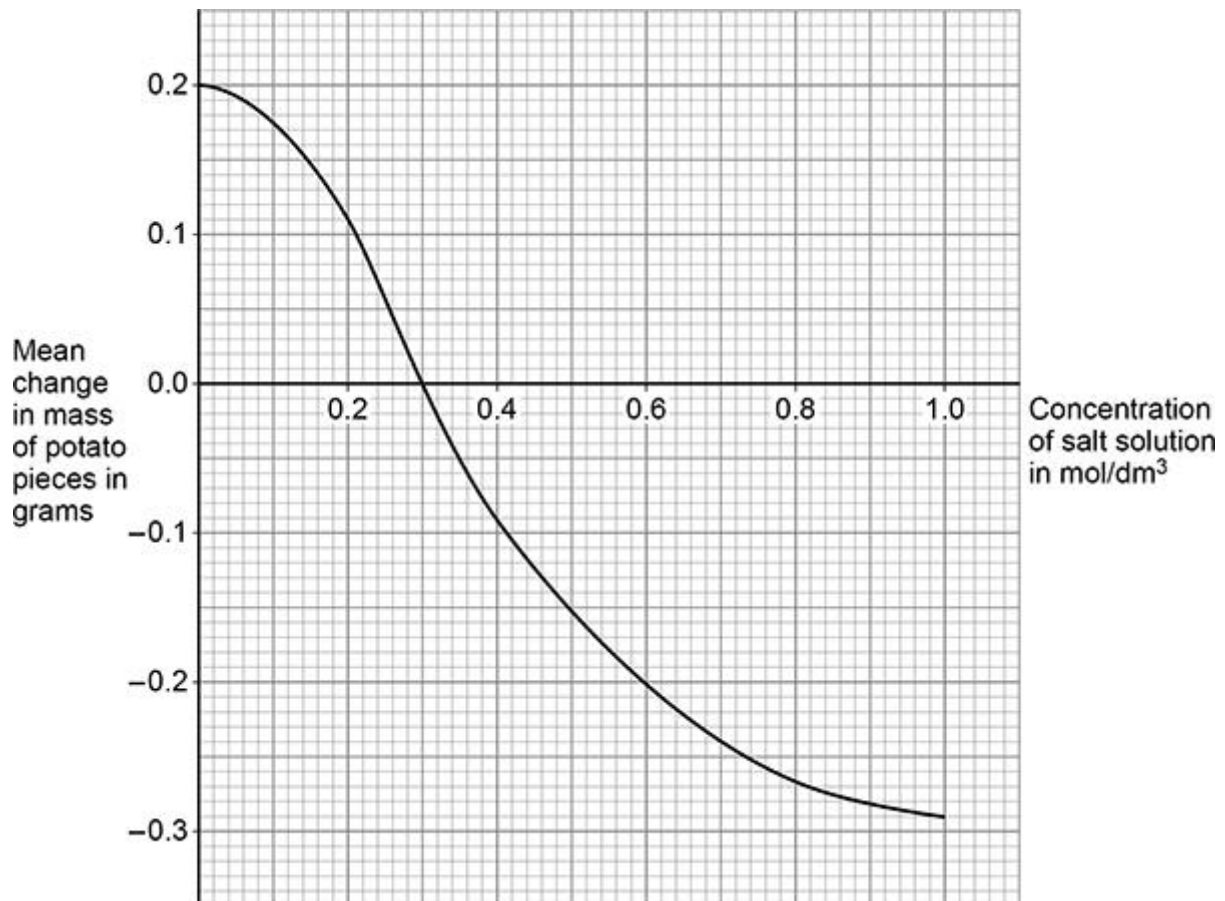**Questions are for both separate science and combined science students**

Q1.

A student investigated the effect of concentration of salt solution on the mass of uncooked potato pieces.

The figure below shows the results.

(a)   Plan a method that could be used to obtain the results in the figure above.

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(6)

(b)   Explain the result for the potato pieces in the 0.6 mol/dm^3 salt concentration.

_____

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_____

(3)

(c)   Explain why the result for the potato pieces at 1.0 mol/dm^3 was different from the result at 0.6 mol/dm^3.

_____

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(2)
(Total 11 marks)

Q2.

Table 1 shows information about five different organisms.

Table 1

Organism	Surface area in m²	Volume in m³	Surface area to volume ratio
A	6.04×10^{-8}	1.65×10^{-12}	36606:1
B	3.21×10^{-3}	1.25×10^{-6}	2568:1
C	9.96×10^{-3}	1.35×10^{-4}	**X**:1
D	4.61×10^{-1}	1.57×10^{-2}	29:1
E	1.99×10^{1}	6.12×10^{0}	3:1

(a)   Calculate value **X** in **Table 1**.

Give your answer to the nearest whole number.

_____

_____

_____

_____

_____

_____

X (nearest whole number) = _____

(3)

(b)   What is the relationship between the size of an organism and its surface area to volume ratio?

Use **Table 1**.

_____

_____

(1)

(c)   Organism **B** exchanges gases with the environment directly through its skin.

Organism **D** exchanges gases with the environment using its respiratory system.

Explain why organism **D** requires a respiratory system, but organism **B** does **not** require a respiratory system.

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(2)

Table 1 is repeated below.

Table 1

Organism	Surface area in m^2	Volume in m^3	Surface area to volume ratio
A	6.04×10^{-8}	1.65×10^{-12}	36606:1
B	3.21×10^{-3}	1.25×10^{-6}	2568:1
C	9.96×10^{-3}	1.35×10^{-4}	**X**:1
D	4.61×10^{-1}	1.57×10^{-2}	29:1
E	1.99×10^{1}	6.12×10^{0}	3:1

Table 2 shows information about organism **D** and organism **E**.

Table 2

Organism	Metabolic rate in arbitrary units
D	890
E	75

(d)   Organisms **D** and **E** both keep a constant body temperature
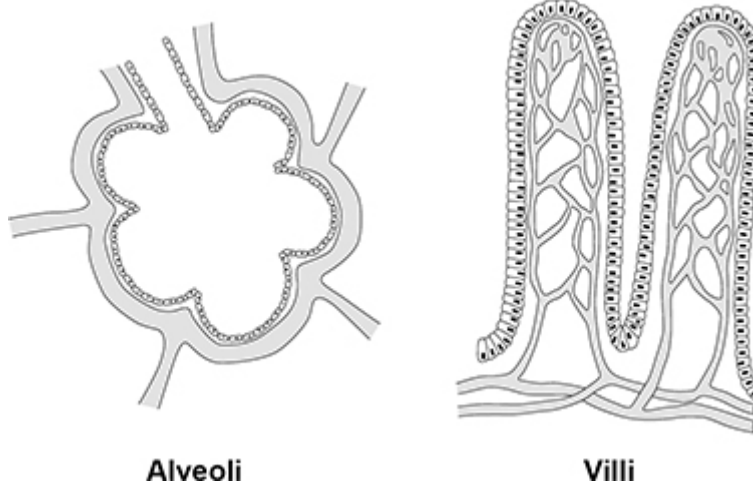   (warm-blooded).

       Explain why the metabolic rate of organism **D** is greater than the metabolic
       rate of organism **E**.

       Use information from **Table 1** and **Table 2**.

       _____

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                                                                    (4)

(e)   Organism **D** and organism **E** both have alveoli in the lungs and villi in the small intestine.

The figure below shows some alveoli and some villi.

Alveoli   **Villi**

Describe how the alveoli and the villi are adapted to increase absorption.

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(4)
(Total 14 marks)