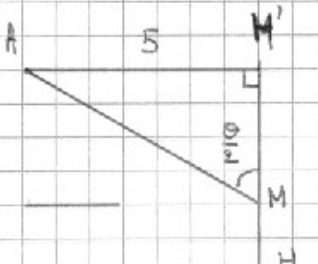


# DM: Optimisation et Trigonometrie

8.  $\theta \in [79; 180]$  (1)

9. il semble que  $\theta = 120^\circ$  (1)

10.

a)  + AH'M est un rectangle:

$$\rightarrow \sin \frac{\theta}{2} = \frac{5}{AM} \text{ donc } AM = \frac{5}{\sin \frac{\theta}{2}} \quad (1)$$

$$\rightarrow \tan \frac{\theta}{2} = \frac{5}{H'M} \text{ donc } H'M = \frac{5}{\tan \frac{\theta}{2}} \quad (1)$$

$$MH = 6 - H'M = 6 - \frac{5}{\tan \frac{\theta}{2}} \quad (1)$$

a)  $f(\theta) = 2AM + MH$

Pour  $\theta \in [79; 180]$

$$= \frac{10}{\sin \frac{\theta}{2}} + 6 - \frac{5}{\tan \frac{\theta}{2}} \quad \text{et } \tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$= 6 + \frac{10 - 5 \cos \frac{\theta}{2}}{\sin \frac{\theta}{2}}$$

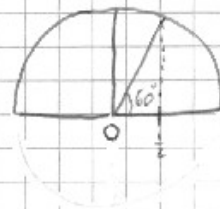
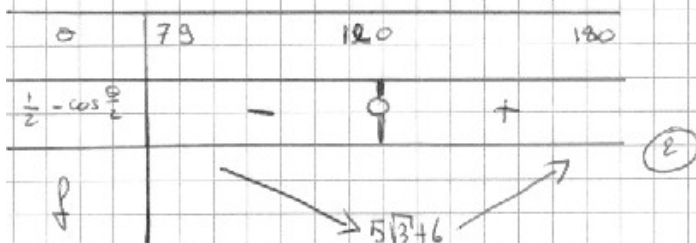
$$= 6 + 5 \frac{2 - \cos \frac{\theta}{2}}{\sin \frac{\theta}{2}} \quad (2)$$

b)  $f'(\theta) = 5 \frac{\frac{1}{2} \sin \frac{\theta}{2} \times \sin \frac{\theta}{2} - \frac{1}{2} \cos \frac{\theta}{2} (2 - \cos \frac{\theta}{2})}{\sin^2 \frac{\theta}{2}}$

$$= 5 \frac{\frac{1}{2} (\sin^2 \frac{\theta}{2} + \cos^2 \frac{\theta}{2}) - \cos \frac{\theta}{2}}{\sin^2 \frac{\theta}{2}} \quad \text{et } \sin^2 \frac{\theta}{2} + \cos^2 \frac{\theta}{2} = 1$$

$$= 5 \frac{\frac{1}{2} - \cos \frac{\theta}{2}}{\sin^2 \frac{\theta}{2}} \quad (2) \rightarrow \cos \frac{\theta}{2} = \frac{1}{2} \Leftrightarrow \frac{\theta}{2} = 60^\circ \text{ (sur } [79; 180])$$

$$\Leftrightarrow \theta = 120^\circ \quad (1)$$



$f$  est minimum pour  $\theta = 120^\circ$  et  $f(120) = 6 + 5 \frac{2 - \cos 60}{\sin 60} = 5\sqrt{3} + 6 \quad (1)$