

1. (2 marks) One effect of the deletion of the RPB1 subunit of RNA polymerase II is

- a) loss of the oligosaccharide-binding domain.
- b) inability of polymerase to bind to transcriptional activators.
- c) slowed elongation rate.
- d) non-viable cells.
- e) extended CTD.

2. (2 marks) Predict a possible effect of deleting the enhancers region of the human amylase gene (*AmyA*).

- a) reduced transcription of ribosomes.
- b) reduction in the production of most hnRNAs
- c) reduction in the amount of amylase made
- d) reduction in the production of Rpb1
- e) reduction in the production of Rpb2

3. (2 marks) Enhancers and repressors can regulate gene expression in a tissue-specific manner based on the types of DNA-binding proteins that are present in the cells of differ tissues.

- a) True
- b) False

4. (2 marks) Which of the following are typical features of transcriptional activators?

- a) transcription-activation domain
- b) DNA-binding domain
- c) kinase domain
- d) transcription-activation domain and DNA-binding domain
- e) transcription-activation domain and kinase domain

5. (2 marks) The DNA-binding and activation domains of activator proteins are independent molecules.

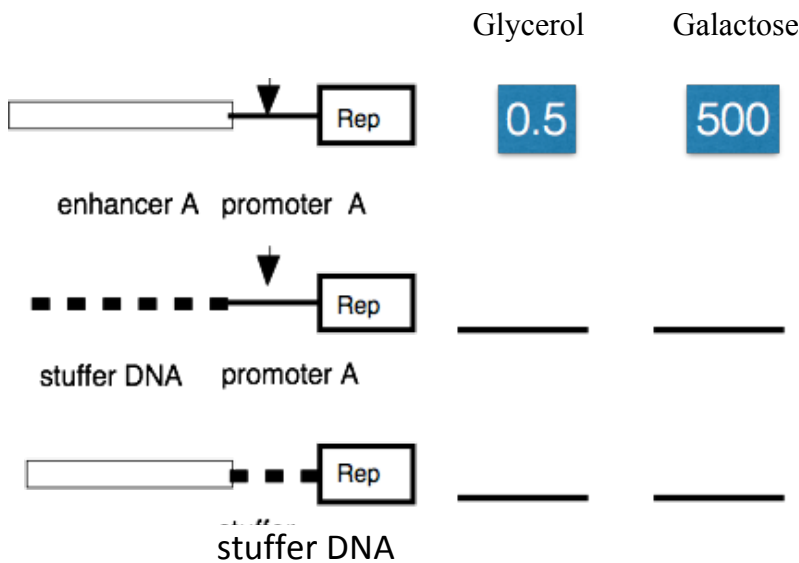
- a) True
- b) False

6. (10 marks) The first line in the following diagram depicts a reporter gene (Rep) that is downstream of a yeast galactose gene promoter. The reporter gene has been inserted into an

autonomously replicating yeast plasmid that has been transformed into yeast.

a) (4 marks) Insert into the figure on the lines indicated the amount of reporter gene expression that you would expect for yeast transformed with the same autonomous plasmid harbouring the modified constructs indicated.

Note. Enhancer region DNA sequences, promoter region DNA sequences and stuffer DNA (DNA that does not contain a start codon or any cis-acting information) are as indicated.



Answer: Expression by both the middle and bottom reporter genes will be 0 or near 0 when either glycerol or galactose is the carbon source (genes require both a promoter region and an enhancer region)

b) (2 marks) How would you expect expression of the second construct in the above table to be altered if you replaced the stuffer DNA with the enhancer for a gene that was constitutively expressed? **Answer: It will be expressed constitutively, because enhancers determine the pattern of expression.**

c) (2 marks) How would you expect the expression of the second construct to be altered if you inserted enhancer A DNA upstream (immediately to the left) of the stuffer DNA in the second reporter gene construct? **Answer: It will be regulated just like the first construct because the enhancer determines the pattern of expression and enhancers work in an orientation and position independent fashion.**

d) (2 marks) How would you expect expression of the third construct to change if the stuffer region was replaced with the promoter region from a constitutively expressed gene? **Answer: The pattern of expression of the new construct would be like that of the first construct, because it would have a functional promoter and a gal enhancer and it is the enhancer that determines the pattern of expression.**
