The Constant of Integration

⑰ An object is dropped from a height of 125m How long does it take to hit ground?

$V = \int -10\,dt \quad V = -10t + 0$ $\quad S \int V : S = -5t^2 + K$

$S = -5t^2 + 125$

• Find time: $-5t^2 + 125 = 0$ $\quad -5(t^2 - 25) = 0$

$(t-5)(t+5) = 0$

$t = 5 \quad t = -5$

⑱ Object is hurled up in air from height of 30m w/ initial velocity of 20 m/s. How long does object remain in air + what speed does it strike ground?

$V = \int -10\,dt \quad V = -10 + C \quad S \int V = -10t + 20 \text{ m/s} \quad S = -5t^2 + 20t + K$

$S = -5t^2 + 20t + 30 \quad -5(t^2 - 4t - 6) = 0$ } have to use quadratic formula

$t = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\quad a = 1 \quad b = -4 \quad c = -6$

$t = \dfrac{-(-4) \pm \sqrt{-4^2 - 4(1)(-6)}}{2(1)} = t = \dfrac{4 \pm \sqrt{16 + 24}}{2} = 5.16$

• finding velocity $V = -10t + 20 \quad V = -10(5.16) + 20$

• Dropped baseball from 169 what is speed?

$S \int V = -10t - 0\,dt \quad S = -5t^2 - 0 + 169 \quad V = \int -10\,dt \quad V = -10t + C$

$V = -10t \quad V = -10(5.81) \quad \dfrac{-5t^2}{5} = \dfrac{169}{5} \quad t = 5.81$

$V = -58.1$