Musterlös.

3a)

$$\underline{r}_A = \frac{2}{\sqrt{3}} a \left(\sin\varphi\, \underline{e}_1 + \cos\varphi\, \underline{e}_2 \right)$$

$$\underline{r}_F = \frac{4}{3} a \left(\cos\varphi\, \underline{e}_1 - \sin\varphi\, \underline{e}_2 \right)$$ 1

$$\delta \underline{r}_A = \frac{\partial \underline{r}_A}{\partial \varphi} \delta\varphi = \frac{2}{\sqrt{3}} a \left(\cos\varphi\, \underline{e}_1 - \sin\varphi\, \underline{e}_2 \right) \delta\varphi$$

$$\delta \underline{r}_F = \frac{\partial \underline{r}_F}{\partial \varphi} \delta\varphi = \frac{4}{3} a \left(-\sin\varphi\, \underline{e}_1 - \cos\varphi\, \underline{e}_2 \right) \delta\varphi$$ 1

$$\delta A = A \underline{e}_1 \cdot \delta \underline{r}_A \Big|_{\varphi=0} + F \underline{e}_2 \cdot \delta \underline{r}_F \Big|_{\varphi=0}$$ 1

$$= \left(\frac{2}{\sqrt{3}} a \cdot A - \frac{4}{3} a \cdot F \right) \delta\varphi \overset{!}{=} 0 \quad \Rightarrow \quad A = \frac{4}{3} \cdot \frac{\sqrt{3}}{2} \cdot F$$

$$\underline{\underline{A = \frac{2}{3} \sqrt{3}\, F}} = \frac{2}{\sqrt{3}} F$$ 1

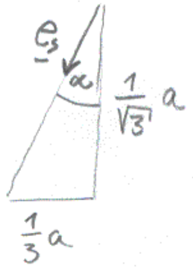
Endergebnis

b)

$$\underline{r}_F = \frac{4}{3} a \left(\cos\varphi\, \underline{e}_1 - \sin\varphi\, \underline{e}_2 \right)$$

$$\underline{r}_S = \underline{r}_F$$

$$\delta \underline{r}_F = \delta \underline{r}_S = \frac{4}{3} a \left(-\sin\varphi\, \underline{e}_1 - \cos\varphi\, \underline{e}_2 \right)$$ 1



1

$$\underline{S} = S \cdot \underline{e}_S = S \left(-\frac{1}{2} \underline{e}_1 + \frac{\sqrt{3}}{2} \underline{e}_2 \right)$$ 1

$$\underline{e}_s = \cos\alpha\, \underline{e}_2 - \sin\alpha\, \underline{e}_1$$

$$\delta A = F \underline{e}_2 \cdot \delta \underline{r}_F \Big|_{\varphi=0} + \underline{S} \cdot \delta \underline{r}_S \Big|_{\varphi=0}$$

$$\tan\alpha = \frac{1}{3} \frac{\sqrt{3}}{1} = \frac{\sqrt{3}}{3}$$

$$= -\frac{4}{3} \cancel{a} F - \frac{4}{3} \cancel{a} \cdot \frac{\sqrt{3}}{2} S \overset{!}{=} 0$$

$$\alpha = 30^\circ$$

$$\underline{e}_s = -\frac{1}{2} \underline{e}_1 + \frac{\sqrt{3}}{2} \underline{e}_2$$ 1

$$\Rightarrow \underline{\underline{S = -\frac{2}{\sqrt{3}} F}}$$ 1 Endergebnis