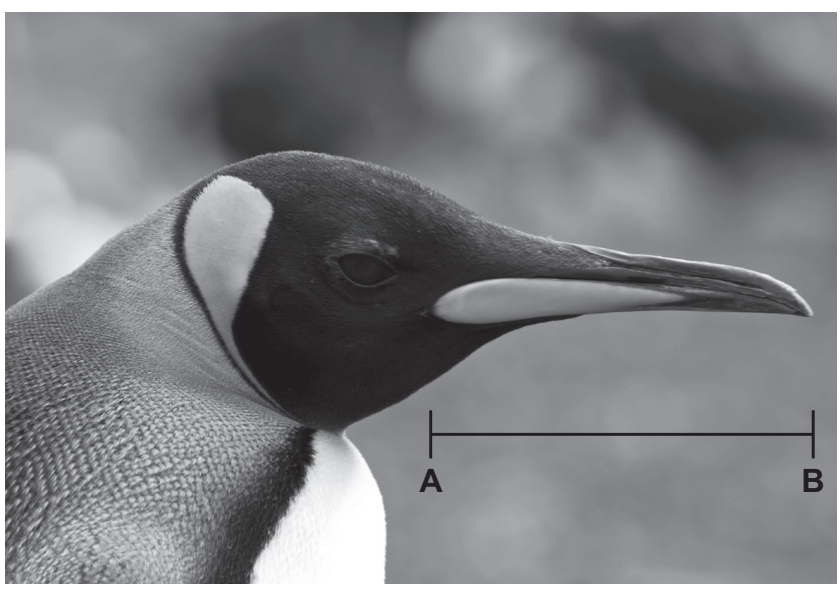
3 **(a)** Fig. 3.1 is a photograph of the head of a king penguin.



magnification ×0.42

Fig. 3.1

(i) Make a large drawing of the head of the king penguin shown in Fig. 3.1.

[4]

(ii) The length of line **AB** represents the length of the penguin's beak.

Measure the length of line **AB** in Fig. 3.1.

length of line **AB** ..... mm

Use your measurement and the formula to calculate the actual length of the penguin's beak.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 3.1}}{\text{actual length of the penguin's beak}}$$

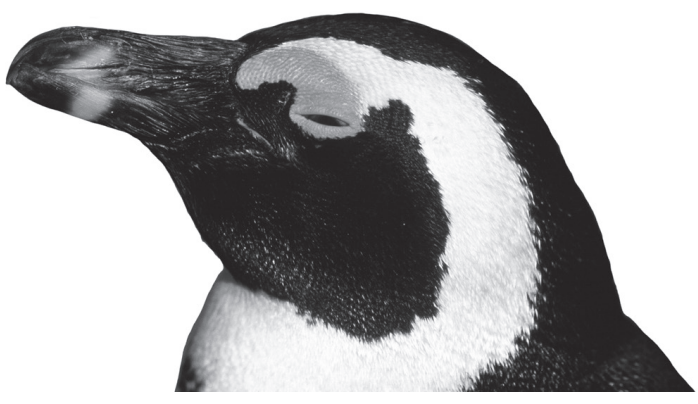
Give your answer to **one** decimal place.

Space for working.

..... mm
[3]

(b) Fig. 3.2 shows the heads of a gentoo penguin and a black-footed penguin.

gentoo



black-footed

not to scale

Fig. 3.2

Other than size, state **two** ways the gentoo penguin differs from the black-footed penguin in Fig. 3.2.

1 .....

.....

2 .....

.....
[2]

(c) Penguins are covered in feathers. The feathers reduce heat loss by insulating the birds from the cold.

A beaker of hot water can be used to represent a penguin.

Plan an investigation to determine the effect of the thickness of an insulating material on heat loss in a beaker of hot water.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 15]