Answers to Some More Practice: d-t, v-t, a-t

1. a. 2.0 m/s

   b. Rate of change of the line. I used points (5, 1) and (6, 0).
   a = - 1 m/s

   c. 0 m/s^2

   d. Area from 0 s to 2 s: 8 m
   Area from 2 s to 6 s: 8 m
   Area from 6 s to 8 s: - 2 m
   Area from 8s to 10 s: - 4 m

$$v_{ave} = \frac{\Delta \vec{d}}{\Delta t} = \frac{8m + 8m + (-2m) + (-4m)}{10s} = \frac{10m}{10s} = 1m/s$$

   e. Area from 2 s to 6 s: 8 m
   Area from 6 s to 8 s: - 2 m
   Area from 8s to 10 s: - 4 m
   Area from 10 s to 11 s: - 1 m

   Displacement = 8m + (-2 m) + (- 4 m) + (- 1 m) = 1 m

   f. Area from 6 s to 8 s: - 2 m
   Area from 8s to 10 s: - 4 m
   Area from 10 s to 11 s: - 1 m
   Area from 11 s to 15 s: 16 m

$$speed_{ave} = \frac{\text{distance}}{\Delta t} = \frac{2m + 4m + 1m + 16m}{9s} = \frac{23m}{9s} = 2.6m/s$$

   g. Velocity at 4 s: - 1 m/s
   Velocity at 14 s: 2 m/s

$$a_{ave} = \frac{\Delta \vec{v}}{\Delta t} = \frac{v_f - v_i}{\Delta t} = \frac{2m/s - (-1m/s)}{10s} = \frac{3m/s}{10s} = 0.3\,\frac{m}{s^2}$$

   h. [0,2]s $\cup$ [8,10]s

   i. [6,8]s $\cup$ [11,15]s

   j. [6,11]s

2. a. [0,4]s $\cup$ [4,9]s $\cup$ [11,16]s

b. [4,9]s

c. [9,11]s

d. Rate of change. I used points (5,4) and (8,-2).
v = -2 m/s

e. Rate of change. I used points (0,2) and (2,4).
v = 1 m/s

f. $\text{Speed}_{\text{ave}} = \frac{\text{distance}}{\Delta t} = \frac{6m + 4m}{7s} = \frac{10m}{7s} = 1.4m/s$

g. $v_{ave} = \frac{\Delta \vec{d}}{\Delta t} = \frac{d_f - d_i}{\Delta t} = \frac{2m - 0m/s}{8s} = 0.25m/s$

h. $\Delta \vec{d} = d_f - d_i = -4m - 2m = -6m$

i. Distance = 2 m + 10 m + 3 m =15 m

j. 0 m/s^2

k. Velocity at 6 s: - 2 m/s
Velocity at 15 s: 1.5 m/s

$$a_{\text{ave}} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{9s} = \frac{1.5m/s - (-2m/s)}{9s} = \frac{3.5m/s}{9s} = 0.39\,\frac{m}{s^2}$$

l. Velocity at 1 s: 1 m/s
Velocity at 10 s: 0 m/s

$$a_{\text{ave}} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{10s} = \frac{0m/s - (1m/s)}{10s} = \frac{-1m/s}{10s} = -0.1\,\frac{m}{s^2}$$

3. a. [3,8]s

   b. 4 m/s^2

   c. Area from 0 s to 3 s: 12 m/s
   Area from 3 s to 5 s: 4 m/s

   Change in velocity = 12 m/s + 4 m/s = 16 m/s

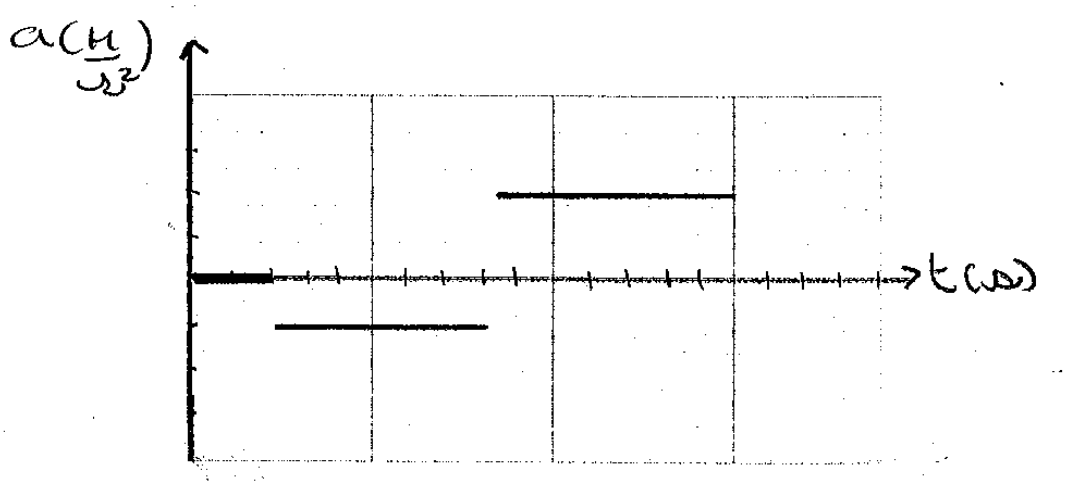
   If the object started at rest, the object will be going 16 m/s after 5 seconds.

   d. Area from 0 s to 3 s: 12 m/s
   Area from 3 s to 5 s: 4 m/s
   Area from 5 s to 8 s: - 9 m/s
   Area from 8 s to 10 s: -12 m/s

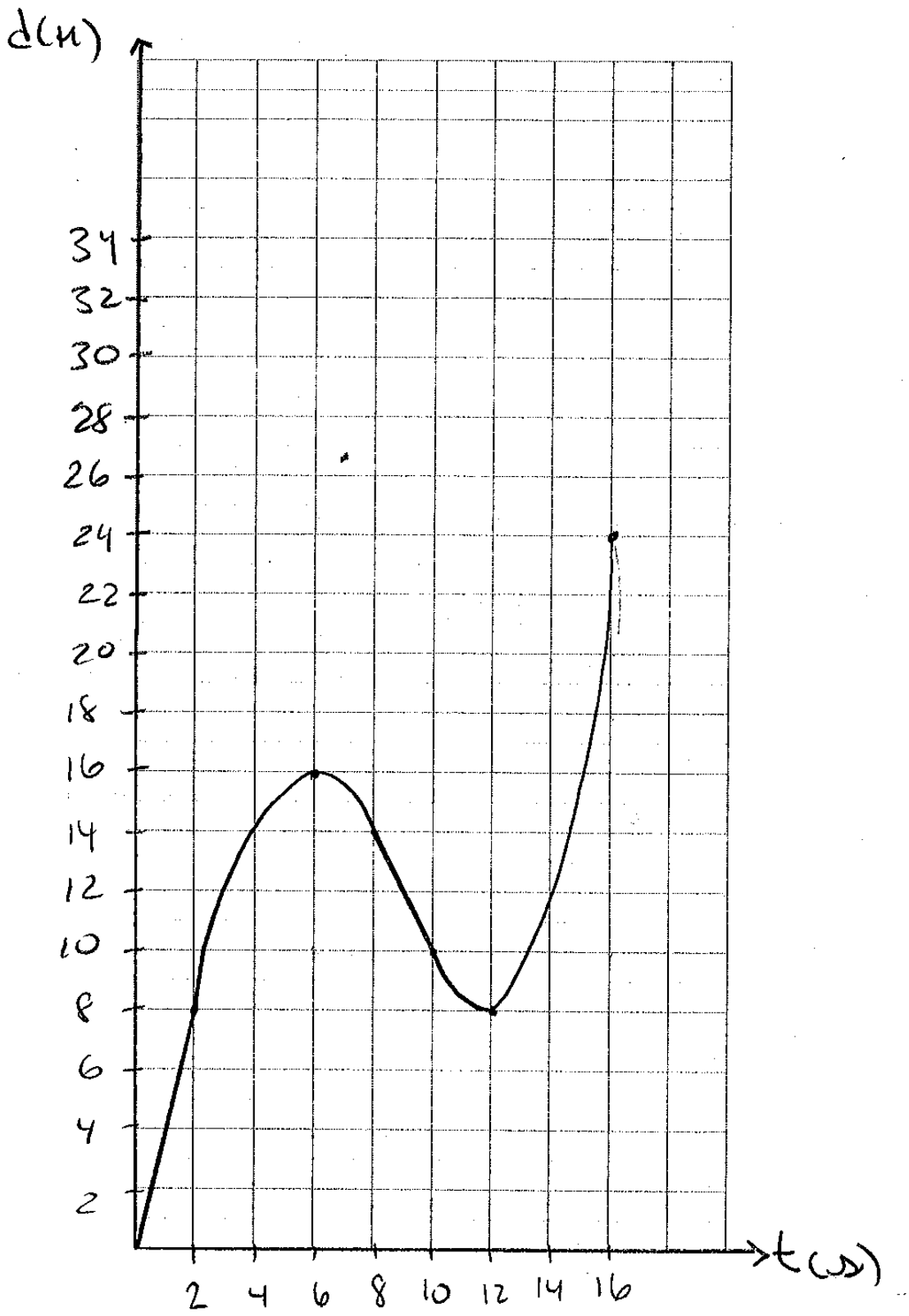
   Change in velocity = 12 m/s + 4 m/s – 9 m/s – 12 m/s = - 5 m/s

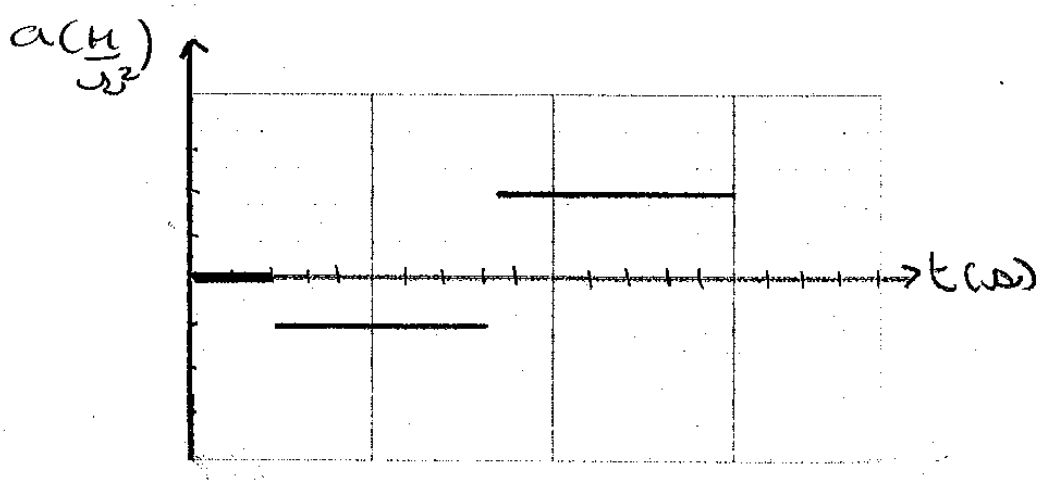
   If the object started at rest, the object will be going at – 5 m/s after 10 s.

4.



5.




a(m/s²)
t(s)