

6.27

$$V = \pi R^2 \times L$$

$$\Rightarrow dV = \frac{dV}{dR} dR + \frac{dV}{dL} dL$$

$$\Rightarrow dV = 2\pi LR dR + \pi R^2 dL$$

$$\Rightarrow \frac{dV}{dt} = 2\pi LR \frac{dR}{dt} + \pi R^2 \frac{dL}{dt}$$

$$\Rightarrow \frac{dL}{dt} = \frac{\left( \frac{dV}{dt} - 2\pi LR \frac{dR}{dt} \right)}{\pi R^2} = \frac{1000 - 2\pi \times 400 \times 50 + 0,001}{\pi \times (50)^2}$$

$$\approx \underline{\underline{0,113 \text{ m/s}}}$$

6.28

$$L = \sqrt{x^2 + y^2}$$

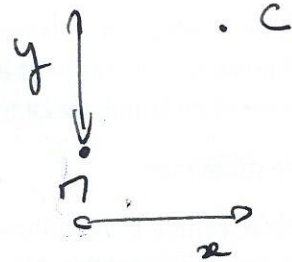
$$dL = \frac{dL}{dx} dx + \frac{dL}{dy} dy$$

$$\Rightarrow dL = \frac{x}{\sqrt{x^2 + y^2}} dx + \frac{y}{\sqrt{x^2 + y^2}} dy$$

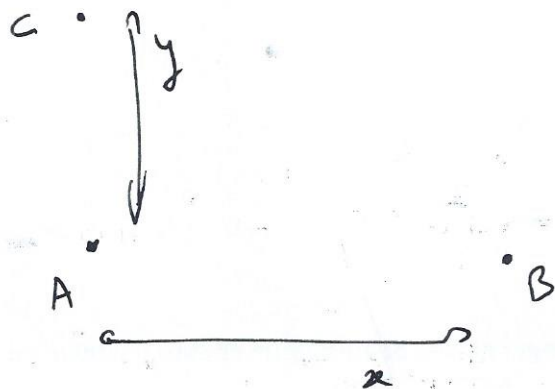
$$\Rightarrow \frac{dL}{dt} = \frac{x}{\sqrt{x^2 + y^2}} \frac{dx}{dt} + \frac{y}{\sqrt{x^2 + y^2}} \frac{dy}{dt}$$

$$\Rightarrow \frac{dx}{dt} = \frac{\left( \frac{dL}{dt} - \frac{y}{\sqrt{x^2 + y^2}} \frac{dy}{dt} \right)}{\left( \frac{x}{\sqrt{x^2 + y^2}} \right)} = \frac{\left( 1 - \frac{4}{\sqrt{4^2 + 3^2}} \times 1 \right)}{\left( \frac{3}{\sqrt{4^2 + 3^2}} \right)}$$

$$= \frac{(1 - 0,8)}{(3/5)} = \frac{0,2}{0,6} = 0,33 \text{ m/s}$$



6.23



$$BC = \sqrt{x^2 + y^2}$$

$$v = \frac{d(BC)}{dt} = \frac{d(BC)}{dx} \times \frac{dx}{dt} + \frac{d(BC)}{dy} \times \frac{dy}{dt}$$

$$v = \frac{x}{\sqrt{x^2 + y^2}} \times \frac{dx}{dt} + \frac{y}{\sqrt{x^2 + y^2}} \times \frac{dy}{dt}$$

$$\frac{dx}{dt} = 40$$

$$\frac{dy}{dt} = 60$$

~~À 14h, le bateau A est parti depuis 2 heures et est donc parvenu  $x = 80$  km et  $y = 120$  km.~~

~~$$v = \frac{80}{\sqrt{80^2 + 120^2}} \times 40 + \frac{120}{\sqrt{80^2 + 120^2}} \times 60$$~~

~~$$= \frac{3200 + 7200}{\sqrt{80^2 + 120^2}}$$~~

~~$$= \frac{10400}{144,222} \approx 72 \text{ km/h}$$~~

À 14h, le bateau B est parti depuis 2h et a parvenu  $x = 80$   
 le bateau C est parti depuis 1h et a parvenu  $x = 60$

$$v = \frac{80}{\sqrt{80^2 + 60^2}} \times 40 + \frac{60}{\sqrt{80^2 + 60^2}} \times 60$$

$$= \frac{3200 + 3600}{100} = \underline{\underline{68 \text{ km/h}}}$$