

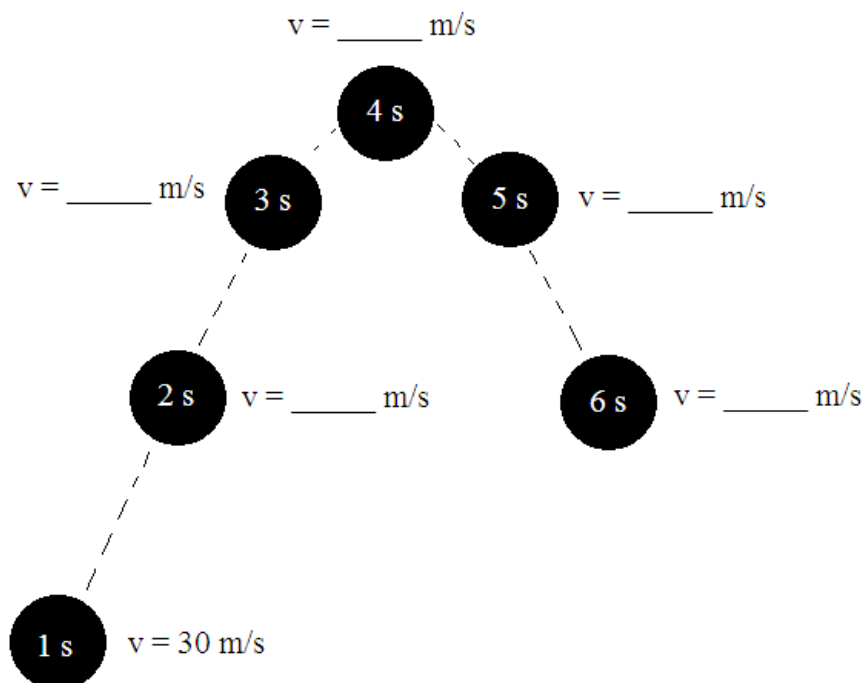
Conceptual Physics Semester 1 Final Exam Study Guide

Chapter 1: Science of Physics

1. List the steps of the scientific method. Explain why the scientific method is not usually followed step-by-step from beginning to the end.
2. What is a hypothesis? What makes a hypothesis a scientific one?

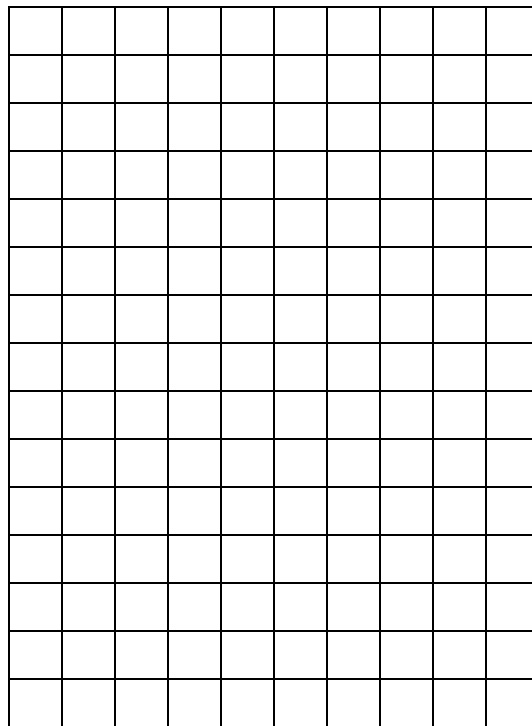
Chapter 2: Linear Motion

3. Compare and contrast speed and velocity.
4. Define acceleration. Give 2 examples of units for acceleration.
5. The ball below is being thrown straight up and falling straight down. Fill in the blanks with the velocity of the ball at the given times.



6. Graph the following data on the grid provided and answer the following questions.

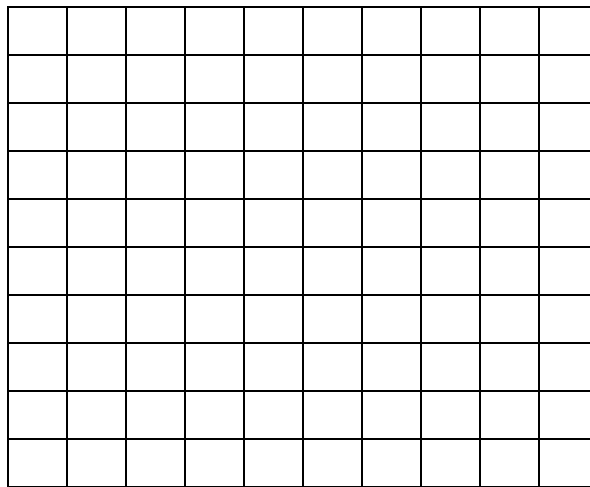
Distance of an Object Over a Period of Time	
Time (s)	Distance (m)
0	5
1	10
2	10
3	15
4	0
5	5



- During which time interval is the object at rest?
- During which time interval does the object have the greatest velocity?
- What do the slopes of the lines on this graph represent?

7. Graph the following data on the graph provided and answer the following questions.

Velocity of and Object Over a Period of Time	
Time (s)	Velocity (m/s)
0	3
1	3
2	8
3	10
4	6
5	0



- During which time interval is the object maintaining a constant speed?
- At what point is the object at rest?
- At what point does the object begin to slow down?
- What do the slopes of each line represent?
- Describe a situation where acceleration is negative and velocity is positive.

8. What is free fall?

9. If the odometer of a car reads 0 km at the beginning of a trip, and reads 45 km 30 minutes later, what is the average speed of the car?

10. In 5 s, a car moving in a straight line increases its speed from 50 km/h to 65 km/h. Calculate the acceleration of the car.

11. If an rock falls from a cliff that is 25 m high, how long with the rock take to reach the ground?

Chapter 3: Projectile Motion

12. Compare and contrast vector and scalar quantities.

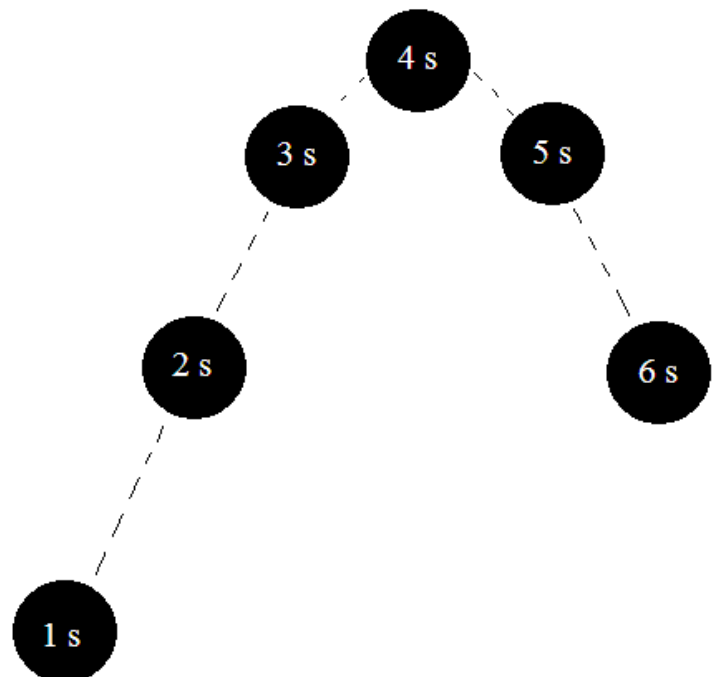
13. Give 5 examples of direction descriptors.

14. The object in the picture below was launched at an angle.

a) At what time is the vertical velocity equal to zero?

b) What is the horizontal acceleration at any time?

c) What is the vertical acceleration at any time?



15. An airplane is flying at 85 m/s at an altitude of 300 m, when an object is dropped out of the side of the airplane.
- a) How long does the object take to hit the ground?

 - b) How far, horizontally, has the object traveled?

Chapter 4: Newton's 1st Law

16. State Newton's 1st Law in your own words.
17. Compare and contrast mass and weight.
18. If mass increases, inertia would _____.
19. Define equilibrium.
- a) Give an example of equilibrium where an object is at rest.

 - b) Give an example of equilibrium where an object is moving.
20. In which direction does friction always act?

Chapter 5: Newton's 2nd Law

21. What is required to change the motion of an object?
22. A 20 kg barrel is pulled with a force at a constant acceleration. If the force was doubled, what would happen to the acceleration?
23. Using the concept of pressure, explain why the bed of nails demonstration is perfectly safe.
24. How much force must a 30,000 kg jet develop to achieve an acceleration of 1.5 m/s^2 ?

Chapter 6: Newton's 3rd Law

25. State Newton's 3rd Law in your own words.
26. Forces always occur _____.
27. State the reaction force for each of the following:
 - a) A bat hits a baseball. _____
 - b) A hammer pounds a nail. _____
 - c) The earth's gravity pulls you down. _____
28. A meteor crashes into the moon.
 - a) The forces acting on the meteor and the moon are _____.
 - b) Will the acceleration be the same? Why or why not?

29. When a horse pulls on a cart in motion, the cart pulls on the horse with an equal force. What force is present in the system that allows it to be set in motion?

Chapter 7: Momentum

30. Define momentum-using inertia.
31. State the Law of conservation of momentum in your own words.
32. What is required to change the momentum of an object?
33. What is impulse?
34. Why would a bouncing object generate more impulse than one that does not bounce?
35. Why are cars equipped with airbags?
36. Give examples of the following:
- a) Elastic collision

 - b) Inelastic collision
37. A man on a bike with a total mass of 75 kg riding at 8 m/s slows down to 5 m/s in 5 s.
- a) What is his initial momentum?

- b) What is his final momentum?
- c) What is his impulse?
- d) What is the force applied to the brakes?

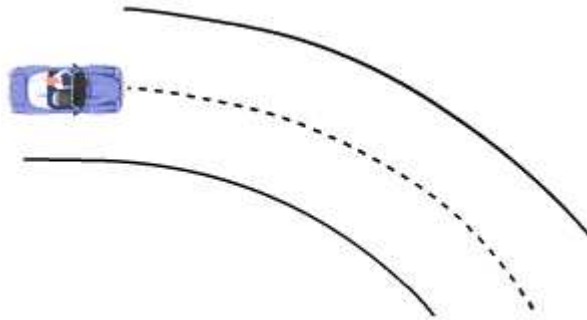
Chapter 8: Energy

38. A person walks up a flight of stairs, and then runs up the same flight of stairs.
- a) In which situation does the person do more work?
 - b) In which situation does the person use more power?
 - c) In which situation is more energy transferred?
39. Compare and contrast kinetic and potential energy.
40. Fill in the blanks with either *kinetic* or *potential*
- a) When a rock is pulled back in a slingshot, it has _____ energy.
 - b) When a pendulum is hanging straight down, it may have _____ energy, but it will not have _____ energy.
41. A 50 kg object is moving at a constant velocity.
- a) If the mass doubles, how would the kinetic energy change?
 - b) If the velocity doubles, how would the kinetic energy change?
42. A 50 Newton block is lifted a vertical distance of 2 meters.
- a) Calculate the work done on the block.

- b) If the block was lifted in 2 seconds, what is the power used?
- c) After the block is lifted, how much potential energy does it have?

Chapter 9: Circular Motion

43. A car is turning right around a curved exit ramp. Draw in arrows indicating the direction of velocity, force, and acceleration.



44. What force is acting on a person that is standing in a spinning gravitron?
45. On a spinning merry-go-round:
- Where is the tangential speed the greatest?
 - Where is the rotational speed the greatest?

Chapter 10: Center of Gravity

46. What causes objects to topple over?

47. A object always spins around the _____.

Chapter 11: Rotational Mechanics

48. Competitive bike racers sometimes have inserts that convert their bike wheels to disks for races. Why would this be a competitive advantage?

49. If a plumber applies 50 N to a pipe wrench with a 0.25 m long.

a) What is the applied torque?

b) Using the same amount of force, how could he change tools to apply more torque?

50. An diver rotational velocity increases in which position? Which position would cause the rotational velocity to decrease?