Esercizi e ripasso

AS 2020-21 prof. A. Pisani

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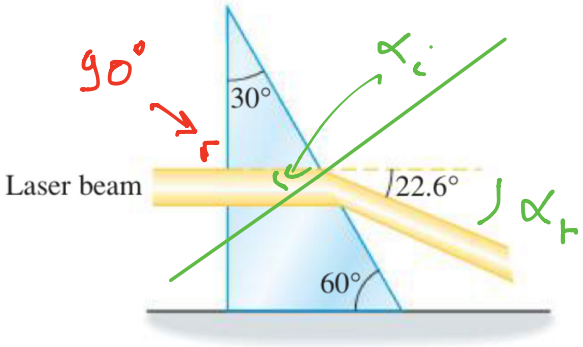
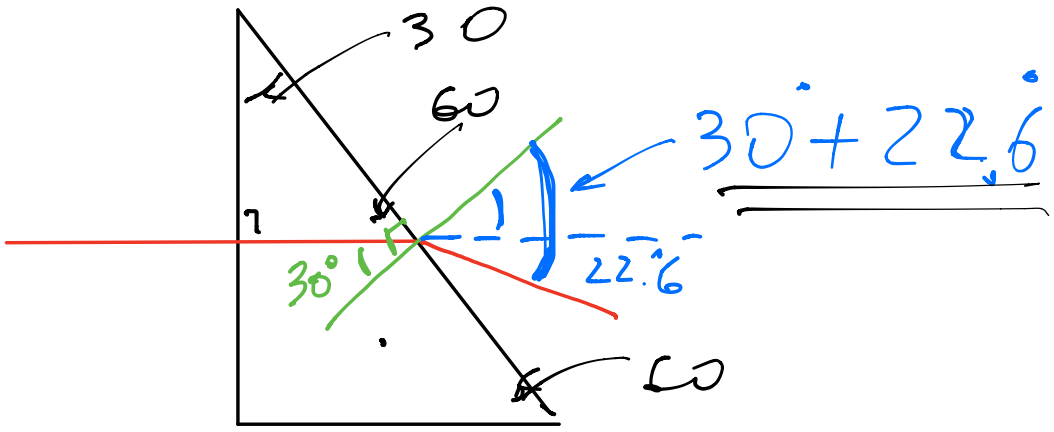
14. IN ENGLISH

Figure shows a laser beam deflected by a 30°-60°-90° prism. What is the prism's index of refraction? [1.59]





$$n \operatorname{sen} \alpha_i = 1 \cdot \operatorname{sen}(\alpha_r)$$

$$n = \frac{\operatorname{sen}(52.6)}{\operatorname{sen}(30^\circ)}$$

$\simeq 1.59$ ✓

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19. Prova i bassi!

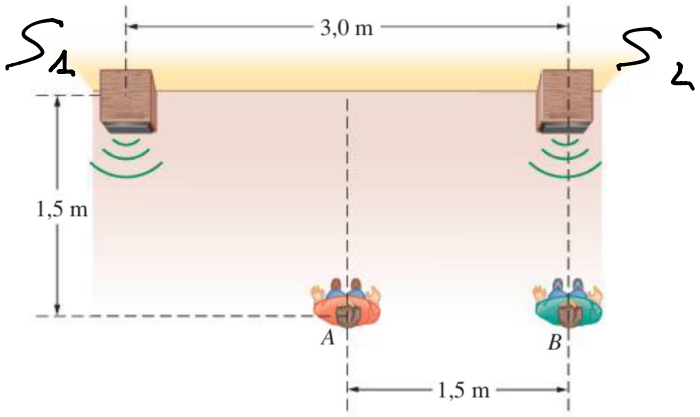
I due studenti *A* e *B* mostrati in figura stanno ascoltando un tono puro emesso da due altoparlanti in fase.

a) Se gli studenti sentono un suono massimo, qual è la minor frequenza possibile del suono emesso dagli altoparlanti?

b) Se gli altoparlanti fossero sfasati di 180°, un suono a 185 Hz udito nella posizione *B* sarebbe un massimo o un minimo?

[*a*) 0,19 kHz; *b*) minimo]

INTERF. COSTRUTT.



$\vartheta_1 = \vartheta_2 \leftarrow$ rm S_1 e S_2

(A): $\overline{S_1 A} = \overline{S_2 A} \Rightarrow \Delta \ell = 0$

↓

IN FASE

(B) $\overline{S_1 B} \neq \overline{S_2 B}$

$$\Delta l = \overline{S_1 B} - \overline{S_2 B} = n\lambda$$

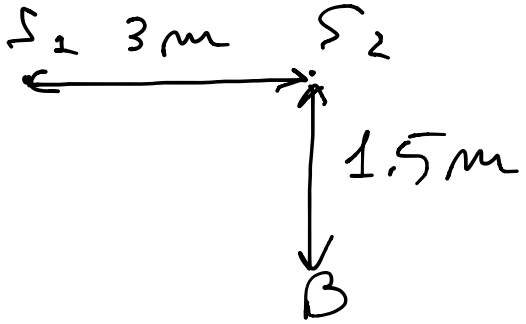
↑ INTERF. COSTRUTT.

$$\lambda \cdot f = v = 343 \text{ m/s}$$

↑ MAX ↑ MIN

λ_{MAX} : $n = 1$

$\Delta l = \lambda$



$$\overline{S_1B} = \sqrt{(3m)^2 + (1.5m)^2} = 3.354\ m$$

$$\overline{S_2B} = 1.5\ m$$

$$\Delta l = 3.354\ m - 1.5\ m =$$

$$= 1.854\ m$$

$$f_{min} = \frac{v}{\lambda_{max}} = \frac{343\ m/s}{1.854\ m} =$$

$$= 185.00\ Hz \quad \checkmark$$

b) MINIMO

S_1 e S_2 $\quad \Delta\vartheta = \frac{\lambda}{2}$

$\Delta l(B) = \lambda \Rightarrow$

(N B $\quad \Delta\vartheta = \frac{\lambda}{2} \rightarrow$ INTERF. DISTRUTT.

Minimo.

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12. IN ENGLISH

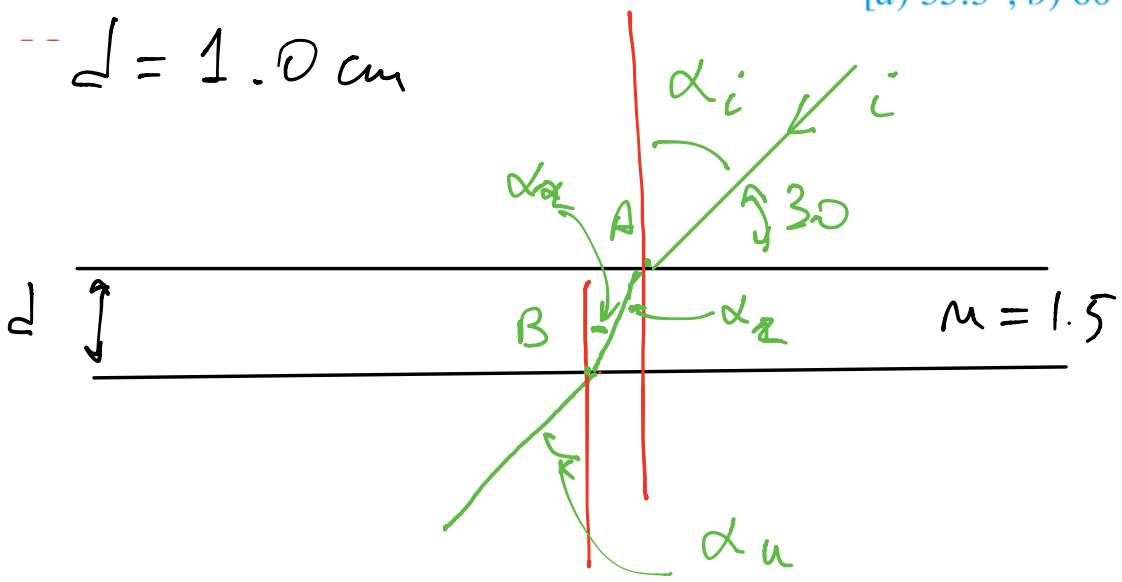
A laser beam is aimed at a 1.0 cm thick sheet of glass ($n = 1.50$) at an angle 30° above the glass.

a) What is the laser beam's direction of travel in the glass?

b) What is its direction in the air on the other side?

[*a*) 35.3°; *b*) 60°]

$d = 1.0$ cm



(A): $n \operatorname{sen} \alpha_r = 1 \cdot \operatorname{sen} \alpha_i$

$\alpha_i = 60° = 90° - 30°$

60°

$$\alpha_2 = \operatorname{sen}^{-1}\left(\frac{1}{n} \cdot \operatorname{sen}\alpha_i\right) \qquad n = 1.5$$

$$= \boxed{35.26^\circ}$$

$$n \operatorname{sen}\alpha_2 = \operatorname{sen}\alpha_a$$

$$\boxed{\alpha_a = 60^\circ}$$