

Forkunnskaper i matematikk for fysikkstudenter.
Trigonometri – løsninger på oppgaver.

Oppgave 1:

a) Fra grader til radianer:

$$\frac{g}{180} = \frac{v}{\pi} \Leftrightarrow v = \frac{g}{180} \cdot \pi.$$

Setter inn:

$$g = 15^\circ \Leftrightarrow v = \frac{15}{180} \cdot \pi = \underline{\underline{\frac{1}{12}\pi}}.$$

$$g = 75^\circ \Leftrightarrow v = \frac{75}{180} \cdot \pi = \frac{5}{12}\pi.$$

$$g = 165^\circ \Leftrightarrow v = \frac{165}{180} \cdot \pi = \frac{11}{12}\pi.$$

$$g = 51.9^\circ \Leftrightarrow v = \frac{51.9}{180} \cdot \pi \approx 0.906.$$

b) Fra radianer til grader:

$$\frac{g}{180} = \frac{v}{\pi} \Leftrightarrow g = \frac{180}{\pi} \cdot v.$$

Setter inn:

$$v = \frac{13}{12}\pi \Leftrightarrow g = \frac{180}{\pi} \cdot \frac{13}{12}\pi = 195^\circ.$$

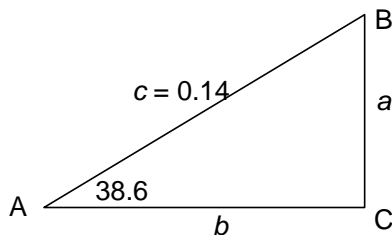
$$v = \frac{7}{12}\pi \Leftrightarrow g = \frac{180}{\pi} \cdot \frac{7}{12}\pi = 105^\circ.$$

$$v = 0.438 \Leftrightarrow g = \frac{180}{\pi} \cdot 0.438 \approx 25.1^\circ.$$

$$v = 2.57 \Leftrightarrow g = \frac{180}{\pi} \cdot 2.57 \approx 147.3^\circ.$$

Oppgave 2:

a)



$$\sin A = \frac{a}{c}$$

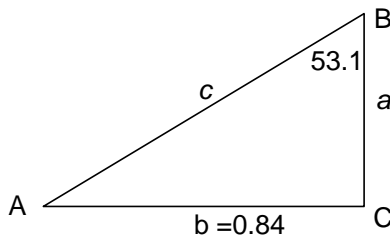
$$\Leftrightarrow a = c \sin A = 0.14 \cdot \sin 38.6^\circ = \underline{\underline{0.087}}$$

$$\cos A = \frac{b}{c}$$

$$\Leftrightarrow b = c \cos A = 0.14 \cdot \cos 38.6^\circ = \underline{\underline{0.11}}$$

$$\angle B = 90^\circ - \angle A = 90^\circ - 38.6^\circ = \underline{\underline{51.4^\circ}}.$$

b)



$$\tan B = \frac{b}{a}$$

$$\Leftrightarrow a = \frac{b}{\tan B} = \frac{0.84}{\tan 53.1^\circ} = \underline{\underline{0.63}}$$

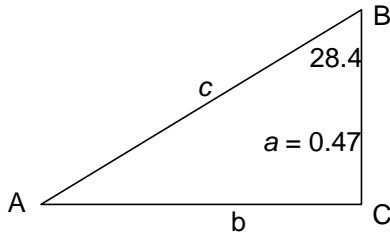
$$\sin B = \frac{b}{c}$$

$$\Leftrightarrow c = \frac{b}{\sin B} = \frac{0.84}{\sin 53.1^\circ} = \underline{\underline{1.05}}$$

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$$\angle A = 90^\circ - \angle B = 90^\circ - 53.1^\circ = \underline{\underline{36.9^\circ}}.$$

c)



$$\tan B = \frac{b}{a}$$

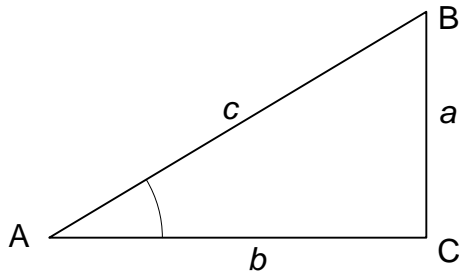
$$\Leftrightarrow b = a \tan B = 0.47 \cdot \tan 28.4^\circ = \underline{\underline{0.254}}$$

$$\cos B = \frac{a}{c}$$

$$\Leftrightarrow c = \frac{a}{\cos B} = \frac{0.47}{\cos 28.4^\circ} = \underline{\underline{0.534}}$$

$$\angle A = 90^\circ - \angle B = 90^\circ - 28.4^\circ = \underline{\underline{61.6^\circ}}.$$

Oppgave 3:



I dette løsningsforslaget vil jeg referere til en trekant som vist til venstre.

a) Når $\cos A = 0.6 = \frac{b}{c}$, kan vi velge enheter slik at $c = 1$ og $b = 0.6$. Da blir

$$a = \sqrt{c^2 - b^2} = \sqrt{1^2 - 0.6^2} = \sqrt{1 - 0.36} = \sqrt{0.64} = \underline{\underline{0.8}}.$$

Da blir

$$\sin A = \frac{a}{c} = \frac{0.8}{1} = \underline{\underline{0.8}}.$$

$$\tan A = \frac{a}{b} = \frac{0.8}{0.6} = \underline{\underline{1.333}}$$

b) Når $\tan A = 2 = \frac{a}{b}$, kan vi velge enheter slik at $a = 2$ og $b = 1$. Da blir

$$c = \sqrt{a^2 + b^2} = \sqrt{2^2 + 1^2} = \underline{\underline{\sqrt{5}}}.$$

Da blir

$$\sin A = \frac{a}{c} = \frac{2}{\sqrt{5}} = \underline{\underline{\frac{2}{5}\sqrt{5}}}.$$

$$\cos A = \frac{b}{c} = \frac{1}{\sqrt{5}} = \underline{\underline{\frac{1}{5}\sqrt{5}}}.$$

c) Når $\sin A = \frac{1}{4}\sqrt{7} = \frac{a}{c}$, kan vi velge enheter slik at $a = \sqrt{7}$ og $c = 4$. Da blir

$$b = \sqrt{c^2 - a^2} = \sqrt{4^2 - \sqrt{7}^2} = \sqrt{16 - 7} = \sqrt{9} = \underline{\underline{3}}.$$

Da blir

$$\cos A = \frac{b}{c} = \frac{3}{4}.$$

$$\tan A = \frac{a}{b} = \underline{\underline{\frac{\sqrt{7}}{3}}}.$$

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Oppgave 4:

- a) $\arcsin\left(\frac{1}{2}\sqrt{3}\right) = \frac{\pi}{3}$ (eller 60°) fordi $\sin\left(\frac{\pi}{3}\right) = \frac{1}{2}\sqrt{3}$.
- b) $\arccos(0) = \frac{\pi}{2}$ (eller 90°) fordi $\cos\left(\frac{\pi}{2}\right) = 0$.
- c) $\arctan(0) = 0$ fordi $\tan 0 = 0$.
- d) $\arccos\left(-\frac{1}{2}\right) = \frac{2}{3}\pi$ (eller 120°) fordi $\cos\left(\frac{2}{3}\pi\right) = -\frac{1}{2}$.
- e) $\arcsin\left(-\frac{1}{2}\right) = -\frac{\pi}{6}$ (eller -30°) fordi $\sin\left(-\frac{\pi}{6}\right) = -\frac{1}{2}$.
- f) $\arctan(-\sqrt{3}) = -\frac{\pi}{3}$ (eller -60°) fordi $\tan\left(-\frac{\pi}{3}\right) = -\sqrt{3}$.