

### Example of a German A-level task allowing a digital tool

Consider the function  $r: x \mapsto \frac{1}{16}x^2 \cdot e^{-0,25x+1}$  defined on  $\mathbb{R}$ . For  $-4 \leq x \leq 10$ , the graph of  $r$  describes a water slide. To improve safety for bathers, a surveillance camera that can rotate in all directions should be installed. Its position in the model is indicated by point  $(12|3)$ . The line of sight from the camera towards a point on the slide  $(a|r(a))$ , where  $-4 \leq a \leq 10$ , can be described by the straight line  $g_a$ , whose equation is  $y = \frac{3-r(a)}{12-a} \cdot x + \left(3 - \frac{3-r(a)}{12-a} \cdot 12\right)$ .

Use mathematical calculations to determine whether the right-curving part of the graph of  $r$  is fully visible from the camera's perspective.

Reference:

[https://www.iqb.hu-](https://www.iqb.hu-berlin.de/media/exercise_files/Abituraufgaben_Mathematik/2025MerhoehtBAnalysisM)

[berlin.de/media/exercise\\_files/Abituraufgaben\\_Mathematik/2025MerhoehtBAnalysisM](https://www.iqb.hu-berlin.de/media/exercise_files/Abituraufgaben_Mathematik/2025MerhoehtBAnalysisM)  
[MS2\\_Aufgabe.pdf](https://www.iqb.hu-berlin.de/media/exercise_files/Abituraufgaben_Mathematik/2025MerhoehtBAnalysisM)