

Name: _____

Date: _____

1.2 Kinematics in 1D Practice

Unit 1: Kinematics, Vectors, and Mathematics

Instructions for each problem:

- write out all possible variables, fill in the relevant values, eliminate variables not used
- draw/model the scenario
- Write the equations you are going to use before substituting values
- Show your work and track your units
- **Extend:** rearrange the equations first to solve for the unknown

1. A stationary boat accelerates to 90 km/hr over 1 km. What is the time it takes to do this?
2. A braking train can decelerate at 0.400 m/s^2 . If the train is travelling at 160. km/hr and needs to plan to stop at a pick-up area. How far in advance does it need to apply the brakes?
3. A satellite in space is travelling at 14 m/s in one direction. A thruster is applied for 30. s and the satellite is then travelling at 12 m/s in the opposite direction. What acceleration does the thrust cause?

4. A rock is dropped off a 40. m cliff. The rock accelerates due to gravity. What is the time it takes to hit the ground?
5. A child on a toboggan slides down a snowy hill, accelerating uniformly at 2.8 m/s^2 . When the toboggan passes the first observer, it is travelling with a speed of 1.4 m/s . How fast will it be moving when it passes a second observer, who is 2.5 m downhill from the first observer?
6. A semi-loaded train travelling at $100. \text{ m/s}$ can decelerate at $20. \text{ m/s}^2$. How far in advance must the brakes be applied to come to a stop?
7. A bike rider accelerates constantly to a velocity of 7.5 m/s during 4.5 s. The bike's distance is 19 m. What is the initial velocity of the bike?

Answers: 1) 80s, 2) 2470 m, 3) -0.87 m/s^2 , 4) 2.9 s, 5) 4.0 m/s , 6) 250 m, 7) 0.94 m/s