Physics Review Semester 1 B

1. A car starts from rest. It accelerates from 0 to 20 m/sec in 5 sec. What is the acceleration of the car?
2. A car starts from rest. It accelerates from 0 to 20 m/sec in 5 sec. What distance does the car travel in that time?
3. A car starts from rest. It accelerates from 0 to 40 m/sec over a distance of 300 meters. What is the acceleration of the car?
4. A car starts from rest. It accelerates from 0 to 40 m/sec over a distance of 300 meters. How many seconds does it take to travel that distance?
5. An object is thrown upwards with an initial speed of 35 m/sec. The ball continues upward until it comes to a stop. Draw the motion diagram. Be sure to include acceleration.
6. An object is thrown upwards with an initial speed of 35 m/sec. The ball continues upward until it comes to a stop. How many seconds does it take the ball to reach its highest point?
7. An object is thrown upwards with an initial speed of 35 m/sec. The ball continues upward until it comes to a stop. How high does the ball go?
8. A ball (initially at rest) is dropped from the top of a building which is 150 meters high. It falls until it hits the ground. Draw the motion diagram.
9. A ball (initially at rest) is dropped from the top of a building which is 150 meters high. It falls until it hits the ground. How many seconds does it take to hit the ground?
10. A ball (initially at rest) is dropped from the top of a building which is 150 meters high. It falls until it hits the ground. What is the speed of the ball just before it hits the ground?
11. A car has an initial speed of 39 m/sec. It decelerates at a rate of 3 m/sec^2. What is the speed of the car after 1 second of deceleration? What is the speed after 2 seconds of deceleration?
12. A car has an initial speed of 39 m/sec. It decelerates at a rate of 3 m/sec^2. How many seconds does it take the car to come to a stop?
13. A 500 kg rocket is initially at rest on the ground. There is an upward thrust force on the rocket of 20,000 N which causes the rocket to accelerate upwards. The thrust force is applied for a time of 15 seconds. Draw a force diagram of the rocket as it is accelerating upwards. Show the value of each force and give the name of each force. Also show the net force and the direction of the net force.
14. What is the acceleration of the rocket?
15. What is the speed of the rocket after 15 seconds of thrust force?
16. A person pushes a 50 kg cart with a force of 200 N to the right. The force of friction between the cart and the floor is 150 N. Draw the force diagram. Show the value of each force and give the name for each force. Also draw net force and the direction of the net force.
17. A person pushes a 50 kg cart with a force of 200 N to the right. The force of friction between the cart and the floor is 150 N. What is the acceleration of the cart?
18. A person pushes a 50 kg cart with a force of 200 N to the right. The force of friction between the cart and the floor is 150 N. What is the coefficient of friction between the cart and the floor?
19. A person pushes a 50 kg cart with a force of 200 N to the right. The force of friction between the cart and the floor is 150 N. The cart is pushed until it reaches a speed of 6 m/sec (moving to the right). At that point the person stops pushing. That means the cart will slow down and eventually come to a stop.
20. Draw the force diagram. Show the value of each force and give the name of each force. Also show the net force and the direction of the net force.
21. Draw the motion diagram for the cart. Include the acceleration arrow.
22. How many seconds will it take for the cart to come to a stop?
23. What is the coefficient of friction between the cart and the floor?
24. A car accelerates from 0 to 20 m/sec (point A to point B) over a time of 5 seconds. The car then continues to travel to point C at a constant speed of 20 m/sec. The total time to go from point a to c is 12 seconds.
25. Draw the motion diagram for each part.
26. Find the acceleration from a to b.
27. Find the acceleration form b to c.
28. Find the distance traveled from a to b.
29. Find the distance traveled from b to c.
30. Find the total distance traveled from a to c.
31. A rock is dropped from rest from a bridge. It falls for 2.8 seconds then hits the water.
32. What is the height of the bridge?
33. What is the speed of the rock when it hits the water?
34. A rocket is lifting off from the ground. It has a mass of 8000 kg and is accelerating upward at 25 m/sec^2.
35. Draw a diagram of the forces on the rocket. Give the name of each force. (There is a thrust force on the rocket). Include the net force.
36. What is the thrust of the force on the rocket?
37. A ball is thrown vertically into the air. After the ball has left the hand, the force of the hand on the ball is:
38. Greater than the ball’s weight
39. Equal to zero
40. Equal to the ball’s weight
41. Decreases gradually as the ball gains altitude
42. An air force jet accelerates from 350 m/sec to 750 m/sec over a distance of 6 km (6000 m) in the horizontal direction.
43. What is the acceleration of the jet in this interval?
44. How much time does it take for the jet to travel 6000 m?
45. How many g’s does the pilot feel during the acceleration? (Just consider the horizontal direction)
46. A person wearing a jet pack with a total mass of 80 kg (person + jet pack) jumps from a building and descends toward the ground. At the moment that his speed reaches 10 m/sec he turns on the jet pack. The thrust force from the jet pack exerts a constant 800 N upward force on his body. What will happen to this person?
47. A person wearing a jet pack with a total mass of 80 kg (person + jet pack) jumps from a building and descends toward the ground. At the moment that his speed reaches 10 m/sec he turns on the jet pack. The thrust force from the jet pack exerts a constant 1100 N upward force on his body.

A.What is the acceleration of the person? What is the direction of the acceleration?

B. Given that the initial velocity is down, draw the motion diagram for the person. Include acceleration.

1. On the surface of Mars, the acceleration of gravity is 4 m/sec/sec. An astronaut on Mars throws a ball straight upwards with an initial speed of 32 m/sec. What is the ball’s velocity 1 second after leaving the hand? What is the velocity 2 seconds after leaving the hand?
2. On the surface of Mars, the acceleration of gravity is 4 m/sec/sec. An astronaut on Mars throws a ball straight upwards with an initial speed of 32 m/sec. What is time required for the ball to reach maximum height?
3. On the surface of Mars, the acceleration of gravity is 4 m/sec/sec. An astronaut on Mars throws a ball straight upwards with an initial speed of 32 m/sec. What is the ball’s velocity maximum height?