

NEWTON'S FIRST LAW :-



A BODY AT REST WANTS TO
STAY AT REST.

Grade 12 Physics Kinematics Test

First Name: _____

Last Name: _____

Directions:

- Please answer to 2 decimal points
- The test is designed to be completed in 75 minutes

For grading use only

Page:	2	3	4	5	Total
Points:	7	23	50	35	115
Score:					

Questions

1. (1 point) A car accelerates uniformly from rest to a speed of 25 m/s in 10 seconds. What is the car's acceleration?
 - A. 1.5 m/s^2
 - B. 2.5 m/s^2
 - C. 3.5 m/s^2
 - D. 4.5 m/s^2
2. (1 point) A projectile is launched with an initial velocity of 20 m/s at an angle of 30° above the horizontal. What is the maximum height it reaches?
 - A. 10 m
 - B. 15 m
 - C. 20 m
 - D. 25 m
3. (1 point) What is the force required to accelerate a 5 kg object at 3 m/s^2 ?
 - A. 15 N
 - B. 10 N
 - C. 20 N
 - D. 25 N
4. (1 point) An object moves in a circular path with a radius of 4 m at a constant speed of 8 m/s. What is the centripetal acceleration?
 - A. 8 m/s^2
 - B. 16 m/s^2
 - C. 16 m/s^2
 - D. 32 m/s^2
5. (1 point) A spring with a spring constant of 200 N/m is compressed by 0.1 m. What is the potential energy stored in the spring?
 - A. 1 J
 - B. 2 J
 - C. 1 J
 - D. 4 J
6. (1 point) A 10 kg object is dropped from a height of 20 m. What is its speed just before it hits the ground? (Assume no air resistance)
 - A. 10 m/s
 - B. 14 m/s
 - C. 20 m/s
 - D. 25 m/s
7. (1 point) A 3-ohm resistor is connected to a 12 V battery. What is the current flowing through the resistor?
 - A. 2 A
 - B. 4 A

- C. 6 A
D. 8 A
8. (1 point) A 2 kg object is moving with a velocity of 5 m/s. What is its kinetic energy?
A. 25 J
B. 15 J
C. 25 J
D. 50 J
9. (1 point) A 50 N force is applied to a 10 kg object, causing it to accelerate. What is the object's acceleration?
A. 2 m/s²
B. 5 m/s²
C. 5 m/s²
D. 10 m/s²
10. (1 point) A block slides down a frictionless incline of 30°. What is the acceleration of the block along the incline?
A. 3.3 m/s²
B. 5.0 m/s²
C. 7.5 m/s²
D. 9.8 m/s²

Short Answer

11. A football with a mass of 0.4 kg is thrown with an initial velocity of 20 m/s at an angle of 30° above the horizontal.
- (a) (5 points) Calculate the time it will take for the football to reach its maximum height.
 - (b) (5 points) Find the maximum height of the football.
 - (c) (5 points) Determine the total time the football will be in the air before landing.
 - (d) (5 points) Calculate the horizontal distance it will cover before landing.
12. A block of mass 4 kg rests on an inclined plane with an angle of 20° to the horizontal. The block is connected by a rope to a hanging block of mass 2 kg. The coefficient of friction between the block on the incline and the surface is 0.11.

- (a) (5 points) Calculate the normal force acting on the block on the incline.
 - (b) (5 points) Find the frictional force acting on the block on the incline.
 - (c) (5 points) Calculate the tension in the rope.
 - (d) (5 points) Determine the acceleration of the system.
13. A canoe is traveling at a velocity of 60.0 km/h due south with respect to the water. Due to a current, the canoe ends up traveling at 30.0 km/h at an angle of 45° south of west with respect to the shore.
- (a) (5 points) Using vector components, calculate the velocity of the current.
 - (b) (5 points) Find the direction of the current with respect to the southward direction.
14. A 0.050 kg yo-yo is swung in a vertical circle on the end of its 0.30 m long string. The yo-yo is at its slowest speed, just enough to complete the vertical circle.
- (a) (5 points) Calculate the minimum speed of the yo-yo required to complete the circle.
 - (b) (5 points) Draw a labelled free-body diagram at the highest point of the vertical circle.
 - (c) (5 points) What will the maximum tension in the string be when the yo-yo is swung at the minimum speed?
 - (d) (5 points) Where will the maximum tension occur in the vertical circle? Draw a labelled free-body diagram showing the forces acting on the yo-yo at this point.

15. A 5 kg block rests on an inclined plane with a 30° angle. The block is connected by a rope to a 3 kg hanging block. The coefficient of friction between the 5 kg block and the plane is 0.15.
- (a) (5 points) Determine the gravitational force acting on the 5 kg block.
 - (b) (5 points) Calculate the frictional force acting on the 5 kg block.
 - (c) (5 points) Find the tension in the rope connecting the blocks.
 - (d) (5 points) Calculate the acceleration of the system.
16. A boat is crossing a river that is 200 m wide. The boat has a velocity of 8 m/s relative to the water, and the current in the river flows at a velocity of 3 m/s.
- (a) (5 points) Calculate the time it takes for the boat to cross the river.
 - (b) (5 points) Determine the distance the boat will be displaced downstream while crossing.
 - (c) (5 points) Calculate the angle at which the boat must head to travel directly across the river (i.e., without drifting downstream).