Tutorial N°3: Exercises on spherical diopters and thin lenses.

Exercise 3.1:

A spherical diopter with top S and center C separating 2 media with indices n =1 and n'=4/3 has a radius of curvature |r|=4 cm.

1) Write the formulas of the spherical diopter without demonstration: relation of conjugation, transverse magnification and focal lengths.

2) This diopter gives an image A'B' (p' = SA') of a real object AB (p = SA') such that the magnification γ is equal to +2.

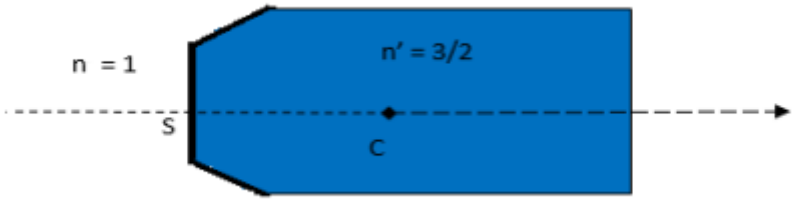
a- Calculate the distances p and p' and on a scale figure, place the points S, C, A and A'.

b- Calculate the focal lengths f and f'.

c- Is the diopter convergent or divergent; convex or concave? Place the points on the diagram.

Exercise 3.2:

A spherical diopter with a radius of curvature of 10 cm separates two media with indices n =1 and n'=3/2.



Determine the position of the focal lengths, Calculate and draw the position of the image of an object AB.

Place a:

a) 60 cm from the top and real;

b) 10 cm from the top and real;

c) 5 cm behind the diopter (virtual object).

Same questions if we reverse the indices

Exercise 3.3:

A lens forms an image of an object 20 cm away from it. The image is at 6 cm from the lens and on the same side as the object.

a) What is the focal length of the lens?

b) Determine the nature of the lens.

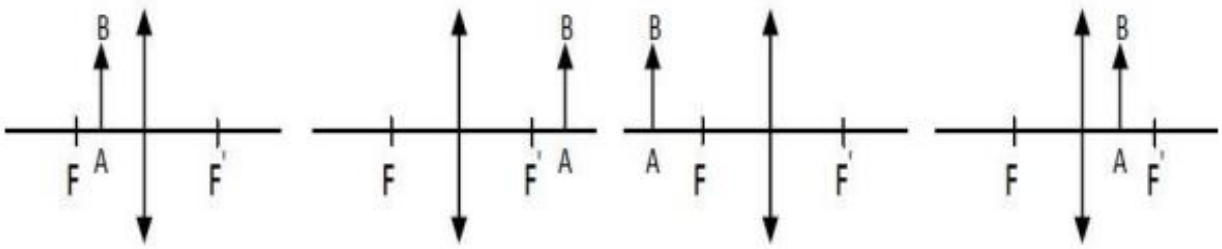
c) If the object is 0.4 cm in size, what is the size of the image?

d) Determine the nature of the image.

e) Make the diagram

Exercise 3.4:

1. When the lens is convergent, complete the following constructions:



1. When the lens is divergent, complete the following constructions: