
 - (c) The normal force
 - (d) It depends on which point on the wheel you consider to be the axis
7. An ice skater with her hands pulled in towards her body is going to have a smaller moment of inertia than with her hands outstretched.
- (a) True
 - (b) False
8. An ice skater spinning with her hands outstretched will spin at a faster rate if she pulls her hands in towards her body. This phenomenon is a demonstration of what conservation law?
- (a) Conservation of energy
 - (b) Conservation of linear momentum
 - (c) Conservation of angular momentum
 - (d) It's not a demonstration of any conservation law
9. A distant planet, X, has a mass double that of Earth and a radius triple that of Earth. What would the gravitational acceleration of planet X be at its surface? Assume $g = 9.81 \text{ m/s}^2$, and use Google to look up any constants you feel you might need to solve this problem.
- (a) 2.18 m/s^2
 - (b) 4.37 m/s^2
 - (c) 6.54 m/s^2
 - (d) 13.1 m/s^2
10. A satellite is placed in orbit around the Earth such that it has a period of 90 minutes. What is the altitude of the satellite's orbit? *Use Google to look up any constants you feel you might need to solve this problem.*
- (a) 282 km
 - (b) 405 km
 - (c) 2,547 km
 - (d) 6,653 km

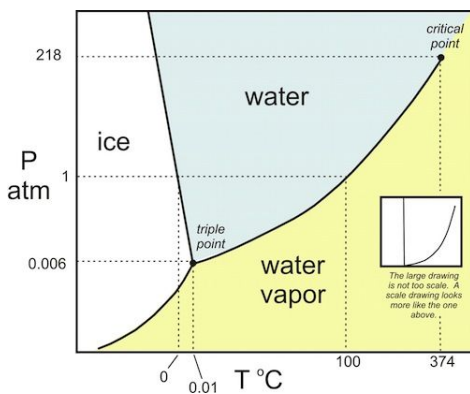
11. A satellite is placed in orbit around the Earth such that it has a period of 90 minutes. What is the velocity of the satellite? *Use Google to look up any constants you feel you might need to solve this problem.*

- (a) 3.89 km/s
- (b) 5.55 km/s
- (c) 7.74 km/s
- (d) 8.57 km/s



12. The above figure shows a graph of temperature versus heat added to a substance. The flat part of the graph represents the:

- (a) Specific heat
- (b) Heat capacity
- (c) Latent heat
- (d) None of the above



13. According to the diagram above, for what pressures can water undergo sublimation?

- (a) Pressures below 0.006 atm
- (b) Pressures above 0.006 atm
- (c) Pressures below 218 atm
- (d) Pressures above 218 atm

14. Placing a pot of cold water on top of a hot-coil stove will bring the water to a boil. During this process, what mechanism of heat transfer heats up the water?
- (a) Conduction
 - (b) Convection
 - (c) Radiation
 - (d) None of the above
15. Placing a pot of cold water on top of a hot-coil stove will bring the water to a boil. During this process, what mechanism of heat transfer keeps the water at an even temperature?
- (a) Conduction
 - (b) Convection
 - (c) Radiation
 - (d) None of the above
16. 2.7kg of water, initially at 27°C, has 1500 kJ of heat added to it. What phase would the water be in after the heat is added? *Note, look up any constants needed in your textbook.*
- (a) Solid
 - (b) Liquid
 - (c) Liquid/gas mixture
 - (d) Gas
17. An aluminum pot, filled with water at 25°C, is placed on a stove top at 200°C. The base of the pot is circular, with a radius of 10cm and thickness of 1mm. How quickly is heat entering the water? Note that the thermal conductivity of aluminum is 217 W/mK and the thermal conductivity of water is 0.6 W/mK.
- (a) 3.30×10^3 J/s
 - (b) 3.30×10^5 J/s
 - (c) 1.19×10^6 J/s
 - (d) 1.19×10^7 J/s