The National Orthodox School Shmaisani

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Subject: Physics **Title: Collision HW**

Name: **Mark: ___/10**

Question 1) A bullet of mass 0.1 kg traveling horizontally at a speed of 300 m/s embeds itself in a block of mass 3.5 kg that is sitting at rest on a nearly frictionless surface.

a. What is the speed of the block after the bullet embeds itself in the block?

P=mv

P=0.1x300=30kgm/s

30=mv 30=3.6v

V=8.33m/s

b. Calculate the kinetic energy of the bullet and the block before the collision.

Ke1(block)=0J

Ke2(bullet)=½ 0.1 x 300^2=4500J

c. Calculate the kinetic energy of the bullet and the block after the collision.

Ke=½ 3.6x8.33^2=124.9J

d. Was this collision elastic or inelastic? Explain your answer.

Inelastic, Energy was transferred out of the system because the energy was inelastic.

Question 2) A 4500.0 kg pickup truck is moving at 15.0 m/s. A 2500.0 kg Tesla Model X is sitting at rest at a stop sign. The pickup truck collides with the Tesla and the cars DO NOT stick together. After the collision, the Tesla is moving at 12.0 m/s.

a. What is the final velocity of the truck?

P1=mv=4500x15=67500 kgm/s

P2=mv=2500x12=30000 kgm/s

67500-30000=37500

37500=4500

V=8.33m/s

b. What is the total initial kinetic energy of the two-car system?

Ke=0

Ke=½ 4500x15@=506,250

c. What is the total final kinetic energy of the two-car system?

Ke=½ 2500x12@ = 180,000J

Ke=½ 4500 x 8.33@ = 156,125.025

Total=180,000+156,125.025= 336125.025

d. What type of collision is this? Explain your answer.

Inelastic, energy is transferring out the system