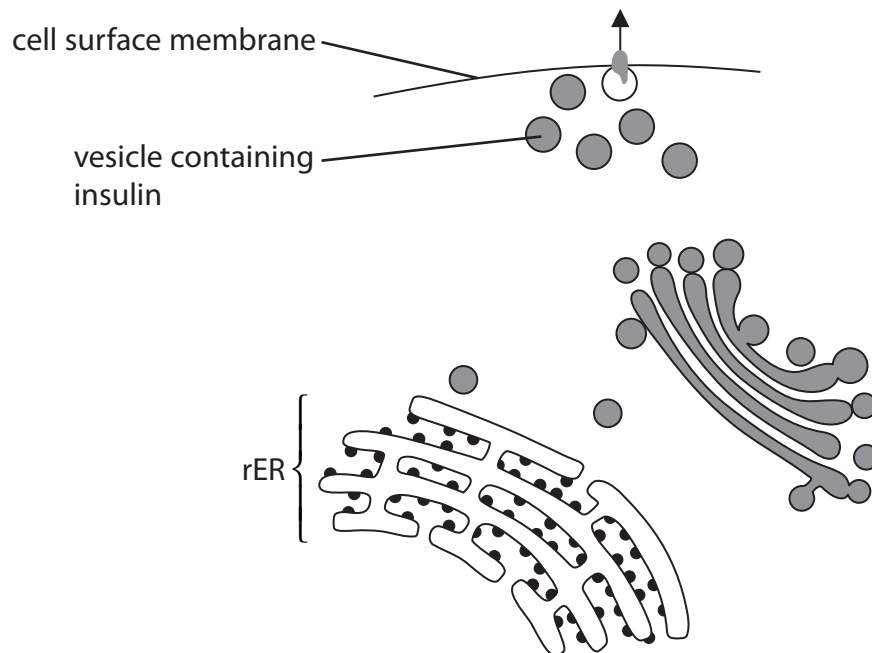


- 2 Insulin is a protein produced by beta cells in the pancreas. Insulin is synthesised on ribosomes, then modified and packaged in vesicles. It is stored in these vesicles until it is secreted.

The diagram below shows the organelles involved in this process of modifying and packaging the insulin in vesicles.



- \*(a) Using the information in the diagram, describe how insulin is modified, packaged and secreted by the cell.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



Stem cells produced from skin cells can be used to replace these beta cells in mice. The skin cells can be stimulated to become pluripotent stem cells.

- Pluripotent stem cells are

- ☐ **A** specialised cells that can differentiate to give rise to almost any type of cell in the body, including totipotent cells
- ☐ **B** specialised cells that can differentiate to give rise to any type of cell in the body, excluding totipotent cells
- ☐ **C** unspecialised cells that can differentiate to give rise to almost any type of cell in the body, excluding totipotent cells
- ☐ **D** unspecialised cells that can differentiate to give rise to any type of cell in the body, including totipotent cells

- Describe how these pluripotent stem cells became specialised beta cells.

(Total for Question = 5 marks)

