

Formulas that always work:

$$V = \frac{\Delta x}{\Delta t} \quad a = \frac{\Delta v}{\Delta t}$$

Formulas that only work when starting from rest

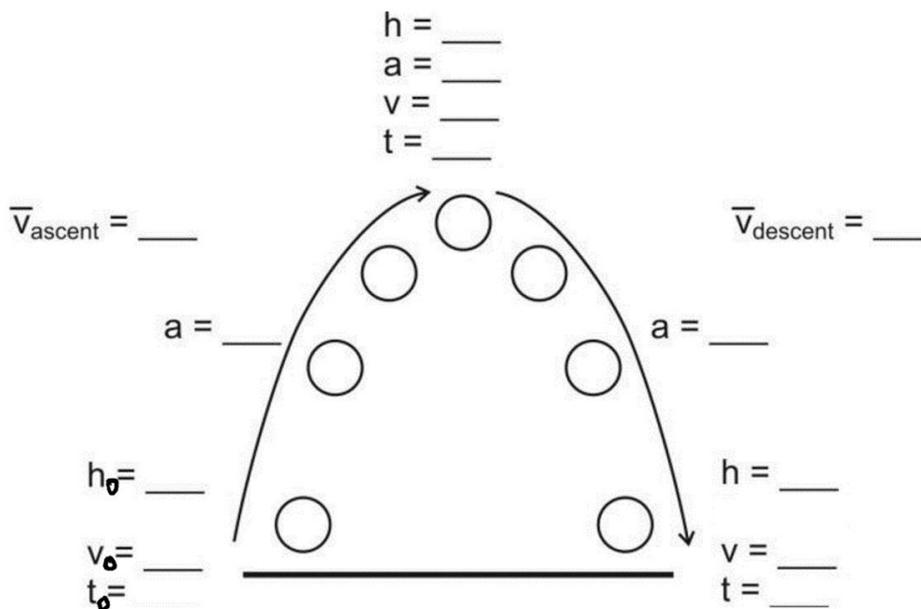
$$a = \frac{2\Delta x}{t^2} \quad \Delta x = \frac{1}{2} a t^2$$

10. Write the basic units for each of the following:

- |                 |                 |
|-----------------|-----------------|
| a. Position     | b. Speed        |
| b. Acceleration | c. Displacement |
| d. Velocity     | e. Time         |

11. Suppose an object is launched directly upward in the absence of air resistance (i.e. it is in free-fall). Between the time it is launched and the time it lands, a time of 6 seconds elapses. The object begins and ends at a height of zero meters.

Fill in all of the missing data below, given that the entire trip takes 6 seconds. [Hint: Start by writing "6s" next to the final time (t).]



Some basic conversions:

- |                    |                 |                            |                     |
|--------------------|-----------------|----------------------------|---------------------|
| 1m/s = 2.24mph     | 1 foot = 0.305m | 1km = 0.62miles            | 1m = 100cm          |
| 1 inch = 2.54cm    | 1km = 1,000m    | 1gallon = 128 fluid ounces | 1 gallon = 4 quarts |
| 1 mile = 5280 feet |                 |                            |                     |

12. If a spool tractor travels 5m, how many feet is this?

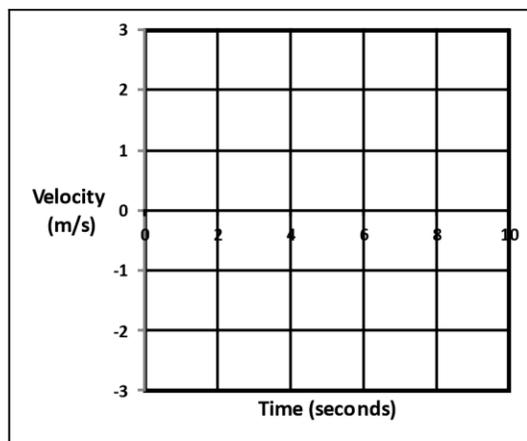
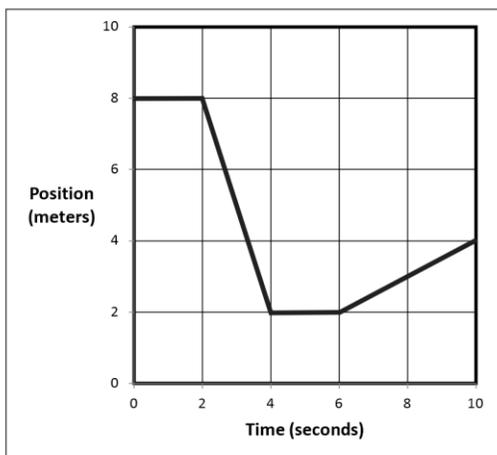
13. A car is travelling at a speed of 60mph. What is its speed in m/s?

14. Identify each of the following as either positive velocity or negative velocity.
- |                   |                    |
|-------------------|--------------------|
| Speed to the left | Speed to the right |
| Speed upward      | Speed downward     |

Match the descriptions in the left column to the descriptions in the right column

- |   |   |
|---|---|
| 15. ___ Negative velocity and positive acceleration | a. No speed, but beginning to move rightward.   |
| 16. ___ Negative velocity and negative acceleration | b. No speed, but beginning to move to the left. |
| 17. ___ Positive velocity and positive acceleration | c. No movement.                                 |
| 18. ___ Positive velocity and negative acceleration | d. Moving leftward, speeding up.                |
| 19. ___ Zero velocity and zero acceleration         | e. Moving rightward, speeding up.               |
| 20. ___ Zero velocity and negative acceleration     | f. Moving leftward, slowing down.               |
| 21. ___ Zero velocity and positive acceleration     | g. Moving rightward, slowing down               |

22. Use the information from the position vs. time graph, below, to complete the velocity vs. time graph.



23. A helicopter is sitting still on the ground. Suddenly the helicopter takes off and begins to accelerate upward. If the helicopter travels a distance of 4m in 1.5s, what is its acceleration?
24. A bus can accelerate at a rate of  $3\text{m/s}^2$ . The bus leaves a stoplight (where it was sitting motionless) and accelerates at this rate for 3 seconds. At the end of 3 seconds...
- What is the speed of the bus?
  - How far has the bus traveled?
  - What is the bus' average speed over these three seconds?