Name: _____KEY____ Period: _____

Physics Test #2 – Tuesday, 2-9-16

Remember that Physics builds on the skills you have already learned, so you will use all of the information from previous tests on this test. This is a review guide…none of these questions are on the test. You have to understand the skills necessary to answer these questions and apply those skills to the questions on the test. Practice! Take your time.

Topics: Momentum, Impulse, Elastic Collisions, Inelastic Collisions, Perfectly Inelastic Collisions

1. Fill in the following table:

Variable	Concept	Units
v	Velocity	m/s
d	Distance	m
m	Mass	Kg
p	Impulse	Kg m/s
F	Force	N
t	time	s
KE	Kinetic Energy	J

2. Explain momentum and how impulse relates to momentum.
Momentum is a product of an object's mass and velocity.
Impulse is change in momentum

3. Identify which of the following would have a greater momentum:

- A 31 kg object moving at 3 m/s or a 37 kg object moving at 2.1 m/s

M= 31 m= 37 p=mv (31)(3)=***93 Kg m/s*** (37)(2.1)= 77.7
V= 3 v= 2.1

- A dog running at 5 m/s or a horse at rest

Dog because it is moving p= m v

- A train moving at 65 m/s or a van moving at 65 m/s

Train because more mass p= m v

3. According to the definition of impulse, when the time is increased, the __force__ is lessened. Give an example of this.
Running a car into barrels to slow you down.

4. Explain the Conservation of Momentum and the Conservation of Kinetic Energy.
Conservation of energy- cant be created or destroyed but can change form.
Conservation of momentum- when two objects collide the momentum is conserved.

5. Identify the type of collision:

A. Elastic B. Inelastic C. Perfectly Inelastic

__A___Two objects collide and then separate.
_B__ Two objects collide and when they separate the objects are deformed.
_C__ Two objects collide and stick together moving with a common velocity.

_E__ Kinetic Energy is conserved.
none_ Some Kinetic Energy is lost after the collision.
_All__ Momentum is conserved.

6. What is the mass of an object moving at 13 m/s with a momentum of 41 kg·m/s?
M=? p=mv 41= m (13) m= 41/13 ***m= 3.15 kg***
V= 13
P= 41

7. What is momentum of 14 kg object moving at 16 m/s?
P= ? p=mv p= (14)(16) ***p= 224 kg m/s***
M= 14
V= 16

8. How much force is exerted on 17 kg object moving from rest to 26.2 m/s in 3.6 s?
F=? f= m (Vf-Vi) / t F= 17 (26.2-0) / 3.6 F= (17)(26.2) / 3.6
M= 17
Vi=0 ***F= 123.72 N***
Vf= 26.2

9. Tom throws a basketball at the gym wall with a momentum of 6 kg·m/s and the ball bounces straight back at Tom. What is the ball's change in momentum?
P= 6 kg m/s

△P= ? momentum is conserved so the change is the same. △ ***P= -6 kg m/s***

10. An 85 kg fisherman jumps from a dock into a 13.0 kg rowboat at rest on the west side of the dock. If the velocity of the fisherman is 4.30 m/s to the west as he leaves the dock, what is the final velocity of the fisherman and the boat as they move together after the collision?
M1= 85 M2= 13 m1v1 + m2v2= (m1+ m2)Vf
Vf= -4.3 V2= 0 (85)(-4.3) + (13)(0)= (85+13) Vf
Vt=? -365.5 + 0= (98)Vt
Vf= -365.5 / 98

Vf= 3.73 m/s to the west

11. High speed photographs show the head of a 215 kg golf club traveling at 55 m/s just before it strikes a 46 g golf ball at rest on a tee. After the collision, the club travels in the same direction at 42 m/s. Use the law of conservation of momentum to find the speed of the golf ball just after impact.
M1= 215 m2= .046 m1v1 + m2v2= m1V1+ m2V2
V1= 55 v2= 0 (215)(55) + (46)(0)= (215)(42) + (.046)(V2f)
V1f= 42 V2f= ? 11825 + 0= 9030 + 46 (V2f)
11825= 9030 + .046 (V2f)
11825-9030=.046 (V2f)
V2f= 2795/.046

V2f= 60760 m/s

12. A dry cleaner throws a 22 kg bag of laundry onto a stationary 9.0 kg cart. The cart and the laundry bag begin moving together at 3.0 m/s to the right. Find the velocity of the laundry bag right before the collision.

M1= 22 m2= 9 m1v1 + m2v2= (m1+ m2)Vf
V1= ? v2= 0 (22)(V1) + (9)(0)= (22+9) 3
Vf= 3 (22) V! + 0= (31)(3)
(22) V1= 93
V1= 93/22

V1= 4.23 m/s right

13. A 0.25 kg arrow with a velocity of 12 m/s to the west strikes and pierces the center of a 6.8 kg target. What is the final velocity of the combined mass?

M1= .25 m2= 6.8 m1v1 + m2v2= (m1+ m2)Vf
V1= -12 V2= 0 (.25)(-12) + (6.8)(0)= (.25 + 6.8) Vf
Vf=? (-11.75) + (0)= (7.05) Vf
(-11.75) = 7.05 (vf)
Vf= -11.75/7.05

Vf= 1.67 m/s to the west

14. A 56 kg ice skater traveling at 4.0 m/s to the north suddenly grabs the hand of a 65 kg ice skater traveling 12.0 m/s in the opposite direction as they pass. Without rotating, the two skaters continue skating together with joined hands. What is the final velocity of the two skaters?

M1= 56 M2= 65 m1v1 + m2v2= (m1+ m2)Vf
V1= 4 V2= -12 (56)(4) + (65)(-12)= (56+65)Vf
Vf=? 224 + -780= 121(Vf)
-556= 121(Vf)
Vf= -556/121

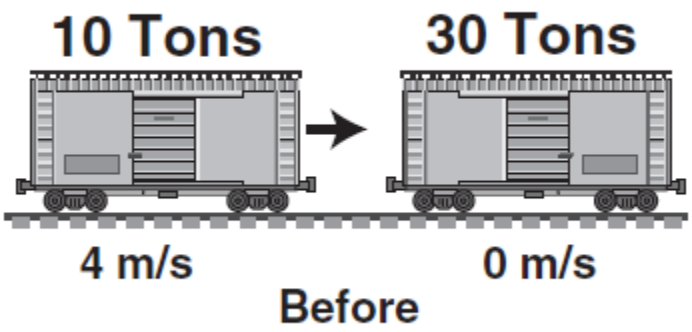
Vf= 4.6 m/s south

15. A 25.0 kg bumper car moving to the right at 5.0 m/s overtakes and collides elastically with a 35.0 kg bumper car also moving to the right. After the collision, the 25.0 kg bumper car slows to 1.50 m/s to the right, and 35.0 kg bumper car moves at 4.50 m/s to the right. Find the velocity of the 35.0 kg bumper car before the collisions?

M1= 25 m2= 35 m1v1 + m2v2= m1V1+ m2V2
V1= 5 V2= ? (25)(5) + (35)(V2) = (25)(1.5) + (35)(4.5)
V1f= 1.5 V2f= 4.5 125 + 35(V2)= (37.5) + (157.5)
125 + 35(V2) = 195
35(V2)= 195+ -125
35(V2)= 70
V2= 70/35

V2= 2 m/s to the right

16. Two trains collide as shown below. Which train's momentum increase after the collision?



30 ton train will have in increase in momentum and the 10 ton will decrease.

17. 2 objects moving towards each other, one has a much smaller mass, hit each other. Which one has the larger change in momentum?
The smaller mass will have a greater change in momentum

18. What is the impulse on a 20 g object when it changes it's velocity from 12 m/s to 17 m/s?

M= 20 g= .02 J= $\triangle$ p p= mv p= m (Vf -Vi)
V1= 12 p= .02 (17-12)
Vf= 17 p= .02(5)
J= ***p= .1 kg m/s***

19. What is the impulse on a baseball bat if the mass of the bat is .96 kg that had a force of 7 n acting on it in 4 seconds?

J=? J= Ft J= (7)(4)
M= .96
F= 7
t= 4 ***J= 28 kg m/s***