1. Speed and velocity are the same thing.
   A. true  B. false

2. If you know the speed and amount of time, how can you find distance?
   A. \(d = s - t\)  B. \(d = t - s\)
   C. \(d = s \times t\)  D. it is unrelated to speed/time

3. A change in direction ALWAYS causes a change in
   A. speed  B. velocity
   C. time  D. both A and B

4. A body accelerates if it
   A. speeds up  B. slows down
   C. changes direction  D. all of the above

5. ___________ acts only between surfaces that are in contact.
   A. Inertia  B. Gravity
   C. Friction  D. A net force

6. An object of large mass has ___________ than an object of small mass.
   A. more inertia  B. less inertia

7. A constant velocity means acceleration is
   A. positive  B. negative
   C. increasing  D. zero

8. Two ways to change acceleration are…
   A. change speed and direction
   B. change momentum and velocity
   C. change momentum and direction
   D. change frame of reference and momentum

9. The rate of acceleration due to gravity on Earth is
   A. always different depending on the mass of an object
   B. 98 km/min
   C. 9.8 m/s²
   D. .98 m/s

10. A paper airplane flies 10 meters in 5 seconds. What is its speed?
    A. 2 m/s  B. \(\frac{1}{2}\) m/s
    C. 50 m/s  D. 20 m/s

11. A car drives for 2 hours at 50 km/h. How far did it go?
    A. 25 km  B. 200 km
    C. 100 km  D. 1/25 km

12. How long does it take an ant to travel 6 km if its speed is 2 km/h?
    A. 12 hours  B. 3 hours
    C. 2 hours  D. 1/3 hours
13. Tom is snowboarding at Bogus. He is traveling at 2 m/s as he gets off the chair lift. Exactly 2 seconds later he is near the bottom of the exit ramp traveling at 4 m/s in the same direction. What is his acceleration?
   A. 4 m/s²  
   B. 2 m/s²  
   C. 8 m/s²  
   D. 1 m/s²

14. A 2000 kg truck has a velocity of 10 km/h. What is its momentum?
   A. 20,000 kg km/h  
   B. 200 kg km/h  
   C. 200,000 kg km/h  
   D. 2000 kg km/

15. Which of the following is an example of a situation involving negative acceleration?
   A. a scooter rolling backward at a steady speed  
   B. a train slowing as it approaches a station  
   C. a rocket leaving the launch pad to enter orbit  
   D. a sprinter starting a 100 meter race

16. The gravitational force between two objects
   A. decreases as the distance between them increases  
   B. decreases as the distance between them decreases  
   C. decreases as they accelerate toward each other  
   D. decreases the mass and velocity of each object

17. A marble and a feather dropped in a vacuum from the same height at the same time will fall at the same rate. Mass has no effect on an object’s rate of acceleration. What effect, then, does the marble’s greater mass have?
   A. The marble’s mass has no effect on anything.  
   B. The marble travels at a higher velocity.  
   C. The marble hits the ground with greater momentum.  
   D. The marble slows down before it hits the ground.

18. According to Newton’s second law of motion, force equals mass times
   A. velocity  
   B. momentum  
   C. acceleration  
   D. mass

19. Inertia is the resistance of an object to a change in its
   A. gravity  
   B. motion  
   C. mass  
   D. balanced force

20. Electra is accelerating as she skates on the ice. However, the speed at which she is skating has not changed. A possible explanation for this is that Electra
   A. turned as she was skating around the rink.  
   B. is skating in a straight line.  
   C. has reached the top speed at which she can skate.  
   D. has stopped skating and is now standing still.

21. On a roller coaster, the cars first climb a hill at a decreasing speed. Then the cars speed up as they go down the hill, before coasting at a steady speed on a straight track. Finally, the cars slow down as the ride ends. The cars have zero acceleration while
   A. climbing the hill  
   B. descending the hill  
   C. coasting on the straight track  
   D. near the end of the track
22. An object’s distance-time graph shows that it moves 10 meters during the first 10 seconds and moves an additional 5 meters during the next 10 seconds. The object has
A. positive acceleration   B. negative acceleration
C. zero acceleration     D. no velocity

23. Draw a graph that shows the speed of a person on a bike. After 10 minutes, the bicyclist has gone 3 miles; after 5 more minutes the bicyclist has gone another mile. From 15 to 20 minutes, the bicyclist takes a break. In the next 15 minutes, the bicyclist covers another 4 miles. (Be sure to use a ruler, label the vertical and horizontal axis.)

24. Draw a graph to show the acceleration of a car using the following data:

<table>
<thead>
<tr>
<th>POINT</th>
<th>VELOCITY (m/s)</th>
<th>TIME (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 m/s</td>
<td>0 sec</td>
</tr>
<tr>
<td>B</td>
<td>4 m/s</td>
<td>2 sec</td>
</tr>
<tr>
<td>C</td>
<td>4 m/s</td>
<td>5 sec</td>
</tr>
<tr>
<td>D</td>
<td>2 m/s</td>
<td>7 sec</td>
</tr>
</tbody>
</table>
In the blank next to each example, write which of Newton’s Laws is described (you may write 1st, 2nd or 3rd)

25. a rocket taking off
26. Cart 2 accelerating slower when mass was increased
27. pushing off the wall at the ice skating rink and going the opposite direction
28. a driver without a seat belt getting thrown from the car in a collision.

Write 5 forces in the correct space on the picture below. (friction, gravity, applied, normal, air resistance, tension, spring, electrical, magnetic)

30. Calculate the speed of a bike using the following measurements:
   Distance = 80 km
   Time = 2 hrs

31. Which of Newton’s Laws is best illustrated below? Circle the correct law: 1st 2nd 3rd

1st Law: An object in motion stays in motion, an object at rest stays at rest unless acted upon by another force.
2nd Law: \( f = ma \)
3rd Law: For every action, there is an equal and opposite reaction.
32. The graph below shows the motion of an object. In the blanks provided, describe the motion of the object at each section on the graph.

Describe the acceleration of the object at each section of the graph below. Use the words positive, negative or zero.

A = 

B = 

C = 

33. Calculate the acceleration of an object using the measurements below. Set up the equation (units = m/s²)

Initial velocity = 6 m/s  final velocity = 12 m/s  time = 4 sec.

Can an object accelerate without changing speed? (circle one)  Yes  or  no

34. Calculate the force of the same object in question 33 using the mass below and the acceleration you just calculated above. Set up the equation (units = Newtons).

Mass = 50 kg

35. What does Newton’s 2nd Law state about the relationship between force, mass and acceleration? Show your understanding by completing each of the following statements.

If mass increases and force stays the same, acceleration will ____________

If force increases and mass stays the same, acceleration will ____________

If mass decreases and force stays the same, acceleration will ____________