

Name _____

Science, Life Skills and Innovations in American Automobile Racing review/assessment questions

1. A race car is racing at the Indianapolis Motor Speedway. One lap at the speedway covers 2.5 miles.

A How many laps would it take to complete the 500-mile race?

B What would be the driver's average speed if he or she takes $2\frac{3}{4}$ hours to complete the race?

2. The Goldenrod Land Speed Racer once raced across the salt flats at 409 miles/hour. At that rate, how long would it take the racer to travel 100 miles?

3. Remembering the history of racing discussed in this unit, why do you think Henry Ford first built a race car and tried to win a race with it? Do you think his reason was similar or different from the reason many drivers offer today for wanting or needing to win?

4. Which of Newton's three laws of motion is best represented by each action described below?

A In order to push a car forward, the man in the pits pushes his feet against the track, and the track pushes back.

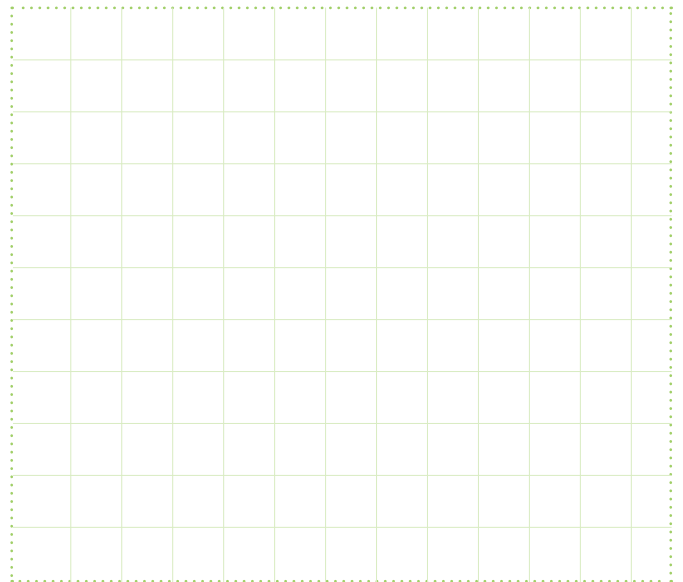
B A large heavy car is harder to push than a lighter car.

C The driver suddenly hits the brakes of the car in which you are riding; your seat belt prevents your face from hitting the dashboard.

D A race car runs out of gas and coasts long enough to get back to the pit area to refuel.

5. Use your knowledge from reading this unit on forces, motion and innovation to answer this question: Why do drivers and their engineers try to keep their race cars as lightweight as possible?

6. Make a sketch of a racetrack and show what part or parts of the track would need to be banked the most. Why?



6. (continued)

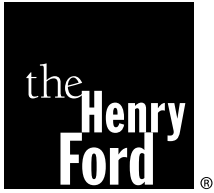
7. Why do race car drivers position their cars closely packed together in a long line while racing around the track?

8. If you were designing a wing or airfoil to take advantage of Bernoulli's principle, should the surface of the wing be longer over the top or longer over the bottom for each of the following cases?

A Flying an airplane

B Creating downforce from an oncoming wind

9. A NASCAR race car might go through 2 to 3 sets of tires during a race. Use terms from science and physics to explain why tires on a NASCAR racer can wear out so fast.



Science, Life Skills and Innovations in American Automobile Racing

review/assessment questions

1. A race car is racing at the Indianapolis Motor Speedway. One lap at the speedway covers 2.5 miles.

A How many laps would it take to complete the 500-mile race?

$$500 \text{ miles} \div 2.5 \text{ miles} = 200 \text{ laps}$$

B What would be the driver's average speed if he or she takes $2\frac{3}{4}$ hours to complete the race?

$$d = v \times t$$

$$v = d / t = 500 \text{ miles} / 2.75 \text{ hours} = 181.81 \text{ miles/hour}$$

2. The Goldenrod Land Speed Racer once raced across the salt flats at 409 miles/hour. At that rate, how long would it take the racer to travel 100 miles?

$$d = v \times t$$

$$t = d / v = 100 \text{ miles} / 409 \text{ miles/hour} = .244 \text{ hour}$$

3. Remembering the history of racing discussed in this unit, why do you think Henry Ford first built a race car and tried to win a race with it? Do you think his reason was similar or different from the reason many drivers offer today for wanting or needing to win?

Henry Ford wanted to get attention from sponsors so that they would invest money in his car company. Race car drivers today constantly need to win or perform well to attract sponsors.

4. Which of Newton's three laws of motion is best represented by each action described below?

A In order to push a car forward, the man in the pits pushes his feet against the track, and the track pushes back.

3rd law: A force in one direction will be equal and opposite to a force in the other direction

B A large heavy car is harder to push than a lighter car.

2nd law: force = mass times acceleration

C The driver suddenly hits the brakes of the car in which you are riding; your seat belt prevents your face from hitting the dashboard.

1st law: an object in motion will continue in motion

D A race car runs out of gas and coasts long enough to get back to the pit area to refuel.

1st law: an object in motion will continue in motion

5. Use your knowledge from reading this unit on forces, motion and innovation to answer this question: Why do drivers and their engineers try to keep their race cars as light as possible?

$$F = ma$$

A large mass means less acceleration but a lighter car (less mass) means more acceleration.

6. Make a sketch of a racetrack and show what part or parts of the track would need to be banked the most. Why?

The track needs to be banked the most in the tightest turns or corners. According to Newton's first law, cars tend to always continue in a straight line unless a force intervenes. If the track is curved, a force is necessary to turn the car around the curve and stay on the track. The force of the banked track helps the car turn instead of going straight.

7. Why do race car drivers position their cars closely packed together in a long line while racing around the track?

This configuration makes use of aerodynamic forces. The air goes over the top of the first car and then continues over all the cars in the row, making the cars in the back not have to fight the wind as much.

8. If you were designing a wing or airfoil to take advantage of Bernoulli's principle, should the surface of the wing be longer over the top or longer over the bottom for each of the following cases?

A Flying an airplane

An airplane wing needs to be longer on top, so the faster moving air above the wing causes a force upward to keep the airplane in the air.

B Creating downforce from an oncoming wind

A race driver wants downforce, so the bottom surface of an airfoil would be longer in order to produce a drop in pressure on its underside.

9. A NASCAR race car might go through 2 to 3 sets of tires during a race. Use terms from science and physics to explain why tires on a NASCAR racer can wear out so fast.

NASCAR race cars go around a lot of corners where the tires on the track need to provide a lot of force to keep the cars on the track. Because the tires do slide some when going around the curves, and because the tires get hot due to friction, they wear out rapidly.