

Momentum & Impulse - Evaluation

Name: _____ Date: ____ COVID-19 (2020) ____

Knowledge & Understanding

1. [1 mark] A ghost has a mass of 2kg (ghosts have mass?) and is moving at 5 m/s [East]. Calculate the momentum of the ghost including the units.

2. [2 mark s] Describe the difference between momentum and inertia.

3. [5 marks] Describe the difference between elastic and inelastic collisions; be thorough.

Application

4. [5 marks] A 2.5 kg remote controlled car was found to have 900J of kinetic energy. Calculate the momentum of this RC car.

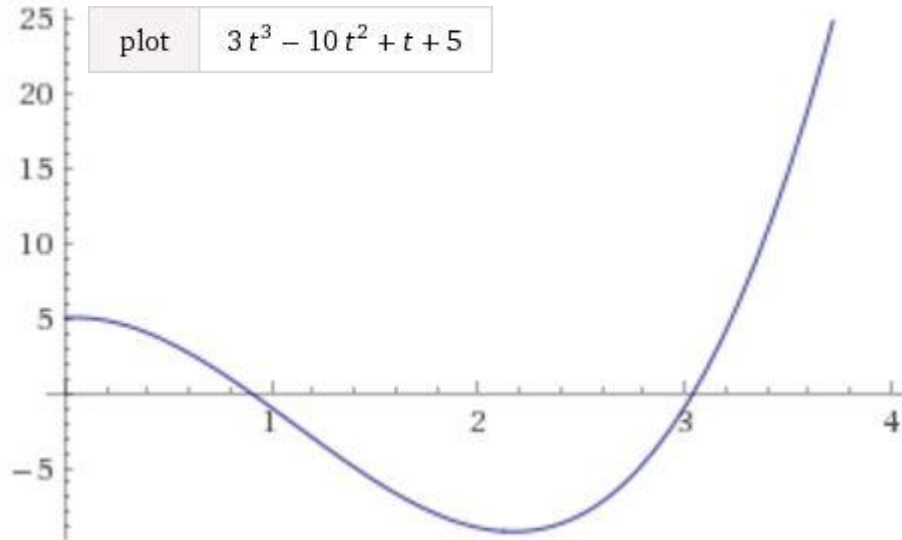
5. [5 marks] A 0.05 kg bullet is fired into a block of wood. The bullet enters the wood at 450 m/s and experiences an impulse of -12.5 Ns.
- Calculate the speed at which the bullet leaves the block.

 - If the block of wood was 30cm thick, calculate the time the bullet spent travelling through it.

Thinking, Inquiry & Problem Solving

6. [5 marks] A 150kg linebacker on a football team is running at 2 m/s towards a receiver. The 85kg receiver is distracted while carrying the ball and is running at 8 m/s directly towards the linebacker. The two collide inelastically during the ensuing tackle. Calculate the final speed of the two players after the collision.

7. [5 marks] Consider a time variant net force acting on a 5 kg object. The graph of this is given below. If the speed of the object at $t = 0$ s was 8 m/s, calculate the speed of the object at $t = 3$ s. Use estimation, integral calculus, and/or Wolfram Alpha to solve this problem. Show your work.



8. [5 marks] During a completely elastic collision between two air track carts the following data is collected. The mass of the one cart is 200g and the other is 600g. The 200g cart is travelling at 20cm/s to the right before the collision and 25cm/s to the left after the collision. The initial speed of the 600g cart was found to be 10cm/s left. Calculate the final speed of the 600g cart. You can use any method to solve this or multiple to show more of your learning.

9. [5 marks] Two objects slide over a frictionless horizontal surface. The first object, mass $m_1=5$ kg, is propelled with speed $v_{1i} = 4.5$ m/s toward the second object, mass $m_2=2.5$ kg, which is initially at rest. After the collision, both objects have velocities which are directed $\theta = 30^\circ$ on either side of the original line of motion of the first object. What are the final speeds of the two objects?

