21 The Titicaca water frog, *Telmatobius culeus*, is an aquatic amphibian found in Lake Titicaca in sub-tropical South America. The water frog has an unusual appearance with large folds of skin as shown in Fig. 21.1.

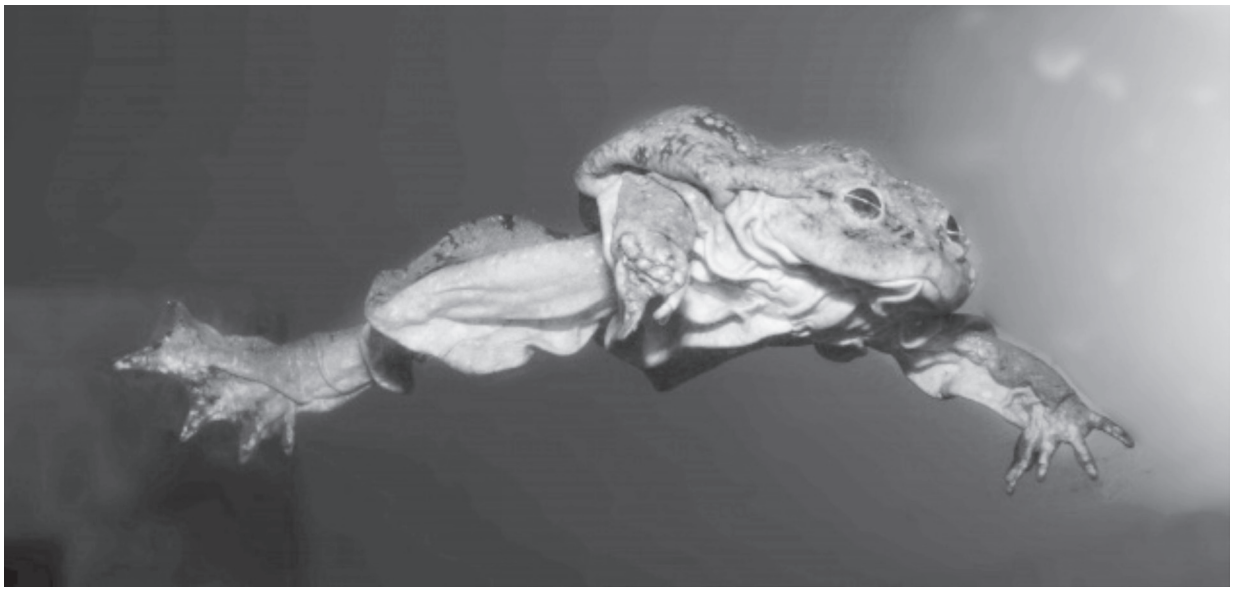

Fig. 21.1

(a) Name the genus of the Titicaca water frog.

..... **[1]**

(b) Outline the properties of water which make it an ideal habitat for an amphibian.

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..... **[2]**

(c) Like all amphibians, frogs are able to absorb oxygen through the skin as well as their lungs.

(i) Suggest why the Titicaca water frog has evolved the unusually large folds of skin seen in Fig. 21.1.

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..... **[2]**

(ii) When out of the water, the Titicaca water frog is able to use its lungs to absorb oxygen.

Lungs contain specialised gaseous exchange surfaces.

Describe and explain how **one** feature of the lungs provides an efficient gas exchange surface.

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..... **[2]**

(d) A student was investigating the effect of cell size on the rate of diffusion into model cells. They had two cubes of agar containing phenolphthalein indicator as shown in Fig. 21.2.

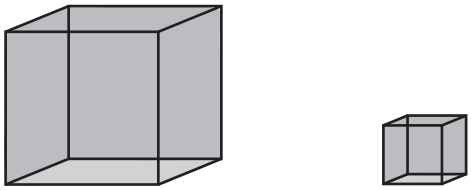

Fig. 21.2

The student placed the cubes in beakers of dilute hydrochloric acid, which caused the indicator to become colourless. They then measured how much of each cube became colourless over time.

(i) State **two** ways the student could have ensured they had confidence in their results.

1 .....

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2 .....

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[2]

(ii) In Fig. 21.2, Cube A is 10 mm along each side and Cube B is 4 mm along each side. Calculate the surface area to volume ratio (SA:V) for both cubes A and B.

Show your working. Give your answers to **one** decimal place.

Cube A .....

Cube B .....

[2]

(iii) Explain why the surface area to volume ratio of an organism determines whether it needs a circulatory system.

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..... **[3]**