

2nd Semester Final Review for Conceptual Questions

Momentum and Impulse

1. What are the two ways you can change the momentum on an object?
2. Is the impulse greater or smaller when objects bounce instead of just stop? Why?
3. How can you decrease the stopping force on an object?
4. If the momentum of an object changes and its mass remains constant what is changing and what will cause this change?
5. The momentum change of an object is equal to?
6. Why is the recoil speed of a gun much smaller than the speed of the bullet if momentum has to be conserved?
7. Ben stepped up to the plate and hit a 0.250 kg underhand ball traveling at 12.0 m/s that was pitched by Sydney. The impact caused the ball to leave his bat with a velocity of 20.0 m/s in the opposite direction. If the impact lasted for 0.008 s, what force did Ben exert on the baseball? What was the acceleration of the ball?
8. Nicole (50kg) jumps out of her stationary 25 kg canoe at 25 m/s and lands in Gabe (66kg) cardboard boat (10kg) that is moving at 13 m/s in the same direction as Nicole jumps. What is the new speed of the canoe after she jumps out? What is the new speed of Gabe's cardboard boat now that the two are in it together?
9. A 70 kg desk is at rest. You push the desk with a net force of 50 N for 4 seconds. What is the change in momentum of the desk? What is its speed at 4 seconds?

Work and Energy

10. Explain the different types of energy.
11. What happens to the potential energy of a roller coaster at the bottom of the first hill?
12. If a crane is replaced with a new crane that has twice the power, how much greater a load can it lift in the same amount of time?
13. Matt, who is 500 kg, is standing at the top of a muddy hill on a rainy day. The hill is 100.0 m long with a vertical drop of 30.0m. Matt slips and begins to slide down the hill. What is Matt's potential energy at the top of the hill? What is the Matt's speed at the bottom of the hill (no friction)? If Matt runs into a spring that is compressed 0.5 m when he comes to a stop, what is the spring constant?
14. If a spring has elastic energy and is used to move a toy car, what type of energy does the car have after the spring has been sprung? If the car hits an incline, what type of energy is it gaining? Losing?

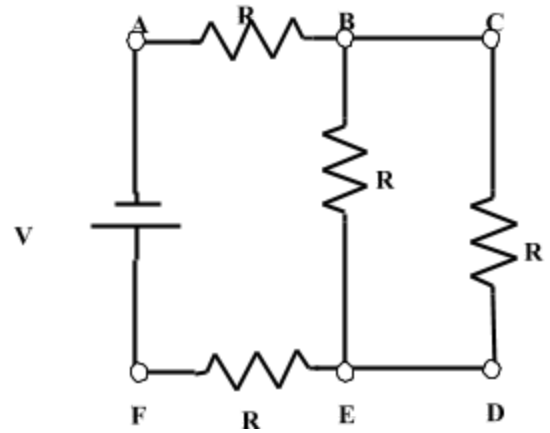
Circular Motion

15. Explain what happens to (circular) speed, acceleration, and centripetal force as the radius increases on an object that is moving in a circle.
16. If an object is moving in a circle at a constant speed, is it accelerating? Explain
17. In general, what causes an object to move in a circle? What is the direction of this force?
18. An object is moving around in a circle attached to a string. How does the velocity change (the period is constant) as you increase the force? Increase the radius? Increase the mass?
19. For an object in uniform circular motion, what direction is the force in? Acceleration? Linear Velocity?
20. A 55 kg person is in a cart moving along a roller coaster track. When the cart and person are at the bottom of a loop, the person experiences a net force of 400 N. If the radius of the loop is 19 m, determine the speed of the person and cart.

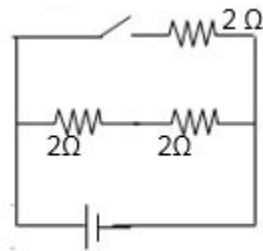
Electrostatics and Electric Circuits

21. What is Ohm's Law (equation)?
22. Using Ohm's Law, describe what happens to the current if you double the voltage, 1/3 the voltage, triple the resistance, 1/2 the resistance.
23. What are the units of electric potential, electric charge, current, and resistance?
24. If a guy grabbed the prongs of a partially plugged in 60 V electrical plug on a day when your skin resistance was 90,000 ohms, how much current would pass through your body?
25. What happens to the overall resistance when you add resistors in new paths to a parallel circuit?
26. What is the total resistance of a 5-ohm resistor and a 3-ohm resistor in a series circuit?
27. What is the total resistance of a 5-ohm resistor and a 3-ohm resistor in a parallel circuit?

28. What is the total resistance in this circuit if each resistor has a resistance of R ? (Answer should be in terms of R)



29. Look at the circuit below:



- While the switch is open, how many paths can the charges move through?
- What is the equivalent resistance while the switch is open?
- What is the equivalent resistance while the switch is closed?
- While the switch is closed, which path has more current moving through it? Explain.

30. Two resistors are placed in series with a battery whose voltage is 4.5 V. Resistor 1 has a value of 12 ohms while resistor 2 has a value of 15 ohms. Determine the current through the battery and through each resistor.
31. A negative charge of $3.5 \times 10^{-6} \text{ C}$ has two other charges nearby. A negative $4.8 \times 10^{-6} \text{ C}$ charge is to the right of the first charge and is .56 m away. Another negative $2.3 \times 10^{-6} \text{ C}$ charge is .35 m to the left of the first charge. What is the net force on the first charge and what direction is it pushing?
32. What is the force on a group of 3 electrons that are 35 mm away from a group of 6 protons?
33. How is the force between objects affected as the charge increases? As the distance increases? (Use Coulomb's law)
34. Two positive charges are held close together and then released, what happens? What if the charges are negative? What if the charges are opposite?

Waves

35. Draw and label the parts of an electromagnetic wave.
36. Describe how a standing wave is created and explain what a node and antinode is.
37. Draw a sound wave and label its parts.

38. A water wave is moving with a velocity of 0.5 m/s. If its wavelength is 1.5 m, determine the frequency of the wave.
39. A 256 Hz tuning fork is struck and a sound wave travels towards a person. If the sound wave is moving 340 m/s, determine the wavelength of the sound.
40. What is the period of a wave if the frequency is .25Hz?
41. What is the relationship between frequency and velocity? Frequency and wavelength?