

$$A_1 = \frac{1}{2} (100) (20 + 33.5)$$

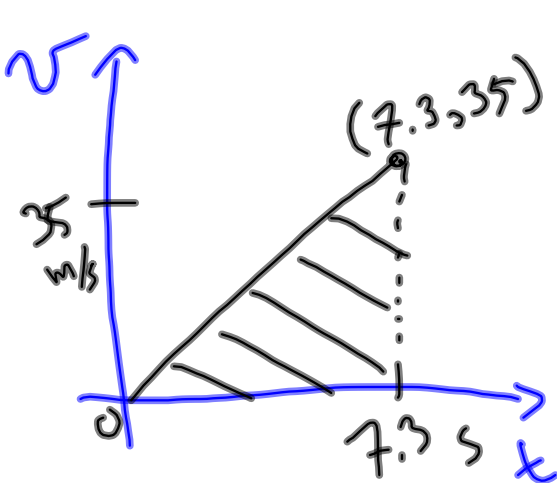
$$A_2 = \frac{1}{2} b \times h$$

$$= \frac{1}{2} (50) (15)$$

Motion Examples

A car accelerates from zero to 35 m/s in 7.3 seconds.

- What is the average acceleration?
- What distance was covered during the acceleration?



a) $a = \text{slope}$

$$a = \frac{35 - 0}{7.3 - 0}$$

$$= 4.8 \text{ m/s}^2$$

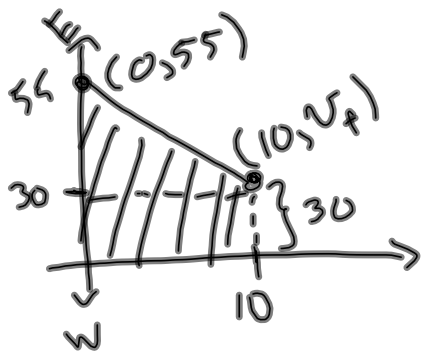
b) dist, $d = \text{Area} = \frac{1}{2} (7.3)(35)$

$$= 127 \text{ m}$$

An object is moving at 55 m/s [E] and undergoes an acceleration of 2.5 m/s² [W] for 10s.

a) What is the final velocity of the car?

b) What was the final displacement of the car?



$$a = \text{slope} \rightarrow \frac{y_2 - y_1}{x_2 - x_1}$$

slowing down (west)

$$-2.5 = \frac{v_f - 55}{10 - 0}$$

$$-2.5 = v_f - 55$$

$$30 = v_f$$

w/s

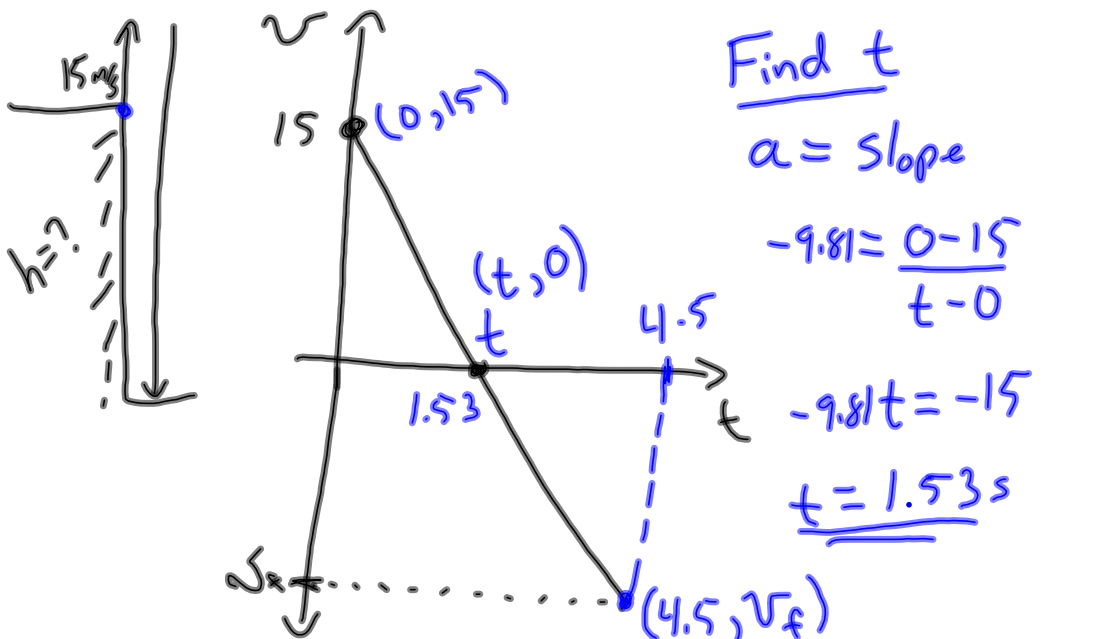
b) Disp = Area

$$d = \frac{1}{2} h (b_1 + b_2)$$

$$= \frac{1}{2} (10) (30 + 55)$$

$$d = 425 \text{ m}$$

Standing near the edge of a cliff a baseball is launched straight up with a velocity of 15 m/s. The ball is in the air for a total of 4.5 s before it hits the ground at the bottom of the cliff. Find the height of the cliff (acceleration of gravity, $g = -9.81 \text{ m/s}^2$). Sketch the V-t graph.



Find v_f
 $a = \text{slope}$
 $-9.81 = \frac{v_f - 15}{4.5 - 0}$
 $(-9.81)(4.5) = v_f - 15$
 $(-9.81)(4.5) + 15 = v_f$
 $-29 \text{ m/s} = v_f$

• $h = \text{disp} = A_{\text{top}} - A_{\text{bottom}}$
 $= \frac{1}{2}(1.53)(15) - \frac{1}{2}(4.5-1.53)(29)$
 $= 11.5 - 43.1$
 $= -32 \text{ m}$

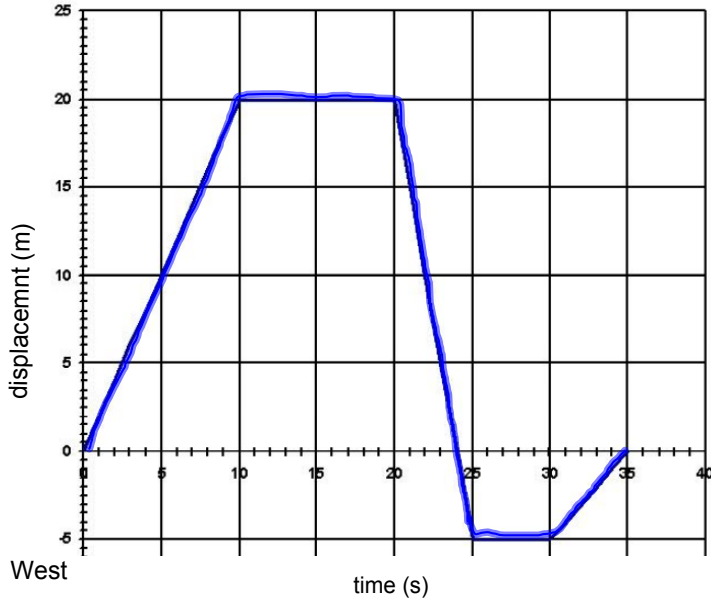
$h = 32 \text{ m high}$

More Practice & Review

1) Use a scale diagram to find the resultant of 90 km [W35°S], 60 km [E], and 70km [W75°N]

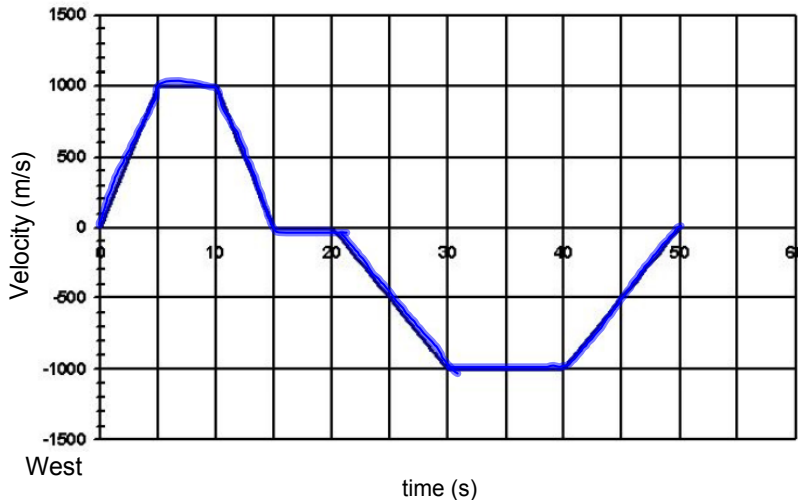
2) Use a scale diagram to find the resultant of 58 m [N], 12 m [S], 45 m [E], and 112 m [W].
(81.3m [W34°N])

3) East



- (a) What was the instantaneous velocity at $t = 7.25$ s? (2.0m/s E)
- (b) What was the displacement at $t = 35$ s? (0.0m)
- (c) What was the distance travelled during the 35 s trip? (50m)
- (d) What was the average speed for the entire trip? (1.43m/s) Average velocity? (0.0m/s)
- (e) What was the instantaneous velocity at $t = 21.83$ s? (-5.0m/s)
- (f) What was the average velocity for the first 25 s? (-0.2m/s)

4) East



- (a) Determine the displacement and distance traveled.
(disp = -10000m)
(dist = 30000m)
- (b) Determine the average speed and velocity. (Spd = 600 m/s)
(Vel = -200 m/s)
- (c) What was the instantaneous acceleration at $t = 42.3$ s?
(100m/s²) at $t = 24.8$ s?
(-100m/s²)

5) A car accelerates from rest to 32 m/s [E] in 12.5 s. (a) Find the average acceleration. (b) What distance does this car cover in that time? (acc = 2.56 m/s² E; dist = 200 m)

6) A plane lands with a velocity of 47 m/s [E]. It takes 17 s to stop. (a) What was the average acceleration of the plane? (b) What distance was required to stop? (acc = -2.76 m/s²; dist = 400 m)

7) A police car initially at 27.8 m/s [E] accelerates at 1.39 m/s² [E] for 8.9 s. (a) What is the final velocity of the car? (b) What distance was covered during the acceleration? ($V_f = 40.2$ m/s; dist = 303 m)

8) A car traveling at 25 m/s [E] accelerates to 10 m/s [E] in 5.0 s. (a) What is the acceleration of the car? (b) What distance was covered in that time? (c) What distance is needed to come to a stop assuming the acceleration is constant? (hint: find the time needed to come to a stop first) (-3.0 m/s² [E]; dist = 87.5 m; dist to stop = 104 m/s)