Name ________________________

Class ________________________

Part 1 – Extreme Cyclist

On page 1.2, press play and watch the animation of an extreme stunt bicyclist.

1. Fill in the blank: The extreme bicyclist's initial velocity is ________________.

On page 1.4 you can grab the point of tangency to observe the graphical meaning of the definition of the slope. The average velocity is the change in position divided by the time interval.

2. Using the graph on page 2.1, what is the average velocity from 0 to 0.95 seconds? Show your work.

3. With position function $s(t) = 8.8 + 6t - 16t^2$, find the velocity when the time is 0.5 seconds. Show your work. Check your answer graphically on page 2.3.

4. Using Calculus, express the velocity of the extreme bicyclist as a function of time. Graph your function on page 3.2.

5. What is the acceleration when $t = 0.1875$ s?

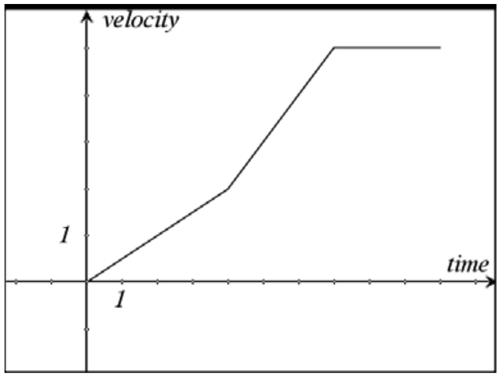
6. Describe the velocity of the extreme cyclist. Explain you reasoning.

7. When is the extreme cyclist's speed positive?

8. Why is the extreme cyclist's speed is increasing when $t = 0.2$ s?

Part 2 – Predict the Graph & Geometry Trace

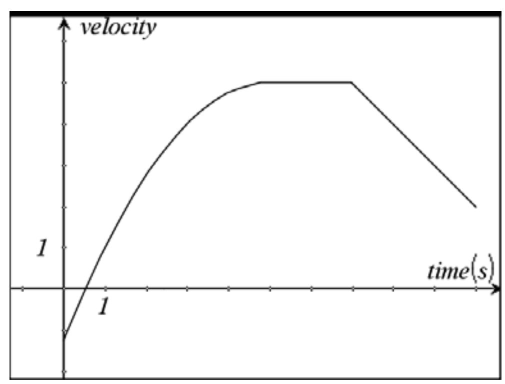
9. For the graph on page 4.2, give a correct interpretation of the graph of distance versus time provided. Also, use this space to sketch your prediction of what the corresponding velocity-time graph looks like.



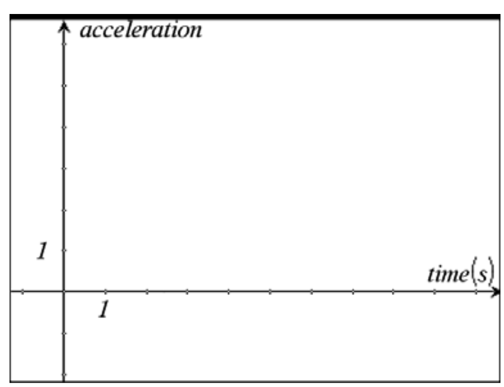
Select **Geometry Trace** (**MENU > Trace > Geometry Trace**), click on the point not on the graph (point *to click*), then press play. The bold line is the velocity-time graph.

10. Describe the motion of the object on page 4.2.

On the right, sketch your prediction of the corresponding acceleration-time graph for the given velocity-time graph from page 5.2. After pressing play, draw the acceleration-time graph boldly.



11. When $t = 5$ s, does acceleration exist? Why?

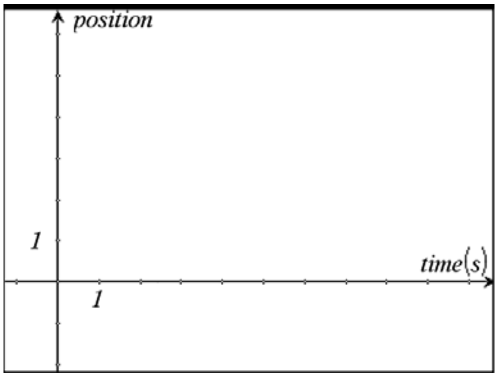


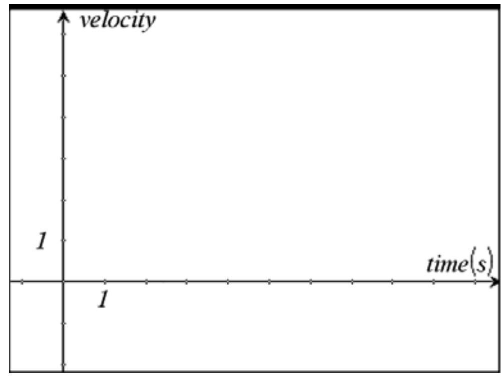
12. When $t = 7$ s, does acceleration exist? Why?

Part 3 – Extreme Airplane

Observe the airplane animation on page 6.2.

13. Sketch your prediction of what the position-time and velocity-time graphs look like from this initial examination.





14. Using the data on page 6.3, find an approximation for the acceleration at $t = 5$. Show method. Include units.

15. If the airplane data can be modeled with the $v(t) = 5 + 2\cos\left(\frac{t}{2}\right)$, when the time t is between 0 and 10 seconds, find the acceleration when $t = 8.7$ min.

Graph the velocity as a function of time on page 6.5.

16. At 8.7 minutes, is the plan speeding up or slowing down? Justify your answer.