

IB Math HL 1 Chapter 20 Review

1. Review Set 20A (2, 3, 4, 6); Review Set 20C (1 – 4)
2. Beth is on her stand up paddle board 4 miles from P, the point on shore closest to her. She needs to get to a point Q on shore that is 8 miles from P. Beth can paddle 5 miles/hour and she can run 7 miles/hour. How far from P should she land in order to get to Q as fast as possible?
3. A man 1.8 meters tall walks at a rate of 3 m per second away from a light that is 4 m above the ground. When he is 7 m from the base of the light, at what rate is the tip of his shadow moving?
4. A spherical balloon is inflating at 27 cubic cm per second. What is the rate of change of the surface area when the radius is 15 cm?
5. Two cyclists A and B leave X simultaneously at 120 degrees to one another, with constant speeds of 12 m/sec and 16 m/s respectively. Find the rate at which the distance between them is changing after 2 minutes.
6. Wesley Crusher is trying out his miniature antigravity device. In this trial, the device moves in a vertical line and its height is given by $h(t) = -\frac{2}{3}t^3 + \frac{9}{2}t^2 - 4t + 4$ meters, where t is in seconds.
 - a. Find expressions for the device's velocity and acceleration and draw sign diagrams for each of them.
 - b. On what interval(s) of time is the device's velocity decreasing?
 - c. On what interval(s) of time is the device's speed decreasing?
 - d. At what time does the device hit the ground?
 - e. What is the impact velocity of the device?
 - f. At what times does the device change direction?
 - g. Find the total distance traveled by the device during its flight.
7. A rectangular page is to contain 24 square inches of print. The margins at the top and bottom of the page are each 1.5 inches wide. The margins on each side are 1 inch. What should be the dimensions of the page so that the least amount of paper is used?