rgrmaymas

$$S^2 = 16 + x^2$$

$$(S + 0{,}165)^2 = 16 + (2 - x)^2$$

$$\Leftrightarrow (S + 0{,}165)^2 = 16 + 4 - 4x + x^2$$

$$\Leftrightarrow S^2 + 2 \cdot 0{,}165\, S + 0{,}165^2 = 20 - 4x + x^2$$

$$\Leftrightarrow S^2 + 0{,}33\, S + 0{,}027225 = 20 - 4x + x^2 \quad | - 0{,}027225$$

$$\Leftrightarrow S^2 + 0{,}33\, S = 19{,}972775 - 4x + x^2$$

$$S = 16 + x^2$$

$$\Leftrightarrow 16 + x^2 + 0{,}33 \sqrt{16 + x^2} = 19{,}972775 - 4x + x^2 \quad | -x^2, -16$$

$$\Leftrightarrow 0{,}33 \sqrt{16 + x^2} = 3{,}972775 - 4x \quad | \,^2$$

$$\Leftrightarrow 0{,}1089 (16 + x^2) = (3{,}972775 - 4x)^2$$

$$\Leftrightarrow 1{,}7424 + 0{,}1089\, x^2 = 15{,}7829412 - 31{,}7822\, x + 16 x^2$$

$$\Leftrightarrow 15{,}8911 x^2 - 31{,}7822 x + 14{,}0405412 = 0$$

$$x^2 - \frac{31{,}7822}{15{,}8911} x + \frac{14{,}0405412}{15{,}8911} = 0$$

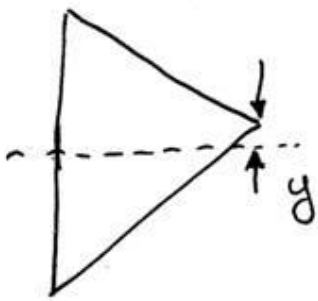
$$\Leftrightarrow x^2 - 2x + 0{,}883547$$

$$- \left(-\frac{2}{2}\right) \pm \sqrt{\left(\frac{2}{2}\right)^2 - 0{,}883547}$$

$$\Leftrightarrow 1 \pm 0{,}341252$$

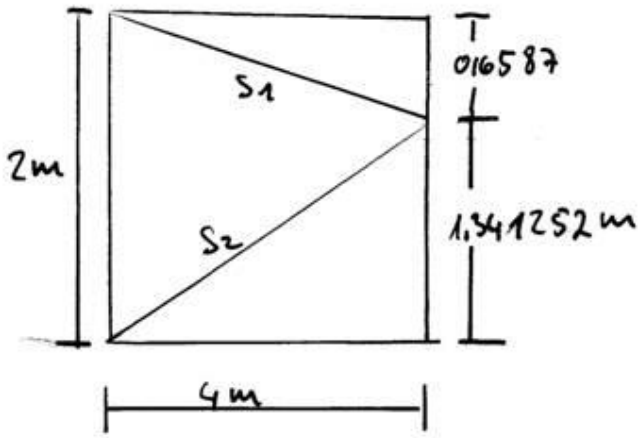
$$x_1 = \underline{1{,}341252}$$

$$x_2 = \underline{0{,}658747}$$



$y = 1{,}341252 - 1$

$= \underline{0{,}341252}$



$$s_2 = \sqrt{4^2 + 1.3412^2}$$

$$= 4,2188 \text{ m}$$

$$s_1 = \sqrt{4^2 + 0,6587^2}$$

$$= 4,05387$$

$$s_2 - s_1 \approx 0,165 = \frac{\lambda}{2}$$

---

b)

$$s_2 - s_1 = (2m+1)\ \frac{\lambda}{2}$$

$$\lambda_m = \frac{2\cdot(s_2 - s_1)}{2m+1}$$

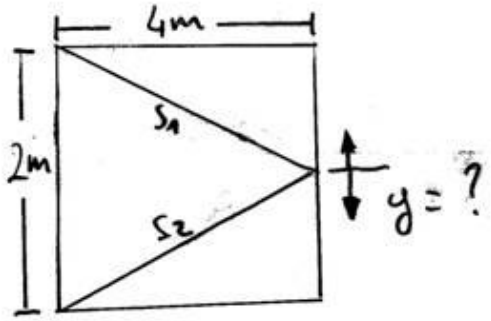
$$\boxed{f_m = \frac{c}{\lambda_m} = c\ \frac{2m+1}{2(s_2-s_1)}}$$

$$f_1 = \frac{330\,m}{s} \cdot \frac{2\cdot 1+1}{2\cdot 0,165} = 3000\ s^{-1}$$

$$f_2 = \frac{330\,m}{s} \cdot \frac{2\cdot 2+1}{2\cdot 0,165} = 5000\ s^{-1}$$

SW 14)

a)



gg. $f = 1000\ Hz$, Schallg. $c = 330\ m/s$

ges. y ; λ

$c = \lambda \cdot f$

$\frac{330\ m}{s} = \lambda \cdot \frac{1000}{s}$

$\lambda = 0{,}33\ m$

Wellenauslöschung nur bei einem Gangunterschied von $(2m+1)\frac{\lambda}{2}$

d.h. $s_2 - s_1 = (2m+1)\frac{\lambda}{2}$; $\frac{\lambda}{2} = 0{,}165\ m$