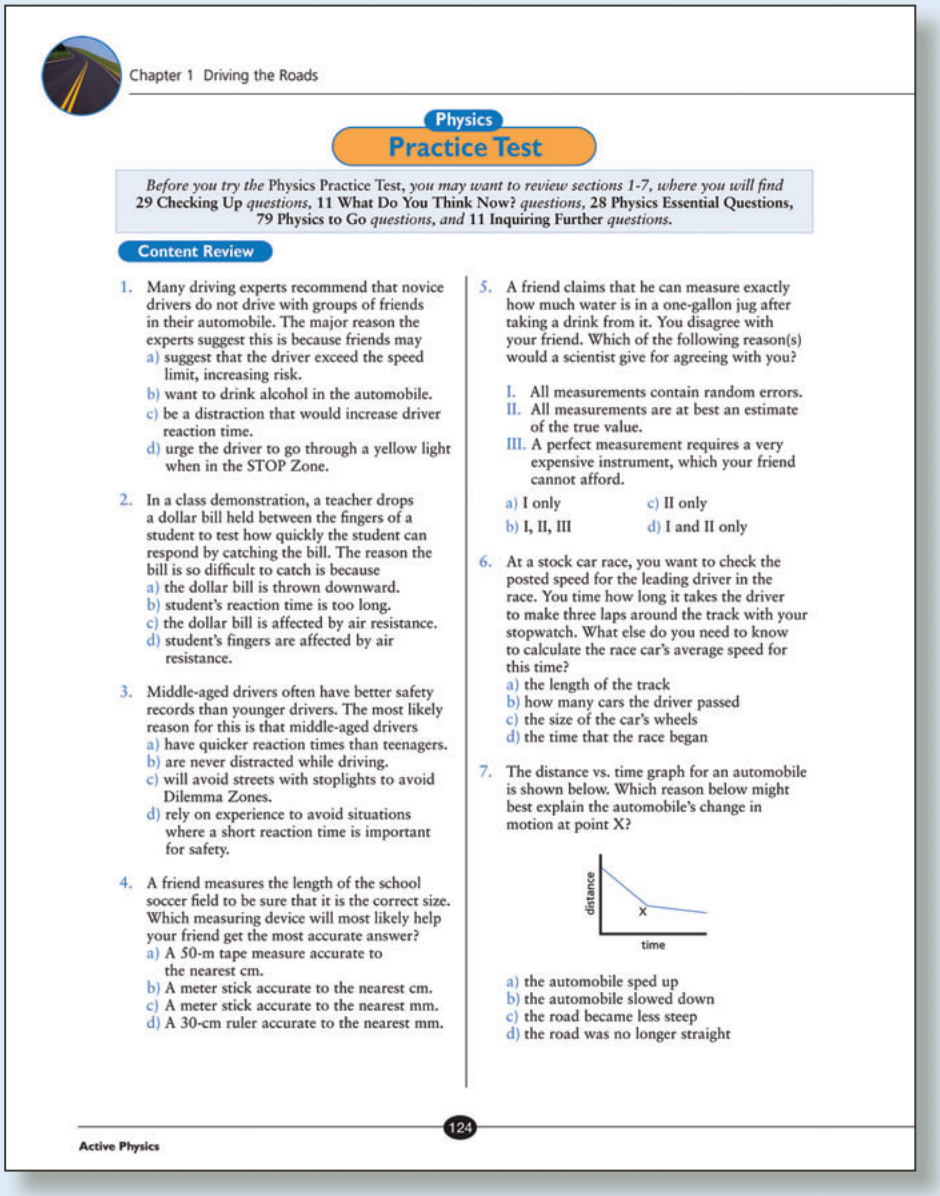
Physics Practice Test

The *Physics Practice Test* is provided as a Blackline Master in your *Teacher Resources CD*.

1c Blackline Master

Content Review

1. c
2. b
3. d
4. a
5. d
6. a
7. b



Chapter 1 Driving the Roads

Physics
Practice Test

Before you try the Physics Practice Test, *you may want to review sections 1-7, where you will find* **29 Checking Up** *questions,* **11 What Do You Think Now?** *questions,* **28 Physics Essential Questions, 79 Physics to Go** *questions, and* **11 Inquiring Further** *questions.*

Content Review

1. Many driving experts recommend that novice drivers do not drive with groups of friends in their automobile. The major reason the experts suggest this is because friends may
   a) suggest that the driver exceed the speed limit, increasing risk.
   b) want to drink alcohol in the automobile.
   c) be a distraction that would increase driver reaction time.
   d) urge the driver to go through a yellow light when in the STOP Zone.

2. In a class demonstration, a teacher drops a dollar bill held between the fingers of a student to test how quickly the student can respond by catching the bill. The reason the bill is so difficult to catch is because
   a) the dollar bill is thrown downward.
   b) student's reaction time is too long.
   c) the dollar bill is affected by air resistance.
   d) student's fingers are affected by air resistance.

3. Middle-aged drivers often have better safety records than younger drivers. The most likely reason for this is that middle-aged drivers
   a) have quicker reaction times than teenagers.
   b) are never distracted while driving.
   c) will avoid streets with stoplights to avoid Dilemma Zones.
   d) rely on experience to avoid situations where a short reaction time is important for safety.

4. A friend measures the length of the school soccer field to be sure that it is the correct size. Which measuring device will most likely help your friend get the most accurate answer?
   a) A 50-m tape measure accurate to the nearest cm.
   b) A meter stick accurate to the nearest cm.
   c) A meter stick accurate to the nearest mm.
   d) A 30-cm ruler accurate to the nearest mm.

5. A friend claims that he can measure exactly how much water is in a one-gallon jug after taking a drink from it. You disagree with your friend. Which of the following reason(s) would a scientist give for agreeing with you?

   I. All measurements contain random errors.
   II. All measurements are at best an estimate of the true value.
   III. A perfect measurement requires a very expensive instrument, which your friend cannot afford.

   a) I only
   b) I, II, III
   c) II only
   d) I and II only

6. At a stock car race, you want to check the posted speed for the leading driver in the race. You time how long it takes the driver to make three laps around the track with your stopwatch. What else do you need to know to calculate the race car's average speed for this time?
   a) the length of the track
   b) how many cars the driver passed
   c) the size of the car's wheels
   d) the time that the race began

7. The distance vs. time graph for an automobile is shown below. Which reason below might best explain the automobile's change in motion at point X?

   a) the automobile sped up
   b) the automobile slowed down
   c) the road became less steep
   d) the road was no longer straight

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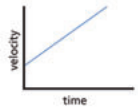
8. Some students decide to take a bike ride. For the first two hours they travel at a speed of 15 mi/hr, they then stop for lunch for an hour. The students then ride for another hour at 10 mi/hr. What was their average speed for the trip?
   a) 10 mi/hr
   b) 12.5 mi/hr
   c) 13.3 mi/hr
   d) 15 mi/hr

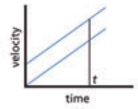
9. The graph below shows the velocity of an automobile vs. time as the automobile accelerates on a road. An automobile that has a greater acceleration would have a velocity vs. time graph that has



   a) a higher velocity at $t = 0$.
   b) a lower velocity at $t = 0$.
   c) a greater slope.
   d) a longer line.

10. A police officer accelerates from rest to catch a speeding motorcycle traveling with constant velocity on a highway. To catch up to the speeder, the police car must
   a) have an acceleration less than the speeding motorcycle.
   b) match the speeding motorcycle's velocity.
   c) match the police car's acceleration to the speeding motorcycle.
   d) have a velocity greater than the speeding motorcycle.

11. The velocity vs. time graph for two automobiles is shown below. At time (t), the automobiles have the same



   a) velocity.
   b) acceleration.
   c) velocity and acceleration.
   d) velocity, acceleration, and distance traveled

12. Two identical automobiles are approaching a yellow light. The first automobile has a speed 30 mi/hr, and the second automobile has a speed 42 mi/hr. Compared to the 30 mi/hr automobile, the stopping distance of the 42 mi/hr automobile will be
   a) the same
   b) 1.4 times longer
   c) double
   d) 4 times longer

13. Which of the following has no effect on the stopping distance of an automobile approaching a yellow light?
   a) the driver's reaction time
   b) the automobile's velocity
   c) the condition of the automobile's brakes
   d) the time the light remains yellow

14. A student is holding an accelerometer made of a ball hanging from a piece of string in her hand. The student is then spun around in a rotating chair as shown. The direction of the hanging string when the chair is rotating indicates

   a) the centripetal force is away from the student.
   b) the centripetal acceleration is toward the student.
   c) the direction of rotation of the chair.
   d) the force needed to overcome the friction of the chair.

15. Which of the following objects cannot be used to accelerate an automobile?
   a) the gas pedal
   b) the brake pedal
   c) the steering wheel
   d) the rearview mirror

8. a
9. c
10. d
11. b
12. c
13. d
14. b
15. d

Critical Thinking

16.a)

Measuring instruments needed are a stopwatch and velocimeter. Alternative instruments that may be used are a stopwatch and meter stick, depending upon the method a student uses to calculate the acceleration.

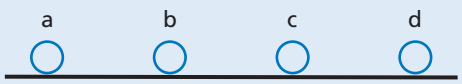
16.b)

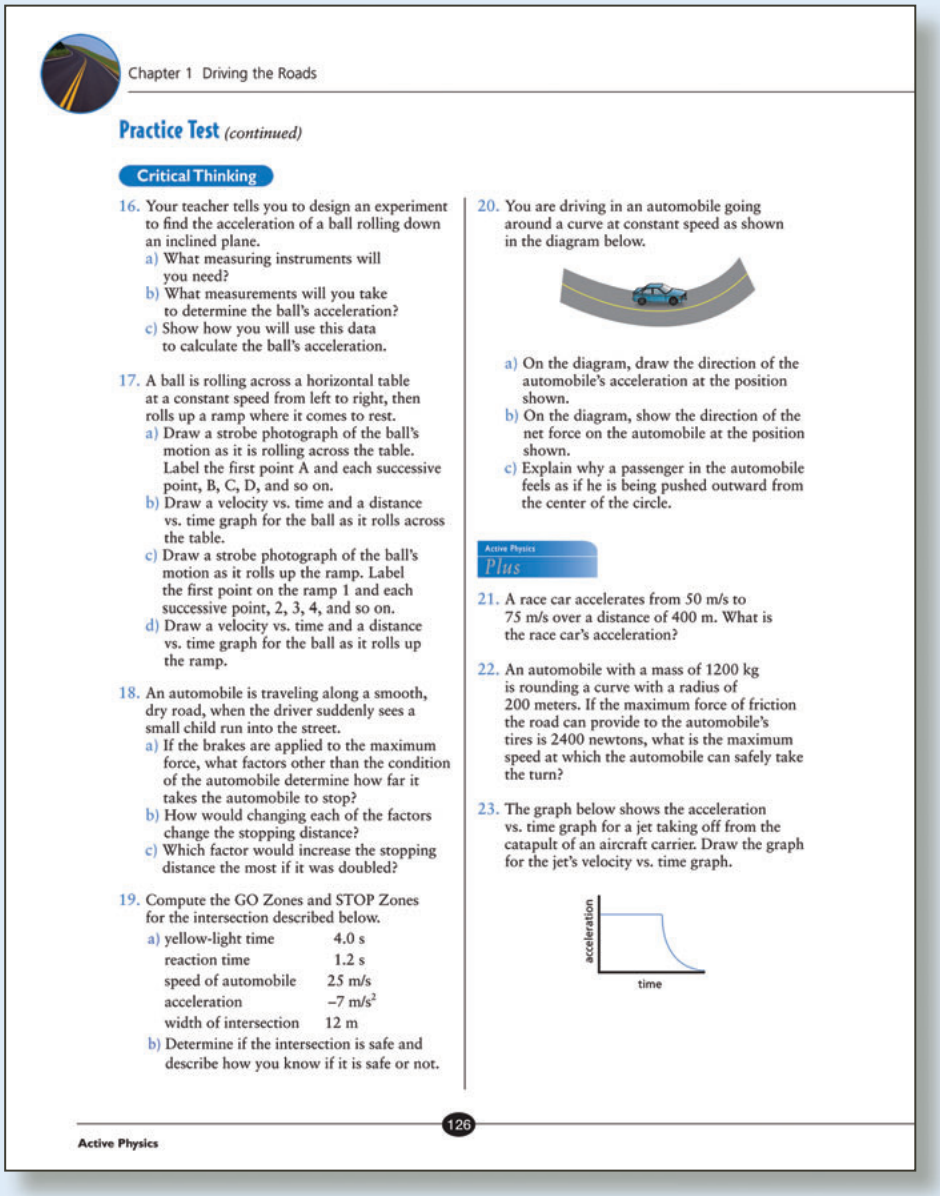
Possible answers include measuring the speed of the ball at two points using the velocimeter, and the time required for the ball to travel between those two points; or, using the stopwatch and meter stick to determine the distance between the two points, and the time required to travel that distance.

16.c)

Data will be calculated using the equation $a = \Delta v / \Delta t$ or, for the second method, using the equation $d = \frac{1}{2} a t^2$.

17.a)





Chapter 1 Driving the Roads

Practice Test *(continued)*

Critical Thinking

16. Your teacher tells you to design an experiment to find the acceleration of a ball rolling down an inclined plane.
    a) What measuring instruments will you need?
    b) What measurements will you take to determine the ball's acceleration?
    c) Show how you will use this data to calculate the ball's acceleration.

17. A ball is rolling across a horizontal table at a constant speed from left to right, then rolls up a ramp where it comes to rest.
    a) Draw a strobe photograph of the ball's motion as it is rolling across the table. Label the first point A and each successive point, B, C, D, and so on.
    b) Draw a velocity vs. time and a distance vs. time graph for the ball as it rolls across the table.
    c) Draw a strobe photograph of the ball's motion as it rolls up the ramp. Label the first point on the ramp 1 and each successive point, 2, 3, 4, and so on.
    d) Draw a velocity vs. time and a distance vs. time graph for the ball as it rolls up the ramp.

18. An automobile is traveling along a smooth, dry road, when the driver suddenly sees a small child run into the street.
    a) If the brakes are applied to the maximum force, what factors other than the condition of the automobile determine how far it takes the automobile to stop?
    b) How would changing each of the factors change the stopping distance?
    c) Which factor would increase the stopping distance the most if it was doubled?

19. Compute the GO Zones and STOP Zones for the intersection described below.
    a) yellow-light time 4.0 s
    reaction time 1.2 s
    speed of automobile 25 m/s
    acceleration -7 m/s^2
    width of intersection 12 m
    b) Determine if the intersection is safe and describe how you know if it is safe or not.

20. You are driving in an automobile going around a curve at constant speed as shown in the diagram below.

    a) On the diagram, draw the direction of the automobile's acceleration at the position shown.
    b) On the diagram, show the direction of the net force on the automobile at the position shown.
    c) Explain why a passenger in the automobile feels as if he is being pushed outward from the center of the circle.

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21. A race car accelerates from 50 m/s to 75 m/s over a distance of 400 m. What is the race car's acceleration?

22. An automobile with a mass of 1200 kg is rounding a curve with a radius of 200 meters. If the maximum force of friction the road can provide to the automobile's tires is 2400 newtons, what is the maximum speed at which the automobile can safely take the turn?

23. The graph below shows the acceleration vs. time graph for a jet taking off from the catapult of an aircraft carrier. Draw the graph for the jet's velocity vs. time graph.

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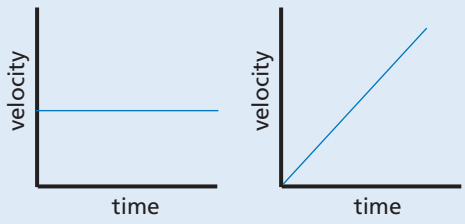
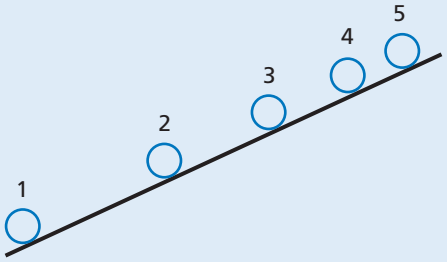
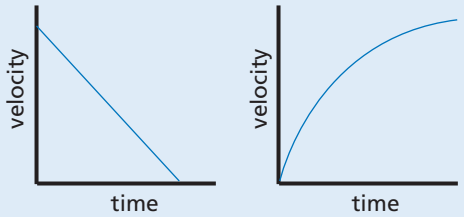
17.b)



17.c)



17.d)



18.a)

The factors that would determine the stopping distance would be reaction time and speed. The road surface also determines the friction, which has an effect on the stopping distance.

18.b)

Increasing the reaction time and the automobile's speed would increase the stopping distance. If the road was wet or snow-covered, the stopping distance would also increase.

18.c)

Doubling the speed would quadruple the stopping distance, which would double the effect of increasing the stopping distance. Doubling the road friction would decrease the stopping distance.

19.a)

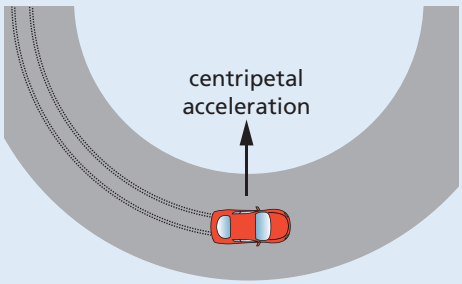
GO Zone = (v)(yellow-light time) – intersection width = 88 m

STOP Zone = (v)(reaction time) + $v^2/2a$ = 105 m

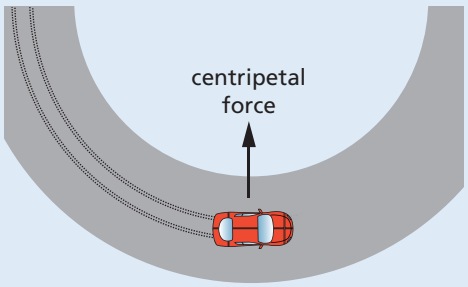
19.b)

There is a 17-m Dilemma Zone, so the intersection is unsafe.

20.a)



20.b)



20.c)

The reason the passenger feels as if they are being pushed outward toward the door is that they are going straight, while the automobile is turning into them. The automobile door ultimately will provide the centripetal force that makes the passenger go around the circle with the automobile.

21.

3.9 m/s^2

22.

20 m/s

23.