

Fill in the Blanks (1 mark each)

_____ is the process by which a target cell detects a signalling molecule that binds to a receptor.

The mechanism by which the end product of a metabolic pathway inhibits an earlier step in the pathway is most precisely described as _____ inhibition.

_____ is the portion of cellular respiration that occurs in both aerobic and anaerobic environments.

Proteolysis breaks a polypeptide chain down into amino acid monomers. This is an example of a/an _____ process in the cell.

Cellulose is produced through the formation of β 1,4 linkages between glucose molecules. This is an example of a/an _____ process in the cell.

Enzyme linked receptors typically have _____ transmembrane domain(s) made up of _____.

A protein _____ is an enzyme that adds phosphate groups to other proteins.

Proteins with a _____ are able to interact with phosphorylated tyrosine residues on a receptor tyrosine kinase.

_____ is an enzyme which converts GTP to cGMP, while _____ is responsible for the conversion of cGMP to GMP.

Written Answers –

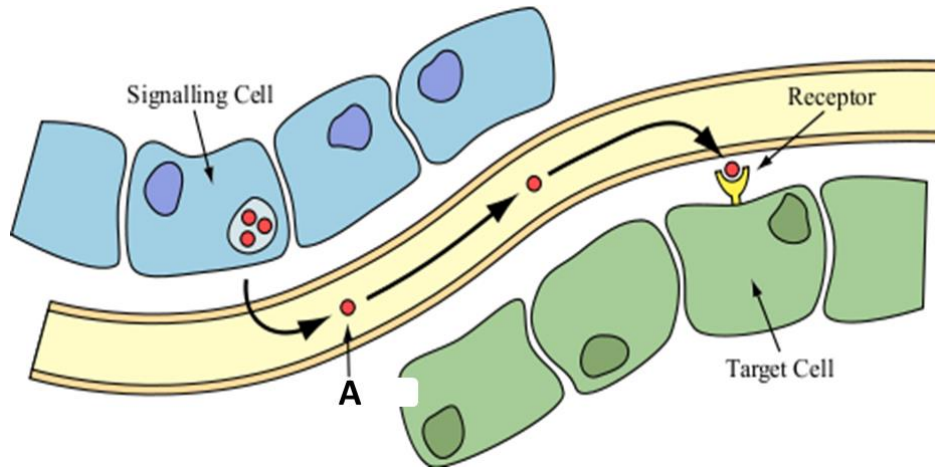
1a) Draw a free energy diagram for an endergonic reaction. Be sure to clearly label the axes and all changes in free energy which occur throughout this reaction. **(4 marks)**

1b) Adding to your graph above, illustrate how the reaction would proceed and specify what would change if this reaction occurred in the presence of an enzyme (**2marks**).

1c) Name a specific metabolic reaction or cellular process that is endergonic (**1mark**).

2) Sketch the citric acid cycle. Be sure to clearly indicate the starting molecule(s), molecule(s) produced (focusing on carbon), # of steps in the process and provide an energy summary (including both input and output of high-energy molecules) for one glucose molecule as it passes through this portion of cellular respiration. You do not need to identify each of the intermediates/enzymes. (**8 marks**)

3)



The diagram above depicts what type of cellular communication? _____

The red molecule labelled A in the diagram could most correctly be labeled as a _____.

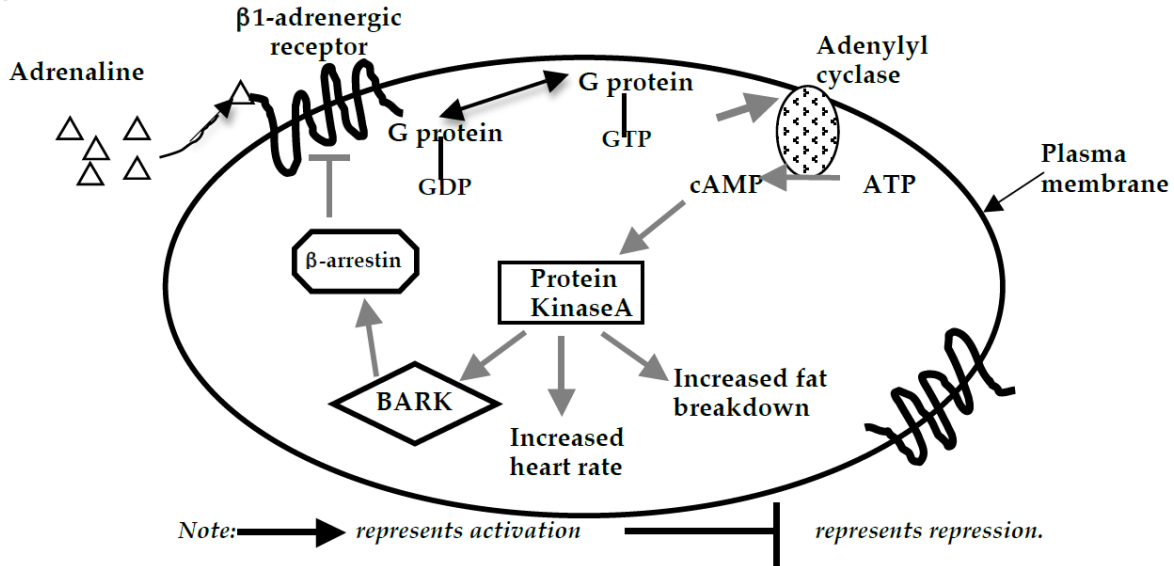
Where is the receptor for this molecule located? _____

Name the **families** of receptors that are found in this cellular location.

Describe the molecular mechanism by which ligand binding activates signal transduction for one of these types of receptors.

4) Some children are born with a mutation that prevents them from making human growth hormone (HGH). Why does injecting them with exogenous hormone allow them to grow?

5)



The β_1 -adrenergic receptor is what specific type of receptor? _____

What is the first messenger in this signalling cascade? _____

Name the second messenger(s) used by this signal transduction cascade. _____

What is/are the cellular response(s) observed?

What does β -arrestin do in this signalling pathway? _____

If you apply cholera toxin, which prevents G proteins from hydrolyzing GTP to GDP, what do you expect would happen to the cellular response?

If you generated a mutant in which the kinase domain of PKA no longer functioned, would activation of this pathway still lead to:

- 1) G protein activation? _____
- 2) cAMP production? _____
- 3) activation of BARK? _____

6) Progesterone is steroid hormone produced by the ovary. Increased expression of the epidermal growth factor gene is observed in its target cells. Describe in detail, the molecular mechanism by which this occurs.