**Motion Practice #4: Kinematics Motion Review**

***INSTRUCTIONS****: Complete the following problems in your journal! Show your process clearly and include proper units throughout calculations for every problem!*

1. The positions of three cars are tracked every second and are represented by a dot on the diagram below.

**Car A**

**Car B**

**Car C**

* 1. Qualitatively describe the motion of the 3 cars
  2. Which car has the greater average velocity from *t2* to *t3*?
  3. Which car reaches the finish line first?
  4. When does Car B pass Car A?

1. Andy kicks a soccer ball so that the ball, which started at rest, leaves his foot at a speed of 24 m/s.
   1. If the contact time was 0.25 seconds, what was the acceleration of the ball?
   2. Andy runs downfield at a steady speed of 4.5 m/s. How long does it take him to travel 60. meters?
2. Leslie coasts down a steady slope on her new mountain bike and her speed goes from 2.0 m/s to 15 m/s in a time of 4.0 seconds.
   1. What is Leslie’s acceleration?
   2. How far did she travel in that time?
3. Ron throws a ball up in the air with an initial velocity of 30. m/s.
   1. What speed will it have when it returns to Ron’s level? (ignore air drag)
   2. In the presence of air resistance, will its speed when he catches it be greater or less than your answer above?
4. Use proportional reasoning to answer the following questions:
   1. How many times greater is an object’s speed if it’s been falling for 8.0s compared to an object that’s been falling for 2.0s?
   2. How much farther has the first object fallen compared to the second one?
5. Chris is preparing to jump off of the 20. m diving platform.
   1. After he jumps, how long will it take Chris to hit the water?
   2. How fast will Chris be going when he enters the water?

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   1. After he jumps, how long will it take Chris to hit the water?
   2. How fast will Chris be going when he enters the water?
10. Ben crash lands on a mysterious planet. He drops a rock from a 8.0 m cliff.
    1. If it takes 0.50 seconds to hit the ground at the bottom of the cliff, what is the acceleration due to gravity on this mysterious planet?
    2. How fast will the rock be going if it falls for 2.0 seconds?
11. Sketch a velocity-time graph for Donna’s Mercedes which accelerated uniformly for 0 mi/hr to 70. mi/hr in 5.0 seconds.
12. What is the car’s speed at 3.0 seconds?
13. How far has the car travelled after 5.0 seconds?
14. What is the car’s acceleration?
15. April is on the Moon! She stands at the top of a 60. m cliff and throws a moon rock straight up with an initial velocity of 25 m/s. Assuming that
16. How long does it take to reach the top of its path?
17. How high is it at the maximum height of its path?
18. It falls back to April, how fast will it be going right before she catches it?
19. How long does it take to fall from its maximum height all the way to the bottom of the 60. m cliff?
20. How fast will it be going just before it hits the ground?
21. If she had dropped the rock from rest, how long would it take to reach to bottom of the 60. m cliff?
22. How fast would it have been going when it hits the ground?
23. A ball rolls down a frictionless incline, accelerating at a constant rate of 175 cm/s2. If it starts at rest and rolls for 1.8 seconds:
24. How fast will it be going?
25. How far will it travel?
26. Tom throws Rock A straight down of the edge of a cliff while Anne throws Rock B straight up at the same speed. If both rocks fall to the ground below, how will their speeds at impact compare?
27. What is the acceleration of a car that maintains a constant velocity of 100. km/hr 10. seconds?
28. Starting from rest, what is the distance a falling object will fall in 10.0 seconds?
29. An apple falls from rest and hits the ground 5.0 m below. Calculate its speed just before it hits the ground.
30. Calculate the total time in the air for a baseball popped up 125 m.
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