Unit 4 Review

Vocabulary Review
Each term may be used once.

acceleration	inertia	scalar
constant acceleration	interaction pair	time interval
constant velocity	net force	uniform motion
displacement	Newton's first law	vector quantity
force	Newton's second law	velocity
force of gravity	Newton's third law	velocity-time graph
friction force	position-time graph	

1. A quantity that has a magnitude and direction is a(n) _____.

2. A change in time is a(n) _____.

3. The change in position of an object is its _____.

4. The ratio of the displacement to the time interval in which the displacement occurs is the _____.

5. The _____ is the ratio of the change in velocity to the time interval in which the change took place.

6. A quantity that has only a magnitude is a(n) _____.

7. A graph that shows how position depends on time is a(n) _____.

8. In _____ equal displacements occur during successive equal time intervals.

9. An object that has the same average velocity for all time intervals is moving at _____ _____.

10. A graph that shows how velocity depends on time is a(n) _____.

11. Motion that can be described by a constant slope on a velocity time graph is _____ _____.

12. The vector sum of two or more forces acting on an object is the _____.

13. The acceleration of a body is directly proportional to the net force on it and inversely proportional to its mass; this is a statement of _____.

14. The two forces in an interactive pair act on different objects and are equal in magnitude and opposite in direction; this is a statement of _____.

15. An attractive force that exists between all objects is _____.

16. An object that is at rest will remain at rest or an object that is moving will continue to move in a straight line with constant speed, if and only if the net force acting on the object is zero; this is a statement of _____.

17. The horizontal force exerted on one surface by another when surfaces are in relative motion is the _____.

18. The tendency of an object to resist changes in its motion is _____.

19. A push or pull is a(n) _____.

20. Two forces that are in opposite directions and have equal magnitudes are a(n) _____ _____.

Multiple Choice

The position-time graph below shows the position of a teacher at various times as he walks across the front of the room. The position 0 m represents the left side of the room and movement to the right is positive. Circle the letter of the choice that best completes each statement.

1. The teacher was walking to the right during the time interval

   a. 1 – 2 s b. 6 – 7 s c. 10 – 12 s d. 7 – 12 s

2. The teacher's displacement for the time interval 0 – 3 s is

   a. –3 m b. 0 m c. +1 m d. +3 m

3. The teacher's average velocity for the time interval 1 – 3 s is

   a. –1 m/s b. +1 m/s c. +2 m/s d. +3 m/s

4. The teacher is standing still during the time interval

   a. 1 – 2 s b. 6 – 7 s c. 10 – 12 s d. 12 – 15 s

5. The average velocity for the time interval 10 – 12 s is

   a. +1 m/s b. +0.5 m/s c. 0 m/s d. –0.5 m/s

6. The teacher's average velocity for the time interval 0 – 15 s is

   a. –2 m/s b. 0 m/s c. +0.067 m/s d. +0.75 m/s

Short Answer

Refer to the diagrams below, showing the location of an object represented by a circle. Complete the table by writing the position of each object.

For each term on the left, write the letter of the matching term on the right.

1. _____ symbol that represents time interval
2. _____ Greek letter delta used to mean change
3. _____ definition of time interval
4. _____ one way of representing the vector quantity acceleration
5. _____ symbol that represents position
6. _____ magnitude of the displacement vector
7. _____ definition of displacement
8. _____ one way of representing the vector quantity velocity
9. _____ symbol that represents displacement
10. _____ symbol that represents the scalar quantity mass

a. distance
b. m
c. Δt
d. $\vec{a}$
e. Δd
f. Δ
g. v
h. d
i. $t_2 - t_1$
j. $d_2 - d_1$

A minivan travels along a straight road. It initially starts moving towards the east. Below is the position-time graph of the minivan. Use the information in the graph to answer questions 1 to 7.

1. Does the minivan move to the east? If so, during which time interval(s)?

2. Does the minivan move to the west? If so, during which time interval(s)?

3. Is the minivan's speed between t_1 and t_2 greater than, less than, or equal to its speed between t_2 and t_3?

4. Is the minivan's speed between t_4 and t_5 greater than, less than, or equal to its speed between t_6 and t_7?

5. Does the minivan ever stop completely? If so, at which time(s)?

6. Does the minivan ever move with a constant velocity? If so, at which time(s)?

7. What is the total displacement of the minivan during the trip?

Refer to the velocity-time graph of a jogger to complete the two tables.

8. During a relay race along a straight road, the first runner on a three person team runs a distance d_1 with a velocity v_1. The runner then hands off the baton to the second runner, who runs d_2 with a constant velocity v_2. The baton is then passed to the third runner, who completes the race by traveling d_3 with a constant velocity of v_3.

   a. In terms of d and v, find the time it takes for each runner to complete a segment of the race.

      Runner 1 _____ Runner 2 _____ Runner 3 _____

   b. What is the total distance of the race course?

      _____

   c. What is the total time it takes for the team to complete the race?

      _____

9. During takeoff, a plane accelerates at $4\ \text{m/s}^2$ and takes 40 s to reach takeoff speed. What is the velocity of the plane at takeoff?

10. Below is the velocity-time graph of an object moving along a straight path. Use the information in the graph to fill in the table below.

    For each of the lettered intervals below, indicate the motion of the object (whether it is speeding up, slowing down, or at rest), the direction of the velocity (+, –, or 0), and the direction of the acceleration (+, –, or 0).

Time Interval	Motion	v	a
A			
B			
C			
D			
E			

11. A soccer ball with a mass of 0.950 kg is traveling east at 10 m/s. What is the momentum of the soccer ball?

12. A force of 200 N directed south is exerted on the ball in question 11 for 0.025 s. What is the impulse on the ball?