

Physics 11 Dynamics Practice Test

BC Curriculum

Part A: Multiple Choice

Instructions: Select the best answer for each question.

1. A car is traveling at a constant velocity. Which of the following statements is true?
 - (a) The net force on the car is zero.
 - (b) There is a constant net force in the direction of motion.
 - (c) There are no forces acting on the car.
 - (d) The car is accelerating.
2. A 10 kg box is pushed with a horizontal force of 30 N on a frictionless surface. What is the acceleration of the box?
 - (a) 0.33 m/s^2
 - (b) 3.0 m/s^2
 - (c) 30 m/s^2
 - (d) 300 m/s^2
3. An object is in equilibrium when:
 - (a) it is at rest.
 - (b) it is moving with constant velocity.
 - (c) the net force on it is zero.
 - (d) all of the above.
4. A skydiver is falling at a constant terminal velocity. How does the magnitude of the force of air resistance, F_{air} , compare to the magnitude of the force of gravity, F_g ?
 - (a) $F_{\text{air}} > F_g$
 - (b) $F_{\text{air}} < F_g$
 - (c) $F_{\text{air}} = F_g$
 - (d) It depends on the skydiver's mass.

5. An 80 kg person is standing on a bathroom scale inside an elevator. The elevator accelerates upward at 2.0 m/s^2 . What is the reading on the scale?
- (a) 160 N
 - (b) 624 N
 - (c) 784 N
 - (d) 944 N
6. A 5.0 kg block is at rest on a horizontal surface. The coefficient of static friction is 0.40 and the coefficient of kinetic friction is 0.20. What is the maximum force of static friction?
- (a) 9.8 N
 - (b) 19.6 N
 - (c) 2.0 N
 - (d) 49 N

Part B: Written Response

Instructions: Show all your work for full marks. Include free-body diagrams where appropriate.

7. A 1200 kg car accelerates from 15 m/s to 25 m/s in 5.0 s. What is the net force acting on the car?
8. A 2.0 kg book is pushed against a vertical wall by a horizontal force. If the coefficient of static friction between the book and the wall is 0.30, what is the minimum horizontal force that must be applied to prevent the book from slipping?
9. Two boxes are connected by a light string on a frictionless horizontal surface. Box A has a mass of 5.0 kg and Box B has a mass of 8.0 kg. A horizontal force of 39 N is applied to Box A, pulling the system to the right.
 - (a) What is the acceleration of the system?
 - (b) What is the tension in the string connecting the two boxes?
10. A 4.0 kg block is placed on a frictionless inclined plane that makes an angle of 30° with the horizontal. What is the acceleration of the block down the incline?
11. A 50.0 kg crate is pulled across a horizontal floor by a rope that makes an angle of 25.0° with the horizontal. The tension in the rope is 180 N and the force of friction between the crate and the floor is 60.0 N.
 - (a) Draw a free-body diagram for the crate.
 - (b) Calculate the acceleration of the crate.
12. A child pulls a 15 kg wagon with a force of 45 N at an angle of 35° above the horizontal. The wagon accelerates at 1.2 m/s^2 . What is the force of friction acting on the wagon?
13. A 65 kg person stands on a scale in an elevator. What is the reading on the scale (in Newtons) if the elevator is:
 - (a) accelerating upwards at 2.0 m/s^2 ?
 - (b) accelerating downwards at 2.0 m/s^2 ?
14. A 10.0 kg box is pushed up a 30° incline by a horizontal force of 150 N. The coefficient of kinetic friction between the box and the incline is 0.25.
 - (a) Draw a free-body diagram for the box.
 - (b) Calculate the acceleration of the box up the incline.

Answer Key

Part A: Multiple Choice

1. (a)
2. (b)
3. (d)
4. (c)
5. (d)
6. (b)

Part B: Written Response

7. 2400 N
8. 65.3 N
9. (a) 3.0 m/s^2
(b) 24 N
10. 4.9 m/s^2
11. (a) A diagram showing gravity (down), normal force (up), tension (up and right), and friction (left).
(b) 2.06 m/s^2
12. 18.9 N
13. (a) 767 N
(b) 507 N
14. (a) A diagram showing gravity (down), normal force (perpendicular out of incline), applied force (horizontal), and friction (parallel down incline).
(b) 4.09 m/s^2 up the incline.