 The gradient/tangent relationship

The gradient and the tangent ratio

Create a [desmos](http://www.desmos.com/) template to investigate $f(x)=mx+b$ by creating a vertical line with a range between the $x-axis$ and $f(x)$.

Instructions

1. Begin with $f(x)=x$.
2. Let $x=c$ $\{0\leq y\leq f(x)\}$ and create a slider for c.
3. Students should already know that $gradient=\frac{rise}{run}$. Use the slider show that the ratio of the $\frac{rise}{run}$ remains the same as the vertical line moves along the x-axis.
4. Students should notice that a right-angled triangle is also formed. Students should consider how the **rise** and **run** are related to the sides of right-angled triangles in trigonometry.
5. Reveal the angle θ between $f(x)$ and the $x-axis$, students should observe that the **rise** is the **opposite side** and the **run** is the **adjacent side**.
6. Students can conclude that $m=\frac{rise}{run}=\frac{opposite}{adjacent}=tanϑ$

Sample template

This is a sample template for the above activity: [www.desmos.com/calculator/cp0lbwktvo](https://www.desmos.com/calculator/cp0lbwktvo)