

Faceprints

You need

- ★ tables for recording measurements (see copymaster)
- ★ a digital camera
- ★ a calculator
- ★ face images (alternatively, see copymaster)
- ★ a computer and printer
- ★ a ruler
- ★ a classmate

TECHNOLOGY

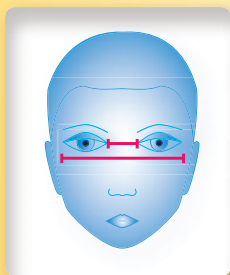
Biometry uses technology and statistical information to identify a person, for example, by comparing fingerprints, voice patterns, or “faceprints” with information stored in a database.

Activity

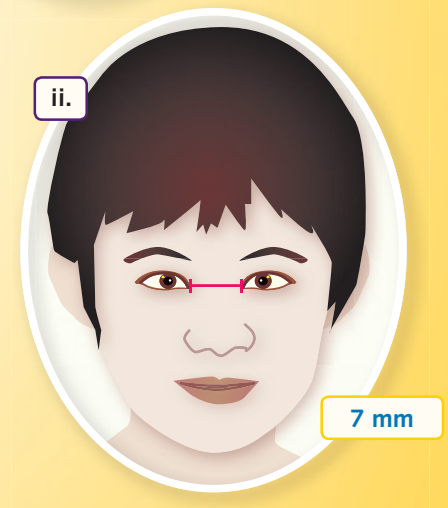
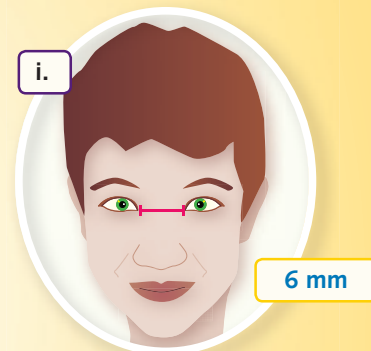
Although all human faces have similar characteristics, each face is unique. Face recognition software can be used to analyse an image of a face and store the resulting mathematical data as a “faceprint”. The next time a security camera picks up this face, it can identify its owner by matching it against the stored faceprint.

1. a. Do the measurements show whether these two people have eyes that are a similar distance apart? Why or why not?

To analyse a face mathematically, a computer calculates relationships between two parts of the face. Dividing one measurement by another measurement shows how large one feature is compared with another feature. This is best done using decimals.



- b. Measure the distance between the outer corners of the eyes in each image.
c. For each image, divide the distance between the eyes by the distance between the outer corners of the eyes.
d. What do the results say about how far apart each person’s eyes are?



2.

Comparing one measurement with another gives a statistic that is not affected by the size of the image.

- a. Ask a classmate to take a photo of your face with a digital camera.
b. Print two versions of the photo, one about half the size of the other.



- c. For each image, measure these distances and record them on your copy of the table:

A	Distance between the eyes
B	Distance between the outer edges of each eye
C	Distance between the bottom of the nose and the chin
D	Distance between the top of the head and the chin



- d. How could you use these measurements to compare the position of the nose with the length of the face?
 e. What other comparison could you make by using two other measurements in a face? Record these measurements (E and F).
 f. Using the measurements for the small image, calculate:
 i. $A \div B$ ii. $C \div D$ iii. $E \div F$.
 g. Repeat, using the measurements for the large image.
 h. What relationship can you see between your answers for f and g? Discuss with a classmate.

3. a. Use the information below to identify which of the three faces matches the stored information.

Distance between the eyes \div distance between the outer edges of each eye	0.36
Distance between the bottom of the nose and the chin \div distance between the top of the head and the chin	0.33
Width of the mouth \div width of the widest part of the face	0.44



- b. Discuss with a classmate the factors that make it hard for a computer to guarantee a perfect match between an image and a stored faceprint.