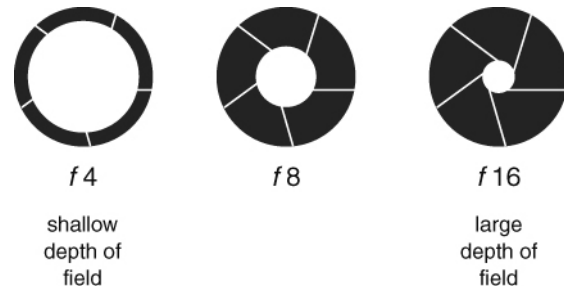


Digital cameras work by changing the energy transferred by light into electrical signals that are then recorded on a memory card. The sensor in the camera needs to receive a certain amount of energy to be able to record an image. The amount of light hitting the sensor is controlled by the size of the aperture and the shutter speed (the length of time that the shutter is open).

Aperture sizes are given f numbers, where the larger numbers mean smaller apertures. A smaller aperture gives a bigger 'depth of field', which means that more things in the image will be in focus.

Shutter speeds are given in fractions of a second, so that  $1/50$  means that the shutter is open for  $1/50$ th of a second. A 'fast' shutter speed is when the shutter is only open for a very short time.

A photographer chooses the right aperture and shutter speed settings depending on the type of photo he or she is taking.



- 1 A photographer takes a photograph with an aperture of f8, and then takes another with an aperture of f16. The shutter speed is the same.
  - a Explain which photograph will look the brightest.
  - b If she wants to have the same brightness in both photos, explain how she should change the shutter speed for the second photograph.
- 2 A photographer is taking a close-up photograph of an insect and wants the background to be out of focus. Explain why he will need to use
  - a a large aperture
  - b a fast shutter speed.
- 3 People who photograph motor racing usually use very fast shutter speeds. Suggest why they do this.
- 4
  - a How does the human eye control the amount of light that enters it?
  - b How is this similar to the way the amount of light is controlled in a camera?
  - c How is it different?
- 5 Refraction occurs in both eyes and cameras. Describe where this happens.
- 6 Eyes and cameras can both focus on objects at different distances. Describe how this is done.
- 7 A photograph taken at night can show many more stars than a person could see with their eyes. Explain how this is possible.
- 8 The sensor in a camera contains lots of small cells. There are three types of cell, each sensitive to a different colour. Suggest what colours they are sensitive to, and why only three colours are necessary.

**I can...**

- recall the functions of parts of the camera and the eye
- compare cameras and eyes.