**Impulse Momentum WS 1**

1. A 700kg racecar slowed from 30m/s to 15 m/s. What was its change in momentum?
2. If the car in the above problem took 5 seconds to slow down from 30m/s to 15 m/s.
   1. What is the impulse?
   2. What was the average force applied by the brakes?
3. A truck hits a brick wall with a force of 120 N. The collision takes 2.0 seconds.

a. What is the impulse of the impact?

b. What is the change in momentum of the truck?

c. If the truck was moving at a speed of 20 m/s, what is the new speed of the truck if the truck has a mass of 150 kg?

1. A tennis ball travelling at 15 m/s is returned by Sam. It leaves his racket with a speed of 25 m/s in the opposite direction from which it came.
   1. What is the change in momentum of the tennis ball?
   2. If the mass of ball was 200 grams and it was in contact with the racket for 0.015 seconds. What is the average force applied by Sam during the hit?

5. Con Cussion plays middle linebacker for the varsity football team. In his last game he delivered a hit to an 82-kg running back, changing his southward velocity of 7.8 m/s into a northward velocity of 3.0 m/s.

**a.** Determine the initial momentum of the running back.  
**b.** Determine the final momentum of the running back.  
**c.** Determine the momentum change of the running back.  
**d.** Determine the impulse delivered to the running back.

e. If the hit occurred over a time period of 0.4 seconds, what was the force of the hit?

6. While playing basketball, Linus lost his balance after making a lay-up and collided with the padded wall behind the basket. His 70-kg body decelerated from 10m/s to 0 m/s in 0.20 seconds.

**a.** Determine the force acting upon his body.  
**b.** If Linus had hit a concrete wall while moving at the same speed, his momentum would have been reduced to zero in 0.0070 seconds. Determine the force on his body after that collision. What does this say about the importance of padding?

**Impulse Momentum WS 1**

1. A 800kg racecar slowed from 32m/s to 15 m/s. What was its change in momentum?
2. If the car in the above problem took 6 seconds to slow down from 30m/s to 15 m/s.
   1. What is the impulse?
   2. What was the average force applied by the brakes?
3. A truck hits a brick wall with a force of 150 N. The collision takes 2.0 seconds.

a. What is the impulse of the impact?

b. What is the change in momentum of the truck?

c. If the truck was moving at a speed of 22 m/s, what is the new speed of the truck if the truck has a mass of 150 kg?

1. A tennis ball travelling at 15 m/s is returned by Sam. It leaves his racket with a speed of 25 m/s in the opposite direction from which it came.
   1. What is the change in momentum of the tennis ball?
   2. If the mass of ball was 200 grams and it was in contact with the racket for 0.015 seconds. What is the average force applied by Sam during the hit?

5. Con Cussion plays middle linebacker for the varsity football team. In his last game he delivered a hit to an 80-kg running back, changing his southward velocity of 7.8 m/s into a northward velocity of 3.4 m/s.

**a.** Determine the initial momentum of the running back.  
**b.** Determine the final momentum of the running back.  
**c.** Determine the momentum change of the running back.  
**d.** Determine the impulse delivered to the running back.

e. If the hit occurred over a time period of 0.4 seconds, what was the force of the hit?

6. While playing basketball, Linus lost his balance after making a lay-up and collided with the padded wall behind the basket. His 80-kg body decelerated from 10m/s to 0 m/s in 0.20 seconds.

**a.** Determine the force acting upon his body.  
**b.** If Linus had hit a concrete wall while moving at the same speed, his momentum would have been reduced to zero in 0.0070 seconds. Determine the force on his body after that collision. What does this say about the importance of padding?

**Impulse Momentum WS 1**

1. A 740kg racecar slowed from 33m/s to 15 m/s. What was its change in momentum?
2. If the car in the above problem took 7 seconds to slow down from 30m/s to 15 m/s.
   1. What is the impulse?
   2. What was the average force applied by the brakes?
3. A truck hits a brick wall with a force of 125 N. The collision takes 2.0 seconds.

a. What is the impulse of the impact?

b. What is the change in momentum of the truck?

c. If the truck was moving at a speed of 18 m/s, what is the new speed of the truck if the truck has a mass of 150 kg?

1. A tennis ball travelling at 15 m/s is returned by Sam. It leaves his racket with a speed of 25 m/s in the opposite direction from which it came.
   1. What is the change in momentum of the tennis ball?
   2. If the mass of ball was 200 grams and it was in contact with the racket for 0.015 seconds. What is the average force applied by Sam during the hit?

5. Con Cussion plays middle linebacker for the varsity football team. In his last game he delivered a hit to an 76-kg running back, changing his southward velocity of 7.8 m/s into a northward velocity of 3.6 m/s.

**a.** Determine the initial momentum of the running back.  
**b.** Determine the final momentum of the running back.  
**c.** Determine the momentum change of the running back.  
**d.** Determine the impulse delivered to the running back.

e. If the hit occurred over a time period of 0.4 seconds, what was the force of the hit?

6. While playing basketball, Linus lost his balance after making a lay-up and collided with the padded wall behind the basket. His 75-kg body decelerated from 10m/s to 0 m/s in 0.22 seconds.

**a.** Determine the force acting upon his body.  
**b.** If Linus had hit a concrete wall while moving at the same speed, his momentum would have been reduced to zero in 0.0070 seconds. Determine the force on his body after that collision. What does this say about the importance of padding?

**Impulse Momentum WS 1**

1. A 900kg racecar slowed from 35m/s to 15 m/s. What was its change in momentum?
2. If the car in the above problem took 4 seconds to slow down from 30m/s to 15 m/s.
   1. What is the impulse?
   2. What was the average force applied by the brakes?
3. A truck hits a brick wall with a force of 180 N. The collision takes 2.0 seconds.

a. What is the impulse of the impact?

b. What is the change in momentum of the truck?

c. If the truck was moving at a speed of 26 m/s, what is the new speed of the truck if the truck has a mass of 150 kg?

1. A tennis ball travelling at 15 m/s is returned by Sam. It leaves his racket with a speed of 25 m/s in the opposite direction from which it came.
   1. What is the change in momentum of the tennis ball?
   2. If the mass of ball was 200 grams and it was in contact with the racket for 0.015 seconds. What is the average force applied by Sam during the hit?

5. Con Cussion plays middle linebacker for the varsity football team. In his last game he delivered a hit to an 75-kg running back, changing his southward velocity of 7.8 m/s into a northward velocity of 3.5 m/s.

**a.** Determine the initial momentum of the running back.  
**b.** Determine the final momentum of the running back.  
**c.** Determine the momentum change of the running back.  
**d.** Determine the impulse delivered to the running back.

e. If the hit occurred over a time period of 0.4 seconds, what was the force of the hit?

6. While playing basketball, Linus lost his balance after making a lay-up and collided with the padded wall behind the basket. His 76-kg body decelerated from 10m/s to 0 m/s in 0.24 seconds.

**a.** Determine the force acting upon his body.  
**b.** If Linus had hit a concrete wall while moving at the same speed, his momentum would have been reduced to zero in 0.0070 seconds. Determine the force on his body after that collision. What does this say about the importance of padding?

**Impulse Momentum WS 1**

1. A 780kg racecar slowed from 28m/s to 15 m/s. What was its change in momentum?
2. If the car in the above problem took 3.5 seconds to slow down from 30m/s to 15 m/s.
   1. What is the impulse?
   2. What was the average force applied by the brakes?
3. A truck hits a brick wall with a force of 220 N. The collision takes 2.0 seconds.

a. What is the impulse of the impact?

b. What is the change in momentum of the truck?

c. If the truck was moving at a speed of 25 m/s, what is the new speed of the truck if the truck has a mass of 150 kg?

1. A tennis ball travelling at 15 m/s is returned by Sam. It leaves his racket with a speed of 25 m/s in the opposite direction from which it came.
   1. What is the change in momentum of the tennis ball?
   2. If the mass of ball was 200 grams and it was in contact with the racket for 0.015 seconds. What is the average force applied by Sam during the hit?

5. Con Cussion plays middle linebacker for the varsity football team. In his last game he delivered a hit to an 88-kg running back, changing his southward velocity of 7.8 m/s into a northward velocity of 3.6 m/s.

**a.** Determine the initial momentum of the running back.  
**b.** Determine the final momentum of the running back.  
**c.** Determine the momentum change of the running back.  
**d.** Determine the impulse delivered to the running back.

e. If the hit occurred over a time period of 0.4 seconds, what was the force of the hit?

6. While playing basketball, Linus lost his balance after making a lay-up and collided with the padded wall behind the basket. His 72-kg body decelerated from 10m/s to 0 m/s in 0.28 seconds.

**a.** Determine the force acting upon his body.  
**b.** If Linus had hit a concrete wall while moving at the same speed, his momentum would have been reduced to zero in 0.0070 seconds. Determine the force on his body after that collision. What does this say about the importance of padding?

**Impulse Momentum WS 1**

1. A 840kg racecar slowed from 39m/s to 15 m/s. What was its change in momentum?
2. If the car in the above problem took 3 seconds to slow down from 30m/s to 15 m/s.
   1. What is the impulse?
   2. What was the average force applied by the brakes?
3. A truck hits a brick wall with a force of 290 N. The collision takes 2.0 seconds.

a. What is the impulse of the impact?

b. What is the change in momentum of the truck?

c. If the truck was moving at a speed of 22 m/s, what is the new speed of the truck if the truck has a mass of 150 kg?

1. A tennis ball travelling at 15 m/s is returned by Sam. It leaves his racket with a speed of 25 m/s in the opposite direction from which it came.
   1. What is the change in momentum of the tennis ball?
   2. If the mass of ball was 200 grams and it was in contact with the racket for 0.015 seconds. What is the average force applied by Sam during the hit?

5. Con Cussion plays middle linebacker for the varsity football team. In his last game he delivered a hit to an 92-kg running back, changing his southward velocity of 7.8 m/s into a northward velocity of 3.4 m/s.

**a.** Determine the initial momentum of the running back.  
**b.** Determine the final momentum of the running back.  
**c.** Determine the momentum change of the running back.  
**d.** Determine the impulse delivered to the running back.

e. If the hit occurred over a time period of 0.4 seconds, what was the force of the hit?

6. While playing basketball, Linus lost his balance after making a lay-up and collided with the padded wall behind the basket. His 90-kg body decelerated from 10m/s to 0 m/s in 0.25 seconds.

**a.** Determine the force acting upon his body.  
**b.** If Linus had hit a concrete wall while moving at the same speed, his momentum would have been reduced to zero in 0.0070 seconds. Determine the force on his body after that collision. What does this say about the importance of padding?