

Let's Learn Techische Mechanik

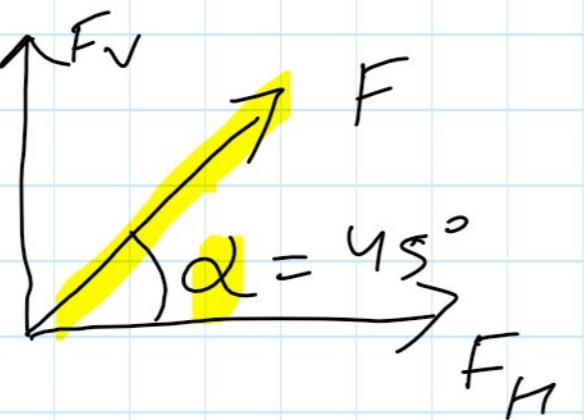
→ Hallo zusammen!

→ Flynn Rider

→ Ziel - (1) Kräftezerlegung
(2) Knoten Verfahren

Kräftezerlegung

Montag, 15. April 2019 21:32



$$F_H = F \cdot \cos \alpha$$

$$F_V = F \cdot \sin \alpha$$

1) wichtigster Fall

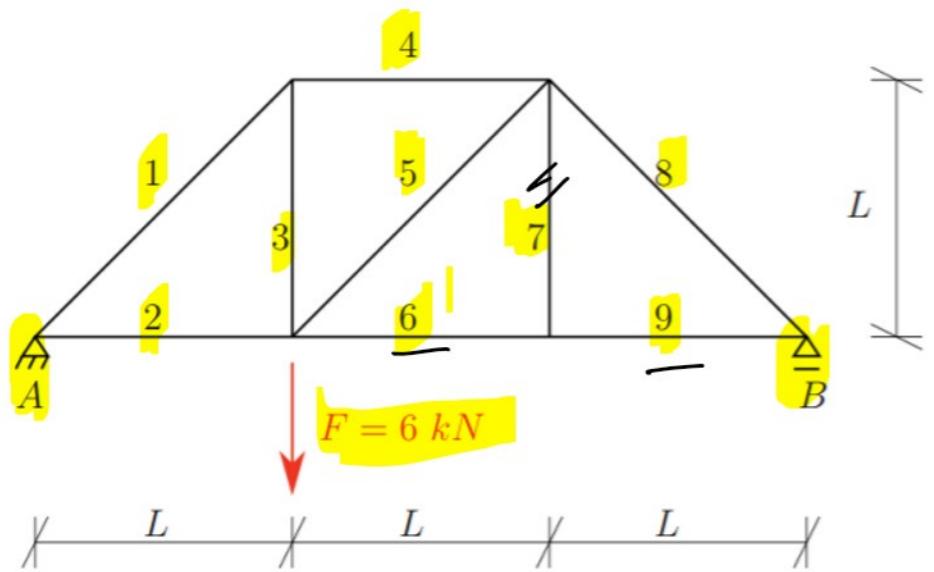
$$\alpha = 45^\circ \Rightarrow \sin 45^\circ = \cos 45^\circ$$

$$\underline{\underline{F_H = F_V}}$$

Knoten Verfahren

Sonntag, 7. April 2019 19:35

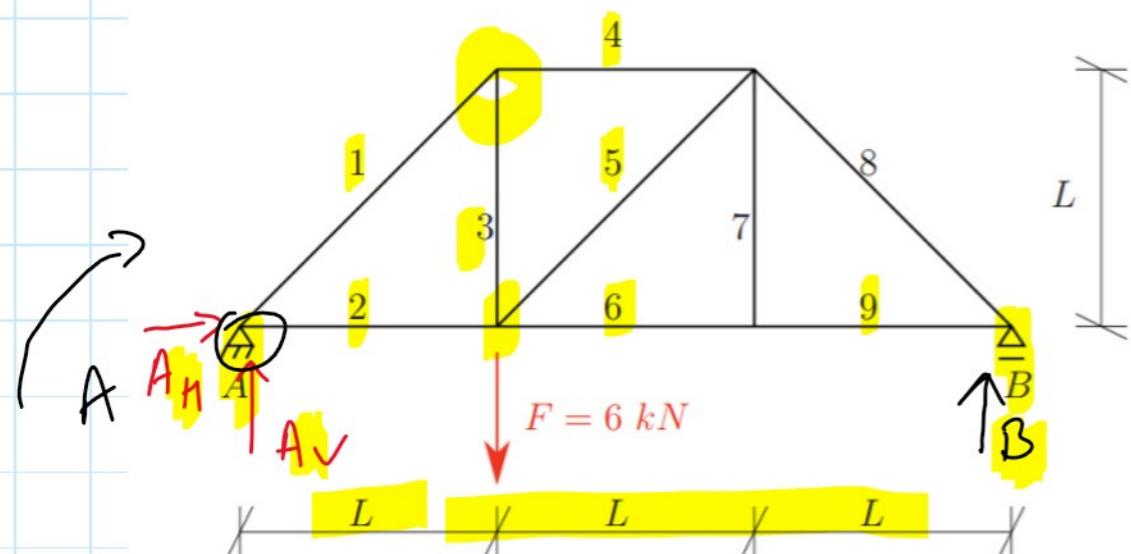
1)



$$S_7 = 0$$

a) Erster Schritt:

Auflagerkräfte auflösen.





1) Horizontal Richtung.
 $\rightarrow \sum H = 0 : A_H = 0$

2) vertikal Richtung.

$\uparrow \sum V = 0 : A_V + B - F = 0$
 $A_V + 13 = 6 \text{ kN}$

3) Momente gleichung.

$\curvearrowright A \sum M = 0 : F \cdot 1 - B \cdot 3l = 0$

$$3B = F$$

$$B = 2 \text{ kN}$$

$$A_V = 4 \text{ kN} \quad A_H = 0$$

ii) Zweite Schritte: Stabkräfte

$$S_7 = 0 \quad (\text{Nullstab})$$

$$S_6 = S_g$$

$\uparrow S_{12}$

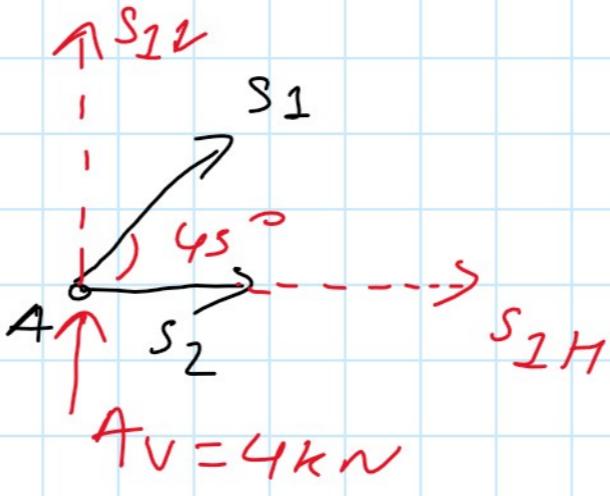
- b - v J

$$S_{1v} = S_{1H}$$

$$\uparrow : \sum V = 0$$

$$\Rightarrow A_v + S_{1v} = 0$$

$$\Rightarrow S_{1v} = -4kN = S_{1H}$$



$$\rightarrow : \sum H = 0$$

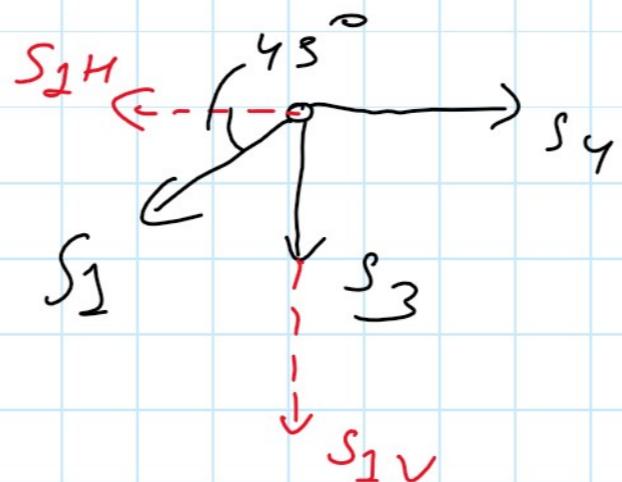
$$S_2 + S_{1H} = 0$$

$$\Rightarrow S_2 = -S_{1H} = 4kN$$

$$\rightarrow : \sum H = 0$$

$$S_4 - S_{1H} = 0$$

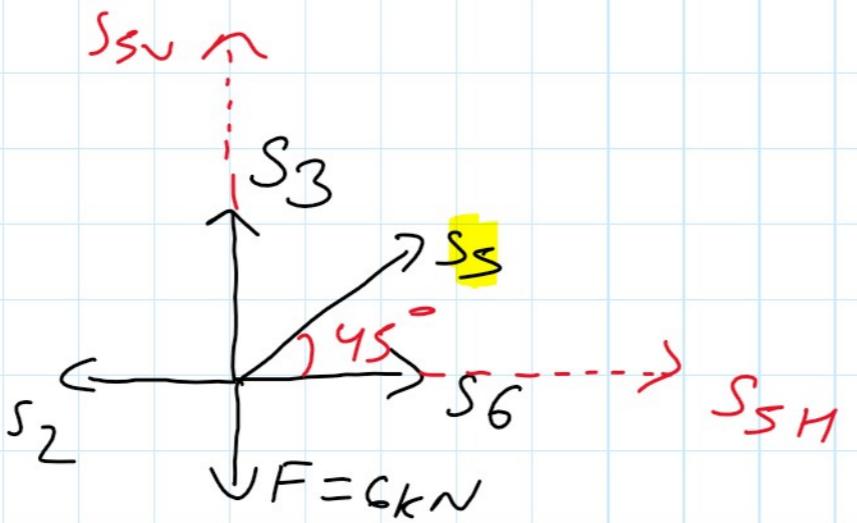
$$S_4 = -4kN$$



$$\uparrow : \sum V = 0$$

$$-S_3 - S_{1v} = 0$$

$$\Rightarrow S_3 = -S_{1v} = 4kN$$



$$\uparrow: \sum v = 0$$

$$S_3 + S_{5v} - F = 0$$

$$4\text{kN} + S_{5v} - 6\text{kN} = 0$$

$$S_{5v} = 2\text{kN}$$

$$S_5 \cos 45^\circ = 2\text{kN}$$

$$S_5 = 2\sqrt{2}\text{ kN}$$

✓

$$\rightarrow: \sum h = 0$$

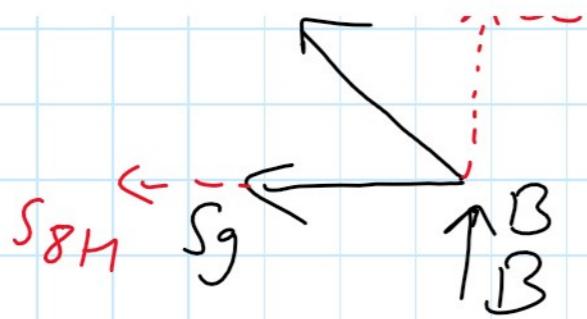
$$S_6 + S_{5H} - S_2 = 0$$

$$S_6 + 2\text{kN} - 4\text{kN} = 0$$

$$S_6 = 2\text{kN} = \underline{S_g}$$

S_8

$\uparrow S_{8v}$



$$\leftarrow : \sum H = 0$$

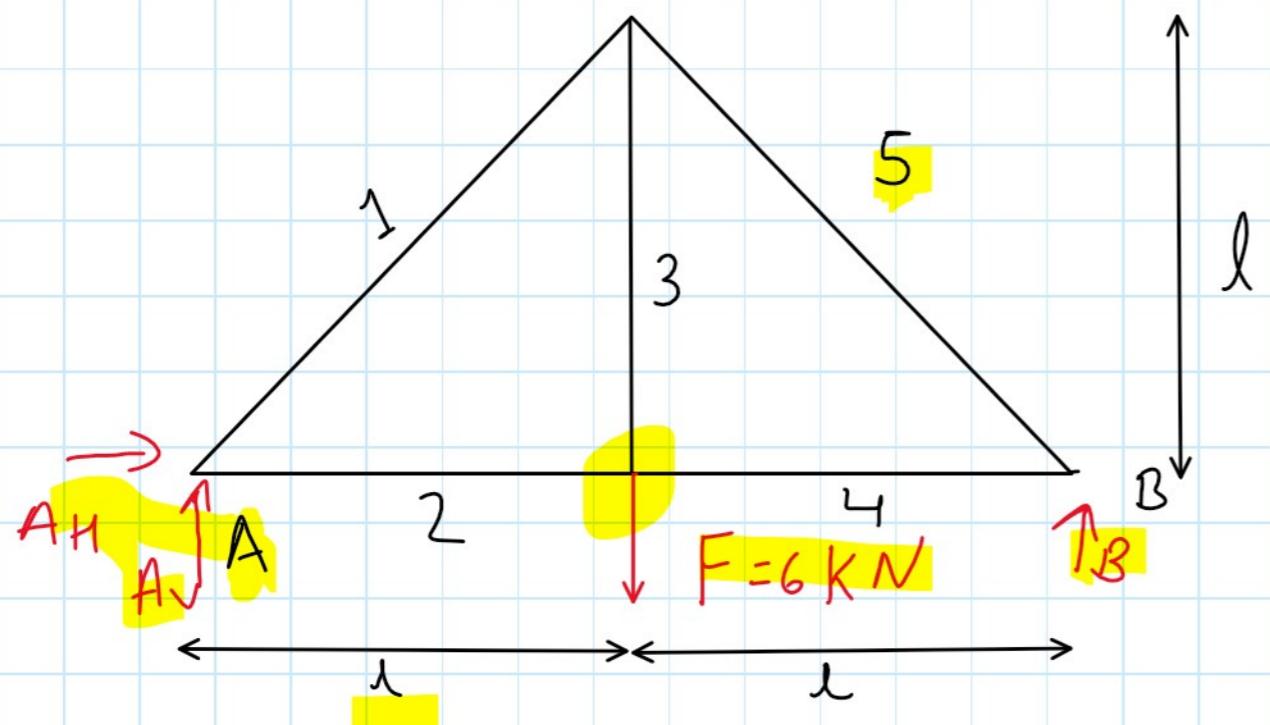
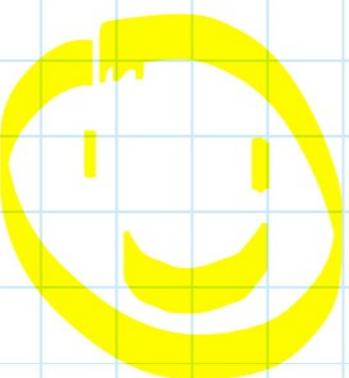
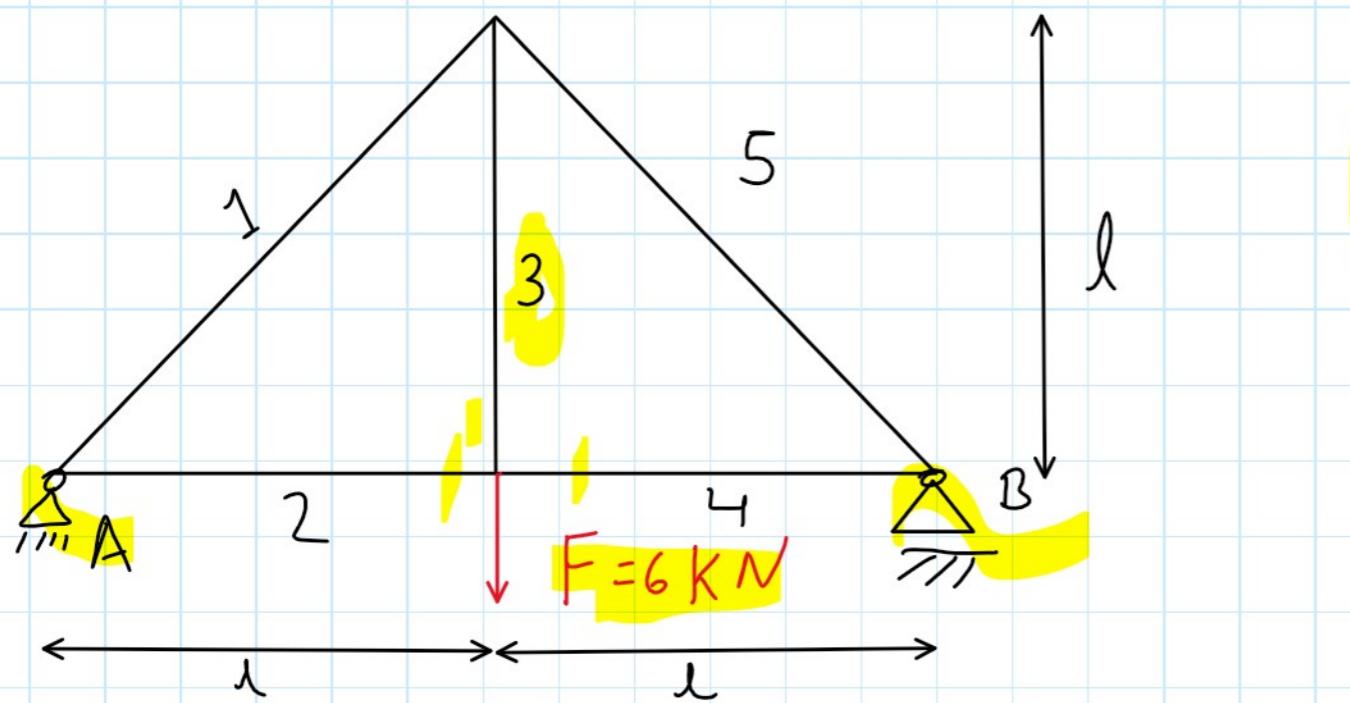
$$S_{8H} + S_g = 0$$

$$S_{8H} = -2 \text{ kN}$$

$$S_8 = -2\sqrt{2} \text{ kN}$$

Knotenverfahren 2

Montag, 15. April 2019 21:30



$$\rightarrow: \quad \sum H = 0 \\ A_H = 0$$

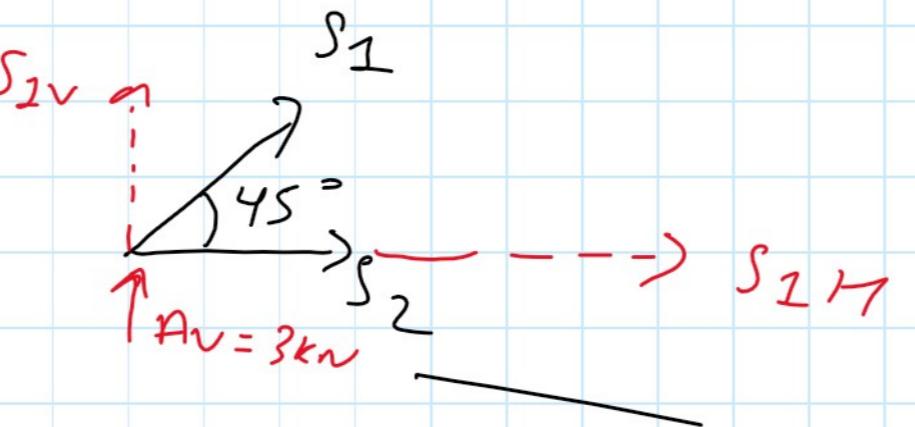
$$\uparrow: \quad \sum v = 0 \Rightarrow A_v + B - F = 0$$

$$A_v + B = 6$$

$$\curvearrowright A: \quad F \cdot l - B \cdot 2l = 0$$

$$B = F/2 = 3 \text{ kN}$$

$$A_v = 3 \text{ kN}$$



$$S_{1v} = S_{1h}$$

$$\uparrow: \quad \sum v = 0 \Rightarrow S_{1v} + A_v = 0$$

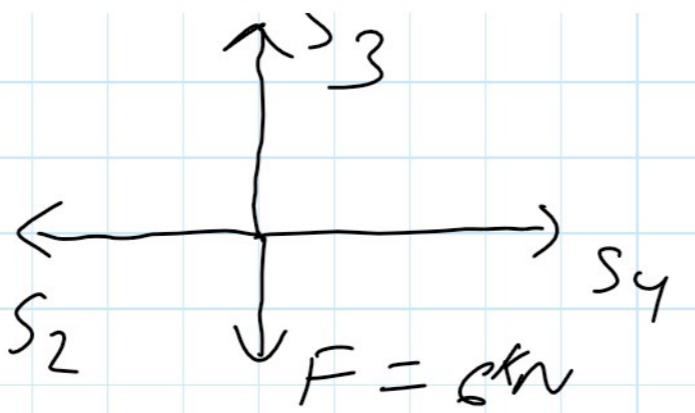
$$S_{1v} \cos 45^\circ = -3 \text{ kN}$$

$$S_1 = -3\sqrt{2} \text{ kN}$$

$$\rightarrow: \quad S_2 + S_{1h} = 0$$

$$S_2 = -S_{1h} = 3 \text{ kN}$$

$$\uparrow S_3$$



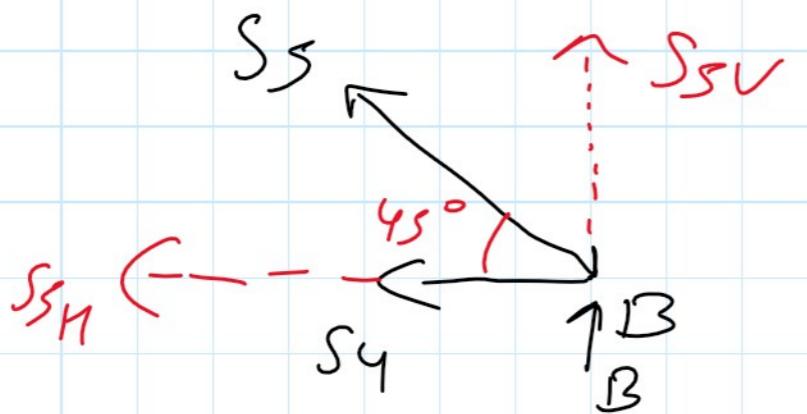
$$\rightarrow: \sum M = 0$$

$$S_4 - S_2 = 0$$

$$S_4 = S_2 = 3 \text{ kN}$$

$$\uparrow: \sum V = 0$$

$$S_3 = F = 6 \text{ kN}$$



$$\uparrow: S_5V = -B$$

$$S_S \cos 95^\circ = -3kN$$

$$S_S = -3\sqrt{2} kN$$