

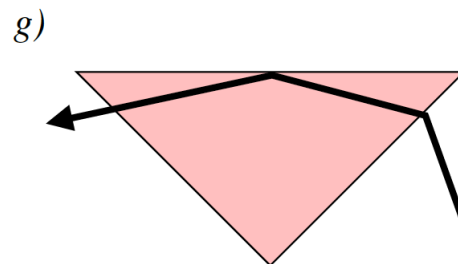
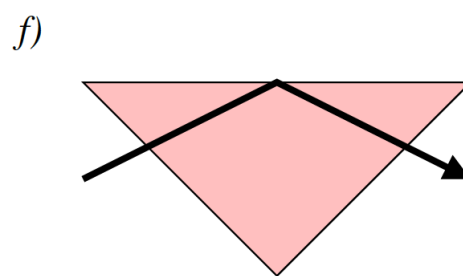
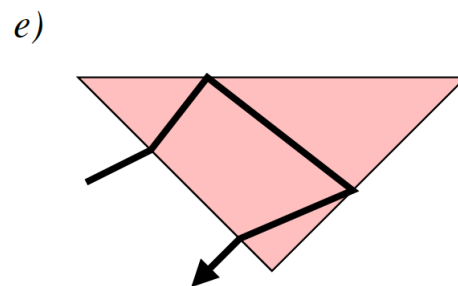
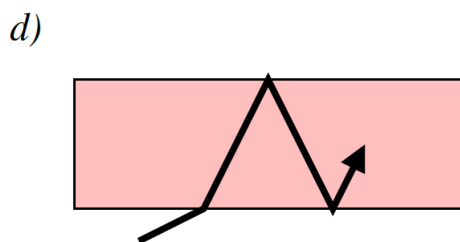
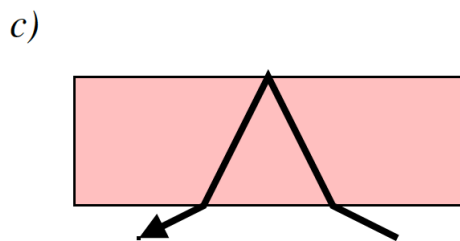
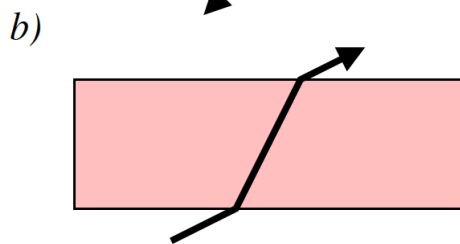
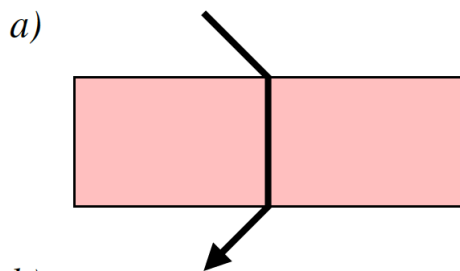
Exercises and Complements for the Introduction to Physics II
 for Students
 of Biology, Pharmacy and Geoscience

Sheet 7 / 13.04.2022

Discussion: 19.04.2022 / 20.04.2022

Exercise 25.

From a) to g), which optical paths through a glass plate are drawn incorrectly?

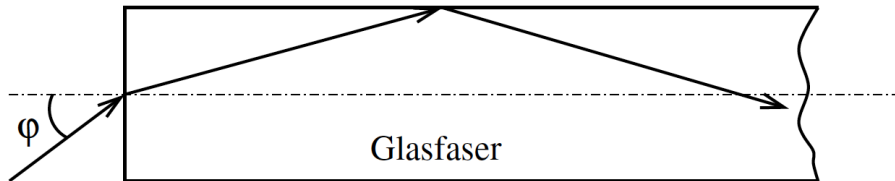


Exercise 26.

The dimensions of the rear window in a car are: $W \times H = 120 \times 45 \text{ cm}^2$. The driver sits at a distance of $l = 2 \text{ m}$ away from the rear window. How big should the rear-view mirror be such that the driver can see the entire rear window. The distance between the driver and the mirror is $l_0 = 0.5 \text{ m}$.

Exercise 27.

Light is coupled into the end of a glass fiber with refractive index $n_F = 1.40$. Due to total reflection, the light can transmit inside the fiber without loss.



- (a) When the glass fiber is surrounded by air, what is the maximum incident angle φ with which the light beam is able to enter and stay inside the fiber?
- (b) How does the angle of incidence change when the glass fiber is surrounded by water?

Exercise 28.

A light wave with a wavelength of $\lambda = 750 \text{ nm}$ (in air) hits a glass plate (refractive index of $n = 1.5$) at an angle of incidence $\alpha = 45^\circ$ and passes through it.

- (a) What is the speed of light inside the glass plate?
- (b) What is the frequency and wavelength of the light inside the glass plate and after the glass plate?
- (c) By how many degrees is the light wave refracted when it passes from the air into the glass plate?
- (d) At what angle does the light leave the glass plate?

Answers:

Aufgabe 26. $7.5 \times 20 \text{ cm}^2$

Aufgabe 27. (a) 78.46° (b) 19.20°

Aufgabe 28. (a) $2 \cdot 10^8 \text{ m/s}$ (b) $4 \cdot 10^{14} \text{ Hz}$; 750 nm ; 500 nm (c) 16.90° 45°