

1. The proteome is
- A all the genes expressed as proteins
 - B the entire set of proteins expressed by the genome
 - C the number of proteins expressed due to alternative RNA splicing
 - D the number of proteins expressed due to alternative RNA splicing and post-translational modification.
2. The proteome is larger than the number of genes in the genome of an organism because
- A not all genes are expressed as proteins in a particular cell
 - B post translational modifications generate multiple RNAs from a single gene
 - C alternative splicing generates multiple RNAs from a single gene
 - D each mRNA molecule is translated by many ribosomes.

3. The proteome of a cell will be most similar to the number of

- A genes expressed
- B primary mRNA transcripts
- C alternative mRNA mature transcripts
- D genes in genome

4. Transmembrane proteins carry a signal sequence, which halts translation and directs the ribosome synthesising the protein to dock with the

- A plasma membrane
- B endoplasmic reticulum
- C transport vesicle
- D golgi apparatus.

5. Which row in the table describes functions of compartments involved in the synthesis and transport of proteins?

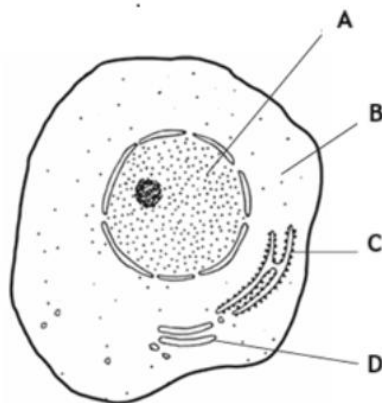
	Compartment		
	Smooth endoplasmic reticulum	Rough endoplasmic reticulum	Golgi apparatus
A	post-translational modification	lipid synthesis	protein transport
B	lipid synthesis	protein transport	post-translational modification
C	lipid synthesis	post-translational modification	protein transport
D	post-translational modification	protein transport	lipid synthesis

6. Which line in the table identifies correctly the two cell structures shown in the diagram?



	X	Y
A	Golgi body	Vesicle
B	Golgi body	Ribosome
C	Endoplasmic reticulum	Vesicle
D	Endoplasmic reticulum	Ribosome

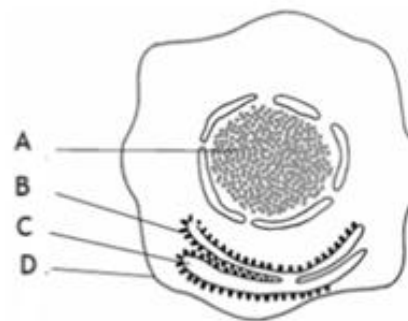
7. A signal sequence on a transmembrane protein halts translation and causes the ribosome synthesising the transmembrane protein to dock at



8. Which of the following identifies correctly the sequence in which organelles become involved in the production of an enzyme for secretion?

- A Nucleus → Ribosomes → Golgi Apparatus → Rough ER
- B Ribosomes → Vesicles → Rough ER → Golgi Apparatus
- C Nucleus → Rough ER → Vesicles → Ribosomes
- D Ribosomes → Rough ER → Golgi Apparatus → Vesicles

9. Describe the function of C.



- A To make protein
- B To transport proteins
- C To synthesise lipids
- D To transport lipids

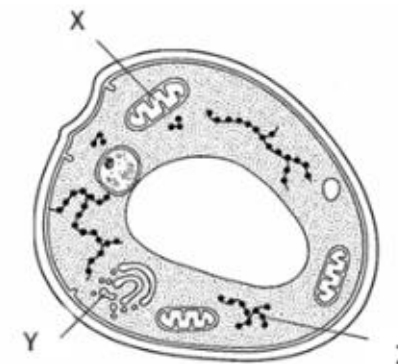
10. The following cell components are involved in the synthesis and secretion of an enzyme.

- 1 Golgi apparatus
- 2 Ribosome
- 3 Cytoplasm
- 4 Endoplasmic reticulum

Which of the following identifies correctly the route an amino acid molecule would follow as an enzyme is synthesised and secreted?

- A 3 2 1 4
- B 2 4 3 1
- C 3 2 4 1
- D 3 4 2 1

11. The diagram shows a highly magnified diagram of a yeast cell.



Carbohydrates are added to proteins at

- A X only
- B Y and Z only
- C Y only
- D X and Z only

12. The processing of proteins prior to secretion takes place in the

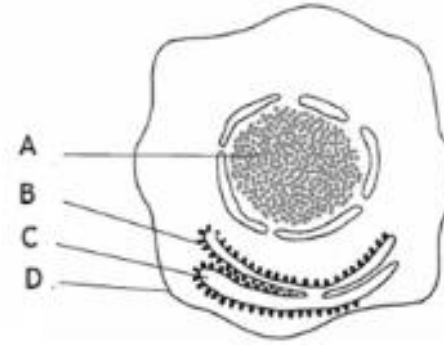
- A endoplasmic reticulum
- B Golgi apparatus
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13. The proteome is larger than the number of genes in the genome of an organism because
- A alternative RNA splicing produces more than one protein from each gene
 - B each mRNA is translated by many ribosomes
 - C post translational modifications generate many RNAs from a single gene
 - D not all genes are expressed as proteins in a cell.

14. Where are lipids synthesised?
- A Rough endoplasmic reticulum (RER)
 - B Golgi apparatus
 - C Ribosomes
 - D Smooth endoplasmic reticulum (SER)

15. Insulin synthesised in a pancreatic cell is secreted. Its route from synthesis to secretion includes
- A Golgi apparatus → endoplasmic reticulum → ribosome
 - B ribosome → Golgi apparatus → endoplasmic reticulum
 - C endoplasmic reticulum → ribosome → Golgi apparatus
 - D ribosome → endoplasmic reticulum → Golgi apparatus.

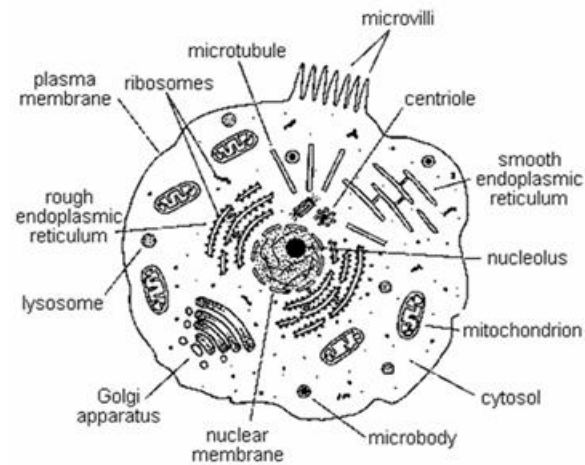
16. The organelle that docks onto the smooth ER causing it to become rough ER.



17. The Golgi apparatus is involved in the packaging of
- A ribosomes
 - B monosaccharides
 - C RNA
 - D enzymes.
18. The proteome of a cell will be most similar to the number of
- A mRNA transcribed
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 - D alternative splicings.

1

The diagram represents a typical animal eukaryotic cell with its various membrane bound compartments.



a) Many useful molecules are recycled within the cell.

Describe the role of membrane bound lysosomes in the cells' recycling process.

1

(b) All protein synthesis begins at cytosolic ribosomes.

Explain the importance of signal sequences in the synthesis of transmembrane proteins.

2

c) Give an example of a post translational modification when a protein is inserted into the lumen of the Golgi apparatus.

d (i) Name the organelle that moves materials between compartments.

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(ii) Explain how this organelle is able to move from the Golgi apparatus and fuse with the plasma membrane .

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e) Prokaryotic cells lack many of the membrane bound organelles contained within eukaryotic cells.

Explain why only eukaryotic cells require a system of internal membranes.

2

2. State the term that describes the entire set of proteins expressed by a genome.

1

3 It has been suggested that different forms of the GABA_A receptor subunit can arise as a result of alternative RNA splicing.

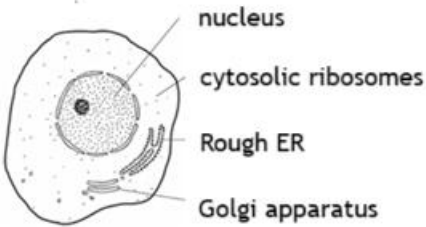
Explain how alternative RNA splicing could result in the production of variant forms of GABA_A receptor subunits.

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4 Describe the pathway by which proteins translated on the rough endoplasmic reticulum (RER) are modified and then secreted from the cell.

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5 The diagram represents a typical eukaryotic cell.



(a) Give a role of the smooth endoplasmic reticulum (SER).

1

(b) Prokaryotic cells, such as bacteria, function well with a plasma membrane but no other internal membrane structures. Explain why eukaryotic cells also require organelles to function efficiently.

2

(c) Describe the pathway of secreted proteins from the Golgi apparatus.

2

6. Give an account of the synthesis and translation of cell proteins. 10

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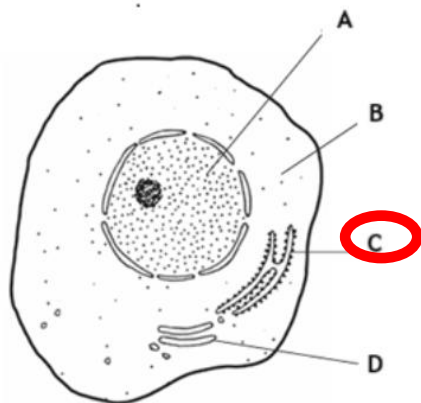
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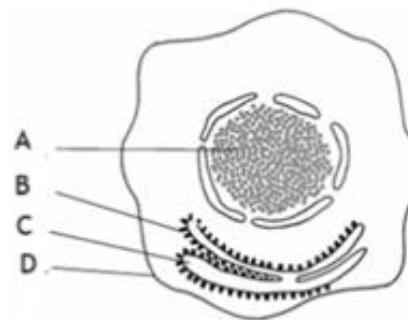
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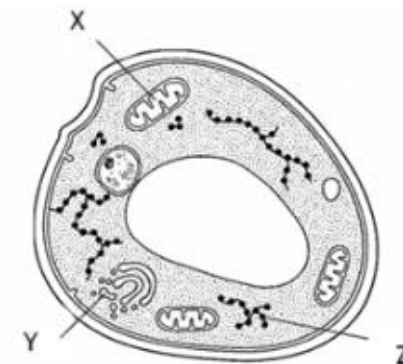
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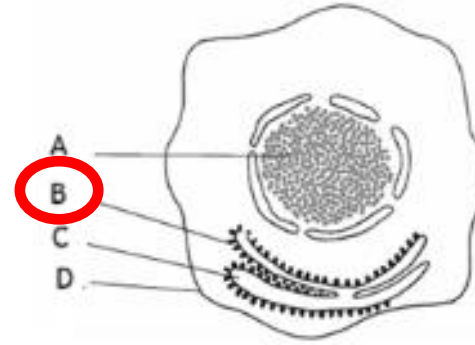
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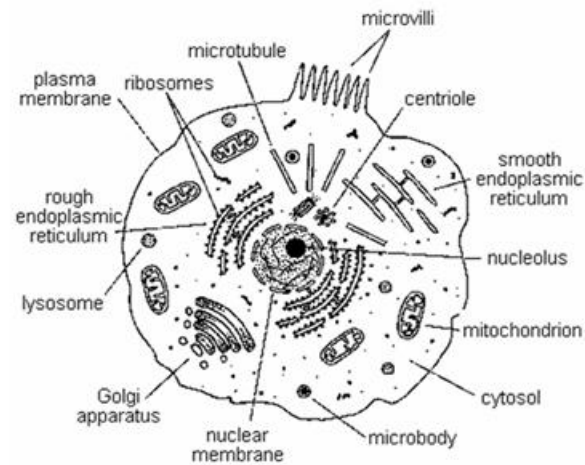
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The diagram represents a typical animal eukaryotic cell with its various membrane bound compartments.



a) Many useful molecules are recycled within the cell.

Describe the role of membrane bound lysosomes in the cells' recycling process.

Contain hydrolases that digest proteins/lipids/nucleic acids/ Carbohydrates for reuse

1

(b) All protein synthesis begins at cytosolic ribosomes.

Explain the importance of signal sequences in the synthesis of transmembrane proteins.

Halts translation (1)
Causes ribosomes synthesising protein to dock with ER (1)

c) Give an example of a post translational modification when a protein is inserted into the lumen of the Golgi apparatus.

Adds carbohydrate/phosphate to protein

d (i) Name the organelle that moves materials between compartments.

vesicles

1

(ii) Explain how this organelle is able to move from the Golgi apparatus and fuse with the plasma membrane .

Via spindle microtubules moving vesicle to cell membrane

1

e) Prokaryotic cells lack many of the membrane bound organelles contained within eukaryotic cells.

Explain why only eukaryotic cells require a system of internal membranes.

Eukaryotes have a smaller surface area: volume ratio/ too small a surface area to carry out all vital functions carried out by membranes

2

System of internal membranes increase increases total surface area of membrane for reactions to occur

2

2. State the term that describes the entire set of proteins expressed by a genome.
proteome

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3 Explain how alternative RNA splicing could result in the production of variant forms of GABA_A receptor subunits.

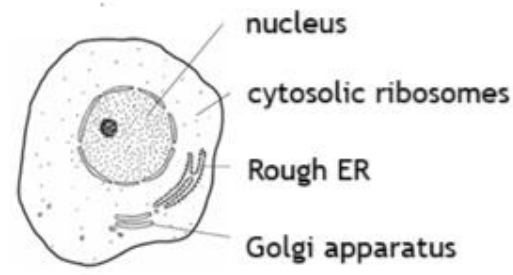
2

Different exons are spliced together (1)
quences of amino acids (1)

4 Describe the pathway by which proteins translated on the rough endoplasmic reticulum (RER) are modified and then secreted from the cell.

1. Proteins enter the lumen of the RER
2. Proteins transported in vesicles to the Golgi apparatus
3. Proteins move through the Golgi apparatus
4. Post-translational modifications in the Golgi apparatus
5. Addition of carbohydrate is the major modification
6. Packaged into secretory vesicles
7. Secretory vesicles move along microtubules to plasma membrane.
8. Secretory vesicles fuse with the plasma membrane

5 The diagram represents a typical eukaryotic cell.



5

(a) Give a role of the smooth endoplasmic reticulum (SER).
Produces lipid

1

(b) Prokaryotic cells, such as bacteria, function well with a plasma membrane but no other internal membrane structures. Explain why eukaryotic cells also require organelles to function efficiently.

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by membranes (1)

System of internal membranes increase increases total surface
area of membrane for reactions to occur

(c) Describe the pathway of secreted proteins from the Golgi apparatus.

Vesicle buds off golgi (1)
Microtubules from MTOC move vesicle to plasma membrane (1)

Vesicle fuses with plasma membrane releasing secreted protein
(1)

2

6. Give an account of the synthesis and translation of cell proteins.

10

1. Synthesis of all proteins begins in cytosolic ribosomes
2. The synthesis of cytosolic proteins is completed there
3. A signal sequence in transmembrane proteins sends the ribosome to dock in the endoplasmic reticulum / ER
4. The signal sequence determines the eventual location of the protein.
5. The endoplasmic reticulum / ER forms a network of membrane tubules continuous with the nuclear membrane
6. Translation continues after ribosome docking and the protein is inserted into the membrane of the ER
7. They are transported by vesicles from the ER and fuse with the Golgi apparatus
8. The Golgi apparatus is a series of flattened membrane discs
9. Molecules move through the Golgi in vesicles that transfer from one disc to the next.
10. As proteins move through the Golgi apparatus they undergo post-translational modification
11. The addition of carbohydrate groups is the main modification
12. Enzymes catalyse the addition of various sugars to form the carbohydrates
13. Vesicles from the Golgi apparatus take proteins to the plasma membrane / lysosomes
14. Lysosomes are membrane-bound organelles containing enzymes that digest proteins / lipids / nucleic acids / carbohydrates
15. Vesicles move along microtubules to other membranes within the cell and fuse with them

Any 10 for 1 mark each