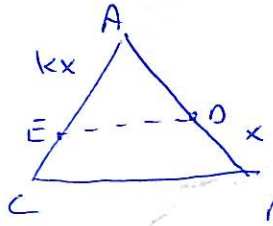
.15 (690)



$f = ED^2 = AE^2 + AD^2 - 2AE \cdot AD \cos 60 =$

$= (kx)^2 + (a-x)^2 - 2kx(a-x)\cdot 0.5 =$

$= k^2x^2 + a^2 - 2ax + x^2 - kxa + kx^2$

$f' = 2xk^2 - 2a + 2x - ka + 2kx =$ ↓ $x = \frac{2}{3}a$

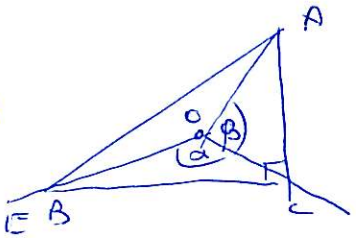
$= 2\cdot\frac{2}{3}ak^2 - 2a + 2\cdot\frac{2}{3}a - ka + 2k\cdot\frac{2}{3}a =$

$= \frac{4}{3}ak^2 + k\left(\frac{4}{3}a - a\right) - 2a + \frac{4}{3}a = \frac{4}{3}ak^2 - \frac{3}{3}ak - 1\frac{3}{3}a = 0 \quad /\cdot 3$

$4ak^2 - 3ak - 10a = 0$ $\qquad k_{1,2} = \frac{3a \pm \sqrt{9a^2 + 160a^2}}{8a} = \frac{3a \pm 13a}{8a} =$ 2 / $-\frac{5}{4}$

x	1	2	3
y'	−	0	+
y	↘	min	↗

-22 (691)



(א) נסמן את הזווית $\beta = \angle AOC$

$(BO=CO) \quad \angle OBC = \frac{180-\alpha}{2} = 90 - \frac{\alpha}{2} \Rightarrow \angle OCA = \frac{\alpha}{2}$

$\angle OAC = 180 - \beta - \frac{\alpha}{2}$

$= \frac{AO}{\sin\frac{\alpha}{2}} = \frac{OC}{\sin(180-\beta-\frac{\alpha}{2})} \Rightarrow OC = \frac{R\sin(\beta+\frac{\alpha}{2})}{\sin\frac{\alpha}{2}}$ משפט הסינוסים ב $\triangle AOC$

$\frac{AC}{\sin\beta} = \frac{OA}{\sin\frac{\alpha}{2}} \Rightarrow AC = \frac{R\sin\beta}{\sin\frac{\alpha}{2}}$

$\frac{BC}{\sin\alpha} = \frac{OC}{\sin(90-\frac{\alpha}{2})} \Rightarrow BC = \frac{R\sin(\beta+\frac{\alpha}{2})\sin\alpha}{\sin\frac{\alpha}{2}\cos\alpha}$ משפט הסינוסים ב $\triangle OBC$

$f = S_{ABC} = \frac{BC\cdot AC}{2} = \frac{R\sin\beta}{2\sin\frac{\alpha}{2}} \cdot \frac{R\sin(\beta+\frac{\alpha}{2})\sin\alpha}{\sin\frac{\alpha}{2}\cos\alpha} = \frac{R^2\sin\beta\sin(\beta+\frac{\alpha}{2})\tan\alpha}{2\sin^2\frac{\alpha}{2}}$

$f' = 0 = \frac{R^2\tan\alpha}{2\sin^2\frac{\alpha}{2}}\left[\cos\beta\sin(\beta+\frac{\alpha}{2}) + \sin\beta\cos(\beta+\frac{\alpha}{2})\right]$

$\cos\beta\sin(\beta+\frac{\alpha}{2}) = -\sin\beta\cos(\beta+\frac{\alpha}{2})$

$\tan(\beta+\frac{\alpha}{2}) = -\tan\beta = \tan(-\beta)$

$\beta + \frac{\alpha}{2} = -\beta + 180 \Rightarrow 2\beta = 180 - \frac{\alpha}{2}$

$\boxed{\beta = 90 - \frac{\alpha}{4}}$

x	$90-\frac{\alpha}{2}$	$90-\frac{\alpha}{4}$	90
y'	+	0	−
y	↗	max	↘

(ב) מהיות $OC = R$ נובע $R = OC = \frac{R\sin(\beta+\frac{\alpha}{4})}{\sin\frac{\alpha}{2}} = \frac{R\sin(90-\frac{\alpha}{4}+\frac{\alpha}{2})}{\sin\frac{\alpha}{2}}$

$R = \frac{R\sin(90+\frac{\alpha}{4})}{\sin\frac{\alpha}{2}} = \frac{R\cos(-\frac{\alpha}{4})}{\sin\frac{\alpha}{2}} = \frac{R\cos\frac{\alpha}{4}}{\sin\frac{\alpha}{2}} = \frac{R\cos\frac{\alpha}{4}}{2\sin\frac{\alpha}{4}\cos\frac{\alpha}{4}}$

$2R\sin\frac{\alpha}{4} = R \rightarrow \sin\frac{\alpha}{4} = \frac{1}{2} = \sin 30$

$\frac{\alpha}{4} = 30 \rightarrow \boxed{\alpha = 120}$

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