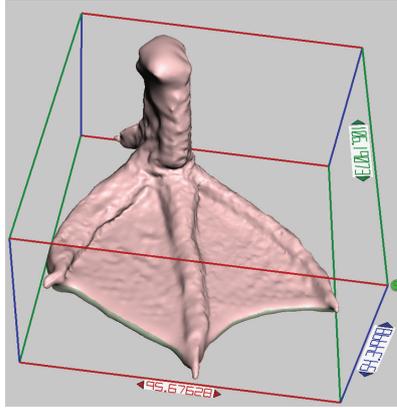


2. 3D printing

Buttercup is a duck who hatched with a deformed left foot that had to be amputated. His owner took pictures of another duck's foot from different angles and was able to use 3D printer technology to produce a new plastic foot for him.

Figure 2: Computer-generated image of a duck's foot



[Source: Courtesy of the Feathered Angels Waterfowl Sanctuary]

Figure 3: Charlie's new plastic foot



[Source: Courtesy of the Feathered Angels Waterfowl Sanctuary]

(This question continues on the following page)

(Question 2 continued)

Figure 4: A 3D printer

Removed for copyright reasons
Please go to: http://en.wikipedia.org/wiki/3D_printing#/media/File:MakerBot_Replicator_2.jpg

A 3D printer, like the one shown in **Figure 4** creates an object by adding plastic layer by layer until it is complete.

Inspired by Buttercup’s story, Alejandro Toys has created a company that uses a computer with a 3D printer and software to produce plastic toys for children.

Alejandro Toys has found out that some software will allow them to input 2D images into the 3D printer software so that they can be converted into a 3D object. They are considering either to use open source software or to purchase proprietary software.

- (a) (i) Identify **two** ways that a 2D image file can be input into the 3D printer software. [2]
- (ii) Identify **four** of the steps required to produce Buttercup’s replacement foot. [4]
- (b) Analyse Alejandro Toys’s decision to either use open source software or to purchase proprietary software to produce the company’s 3D toys. [6]
- (c) It is now possible to use a 3D printer to print a large range of products in addition to toys. These include guns, bicycles and human prosthetic limbs. However some governments are concerned about the software for 3D printers being freely available on the internet.

To what extent should governments regulate the access to software for 3D printers? [8]

Turn over