

# Velocity and Acceleration

Interpreting Graphs

• PHYSICS

NAME: ANSWER KEY

DATE: \_\_\_\_\_

## INTERPRETING GRAPHICAL INFORMATION

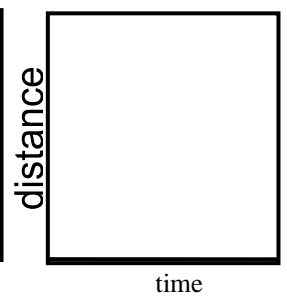
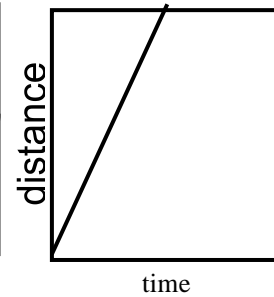
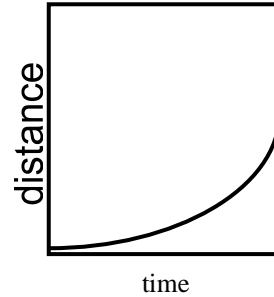
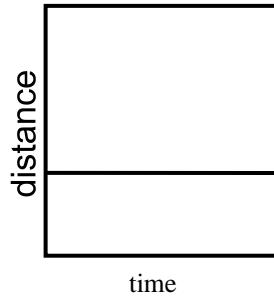
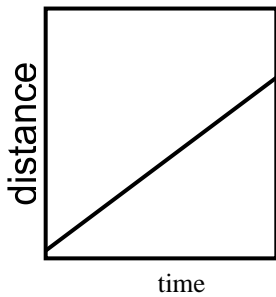
(A.)

(B.)

(C.)

(D.)

(E.)



1. Which graph(s) represent(s) constant speed?

*Constant speed means no acceleration and this means that the distance will change linearly, like a line. This happens in A., B., D., and E.*

2. Which graph(s) represent(s) a plot of zero speed?

*A special kind of constant speed is zero speed, where there is no change in distance and is represented by a flat line like in B. or E.*

3. Which graph(s) represent(s) variable speed?

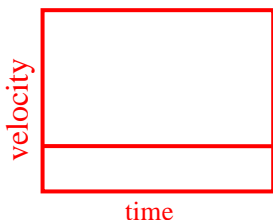
*Variable speed means speed that is not constant. This means acceleration is occurring which makes more time be covered in each consecutive time period than in the one before. This produces a curved graph like in C.*

4. Which graph represents the fastest growing speed (all graphs are of the same time interval)?

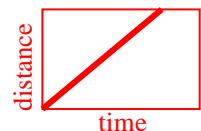
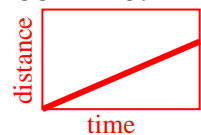
*Technically, the only speed that is increasing AT ALL is represented in graph C. because is the only graph were acceleration is happening. The speeds in B. and E. are zero and in A. and D. they are constant (not changing or growing)*

Suppose graph (B.) were a plot of velocity vs. time instead of distance vs. time. For the following questions choose your answer from A – E above.

5. What would the corresponding graph of distance vs. time look like?

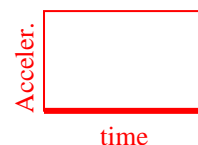


*If this were velocity versus time then it shows that the velocity is not changing. In other words, there is no acceleration. Thus the distance vs. time graphs would be increasing but as straight lines (not curves) like A. and D.*



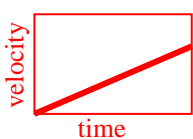
6. How about the graph of acceleration vs. time...what would that look like?

*The velocity is a flat, horizontal line and so it isn't changing. In other words acceleration is zero. This is represented by the last graph.*

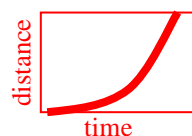


Suppose graph (A.) were a plot of velocity vs. time instead of distance vs. time. For the following questions choose your answer from A – E above.

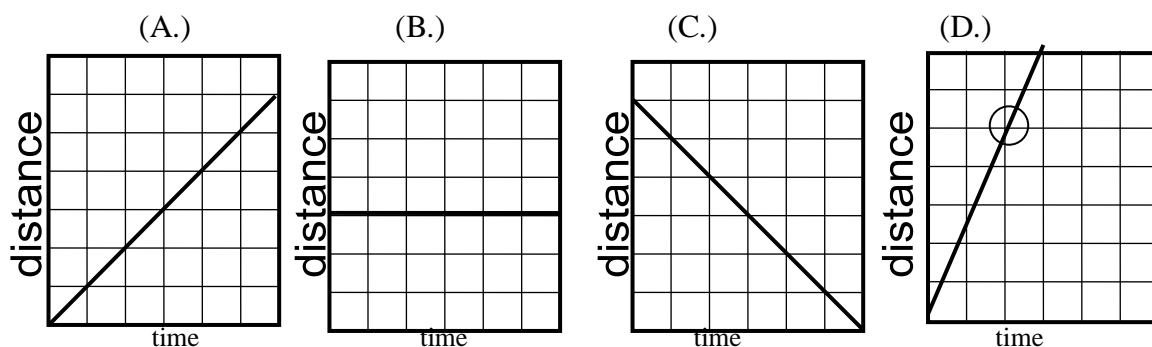
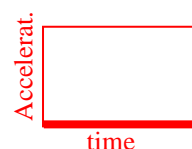
7. What would the corresponding graph(s) of distance vs. time look like?



*Now the velocity is increasing. That means acceleration, positive acceleration is happening. If acceleration is happening the distance is growing every second. This appears as a curved distance vs. time graph, in other words answer C.*



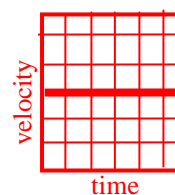
8. How about acceleration vs. time? *Acceleration is happening at a constant rate. How do we know it is constant? Because acceleration is the rate of change of the velocity. The velocity is a straight line so every second the acceleration is changing it by the same constant amount (acceleration is the slope of the velocity graph). So acceleration vs. time would be*



1. What is the distance traveled after two seconds have passed in graph (A.)? 2 units In graph (B.)? 0 units In graph (C.)? -2 units In graph (D.)? 5 units Number answers are needed here.
2. What is the average speed represented in graph (A.)? just find the slope:  $2/2 = 1 \text{ un/s}$  In graph (B.)?  $0/2 = 0 \text{ un/s}$  In graph (C.)?  $-2/2 = -1 \text{ un/s}$  In graph (D.)?  $5/2 = 2.5 \text{ un/s}$  Number answers are needed here.
3. Suppose that the graphs now represent velocity vs. time instead of distance vs. time.

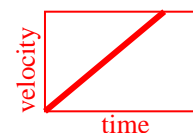
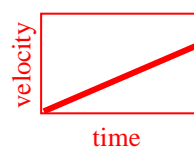
a. How much distance is traveled in graph (B.)?

*Think of the graph now as If you travel at 3 units/second for six seconds, that would be  $d = v \cdot t = 3 \text{ un/s} \cdot (6 \text{ sec}) = 18 \text{ units}$*



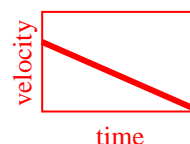
b. What is the acceleration in graph (A.)? just find the slope:  $2/2 = 1 \text{ un/s}^2$  In graph (B.)?  $0/2 = 0 \text{ un/s}^2$  In graph (C.)?  $-2/2 = -1 \text{ un/s}^2$  In graph (D.)?  $5/2 = 2.5 \text{ un/s}^2$  Number answers are needed here.

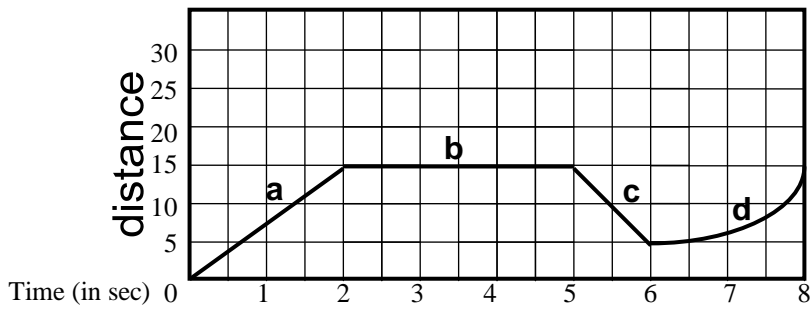
c. Which graph(s) represent(s) accelerated motion? *A and D would be accelerated motion. Velocity is increasing, the slope of the velocity graph is positive.*



d. Which graph(s) represent(s) deceleration?

*Graph C. represents deceleration. The slope of the velocity graph is negative.*





**Answer the following questions:**

1. The distance traveled during portion (b.) is zero. It starts at 15 units and ends at 15 units.
2. The acceleration during portion (a.) is zero. When the graph of distance is a line, the velocity is constant and so there is no acceleration.
3. At which portion of the graph is the velocity negative? The velocity is negative in Segment c. because the slope of the distance vs. time graph is negative.
4. Is the speed constant in portion (d.)? No. When the distance vs. time graph is a curve, then acceleration is happening.
5. What is the speed at t=1 sec.? The speed is distance over time. In other words, the slope of the distance graph.  $v = d/t = 15 \text{ units}/2 \text{ sec.} = 7.5 \text{ units/sec.}$