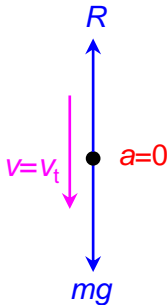terminal velocity

Let's assume that air resistance R is proportional to speed v.

$$R = kv$$

So terminal velocity v_t is reached when

$$mg = kv_t$$
$$\Rightarrow v_t = \frac{mg}{k}$$

When $v = 0$, $F_{net} = mg - kv$
                      $= mg - 0$
                      $= mg$

           $a = g$

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When $v = \frac{1}{2}v_t$, $F_{net} = mg - kv$

$$= mg - \frac{1}{2}mg$$

$$= \frac{1}{2}mg$$

$$a = \frac{1}{2}g$$

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When $v = \dfrac{3}{4} v_t$, $F_{net} = mg - kv$

$$= mg - \dfrac{3}{4} mg$$

$$= \dfrac{3}{4} mg$$

$$a = \dfrac{1}{4} g$$

When $v = \dfrac{7}{8}v_t$, $F_{net} = mg - kv$

$= mg - \dfrac{7}{8}mg$

$= \dfrac{1}{8}mg$

$a = \dfrac{1}{8}g$

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When $v = \dfrac{15}{16} v_t$, $F_{net} = mg - kv$

$$= mg - \dfrac{15}{16} mg$$

$$= \dfrac{1}{16} mg$$

$$a = \dfrac{1}{16} g$$

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When $v = \dfrac{31}{32}v_t$, $F_{net} = mg - kv$

$$= mg - \dfrac{31}{32}mg$$

$$= \dfrac{1}{32}mg$$

$$a = \dfrac{1}{32}g$$

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When $v = \dfrac{63}{64} v_t$, $F_{net} = mg - kv$

$= mg - \dfrac{63}{64} mg$

$= \dfrac{1}{64} mg$

$a = \dfrac{1}{64} g$

v approaches v_t asymptotically.