1. a) Rectilinear
   b) Rectilinear
   c) Uniform Rectilinear Motion (Assuming straight trajectory)
   d) Neither
   e) Uniform Rectilinear Motion
   f) Uniform Rectilinear Motion

2. $d = 384{,}000\,km = 3.84 \times 10^8\,m$

   $c = 3.00 \times 10^8\,m/s$

$$t = \frac{d}{v} = \frac{3.84 \times 10^8\,m}{3.00 \times 10^8\,m/s}$$

$$\boxed{t = 1.28\,s}$$

3. Fastest - Runner A

   Opposite - Runner A

4. a) $x = -20\,m$
   b) $\Delta x = -20\,m$
   c) $\Delta x = -10\,m$
   d) $d = 20\,m$
   e) $d = 20m + 50m + 40m$
      $d = 110\,m$
   f) $v = 0\,m/s$
   g) $v = \frac{50\,m}{20\,s} = 2.5\,m/s$

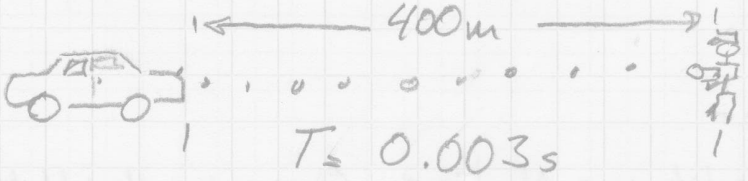
5. $d = 200\,km$ Car A; $V_A = 80\,km/h$
   Car B; $V_B = 100\,km/h$

$$\Delta t_A = \frac{200\,km}{80\,km/h} = 2.5\,h$$

$$\Delta t_B = \frac{200\,km}{100\,km/h} = 2.0\,h$$

Car B arrives	
30 min	before car A.

6.



Infrared pulses travel @ $c = 3.00 \times 10^8 m/s$

The car's speed is much much slower than c, so we can ignore the car's speed.

$d = 2(400m)$ $\quad V = \frac{d}{t}$

$\Delta t = ?$

$$t = \frac{d}{V} = \frac{800m}{3.00 \times 10^8 m/s}$$

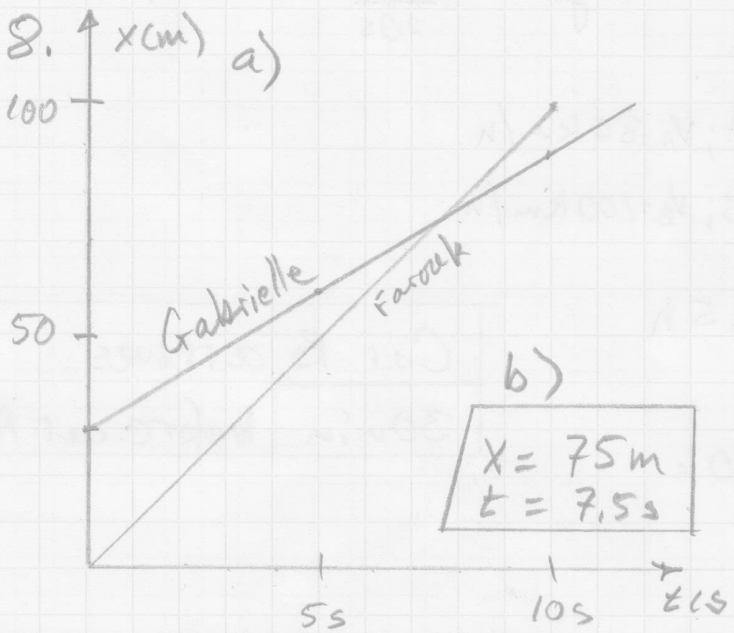
$$\boxed{t = 2.67 \times 10^{-6} s}$$

7. Car travels @ 100km/h for 0.25h & @ 80km/h for 0.75h.

$$d = V \cdot t = (100 km/h)(0.25 h) + (80 km/h)(0.75 h)$$

$$\boxed{d = 85 km}$$

8. a)



b)

$$\boxed{\begin{array}{l} X = 75m \\ t = 7.5s \end{array}}$$

$X_G = 30m + (6m/s)t$

$X_F = (10m/s)t$

$X_G = X_f$; $30m + (6m/s)t = (10m/s)t$

$30m = (10m/s - 6m/s)t$

$t = \frac{30m}{4m/s} = 7.5s$

$X = (10m/s)(7.5s)$

p. 220

9.

$d_i = 250\,km$

The space between the two trains starts out at 250km, and then shrinks by

$V = 50\,km/h + 75\,km/h = 125\,km/h$

$$t = \frac{d}{V} = \frac{250\,km}{125\,km/h} = 2h$$

$$\boxed{t = 2h}$$

Check. Freight train $d = (50\,km/h)(2h) = 100\,km$

Passenger train $d = (75\,km/h)(2h) = 150\,km$

$d = 250\,km$ ✓