

PS Physics
Study Guide – End of Course Exam

Scientific Processes

1. Read through the following scenario and identify the claim, evidence and reasoning.

Lea just finished her lunch. All that is left is her brown paper bag. Lea thinks there is no longer anything in the bag, but Paul disagrees. He thinks the bag is filled with air, and air is something. They decide to measure and compare the mass and volume of a flat bag and a bag inflated with air.

	Flat Bag	Inflated and Closed Bag
Color of Bag	Brown	Brown
Mass of Bag	1 gram	4 grams
Volume of Bag	2 cm ³	220 cm ³

Claim: _____

Evidence (describe the relationship between tested variables):

Reasoning:

2. What is a variable?
3. What is the control of an experiment?

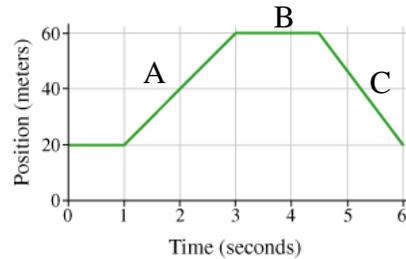
Motion

4. What is the standard (SI) unit for speed? _____ Acceleration? _____
5. What is the difference between distance and displacement (position)?
6. Calculate the speed of a car that travels 72 miles in 9 hours?
7. What does the slope of a position vs. time graph tell us?
8. What does the slope of a velocity vs. time graph tell us?
9. Draw a velocity vs. time graph that shows an increasing speed, constant speed, and then a decreasing speed.

10. What is the difference between speed and velocity?
11. What is meant by positive, negative, and 0 acceleration?
12. I was driving down the street at 60 m/s. I saw a police officer and immediately slowed to 30 m/s. This all took 3 s. What was my acceleration?

13. Answer the following about the graph at the right:

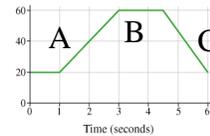
Displacement is increasing: _____
 Displacement is decreasing: _____
 Speed is constant: _____
 Speed is 0 m/s: _____



14. Using the position-time graph above, calculate the speed of the object from 1 second to 3 seconds.
15. On a position vs. time graph, explain what a steep slope means?

Answer the following about the graph at the right:

___ Positive acceleration
 ___ Negative acceleration
 ___ No acceleration



16. Draw a position vs. time graph and then a velocity vs. time graph that illustrates the following motion: Marie is traveling to work. She slowly leaves her house, and has to stop for a bus. Since the kids took too long to get on the bus, she quickly hurries the rest of the way.
17. List the ways you can change the acceleration of an object.
18. Describe how changing the angle of a ramp affects the acceleration of an object.

Forces

19. What is inertia and how is it related to a passenger on a roller coaster?
20. Explain Newton's Second Law in terms of force, mass and acceleration.
21. What is the acceleration of a 30 kg object being pushed with a force of 60 N?
22. How much force is required to move a 100 kg object at an acceleration of 3 m/s².
23. What is the difference between weight and mass?

24. Explain Newton's Third Law in terms of action and reaction forces.
25. Explain how the 3rd Law of Motion explains rocket flight.
26. What is net force?
27. My brother took my Wii-mote and I want it back. If I am pulling it left with a force of 10 N and he's pulling it right with a force of 8 N, what is the net force on the Wii-mote and am I going to get it back?
28. What is the law of universal gravitation?
29. What two factors in the universal law of gravitation are most important in determining the force of gravity between two objects?
30. What is centripetal force and where might you find an example?
31. Distinguish between rotation and revolution and on earth? Using the data below, which of these would be the fastest?

	Distance	Time
Rotation	40,000 km	24 hours
Revolution	942,000,000 km	8766 hours

Work and Energy

32. What is work?
33. What must an object do in order for work to be occurring?
34. What is energy?
35. Identify and provide an example of the 6 forms of energy
36. What are the units of energy?
37. What is potential energy?
38. What is kinetic energy?

39. Draw a diagram and explain the type of energy transfer happening when a ball is thrown in the air
40. Explain the changes between potential and kinetic energy when a person jumps on a trampoline.
41. Describe the energy transformations that occur in the following:
- Turning on a lamp.
 - Burning a piece of paper
 - Eating an apple
 - Sitting by a campfire
42. Describe the law of conservation of energy.
43. Explain why all mechanical systems require an outside energy source to maintain their motion.

Electricity

44. Using the following symbols, draw an open and closed circuit:
- Light bulb
 - Switch
 - Battery
 - Wires
45. What is the difference between an open circuit and a closed circuit?
46. Explain what happens to voltage and current in a series and parallel circuit.
47. Describe how opposite and like charges react to each other.
48. Explain voltage (potential difference), current and resistance and describe the role of each in an electrical circuit.
49. What is the difference between DC (direct current) and AC (alternating current)?

Waves

50. Draw a transverse wave and label all the parts (amplitude, wavelength, crest, and trough).
51. What is needed for ALL waves to continue moving?
52. Describe the period of a wave.
53. Describe the motion of a water wave.
54. What is the relationship between the frequency and wavelength of a wave?

55. How does a transverse wave travel and how does a longitudinal wave travel?
56. Sound waves are an example of what type of wave?
57. Describe and sketch the following ways that waves can interact with the environment:
- Reflection
 - Refraction
 - Diffraction
 - Interference (two types)
 - Scattering
 - Absorption
58. Explain what happens to a wave as it gets further from its starting point
59. Explain why there's a time delay after you see a tree fall to the ground
60. What is the difference between ultrasonic and infrasonic?
61. List the waves found on the Electromagnetic spectrum and provide an example of each.
62. Be able to determine wavelength based on frequency. For example, which of the following have the shortest wavelength? 75 hertz, 150 hertz, or 2000 hertz.
63. Compare and contrast incandescent and florescent lightbulbs
64. What are the three primary colors of light? What are the three primary colors of pigments?
65. Explain what process allows objects to appear different colors
66. What is a ray diagram?
67. Draw and label a ray diagram that illustrates the law of reflection.
68. Compare and contrast sound and light waves? (Include wave type, speed, requirement of medium)

This page is optional to pass out to the students. All of the terms are covered in questions 1-68

Vocabulary: The following is the vocabulary for the entire semester. Not every vocabulary word will be seen on the exam. However, it is important to understand these terms.

steps of Claim-Evidence-Reasoning	speed	average speed
units of time and distance	metric system	dependent variable
independent variable	position vs. time graph	speed vs. time graph
slope	acceleration	displacement (position)
one-dimensional motion	two-dimensional motion	circular motion
velocity	$v=d/t$	$a=\text{change in speed/change in time}$
Newton's three laws of motion	weight vs. mass	net force
$F=ma$	action/reaction forces	gravity
Acceleration due to gravity (9.8m/s^2)	rotation	centripetal
circular motion (ball attached to string)	revolution	gravitational force
Friction	energy transformation	energy conservation
Potential energy	kinetic energy	law of conservation of energy
Work (units)	forms of energy	internal energy source
External energy source		
Circuit	complete circuit	open circuit
Closed circuit	short circuit	electric charges
Static charges	electrostatic charges	voltage (units)
Resistance (units)	current (units)	DC / AC current
Efficiency		
Amplitude	wavelength	frequency
Period	crest	trough
Medium	transverse	longitudinal (compressional)
Sound waves	light waves	oscillate (periodic motion)
Ultrasound	interference (dead spots)	propagate
Reflection	absorption	refraction
Scattering	Electromagnetic spectrum	ray diagram
Angle of incidence	angle of reflection	incident ray
Reflected ray	normal	medium
Transparent	law of reflection	
primary colors of light and pigment		