

Question 12(c).

A concave mirror can be used to form real or virtual images.

Draw a ray diagram to show the formation of a virtual image in a concave mirror.

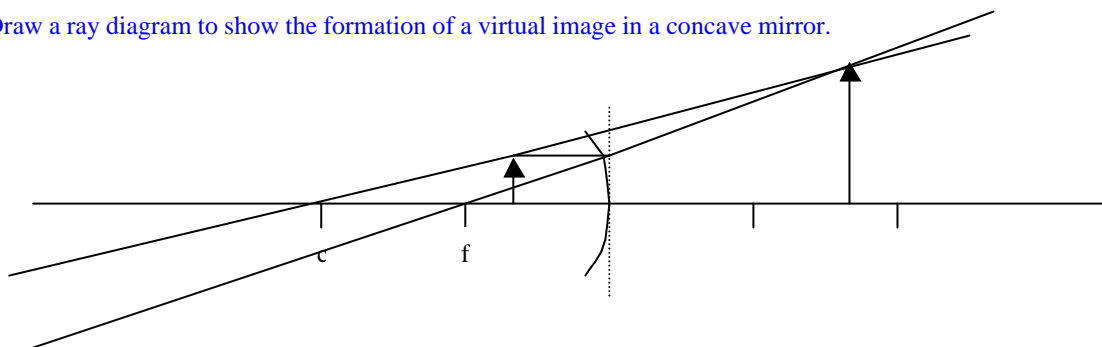
A dentist holds a concave mirror of focal length 25 mm at a distance of 20 mm from a cavity in a tooth.

Find the position of the image of the cavity.

What is the magnification of the image?

Explain why a dentist uses a concave mirror rather than a plane mirror

Draw a ray diagram to show the formation of a virtual image in a concave mirror.



A dentist holds a concave mirror of focal length 25 mm at a distance of 20 mm from a cavity in a tooth.

Find the position of the image of the cavity.

As the object is inside the focus of the concave mirror the image will be virtual => v is negative.

$$\begin{aligned}\frac{1}{f} &= \frac{1}{u} + \frac{1}{v} \\ \frac{1}{v} &= \frac{1}{f} - \frac{1}{u} \\ \frac{1}{v} &= \frac{1}{25} - \frac{1}{20} = \frac{4}{100} - \frac{5}{100} = \frac{-1}{100} = \frac{1}{-100} \\ \Rightarrow v &= -100 \text{ or} \\ \Rightarrow v &= 100 \text{ mm behind the mirror.}\end{aligned}$$

What is the magnification of the image?

$$\text{Magnification, } m = \left| \frac{v}{u} \right| = \left| \frac{-100}{20} \right| = 5$$

Explain why a dentist uses a concave mirror rather than a plane mirror

The magnified image affords the dentist a clearer view of the cavity. A plane mirror only gives an image which is the same size as the object.