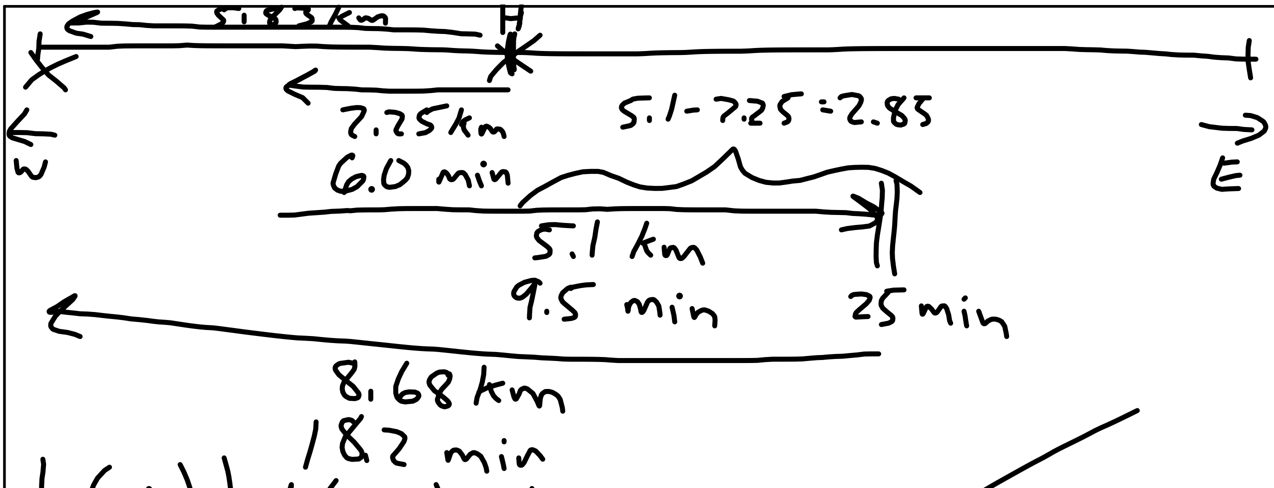
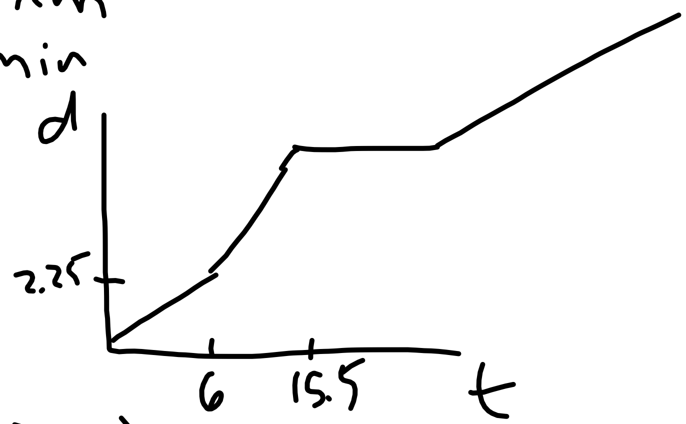
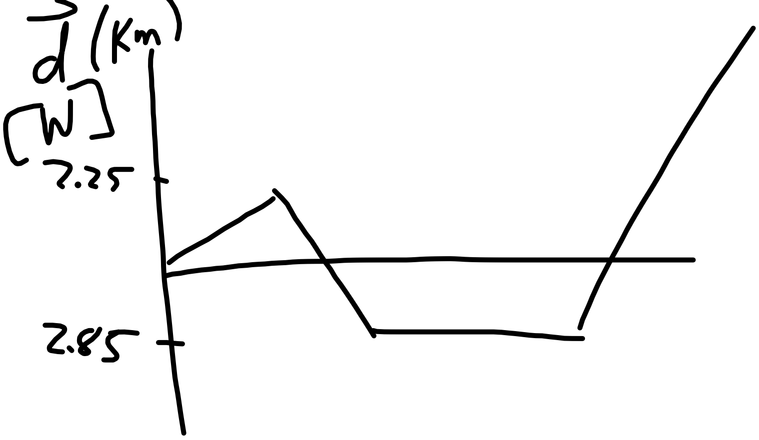


t (min)	d (km)
0	0
6	2.25
15.5	7.35
40.5	7.35
58.7	16.03





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

$$= \frac{16.03 \text{ km}}{58.7 \text{ min}}$$

$$= 0.27\dot{3} \ \frac{\text{km}}{\text{min}}$$

$$\vec{V} = \frac{\vec{d}}{t} = \frac{5.83 \text{ km [W]}}{58.7 \text{ min}}$$

$$= 0.1 \ \frac{\text{km}}{\text{min}} \text{ [W]}$$

5. C $\xrightarrow{\quad D \quad}$ T

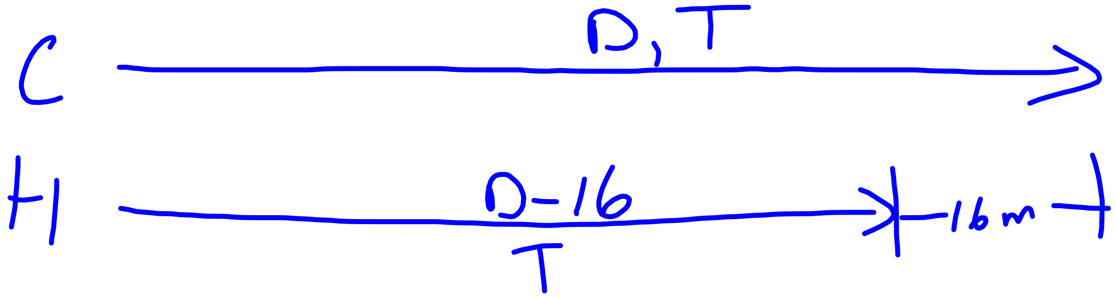
H $\xrightarrow{\quad D-16 \quad}$ T

C	H
$v_i = 0$	$v_i = 0$
$v_f = ?$	$v_f = ?$
$a = 2\ \frac{m}{s^2}$	$a = 1.5\ \frac{m}{s^2}$
$d = D$ ✓	$d = D-16$ ✓
$t = T$ ✓	$t = T$ ✓

calvin

$$d = v_i t + \frac{1}{2} a t^2$$

5. After losing the original downhill sled race to Calvin, Hobbes demands a rematch. This time, Calvin cheats by attaching a mass to Hobbes's sled. As a result, Hobbes acceleration was only 1.5 m/s^2 as opposed to Calvin's 2.0 m/s^2. In the end, Hobbes finished 16 m behind Calvin. Determine the length of the race.



Calvin

$d = D$
$v_i = 0$
$a = 2\ \frac{m}{s^2}$
$t = T$

Hobbes

$d = D - 16$
$v_i = 0$
$a = 1.5\ \frac{m}{s^2}$
$t = T$

$d = \cancel{v_i t} + \frac{1}{2}at^2$

$D = \frac{1}{2}(2)T^2$

$\boxed{D = T^2}$ (1)

$d = \cancel{v_i t} + \frac{1}{2}at^2$

$D - 16 = \frac{1}{2}(1.5)T^2$

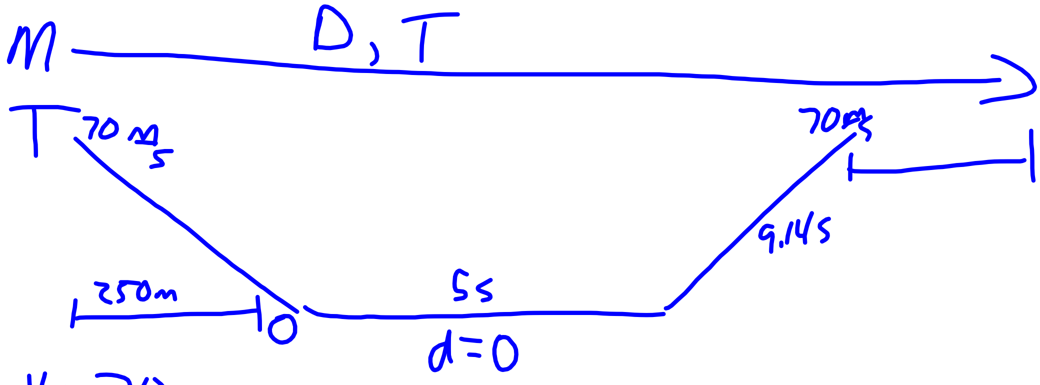
$\boxed{D - 16 = 0.75T^2}$ (2)

$T^2 - 16 = 0.75T^2$
$0.25T^2 = 16$
$T^2 = 64$
$T = 8\ s$

$D = 8^2$
$= 64\ m$

In the Daytona 500 auto race, a Ford Thunderbird and a Mercedes Benz are moving side by side down a straight-away at 252 km/h. The driver of the Thunderbird realizes he must make a pit stop, and he smoothly slows to a stop over a distance of 250 m. He spends 5.00 s in the pit and then accelerates out, reaching his previous speed in 9.14 s. At this point, how far has the Thunderbird fallen behind the Mercedes Benz, which has continued at a constant speed?

$252\ \frac{km}{h} = 70\ \frac{m}{s}$



$v_i = 70\ \frac{m}{s}$
$d = 250$
$v_f = 0$
$t =$

$\frac{d}{t} = \frac{v_i + v_f}{2}$

$\frac{d}{t} = 35$

$t = \frac{250}{35}$
$= 7.14\ s$

$v_i = 0$
$v_f = 70\ \frac{m}{s}$
$t = 9.14\ s$
$d =$

$d = \left(\frac{v_i + v_f}{2}\right) t$
$= (35)(9.14)$
$= 320\ m$

$\therefore$ the thunderbird covers
$250\ m + 320\ m = \underline{\underline{570\ m}}$

in $7.14 + 5 + 9.14 = 21.28\ s$

In this time the MB has $v = 70\ \frac{m}{s}$

$d = vt$
$= (70)(21.28)$
$= 1490\ m$

$\therefore$ The MB is $1490 - 510 = 920\ m$ ahead

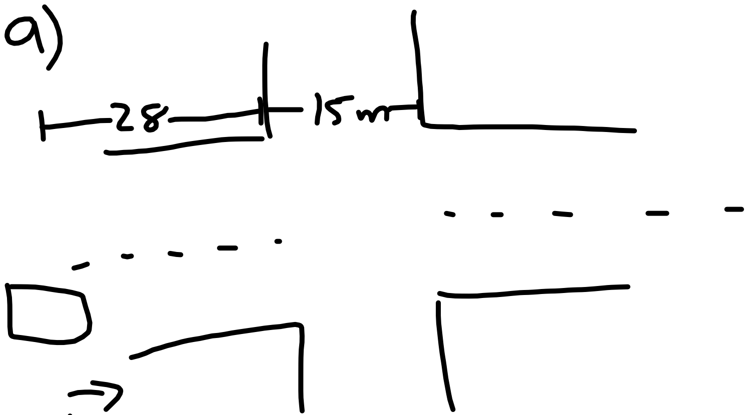
A person driving her car at 45 km/h approaches an intersection just as the traffic light turns yellow. She knows this yellow light lasts only 3.0 seconds before turning red and she is 28 m away from the near side of the intersection. The intersection is 15 m wide. Her car is capable of accelerating from 45 km/h to 65 km/h in 6.0 seconds, and is capable of slowing down at a rate of 5.8 m/s^2.

a) If she hits the gas, will she make it across the intersection before the light turns red? b) If she slams on the breaks, will she stop in time?

Note: Ignore the length of the car and reaction time.

$a = \frac{v_f - v_i}{t} = \frac{18.1 - 12.5}{6} =$

a)



$\overrightarrow{45 \frac{km}{h}}$

$= 12.5 \frac{m}{s}$

$d = 43\,m$

$v_i = 12.5 \frac{m}{s}$

$a = 0.93 \frac{m}{s^2}$

$t = ?$

$v_i = 12.5 \frac{m}{s}$

$a = 0.93 \frac{m}{s}$

$t = 3\,s$

$d = v_i t + \frac{1}{2} a t^2$

$= (12.5)(3) + \frac{1}{2}(0.93)(3)^2$

$= 37.5 + 4.18$

$= 41.68\,m$

b) $d = 28\,m$

$a = -5.8 \frac{m}{s^2}$

$v_i = 12.5\,m$

$v_f = ?$

$v_f^2 = v_i^2 + 2ad$

$= 12.5^2 + 2(-5.8)(28)$

$= 156.25 - 324.8$

$v_f^2 < 0$

$d =$

$a = -5.8 \frac{m}{s^2}$

$v_i = 12.5$

$v_f = 0$

$v_f^2 = v_i^2 + 2ad$

$d = \frac{v_f^2 - v_i^2}{2a}$

$= \frac{0 - 12.5^2}{2(-5.8)}$

$= 13.5\,m$