

Mirrors

First of all, looking at mirrors, there's a particular mirror equation that you should include in your notes. Here it is highlighted in yellow and the representative what each letter represents. Notice that the s with the little o , subscript o , is the object distance, and the s with the i is the image distance, and the f is the focal length.

When f is positive, then that means converging mirrors. When f , when the focal length, is negative, it means that the mirror is diverging mirrors. And we'll be looking at converging and diverging shortly, mirrors. When the image distance is negative, that means it would be indicating a virtual mirror. And when the image distance is positive, it means that it indicates a real mirror.

In magnification, a formula or a way of calculating magnification, again, I would recommend that you copy this in your notes, h_i we've looked at the s_i and the s_o , but the h_i is the image height. And the h_o means the object height. And the h subscript o means the object height. When h is negative, that means it indicates an inverted image. When h is positive, it means for an upright image. Inverted would mean upside down, and upright is upright image.

The capital M , when the capital M is greater than 1, it indicates a larger image. When it's less than 1, it indicates a smaller image. And another way of looking at the M is, if it's positive, if M is positive, it indicates an upright image. When it's negative, it indicates an inverted or an upside down image. Again, I would invite you to include this in your notes. You may want to pause and then resume after you're done.

Let's go ahead and proceed on to the next. Here, we're getting into a conversation about converging mirror and the object distance. If an object is outside the $2f$ point, that is double of the focal point, focal length point, then the image is inverted, smaller, and it's real. However, when the object is inside the f , that is, within the focal point length, the image is upright, it's larger, and it's virtual.

There are some image characteristics here that basically depend upon the object distance in a converging. Again, this is converging mirror. And you may just want to draw these diagrams there in your notes, when the object is between f and $2f$, when the object is beyond $2f$, and when the object is inside f . It really depends upon the object distance.

Now, let's look at the diverging. That was converging, now this is diverging. Image characteristics are the same no matter where the object is located, as far as the image is upright, smaller, and virtual. An example, an object is positioned 20 centimeters in front of a diverging mirror that has a focal length of a negative 0.5 centimeters. Here are the questions. Where is the image formed? Is the image upright or inverted? Is the image smaller or larger? Is the image real or virtual?

Well, let's work ourselves through this example or work through this example. First of all, the solution to, where is the image formed? Well, here's the equation. $\frac{1}{f}$, if you remember, hopefully, you copied this in your notes, $\frac{1}{f}$, $\frac{1}{f}$ is equal to $\frac{1}{s_o}$ plus $\frac{1}{s_i}$, that is $\frac{1}{s_o}$ plus $\frac{1}{s_i}$.

And so the equation is 1 divided by negative 1 divided by negative 5 . That's coming from the focal length, negative 5 centimeters. And 1 is equal to 1 divided by 20 plus 1 divided by s of i . And that's what we're trying to find out, where is the image formed? Where is the image formed? So if you do the math, it says you have to divide, and multiply, and so forth. You would see that the image is formed negative 4 centimeters. That is to the right of the mirror.

The second question was, is the image upright or inverted? If you do the math here, M is equal to negative s_i divided by s_o . And we have M is negative 4 divided by 20 . And since it's a negative, it's the opposite. That makes it a positive. 0.20 .

And the positive indicates that it's an upright. Since it's magnification of 0.0 or 0.20 , it is a smaller than. And because the image distance is negative, and we know that it was-- we were given that, it is a virtual image. We also know that because it's a diverge, diverging mirror.
