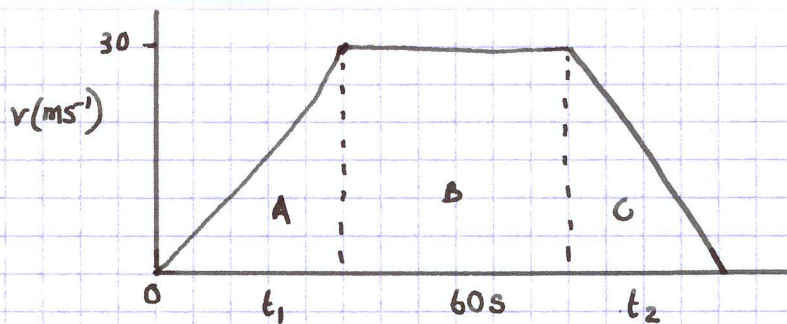


time-velocity graph
(rough!)



calculate t_1

u 0
 v 30
 a 3
 s ?
 t ?

use $v = u + at$

$$t_1 = \frac{v-u}{a}$$

$$t_1 = \frac{30-0}{3}$$

$$\boxed{t_1 = 10}$$

calculate t_2

u 30
 v 0
 a -5
 s ?
 t ?

$$t_2 = \frac{v-u}{a}$$

$$= \frac{0-30}{-5}$$

$$\boxed{t_2 = 6}$$

distance: $A = \frac{1}{2} \cdot 10 \times 30$ $B = 60 \times 30$ $C = \frac{1}{2} \cdot 6 \cdot 30$

$$s = 150 + 1800 + 90 = \boxed{2040 \text{ m}}$$

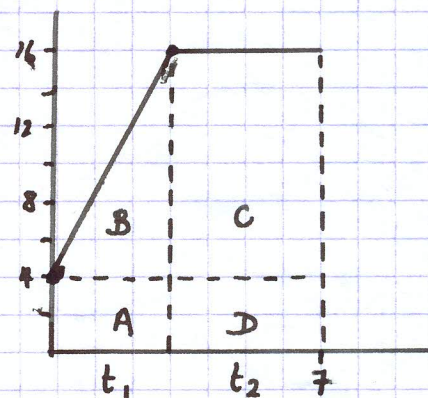
Example 3.

A cyclist starts a 100m race at 4 ms^{-1} and accelerates to a max. speed of 16 ms^{-1} . He continues at this speed and finishes in 7 seconds.

find

- time spent accelerating
- the rate of acceleration

time-velocity graph:



calculate t_1

u 4
 v 16
 a ?
 s ?
 t ?

too many unknowns to use formulae.

However, we are given total distance

$$t_1 = \text{time accelerating} \quad t_2 = 7 - t_1$$

$$\text{distance} = A = 4 \cdot t_1 \quad B = \frac{1}{2} \cdot 4 \cdot 12 \quad C = 12(7 - t_1) \quad D = 4(7 - t_1)$$

$$\Rightarrow 100 = 4t_1 + 6t_1 + 84 - 12t_1 + 28 - 4t_1$$

$$6t_1 = 112 - 100 \quad \Rightarrow \boxed{t_1 = 2}$$

calculate rate of acceleration

u 4
 v 16
 a ?
 s ?
 t 2

use $v = u + at$

$$a = \frac{v-u}{t}$$

$$a = \frac{16-4}{2}$$

$$\boxed{a = 16 \text{ ms}^{-2}}$$