Kogelbanen

17. $\frac{dy}{dx} = r - (0{,}1 + 0{,}1 \cdot r^2) \cdot 2x$

$y'(0) = r$, en dus geldt $l = r$

18. $rx - (0{,}1 + 0{,}1 \cdot r^2) \cdot x^2 = 0$

$x \cdot (r - (0{,}1 + 0{,}1 \cdot r^2) \cdot x) = 0 \quad \rightarrow \quad x = 0 \quad \vee \quad x = \frac{r}{0{,}1 + 0{,}1 \cdot r^2}$

$$\frac{r}{0{,}1 + 0{,}1 \cdot r^2} = \frac{10\,r}{10 \cdot (0{,}1 + 0{,}1 \cdot r^2)} = \frac{10\,r}{1 + r^2}$$

19. $OD = \frac{10\,r}{1 + r^2}$

$$[OD]' = \frac{10 \cdot (1 + r^2) - 2r \cdot 10r}{(1 + r^2)^2} = \frac{10 - 10r^2}{(1 + r^2)^2} = 0$$

$\rightarrow \quad 10 - 10r^2 = 0 \quad \wedge \quad (1 + r^2)^2 \neq 0 \quad \rightarrow \quad r = -1 \quad \vee \quad r = 1$

Voor r = 1 geldt dat de afstand OD maximaal is.

20 $$\left[\frac{10\ .\ (r-1)}{1 + r^2}\right]' = \frac{10\,.\,(1 + r^2) - 2r\,.\,(10\,.\,(r-1))}{(1 + r^2)^2} = 0$$

$\rightarrow \quad -10r^2 + 20r + 10 = 0 \quad \wedge \quad (1 + r^2)^2 \neq 0$

$\rightarrow \quad r^2 - 2r - 1 = 0$ dus $r = 1 - \sqrt{2}$ of $r = 1 + \sqrt{2}$

$\frac{10\,(r-1)}{1 + r^2}$ is maximaal 2,071 met $r = 1 + \sqrt{2}$

De afstand OC bedraagt dus $\sqrt{2\,.\,(2{,}071)^2} = 2{,}93$