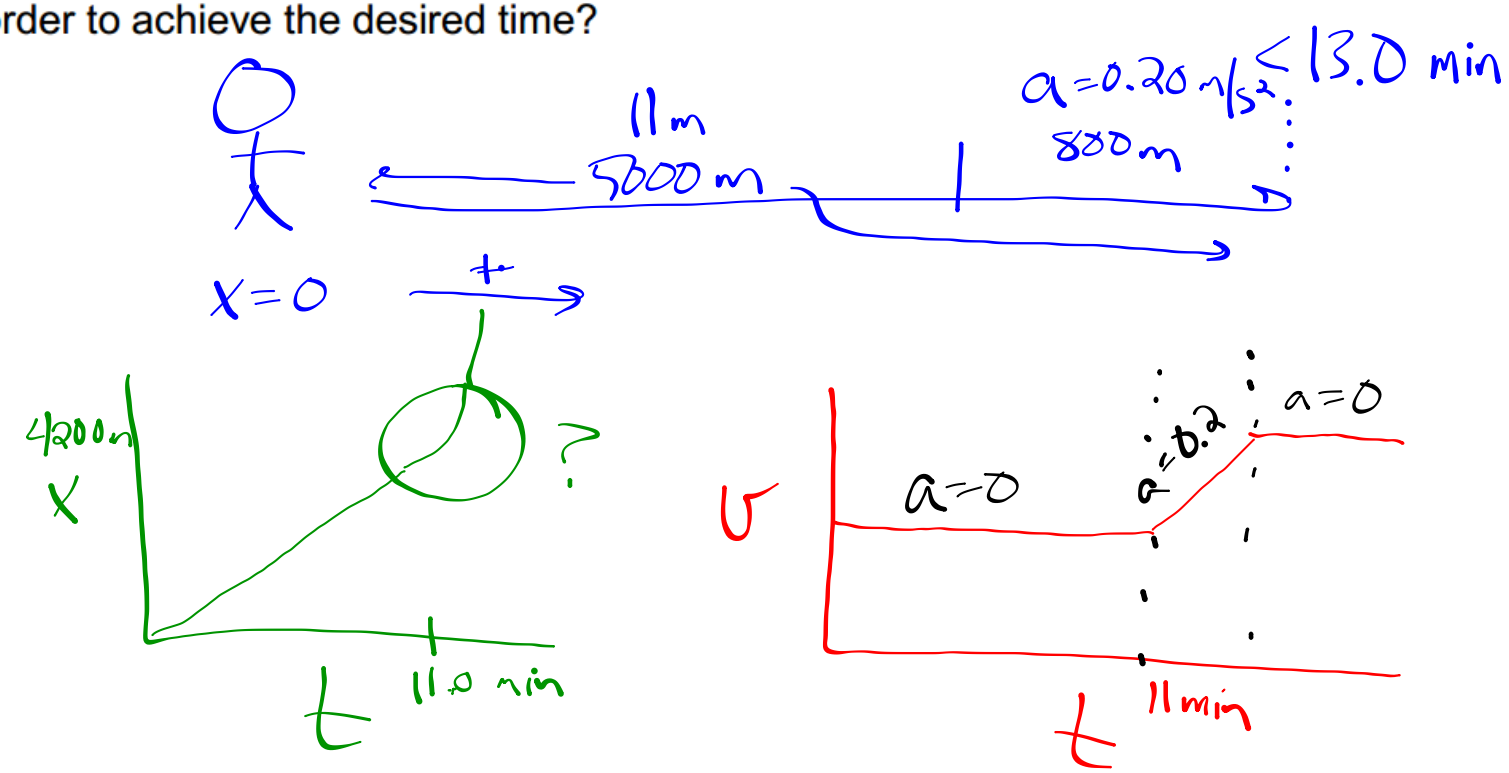
30. A runner hopes to complete the 5000-m run in less than 13.0 min. After exactly 11.0 min, there are still 800 m to go. The runner must accelerate at 0.20 m/s^2 for how many seconds in order to achieve the desired time?



30. A runner hopes to complete the 5000-m run in less than 13.0 min. After exactly 11.0 min, there are still 800 m to go. The runner must accelerate at 0.20 m/s^2 for how many seconds in order to achieve the desired time?

$x_0 = 0$
$x = 4200\text{m}$
$v_0 = 6.36 \frac{\text{m}}{\text{s}}$
$v = 6.36 \frac{\text{m}}{\text{s}}$
$a = 0$
$t = 11 \text{ min.} = 660 \text{ s}$

$x_0 = 4200\text{m}$
$x =$
$v_0 = 6.36 \frac{\text{m}}{\text{s}}$
$v =$
$a = 0.2 \frac{\text{m}}{\text{s}^2}$
$t =$

$x_0 =$
$x = 5000\text{m}$
$v =$
$v_0 =$
$a = 0$
$t =$

$x = x_0 + v_0 t + \frac{1}{2} a t^2$

$x = v_0 t$

$v_0 = \frac{x}{t} = \frac{4200}{660} = 6.36 \frac{\text{m}}{\text{s}}$

$v = v_0 + at$

$v = 6.36 \frac{\text{m}}{\text{s}}$

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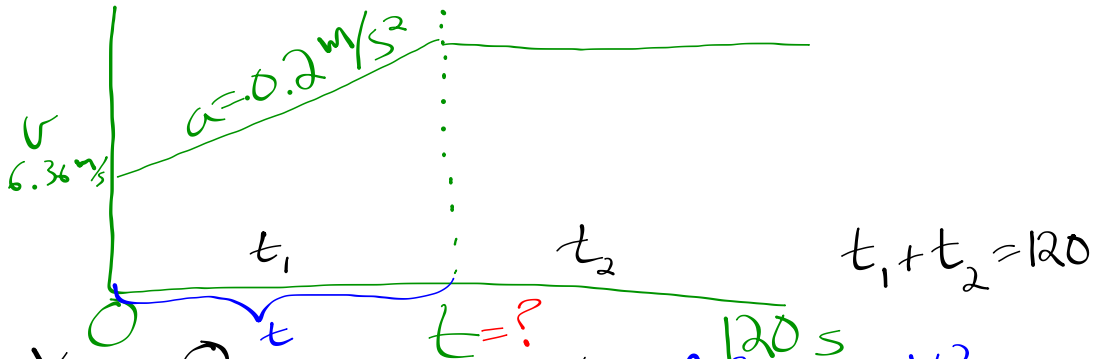

$x_0 = 0$

$x = 6.36t + 0.1t^2$

$v_0 = 6.36 \frac{m}{s}$

$v = 6.36 + 0.2t$

$a = 0.2 \frac{m}{s^2}$

$t_1 = t$

$x = x_0 + v_0 t_1 + \frac{1}{2} a t_1^2$

$= 6.36t + 0.1t^2$

$v = v_0 + a t_1$

$= 6.36 + 0.2t$

$x_0 = 6.36t + 0.1t^2$

$x_0 = 800m$

$v_0 = 6.36 + 0.2t$

$v = 6.36 + 0.2t$

$a = 0$

$t_2 = 120 - t$

$X_0 = 6.36t + 0.1t^2$

$X_0 - 800m$

$V_0 - 6.36 + 0.2t$

$V - 6.36 + 0.2t$

$a - 0$

$t_2 - 120 - t$

$$X = X_0 + V_0 t_2 + \frac{1}{2} a t_2^2$$

$$800 = 6.36t + 0.1t^2 + (6.36 + 0.2t)(120 - t)$$

$$800 = 6.36t + 0.1t^2 + 763.2 + 24t - 6.36t - 0.2t^2$$

$$-0.1t^2 + 24t - 36.78 = 0$$

$t = 1.54$ or $t = 238.46$

does not work