BitWith Bite

PHYSICS WORKSHEET

Impulse

Chapter: Mechanics · Level ★★☆ · Time: 30 min

SCORE ___ / 20

Name _____ Class _____ Date _____

AFTER THIS WORKSHEET YOU CAN

✓ Understand: Impulse Definition ✓ Understand: Impulse-Momentum Theorem ✓ Understand: Units of Impulse

✓ Understand: Extending Collision Time to Reduce Force

Section A · Concept Check • BEGINNER 4 × 1 = 4

1 A 8 N force acts for 5s. Find impulse.

2 A 3 kg object's velocity changes from 4 to 10 m/s in 2s. Find the average force.

3 A baseball (0.15 kg) changes velocity from -20 m/s to 20 m/s (a full reversal) during a 0.01s bat contact. Find the average force.

4 Why does catching a fast ball with a 'soft hands' technique (pulling your hands back) hurt less?

Section B · Problem Solving • INTERMEDIATE 4 × 3 = 12

5 What does the area under a force-time graph represent?

6 A 500 kg car changes velocity by 10 m/s during a collision lasting 0.2s. Find the average force.

7 If the same momentum change happens over a much shorter time, how does the average force change?

8 A 2 kg object experiences an impulse of 16 N*s. If its initial velocity was 0, find its final velocity.

Section C · Challenge • CHALLENGE 2 × 2 = 4

9 Why are padded gloves used in boxing and other combat sports?

10 A 0.5 kg object's momentum changes by 4 kg*m/s over 0.5s. Find the average force applied.

Reflection — the most useful thing I learned: _____

A ___/4 B ___/12 C ___/4 Total ___/20

Teacher's Signature

Parent's Signature

✂ ANSWER KEY — FOLD OR CUT BEFORE HANDING OUT

1 = 40 N*s 2 = F*2=3*6=18, F=9N 3 = F*0.01=0.15*40=6, F=600N 4 = It extends the time of the catch, reducing the average force for the same change in the ball's momentum | 5 = The total impulse delivered 6 = F*0.2=500*10=5000, F=25000N 7 = It increases significantly, since force and time are inversely related for a fixed impulse 8 = 16=2*v, v=8 m/s | 9 = They extend the time of impact, reducing the peak force experienced for a given momentum change 10 = F=4/0.5=8N