

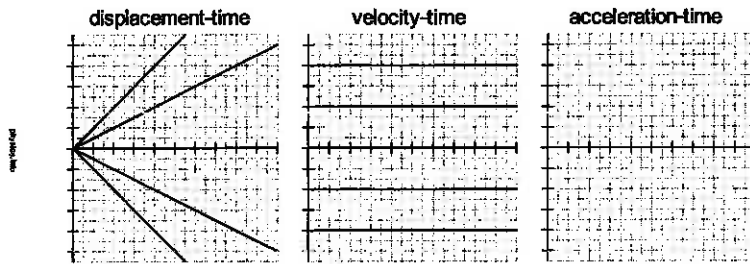
practice problem 3

Quiz - sketch

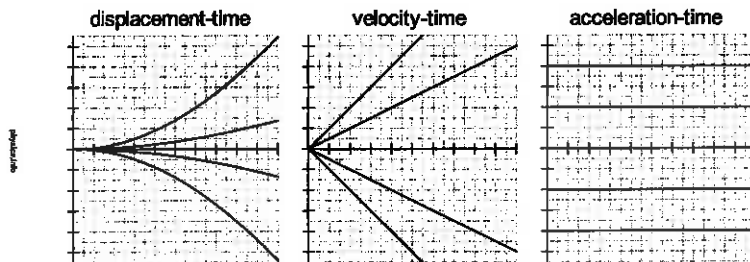
Sketch the displacement-time, velocity-time, and acceleration-time graphs for...

- a. an object moving with constant positive velocity. (Let the initial displacement be zero.)
- b. an object moving with constant positive acceleration. (Let the initial displacement and velocity be zero.)

- a. Since the velocity is constant, the displacement-time graph will always be straight, the velocity-time graph will always be horizontal, and the acceleration-time graph will always lie along the horizontal axis. When the velocity is positive, the displacement should have a positive slope. When the velocity is negative, the displacement should have a negative slope. When the velocity is zero, all the curves should be horizontal.



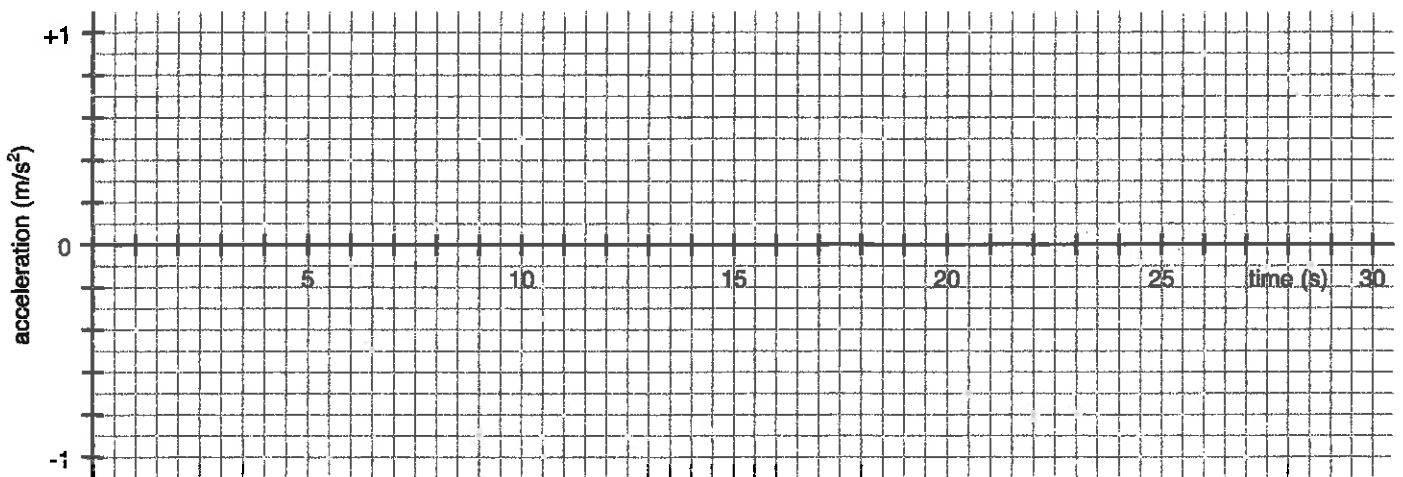
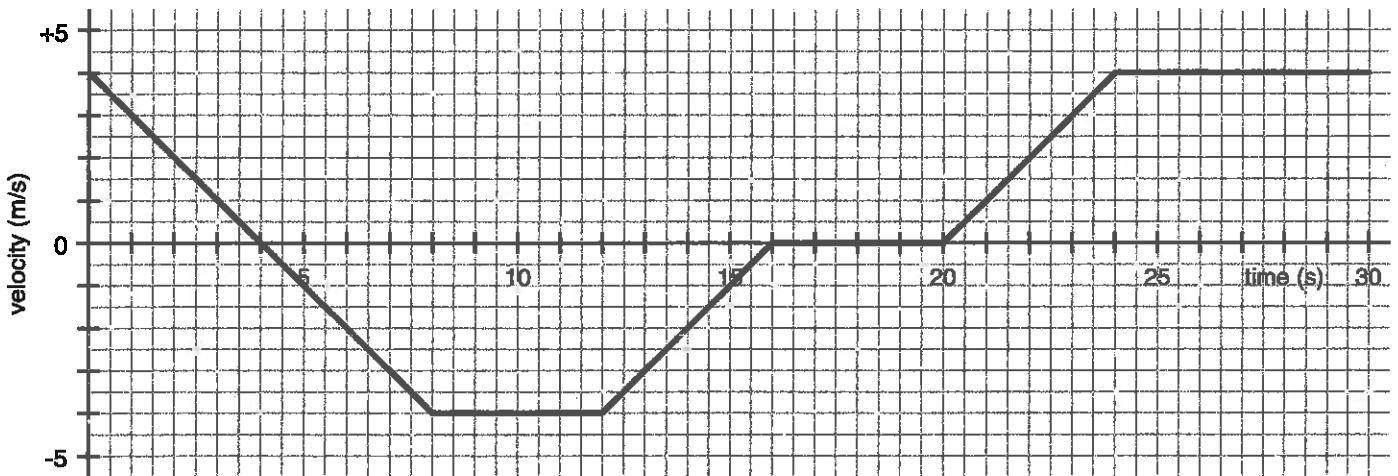
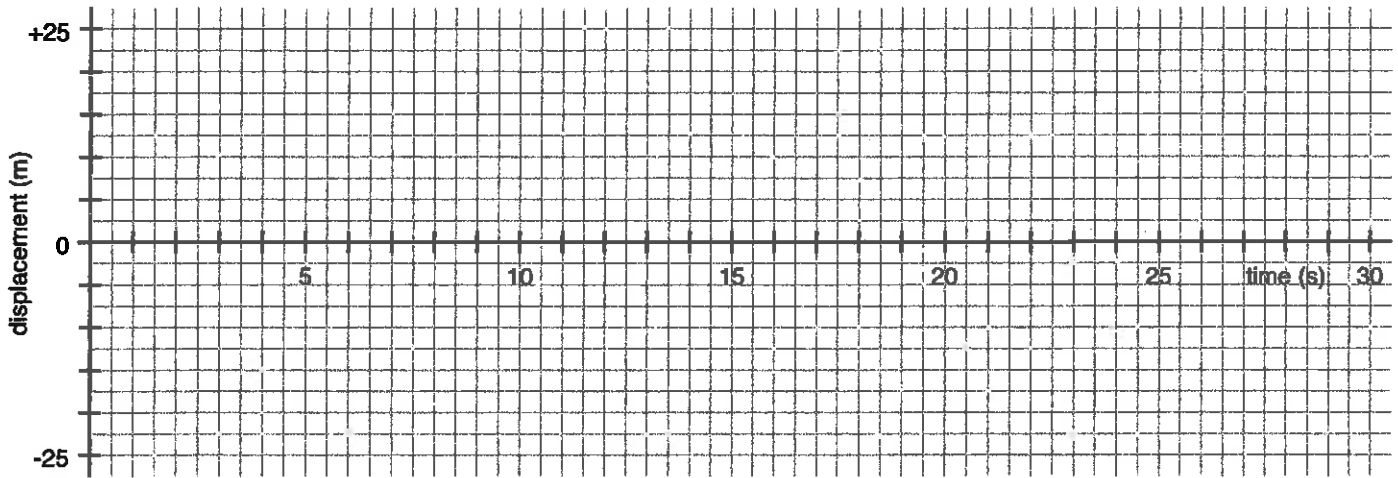
- b. Since the acceleration is constant, the displacement-time graph will always be a parabola, the velocity-time graph will always be straight, and the acceleration-time graph will always be horizontal. When the acceleration is positive, the velocity should have a positive slope, and the displacement should bend upward. When the acceleration is negative, the velocity should have a negative slope, and the displacement should bend downward. When the acceleration is zero, all the curves should be horizontal.



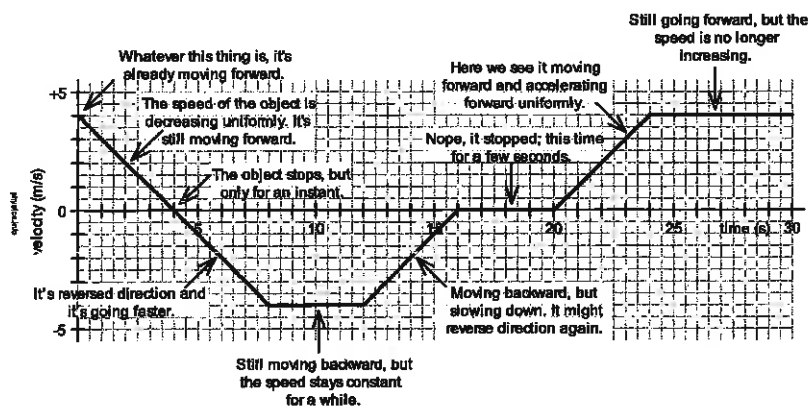
TRANSFORMING GRAPHS OF MOTION

The middle graph below shows the velocity of a hypothetical object moving along a straight line.

1. What can we say about the motion of this object?
2. Plot the corresponding graphs of displacement and acceleration as functions of time.

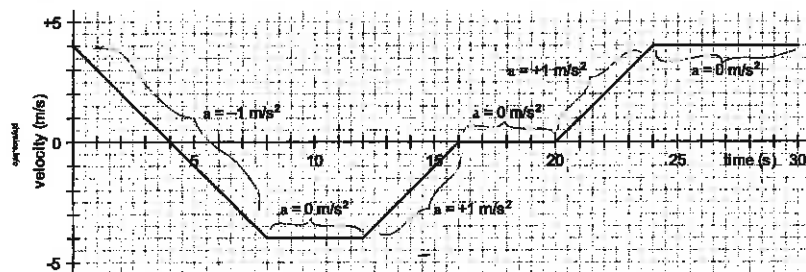


a.

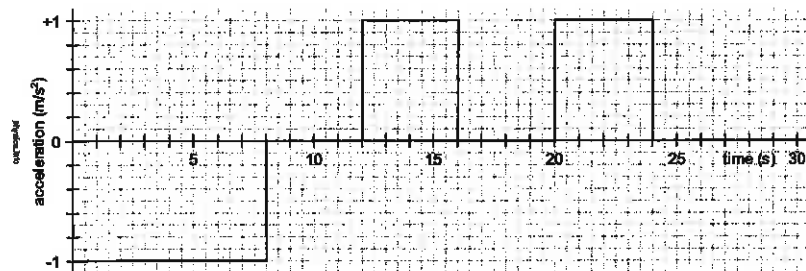


Key for
Quiz - transforming
graphs of motion

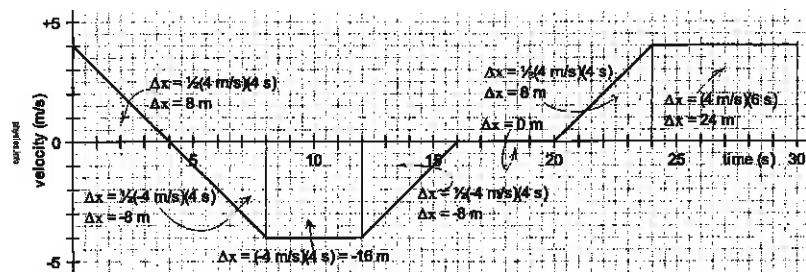
b. Acceleration is the rate of change of displacement with time. To find acceleration, calculate the slope in each interval.



Plot these values as a function of time. Since the acceleration is constant within each interval, the new graph should be made entirely of linked horizontal segments.



c. Displacement is the product of velocity and time. To find displacement, calculate the area under each interval.



Find the cumulative areas starting from the origin (given an initial displacement of zero)

0 s → 0	= 0 m
4 s → 0+8	= +8 m
8 s → 0+8-8	= 0 m
12 s → 0+8-8-16	= -16 m
16 s → 0+8-8-16-8	= -24 m
20 s → 0+8-8-16-8+0	= -24 m
24 s → 0+8-8-16-8+0+8	= -16 m

$$20 \text{ s} \quad -16 \text{ m} + 24 \text{ m} = 8 \text{ m}$$

