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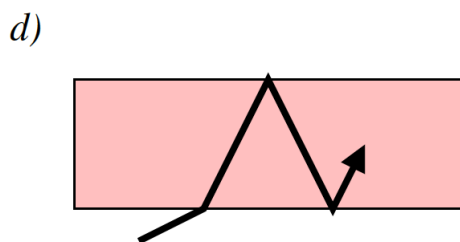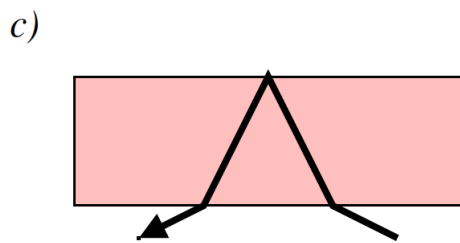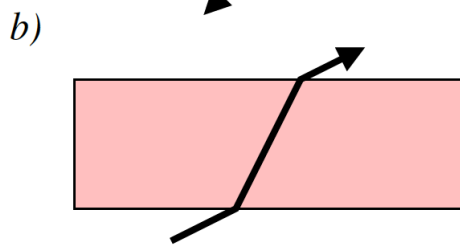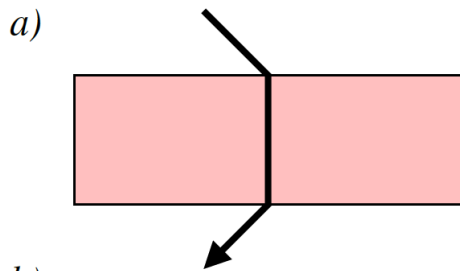# Exercises and Complements for the Introduction to Physics II

for Students

of Biology, Pharmacy and Geoscience

Sheet 7 / 15.04.2021 Zoom - Q&A on the Exercises: **27.-29.04.2021**

Exercise 25.

From a) to g), which optical paths through a glass plate are drawn incorrectly?
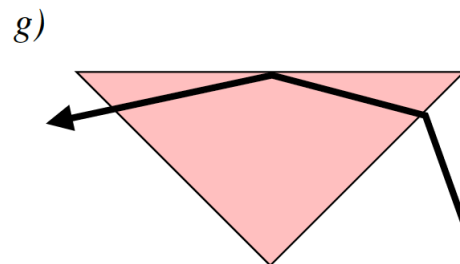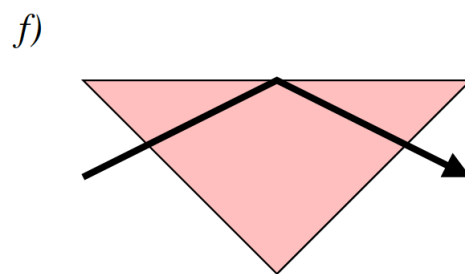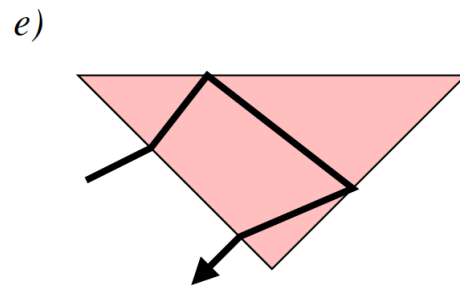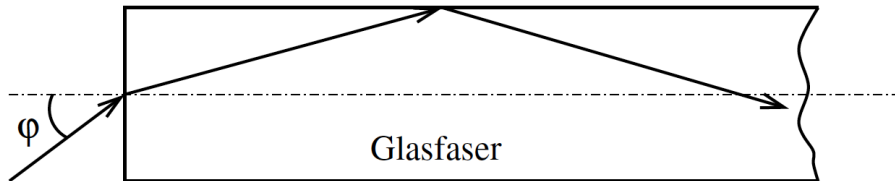
Exercise 26.

The dimensions of the rear window in a car are: $W \times H = 120 \times 45$ cm^2. The driver sits at a distance of $l = 2$ 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 $l_0 = 0.5$ 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.

Glasfaser

(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 $\lambda = 750$ nm (in air) hits a glass plate (refractive index of $n = 1.5$) at an angle of incidence $\alpha = 45°$ 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 iside 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. 7.5×20 cm^2

Aufgabe 27. (a) $78.46°$ (b) $19.20°$

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