

BIOL*1090
Midterm Examination Fall 2010
Answer Key

Section A

1. D	6. E	11. B	16. D	21. D
2. B	7. C	12. C	17. D	22. D
3. E	8. D	13. B	18. C	23. B
4. D	9. A	14. E	19. A	24. D
5. A	10. E	15. D	20. D	25. C

Section B

1. If a bacterium increases the content of unsaturated lipids in its plasma membrane, what effect will this have on the fluidity of the plasma membrane? [1 mark]

_____ **fluidity will increase** _____

2. An integral membrane protein is glycosylated in the ER during its synthesis. If this protein is delivered to the plasma membrane, where will the carbohydrate group appear? [1 mark]

_____ **extracellular, external, outer leaflet of plasma membrane, etc.** _____

3. Name **two functions** of 'coat' proteins during intracellular vesicular trafficking? [2 marks]

_____ **vesicle formation / deforming the membrane** _____

_____ **cargo selection** _____

4. What is the name given to small, relatively rigid domains of the plasma membrane that are enriched in cholesterol? [1 mark]

_____ **lipid rafts** _____

5. In an autophagolysosome, what is responsible for the degradation of the contents? [1 mark]

_____ **hydrolytic enzymes / acidic hydrolases / lysosomal enzymes** _____

6. Which structure, found in many animal cells, performs a similar function to the tonoplast of plant cells? [1 mark]

_____ **lysosomal membrane** _____

7. Into which organelle location are protons pumped to generate a gradient for ATP synthesis during oxidative phosphorylation? [1 mark]

_____ **intermembrane space of mitochondria** _____

8. Which cytoskeletal element contains helical protein domains entwined together, forming a coiled-coil. [1 mark]

_____ **intermediate filaments** _____

9. What is the slowest step in the assembly of an actin filament? [1 mark]

_____ **nucleation** _____

10. Name one function of the smooth endoplasmic reticulum. [1 marks]

One of: production of steroid hormones / lipid synthesis / detoxification / Ca^{2+} storage / carbohydrate metabolism

11. What membrane proteins are primarily responsible for the passage of ATP out of the mitochondria? [1 mark]

_____ **porins** _____

12. Write the letter corresponding to one of the structural components on the left in the space beside the appropriate cellular location on the right. This is complete when each location on the right has **one** letter beside it (you will not use every letter on the left).

[3 marks]

(A) cytochrome C

(B) microtubule-organizing centre

(C) glycocalyx

(D) basolateral membrane

(E) lamins

C extracellular space

E nucleus

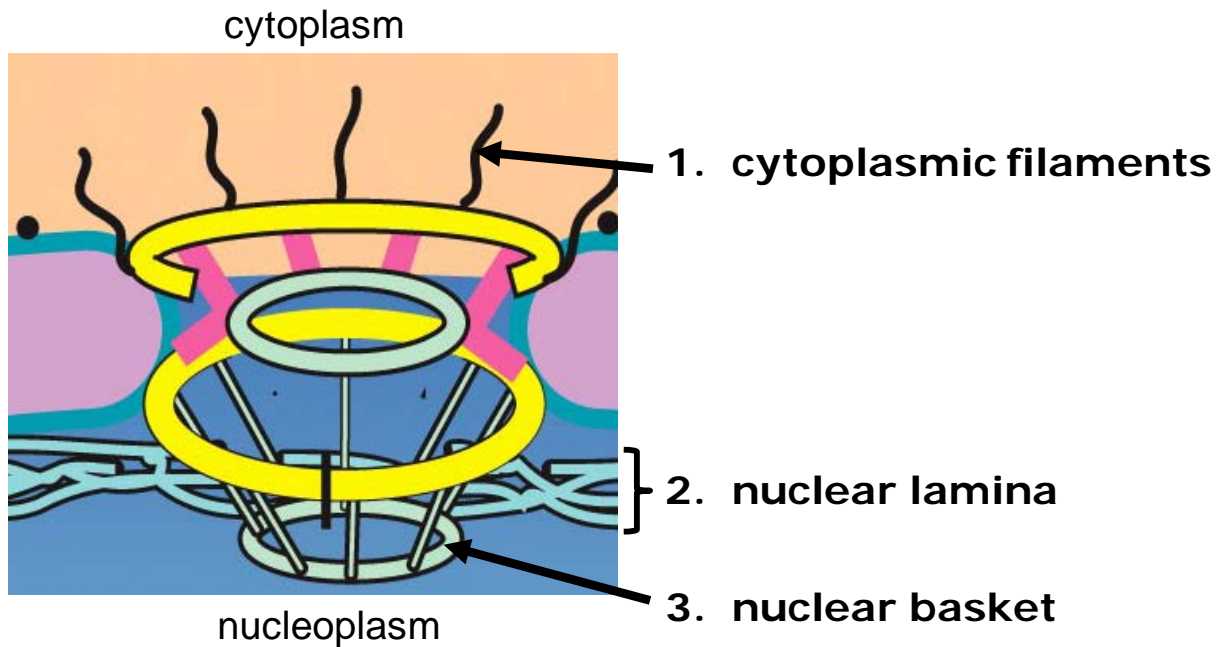
A mitochondria

Section C

1. During translation of a polypeptide, a signal sequence emerges. What steps occur next that result in the protein entering the endoplasmic reticulum? [4 marks]

- **signal recognition particle (SRP) binds signal sequence**
- **SRP/ribosome complex is bound by SRP receptor**
- **release of SRP, ribosome binds to translocon**
- **polypeptide enters ER through translocon**

2. Label the structures indicated in the diagram below. [3 marks]
Hint: #2 is a structure that supports the nuclear envelope.



3. (i) Define active transport. [2 marks]

- **movement of compound against / up concentration gradient (or from low concentration to high concentration)**
- **requires energy / ATP**

- (ii) Based on the definition of active transport, why can't CFTR be considered an active transporter? [1 mark]

- **because it transports (Cl⁻) down a concentration gradient (does not require energy / ATP)**