

①

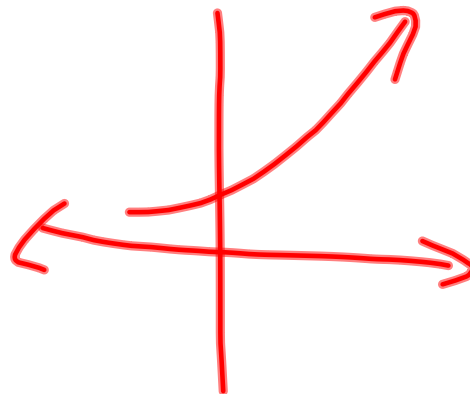
$$\frac{dw}{dt} = w - w_f$$

$$\ln |w| = t + A$$

$$\frac{dw}{dt} = w$$

$$w = B e^t$$

$$\int \frac{dw}{w} = \int dt$$



$$\frac{dr}{dt} = -r + \omega r, r=0$$

$$\frac{dr}{dt} = -r$$

$$\int \frac{dr}{r} = - \int dt$$

$$\ln |r| = -t + A$$

$$r = Be^{-t}$$



$$\frac{dr}{dt} = -r + wr = 0$$

$$\frac{dw}{dt} = w - wr = 0$$

$$r(w-1) = 0$$

$$w(1-r) = 0$$

$$r = 0 \text{ or } w = 1 \quad (w, r)$$

$$(0, 0)$$

$$(1, 1)$$

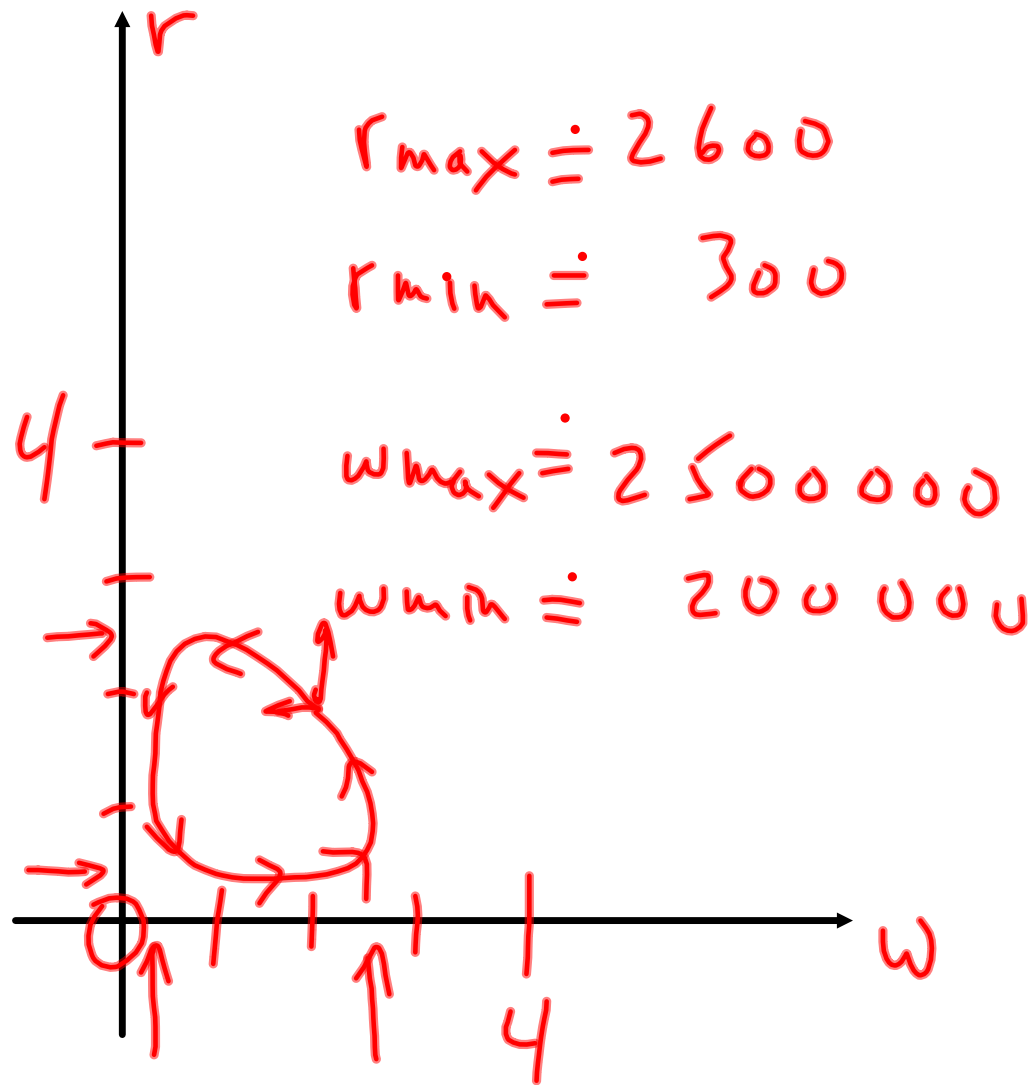
$$\begin{aligned}\frac{dr}{dt} &= -r + wr \\ &= -2 + (2)(2) = 2 > 0\end{aligned}$$

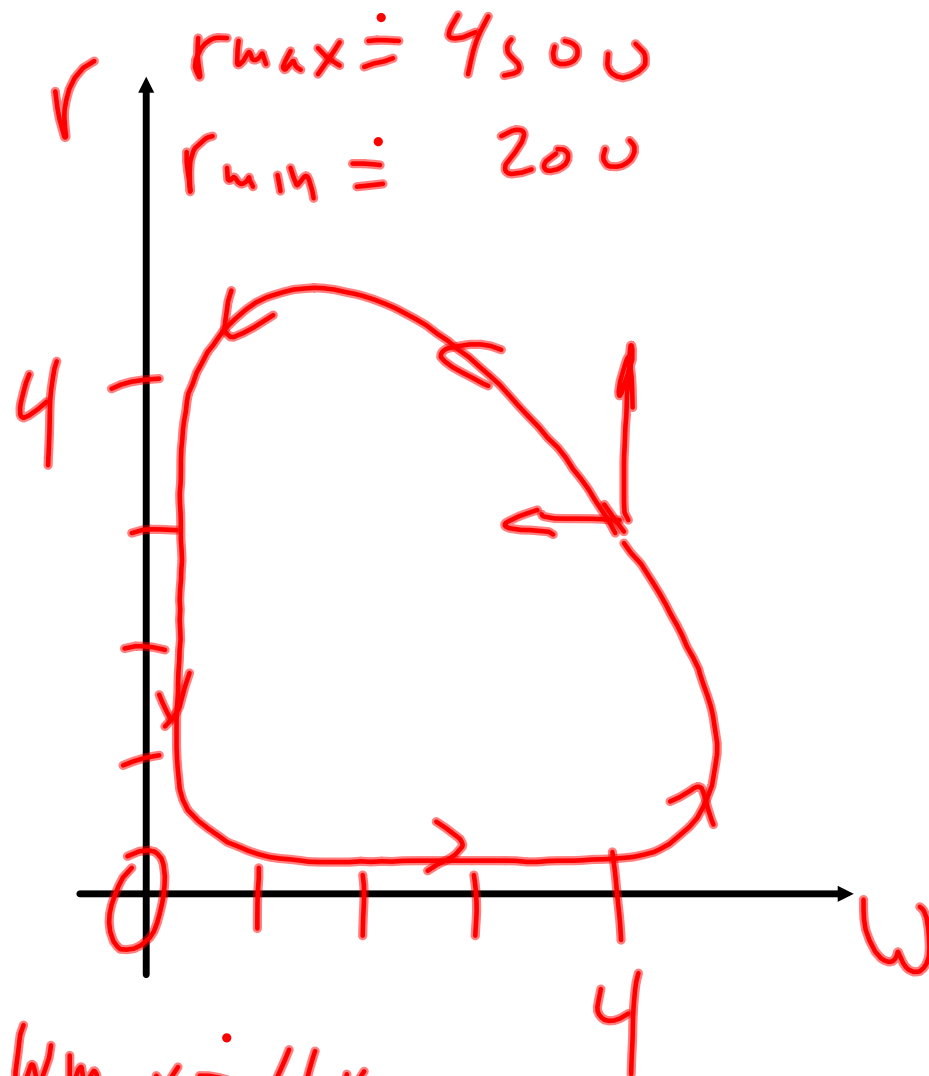
$$\frac{dr}{dw} = \frac{\frac{dr}{dt}}{\frac{dw}{dt}} = \frac{\frac{dr}{dt}}{\frac{dw}{dt}}$$

$$\begin{aligned}\frac{dw}{dt} &= w - wr \\ &= 2 - (2)(2) = -2 < 0\end{aligned}$$

$$\frac{dr}{dw} = \frac{-r + wr}{w - wr}$$







$$\frac{dr}{dt} = -r + wr$$

$$= -3 + 6 = 3 > 0 \uparrow$$

$$\frac{dw}{dt} = w - wr$$

$$= 2 - 6 = -4 < 0 \leftarrow$$

$$(2) \quad \frac{dy}{dx} = \frac{-ax}{-ay}$$

$$\frac{46^2}{2} = \frac{40^2}{2} + A$$

$$\frac{dy}{dx} = \frac{x}{y}$$

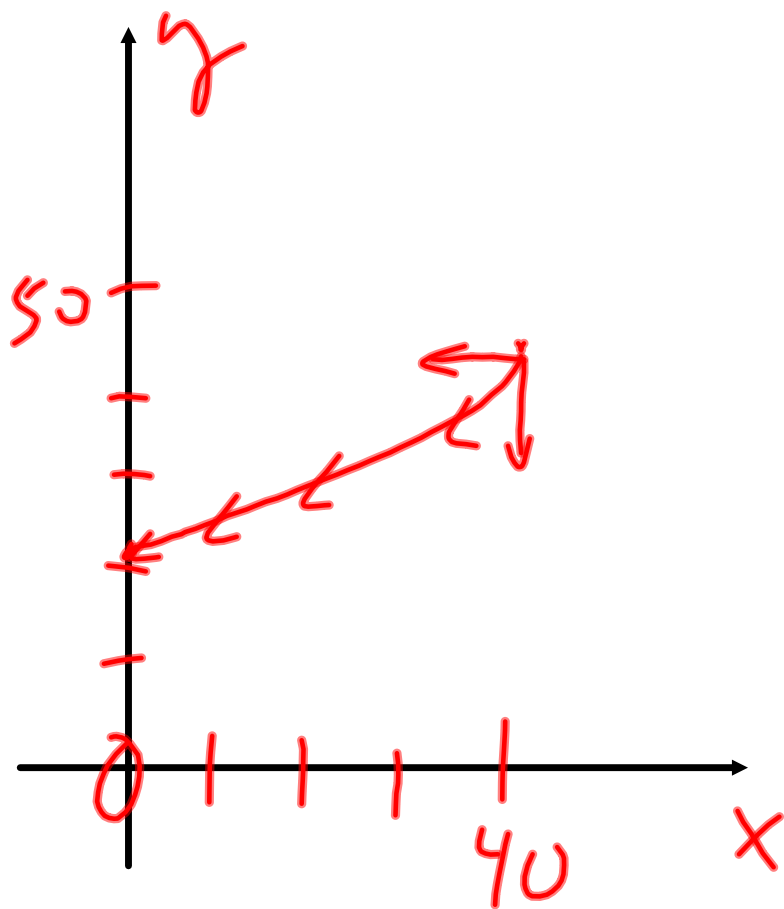
$$\frac{y^2}{2} = \frac{x^2}{2} + 258$$

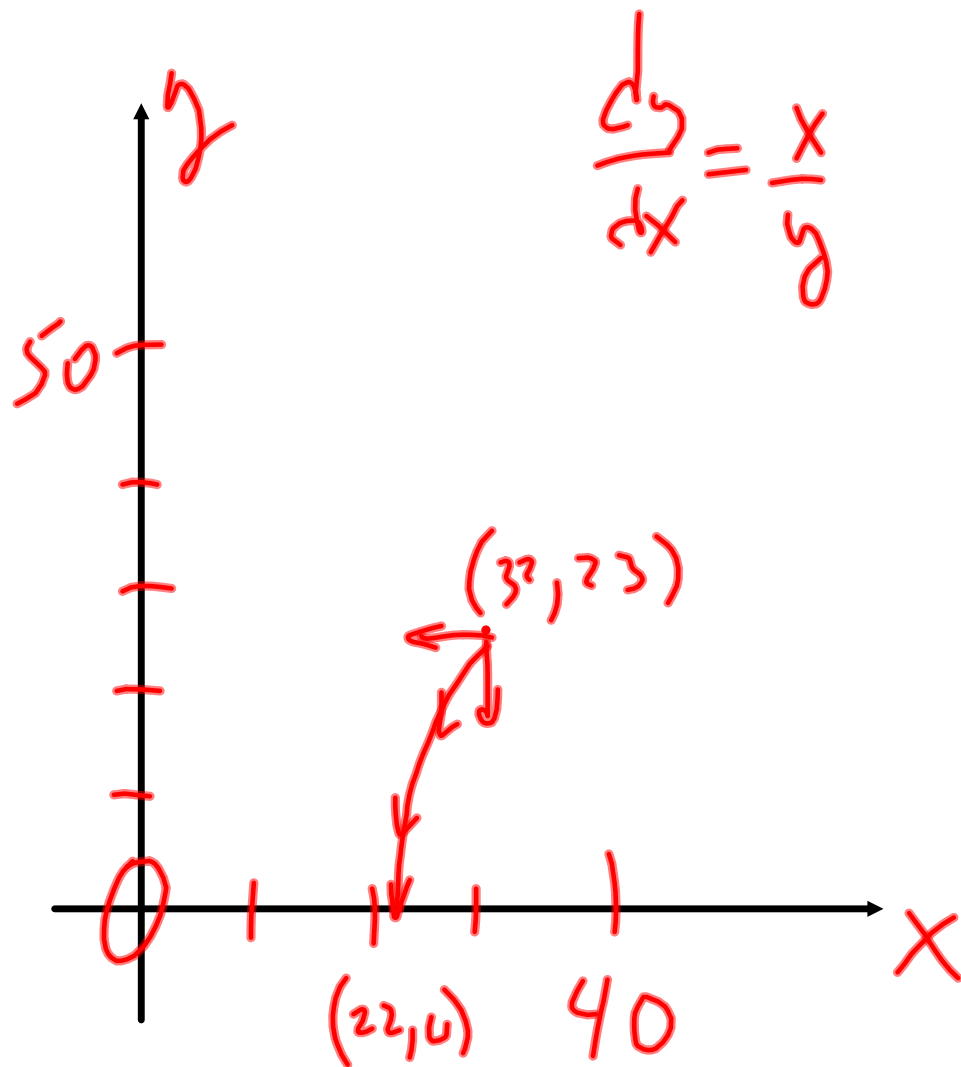
$$\int y dy = \int x dx$$

$$y^2 = x^2 + 516$$

$$\frac{y^2}{2} = \frac{x^2}{2} + A$$

$$y^2 - x^2 = 516$$





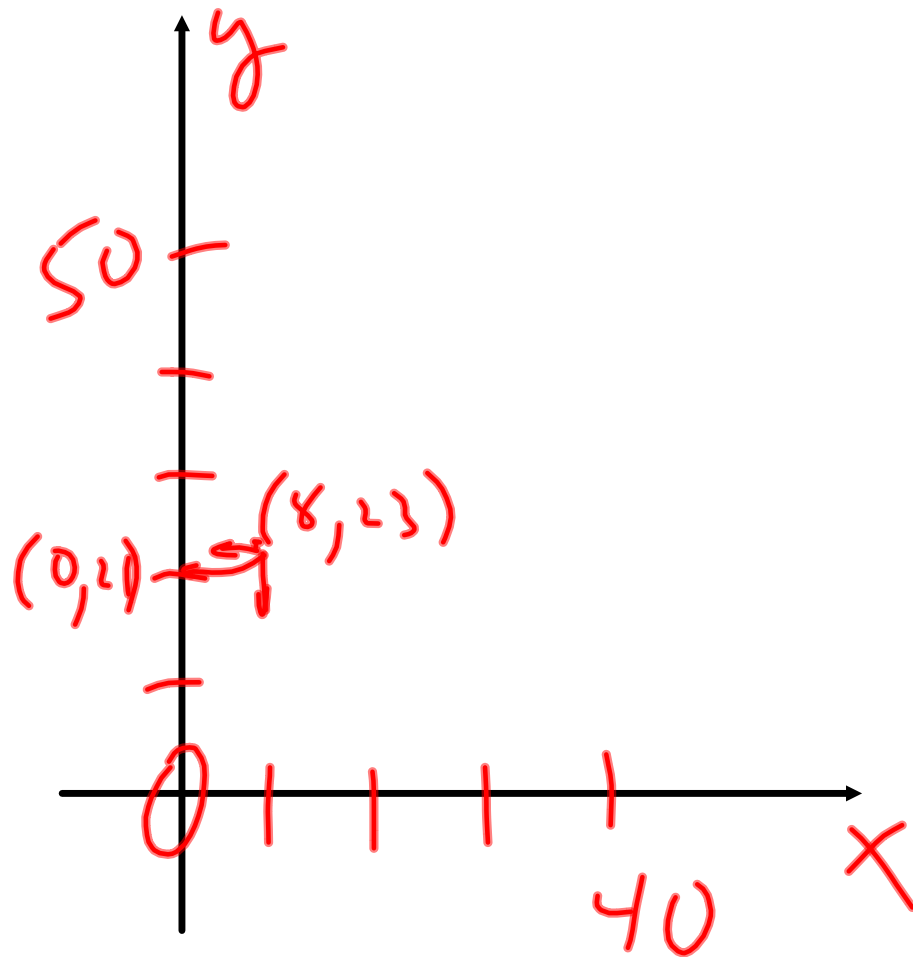
$$\frac{dy}{dx} = \frac{x}{y}$$

$$\frac{dy}{dt} = -ax < 0 \downarrow$$

$$\frac{dx}{dt} = -ay < 0 \leftarrow$$

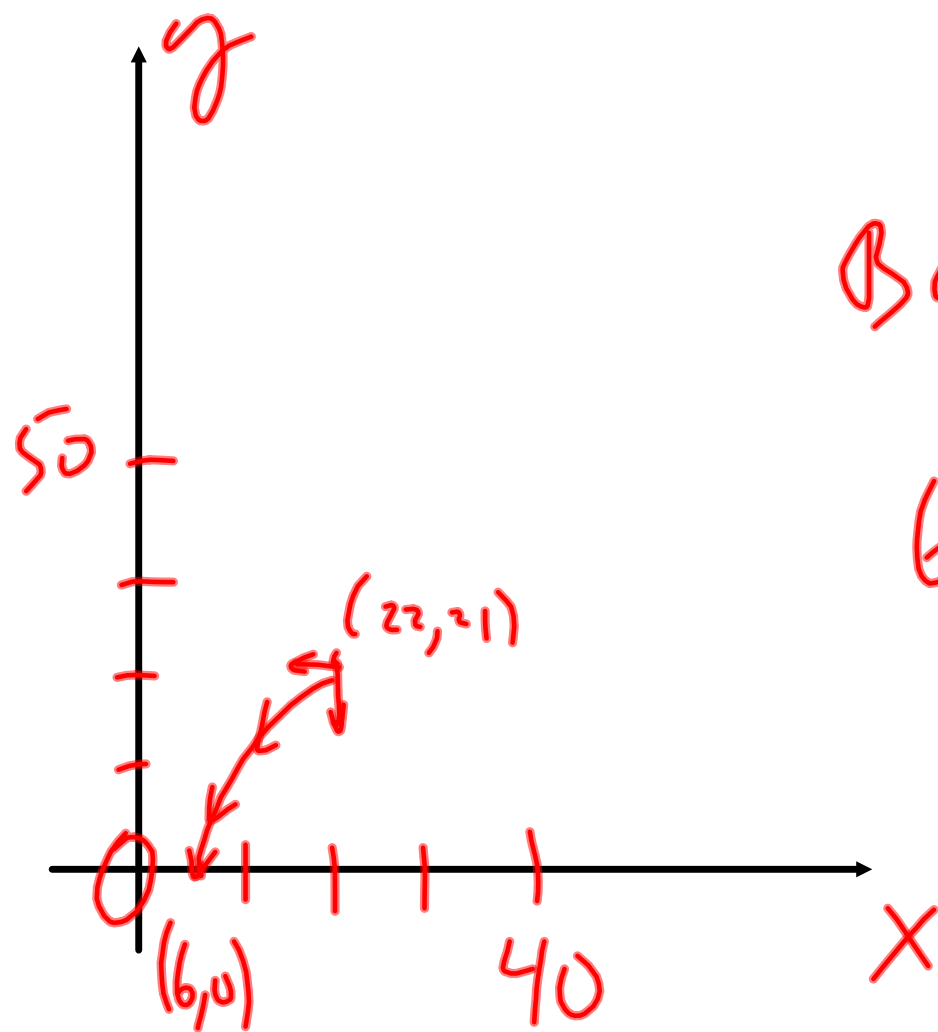
BRITISH
VICTORY

22 SHIPS LEFT.



OPPOSING
VICTORY

21 SHIPS LEFT



BRITISH WON

6 SHIPS LEFT!