

3. We are asked to find the vertical component.

Find  $t$  from the horizontal component.

$$v = \frac{d}{t}$$

$$\begin{aligned} t &= \frac{d}{v} \\ &= \frac{100.0 \text{ m}}{18.0 \text{ m/s}} \\ &= 5.56 \text{ s} \end{aligned}$$

Vertical component

$v_0$	$v_f$	$a$	$d$	$t$
0	X	9.80 m/s <sup>2</sup>	?	5.56 s

$$\begin{aligned} d &= v_0 t + \frac{1}{2} a t^2 \\ &= \frac{1}{2} (9.80 \text{ m/s}^2) (5.56 \text{ s})^2 \\ &= 151 \text{ m} \end{aligned}$$

4. We are asked to find the vertical component.

Find  $t$  from the horizontal component.

$$v = \frac{d}{t}$$

$$\begin{aligned} t &= \frac{d}{v} \\ &= \frac{48.0 \text{ m}}{20.0 \text{ m/s}} \\ &= 2.40 \text{ s} \end{aligned}$$

Vertical component

$v_0$	$v_f$	$a$	$d$	$t$
0	X	9.80 m/s <sup>2</sup>	?	2.40 s

$$\begin{aligned} d &= v_0 t + \frac{1}{2} a t^2 \\ &= \frac{1}{2} (9.80 \text{ m/s}^2) (2.40 \text{ s})^2 \\ &= 28.2 \text{ m} \end{aligned}$$

5. We are asked to find the vertical component.

$v_0$	$v_f$	$a$	$d$	$t$
0	X	9.80 m/s <sup>2</sup>	?	5.50 s

$$\begin{aligned} d &= v_0 t + \frac{1}{2} a t^2 \\ &= \frac{1}{2} (9.80 \text{ m/s}^2) (5.50 \text{ s})^2 \\ &= 148 \text{ m} \end{aligned}$$

6. We are asked to find the horizontal component.

$$v = \frac{d}{t}$$

$$\begin{aligned} d &= vt \\ &= (20.0 \text{ m/s})(4.20 \text{ s}) \\ &= 84.0 \text{ m} \end{aligned}$$

7. a)

time (s)	displacement from $t = 0$ ( $\times 10^{-2}$ m)		displacement during time interval ( $\times 10^{-3}$ m)		average velocity during time interval ( $\times 10^{-2}$ m/s)	
	horiz.	vert.	horiz.	vert.	horiz.	vert.
0	0	0				
0.10	0.5	0.15	5.0	1.5	5.0	1.5
0.20	1.0	0.30	5.0	1.5	5.0	1.5
0.30	1.5	0.70	5.0	4.0	5.0	4.0
0.40	2.0	1.1	5.0	4.0	5.0	4.0
0.50	2.5	1.6	5.0	5.0	5.0	5.0
0.60	3.0	2.2	5.0	6.0	5.0	6.0
0.70	3.5	2.9	5.0	7.0	5.0	7.0
0.80	4.0	3.7	5.0	8.0	5.0	8.0
0.90	4.5	4.6	5.0	9.0	5.0	9.0
1.00	5.0	5.6	5.0	10.0	5.0	10.0
1.10	5.5	6.7	5.0	11.0	5.0	11.0

b)

Velocity-Time Graph

