

Hoofdstuk IV: goniometrische functies

www.karelappeltans.be

August 2, 2020

1 De goniometrische cirkel

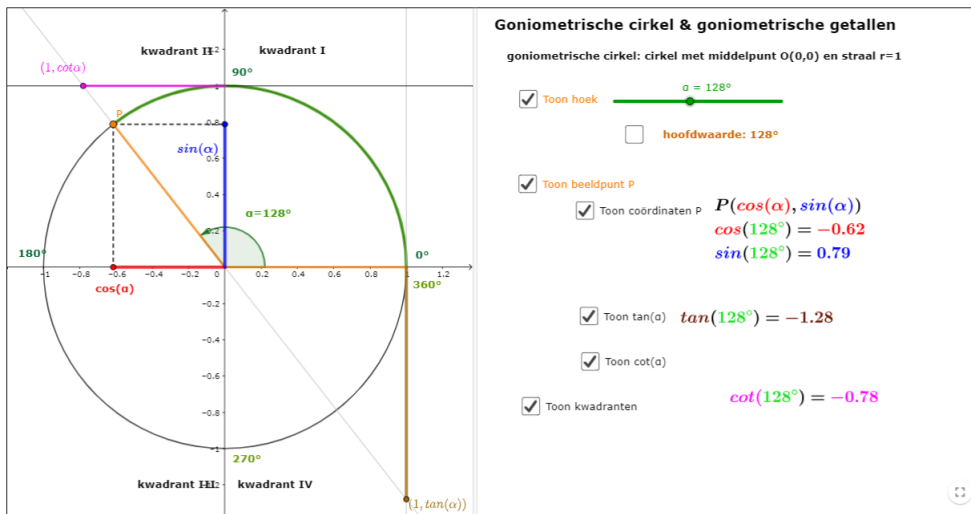


Figure 1: <https://www.geogebra.org/m/FrxHcWA>

2 De goniometrische getallen

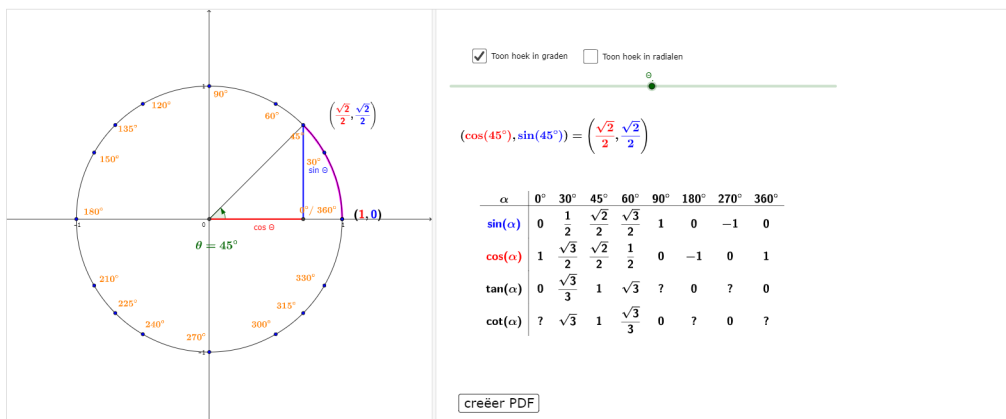


Figure 2: <https://www.geogebra.org/m/FrxHcWA>

3 De Radiaal

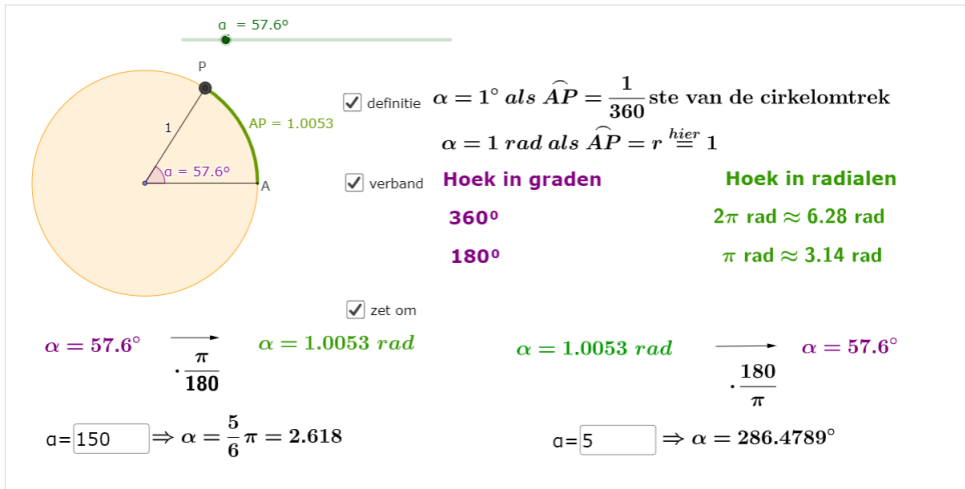


Figure 3: <https://www.geogebra.org/m/QjEWqdp3>

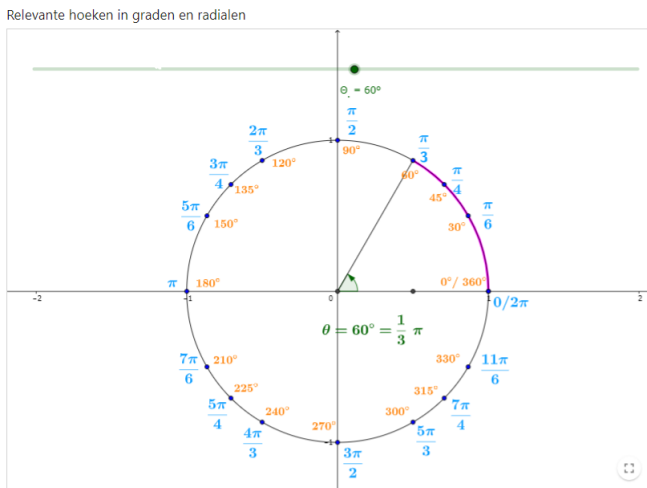


Figure 4: <https://www.geogebra.org/m/QjEWqdp3>

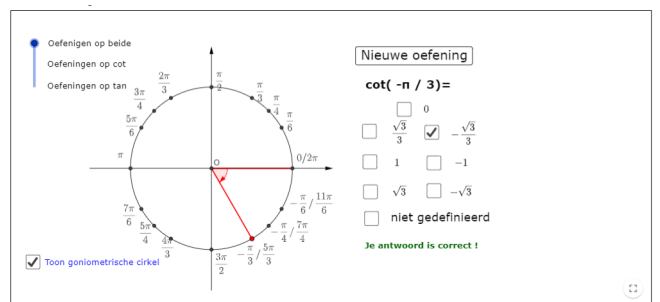
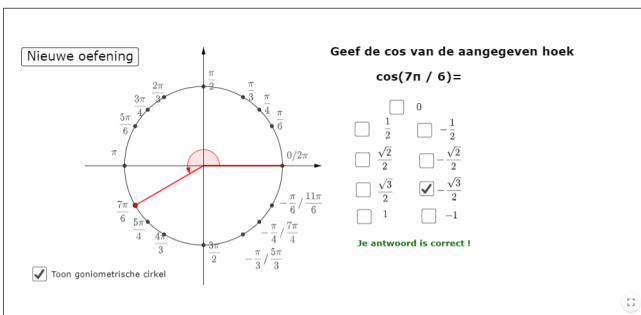


Figure 5: <https://www.geogebra.org/m/QjEWqdp3> | <https://www.geogebra.org/m/QjEWqdp3>

4 Verwante hoeken

4.1 supplementaire hoeken

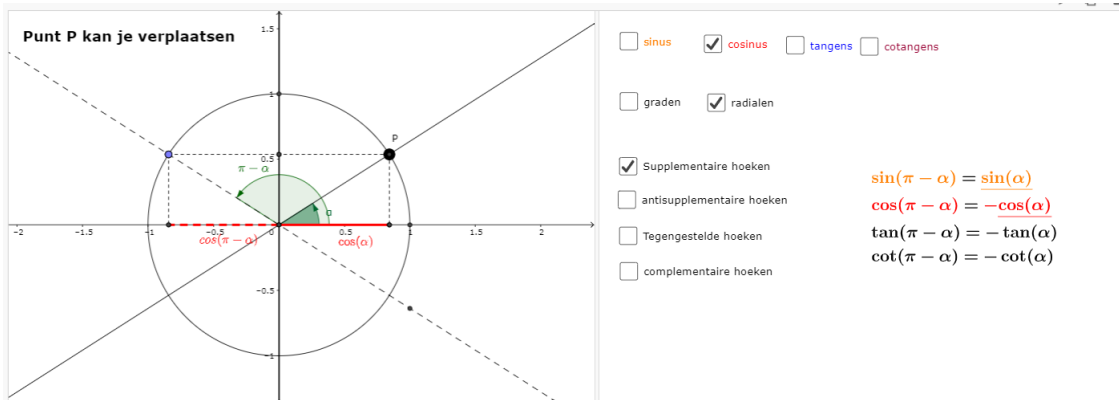


Figure 6: <https://www.geogebra.org/m/q27XXAeF>

4.2 antissupplementaire hoeken

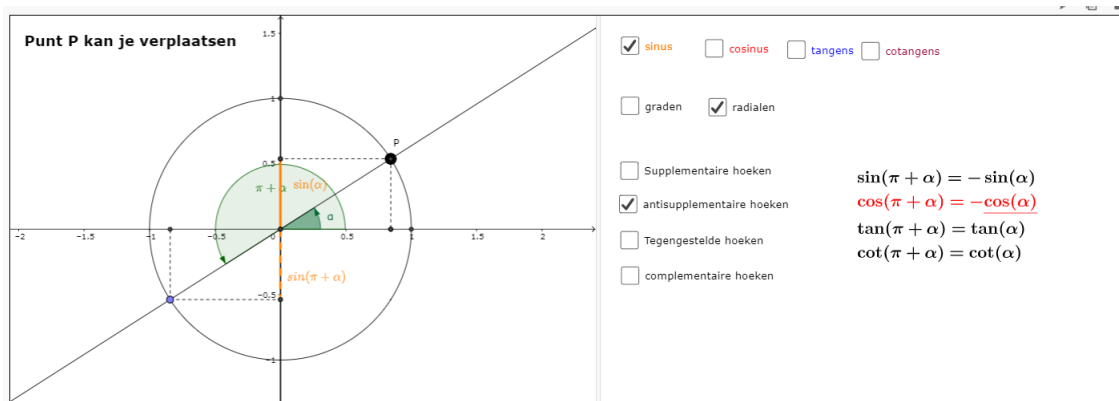


Figure 7: <https://www.geogebra.org/m/q27XXAeF>

4.3 tegengestelde hoeken

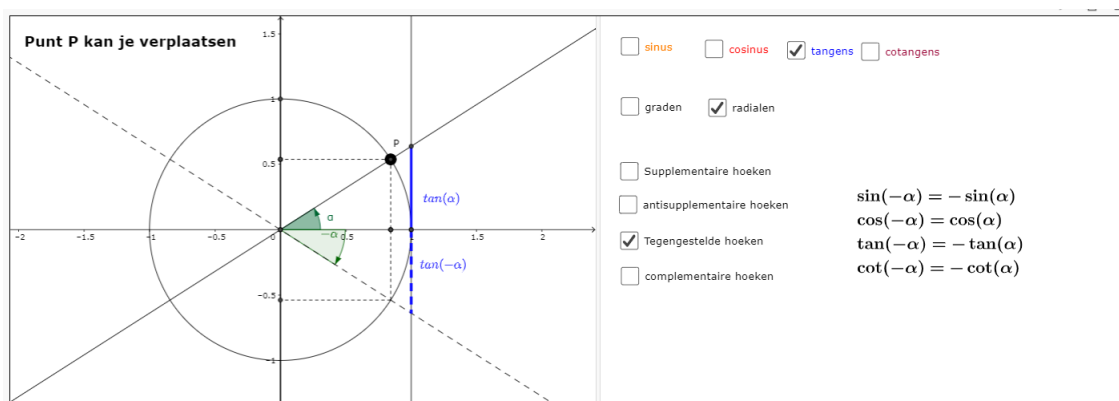


Figure 8: <https://www.geogebra.org/m/q27XXAeF>

4.4 complementaire hoeken

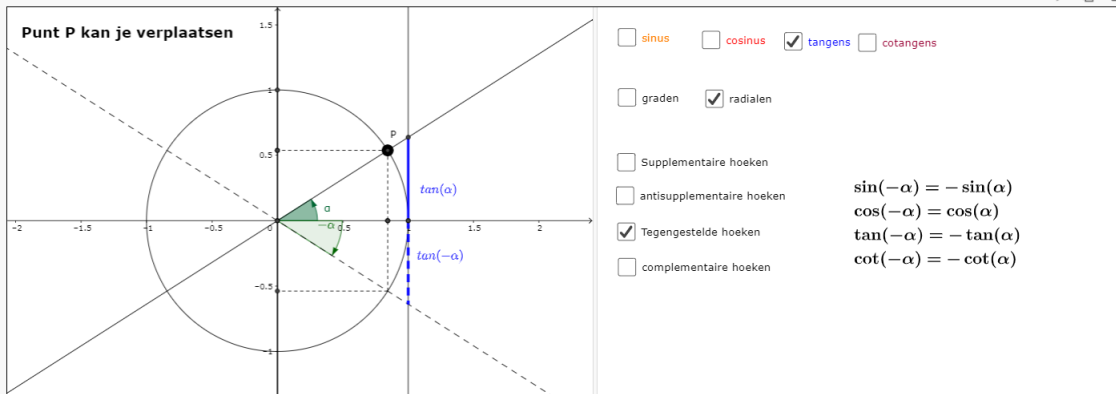


Figure 9: <https://www.geogebra.org/m/q27XXAeF>

4.5 willekeurige verwantschap

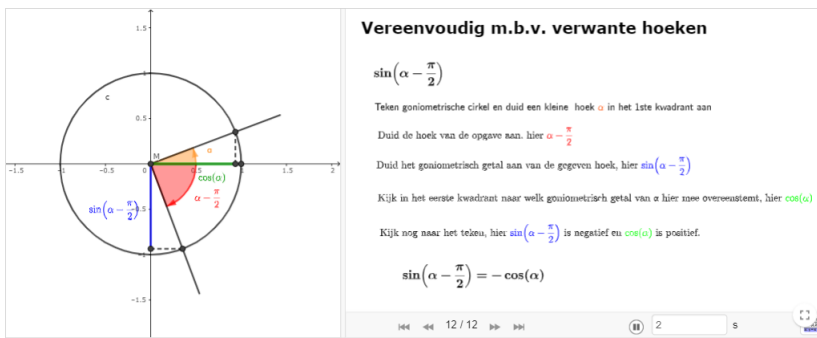


Figure 10: <https://www.geogebra.org/m/q27XXAeF>

5 Goniometrische functies

5.1 periodieke functies

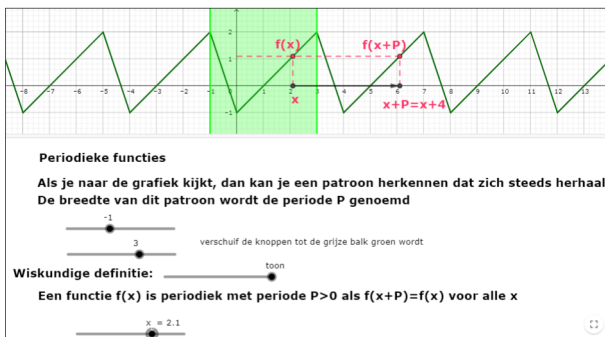


Figure 11: <https://www.geogebra.org/m/dqmct5ur>

5.2 $f(x)=\sin(x)$

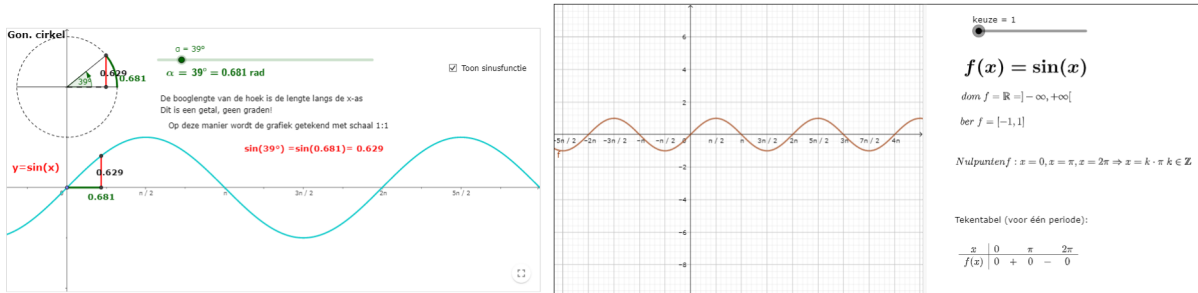


Figure 12: <https://www.geogebra.org/m/eeEyfQce>

5.3 $f(x)=\cos(x)$

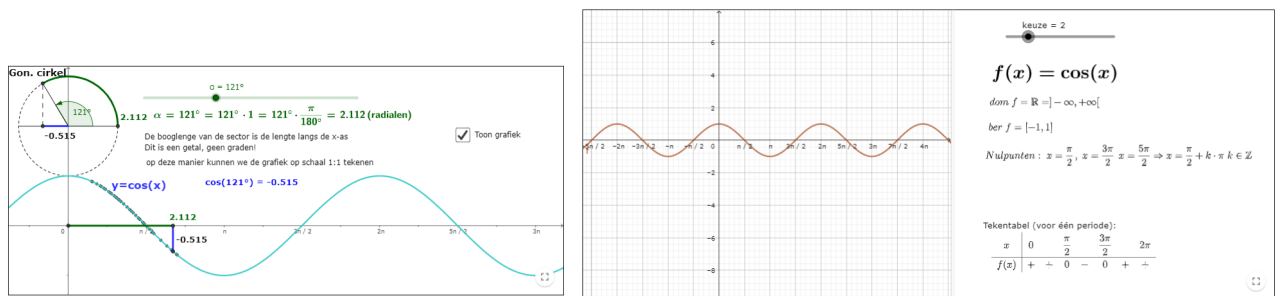


Figure 13: <https://www.geogebra.org/m/eeEyfQce>

5.4 $f(x)=\tan(x)$

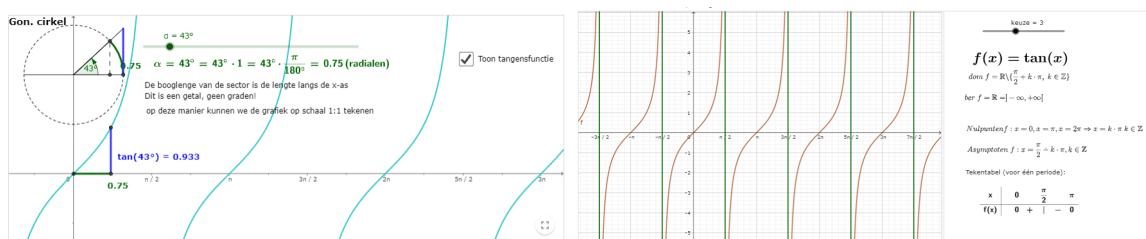


Figure 14: <https://www.geogebra.org/m/eeEyfQce>

6 algemene sinusfunctie

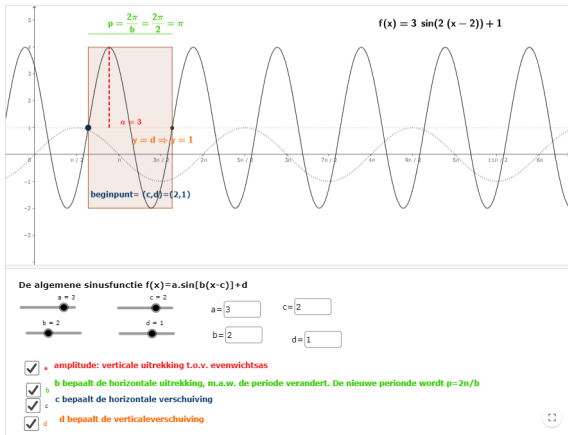


Figure 15: <https://www.geogebra.org/m/BFwHmNn4>

7 cyclometrische functies

7.1 $f(x) = \arcsin(x)$

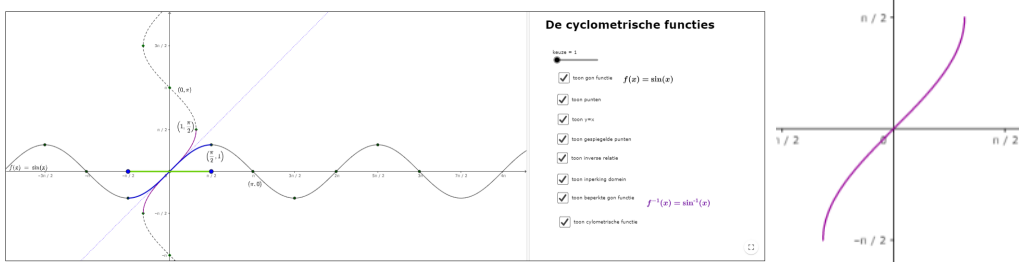


Figure 16: <https://www.geogebra.org/m/Vx7MuEsU> <https://www.geogebra.org/m/Vx7MuEsU>

7.2 $f(x) = \arccos(x)$

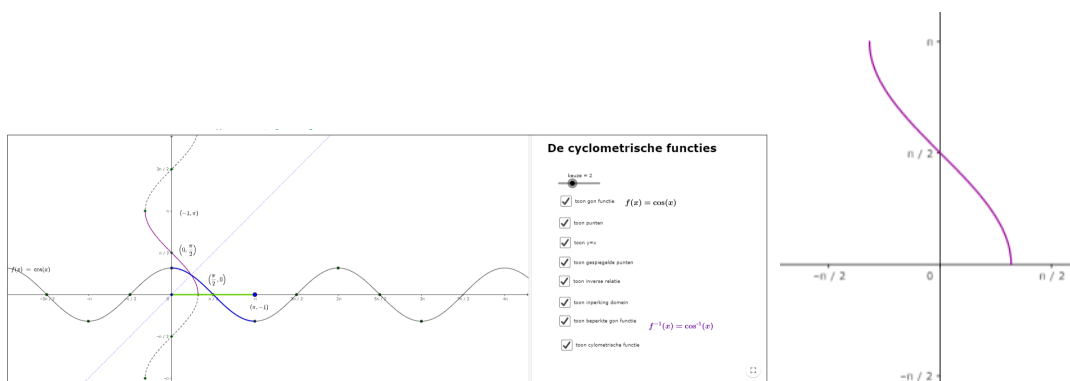


Figure 17: <https://www.geogebra.org/m/Vx7MuEsU> <https://www.geogebra.org/m/Vx7MuEsU>

7.3 $f(x)=\text{atan}(x)$

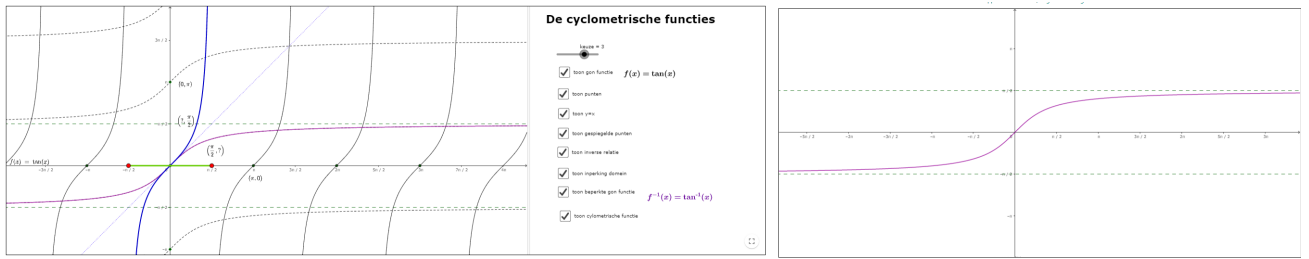


Figure 18: <https://www.geogebra.org/m/Vx7MuEsU> <https://www.geogebra.org/m/Vx7MuEsU>

8 goniometrische identiteiten

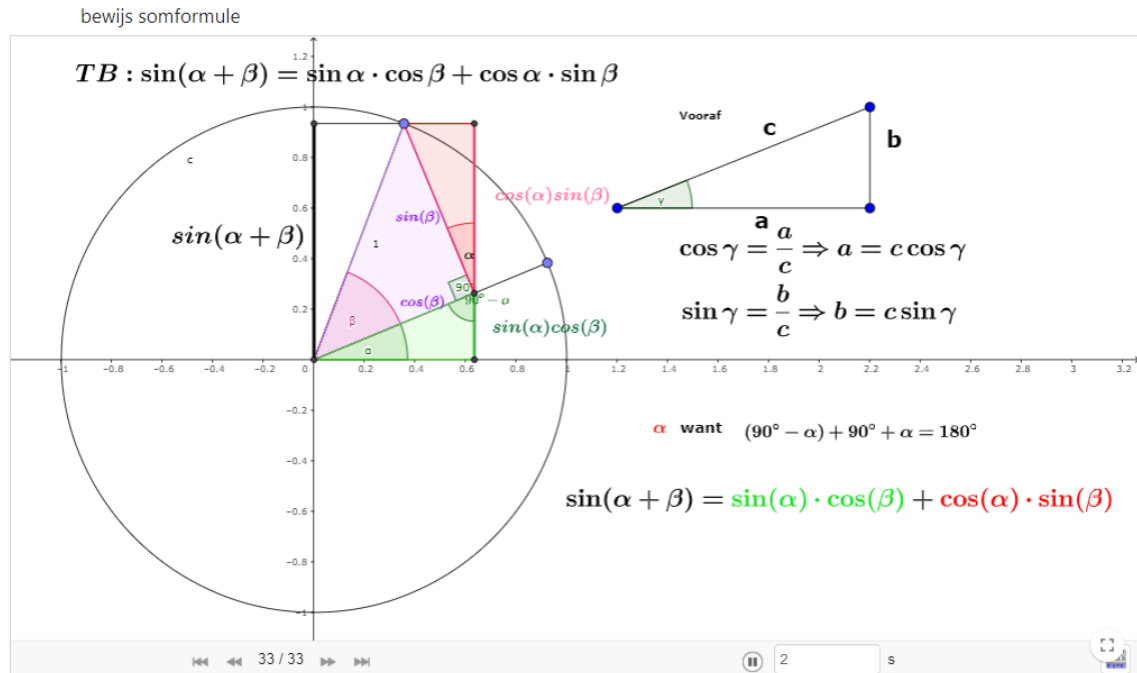


Figure 19: <https://www.geogebra.org/m/QfWuM7tH>

Basisformules

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$$

$$\cot \alpha = \frac{\cos \alpha}{\sin \alpha} = \frac{1}{\tan \alpha}$$

$$\sec \alpha = \frac{1}{\cos \alpha}$$

$$\csc \alpha = \frac{1}{\sin \alpha}$$

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\sin^2 \alpha = 1 - \cos^2 \alpha$$

$$\cos^2 \alpha = 1 - \sin^2 \alpha$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha}$$

$$1 + \cot^2 \alpha = \frac{1}{\sin^2 \alpha}$$

Verdubbelings- en halveringsformules

$$\sin(2\alpha) = 2 \sin \alpha \cos \alpha$$

$$\cos(2\alpha) = \cos^2 \alpha - \sin^2 \alpha$$

$$\cos(2\alpha) = 2 \cos^2 \alpha - 1$$

$$\cos^2 \alpha = \frac{1 + \cos 2\alpha}{2}$$

$$\cos(2\alpha) = 1 - 2 \sin^2 \alpha$$

$$\sin^2 \alpha = \frac{1 - \cos 2\alpha}{2}$$

$$\tan 2\alpha = \frac{2 \tan \alpha}{1 - \tan^2 \alpha}$$

Som- en verschilformules

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \cdot \tan \beta}$$

$$\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \cdot \tan \beta}$$

Formules van Simpson:

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

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

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

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

Figure 20: <https://www.geogebra.org/m/QfWuM7tH>

9 goniometrische vergelijkingen

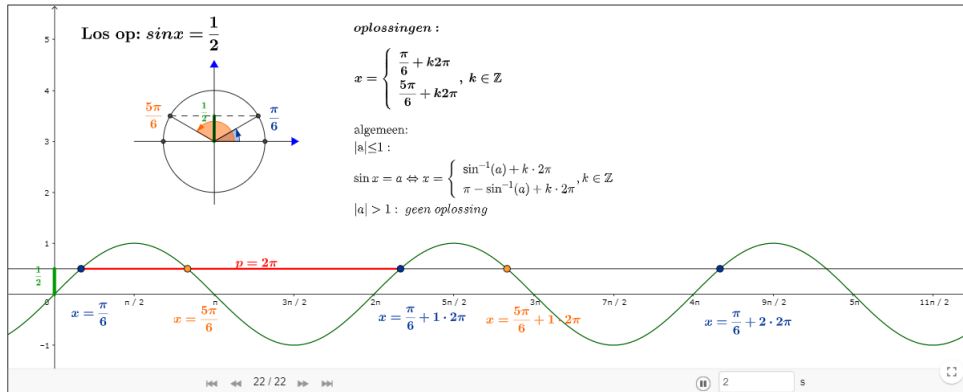


Figure 21: <https://www.geogebra.org/m/ej2fhRDYt>

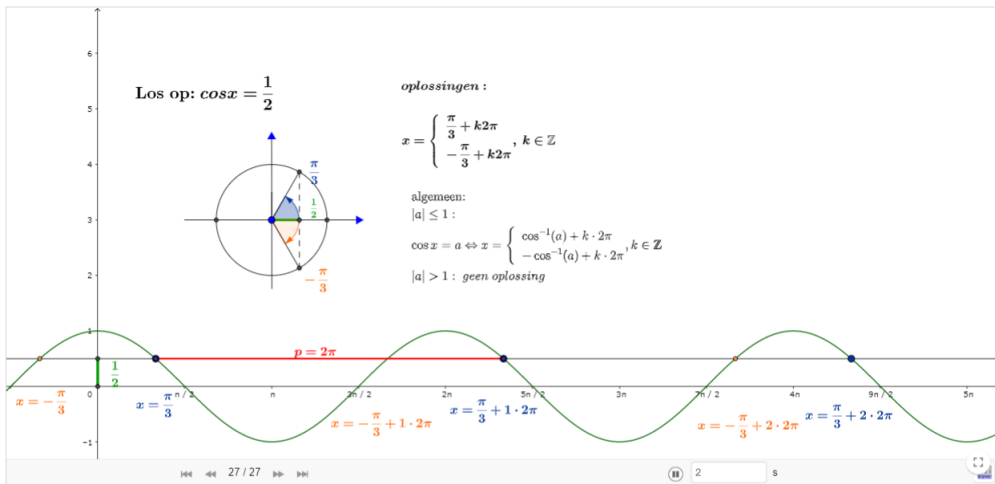


Figure 22: <https://www.geogebra.org/m/ej2fhRDYt>

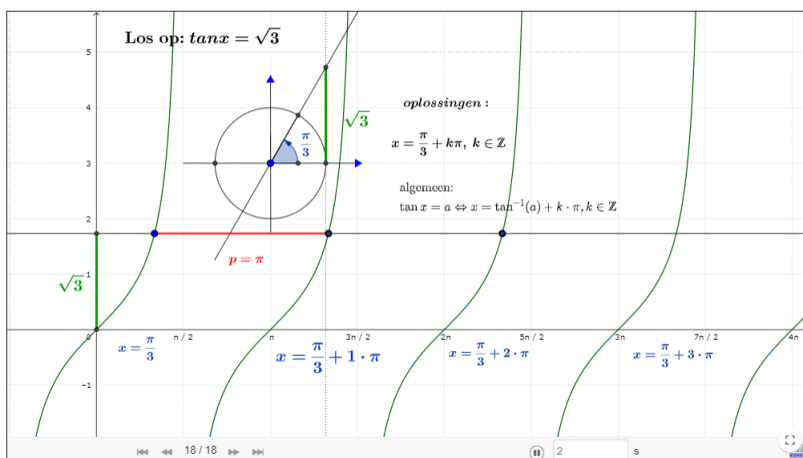


Figure 23: <https://www.geogebra.org/m/ej2fhRDYt>

10 goniometrische ongelijkheden

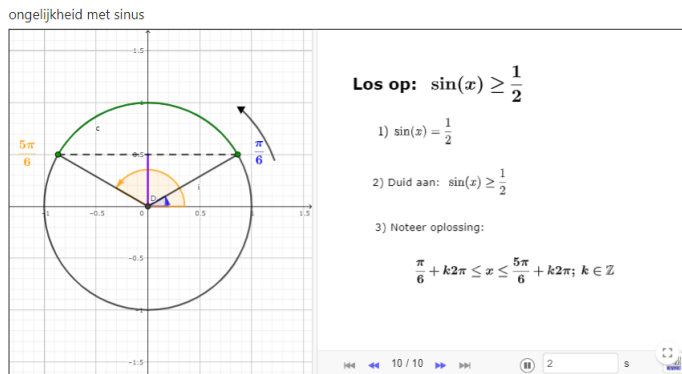


Figure 24: <https://www.geogebra.org/m/jr7kkdkt>

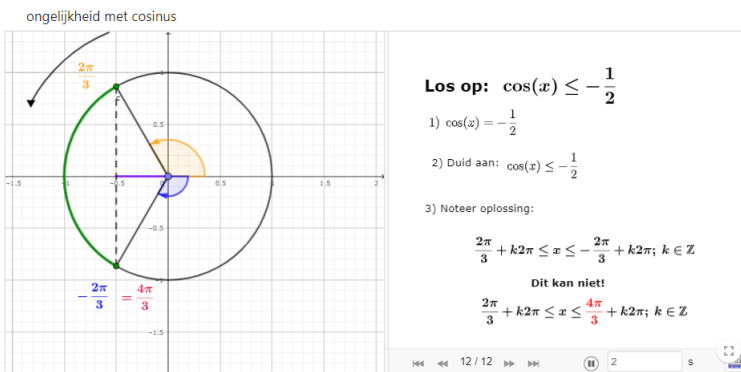


Figure 25: <https://www.geogebra.org/m/jr7kkdkt>

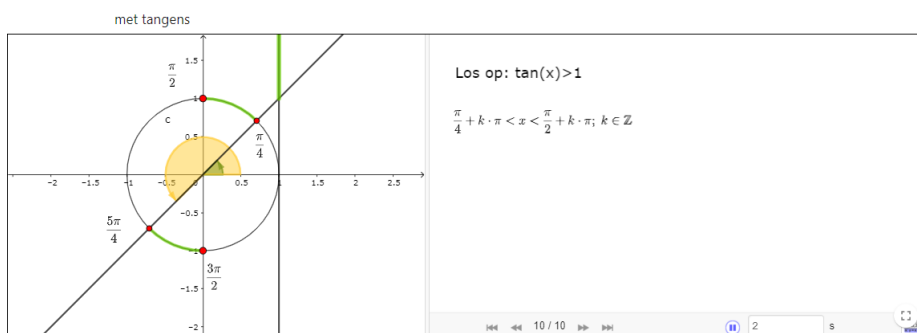


Figure 26: <https://www.geogebra.org/m/jr7kkdkt>

11 oefeningen

12 taken

1. Verwante hoeken
2. Goniometrische formules I
3. Goniometrische formules II
4. Goniometrische vergelijkingen

5. Goniometrische ongelijkheden