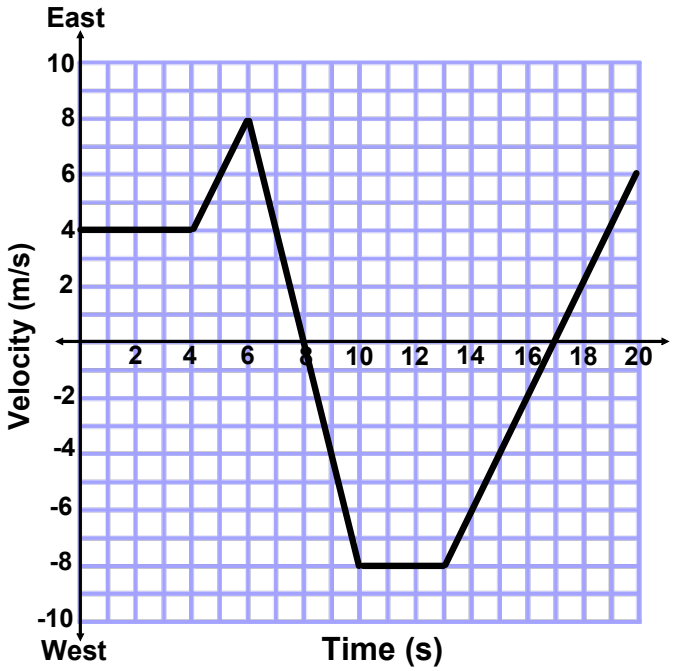

Acceleration Review: Velocity vs Time Graphs Answers

1. At what time(s) did the object change directions?
   8s, 17s

2. During which time interval(s) was the acceleration in the opposite direction as the objects motion?
   6s-8s, 13s-17s

3. Did the object spend more time traveling east or west
   East 0s-8s, 17s-20s = 11s
   West 8s-17s = 9s

   East

4. How much time did the object spend moving east?
   11s

5. How far did the object travel in the last 3s?

$$d = \frac{vt}{2} = \frac{(6)(3)}{2} = \frac{18}{2} = 9m$$

6. Calculate the acceleration at the 8.5s mark.
   2nd point (9s, -4m/s)
   1st point (7s, 4m/s)

$$a = \frac{v_f - v_i}{t_2 - t_1}$$

$$a = \frac{-4 - 4}{9 - 7}$$

$$a = \frac{-8}{2} = -4m/s^2 [W]$$

7. What is the objects velocity at 5s?
4m/s [E]

8. Calculate the total distance and resulting position of the object at the end of the 20 seconds

Distance = Top Area + Bottom Area

Top Area

$d = vt$ $d = (4)(4)$ $d = 16m$

$d = vt$ $= (3)(4)$ $= 12m$

$d = \frac{vt}{2}$ $d = \frac{(4)(1)}{2}$ $d = 2m$

$d = \frac{vt}{2}$ $d = \frac{(4)(2)}{2}$ $d = 4m$

$d = \frac{vt}{2}$ $= \frac{(4)(1)}{2}$ $= 2m$

$d = \frac{vt}{2}$ $d = \frac{(6)(3)}{2}$ $d = 9m$

Total top $= 16 + 12 + 2 + 4 + 2 + 9$
$= 45m$

Bottom Area

$d = \frac{vt}{2}$ $= \frac{(8)(2)}{2}$ $= 8m$

$d = vt$ $= (8)(3)$ $= 24m$

$d = vt/2$ $= \frac{(8)(4)}{2}$ $= 16m$

Total Bottom $= 8 + 24 + 16$
$= 48m$

Distance $= 45m + 48m$
$= 93m$

Position = Top Area − bottom area
$= 45m - 48m$
$= -3m$

9. What is the objects average speed and velocity at the end of 20s?

$v_{sp} = \frac{d}{t} = \frac{93m}{20s} = 4.65m/s$

$\vec{v}_{avg} = \frac{\vec{d}}{t} = \frac{-3}{20} = -0.15m/s$

10. Assuming the object started at position (0,0). Without extensive calculations, estimate at what point in time the object had instantaneously returned to its starting position.
15s