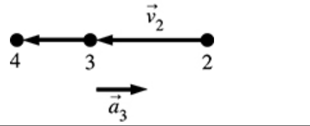
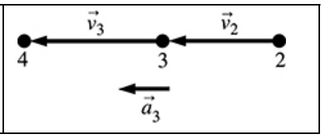
1.12. Solve:

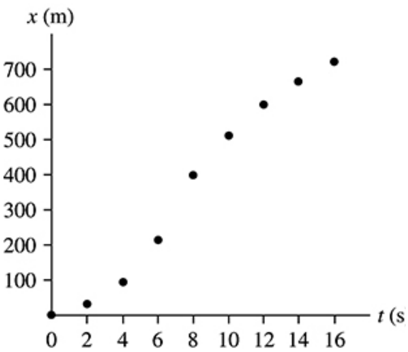
(a)		**(b)**	

1.18. **Solve:**

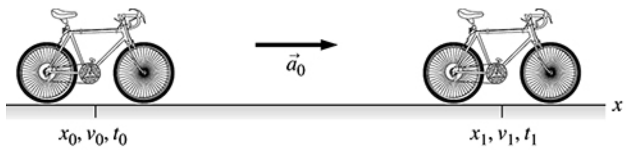
(a)

Dot	Time (s)	*x* (m)
1	0	0
2	2	30
3	4	95
4	6	215
5	8	400
6	10	510
7	12	600
8	14	670
9	16	720

(b)



1.21. Visualize: The bicycle is moving with an acceleration of 1.5 m/s^2. Thus, the velocity will increase by 1.5 m/s each second of motion.



Known

$v_0 = 0 \quad t_0 = 0 \quad x_0 = 0$
$a_0 = 1.5$ m/s^2
$v_1 = 7.5$ m/s

Find

x_1

1.24. Solve: **(a)** $8.0 \text{ inches} = 8.0 \text{ (inch)}\left(\frac{2.54 \text{ cm}}{1 \text{ inch}}\right)\left(\frac{10^{-2} \text{ m}}{1 \text{ cm}}\right) = 0.20 \text{ m}$

(b) $66 \text{ feet/s} = 66\left(\frac{\text{feet}}{\text{s}}\right)\left(\frac{12 \text{ inch}}{1 \text{ foot}}\right)\left(\frac{1 \text{ m}}{39.37 \text{ inch}}\right) = 20 \text{ m/s}$

(c) $60 \text{ mph} = 60\left(\frac{\text{miles}}{\text{hour}}\right)\left(\frac{1.609 \text{ km}}{1 \text{ mile}}\right)\left(\frac{10^3 \text{ m}}{1 \text{ km}}\right)\left(\frac{1 \text{ hour}}{3600 \text{ s}}\right) = 27 \text{ m/s}$

(d) $14 \text{ square inches} = 14 \text{ (inches)}^2\left(\frac{1 \text{ m}}{39.37 \text{ inches}}\right)^2 = 9.0\times10^{-3} \text{ square meter}$

1.27. **Solve:**

(a) $(30\text{ cm})\left(\dfrac{4\text{ in}}{10\text{ cm}}\right)=12\text{ in}$

(b) $(25\text{ m/s})\left(\dfrac{2\text{ mph}}{1\text{ m/s}}\right)=50\text{ mph}$

(c) $(5\text{ km})\left(\dfrac{0.6\text{ mi}}{1\text{ km}}\right)=3\text{ mi}$

(d) $\left(\dfrac{1}{2}\text{ cm}\right)\left(\dfrac{\frac{1}{2}\text{ in}}{1\text{ cm}}\right)=\dfrac{1}{4}\text{ in}$

1.33. **Solve:** My barber trims about an inch of hair when I visit him every month for a haircut. The rate of hair growth is

$$\frac{1(\text{inch})}{(\text{month})}\left(\frac{2.54\text{ cm}}{1\text{ inch}}\right)\left(\frac{10^{-2}\text{ m}}{1\text{ cm}}\right)\left(\frac{1\text{ month}}{30\text{ days}}\right)\left(\frac{1\text{ day}}{24\text{ h}}\right)\left(\frac{1\text{ h}}{3600\text{ s}}\right)=9.8\times10^{-9}\text{ m/s}$$

$$=9.8\times10^{-9}\left(\frac{\text{m}}{\text{s}}\right)\left(\frac{10^{6}\ \mu\text{m}}{1\text{ m}}\right)\left(\frac{3600\text{ s}}{1\text{ h}}\right)=35\ \mu\text{m/h}$$

1.39. Model: Represent the ball as a particle for the motion diagram.

Visualize:

Known

$y_0 = 2.0$ m $v_0 = 15$ m/s

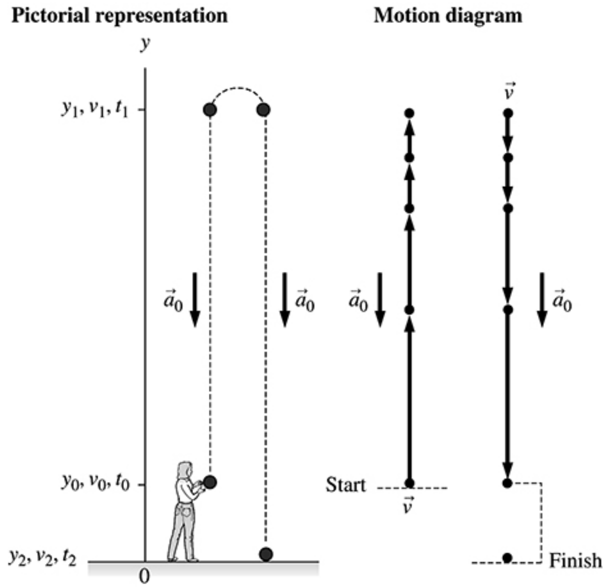
$t_0 = 0$ $a_0 = -9.8$ m/s^2

$a_1 = a_0 = -9.8$ m/s^2

$y_2 = 0$

Find

t_2



1.45. Solve: A car starts coasting at an initial speed of 30.0 m/s up a 10° incline. 230 m up the incline the road levels out to a flat road and the car continues coasting at a reduced speed along the road.

1.54. Solve: (a) We need kg/m^3. There are 100 cm in 1 m. If we multiply by

$$\left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^3 = (1)^3$$

we do not change the size of the quantity, but only the number in terms of the new unit. Thus, the mass density of aluminum is

$$2.7 \times 10^{-3} \left(\frac{\text{kg}}{\text{cm}^3}\right)\left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^3 = 2.7 \times 10^3 \frac{\text{kg}}{\text{m}^3}$$

(b) Likewise, the mass density of alcohol is

$$0.81\left(\frac{\text{g}}{\text{cm}^3}\right)\left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^3\left(\frac{1 \text{ kg}}{1000 \text{ g}}\right) = 810 \ \frac{\text{kg}}{\text{m}^3}$$

1.55. Model: The car is represented by the particle model as a dot.

Solve:

(a)

Time *t* (s)	**Position *x* (m)**
0	1200
10	975
20	825
30	750
40	700
50	650
60	600
70	500
80	300
90	0

(b)