

# 16.3 Gene Control

## Question Paper

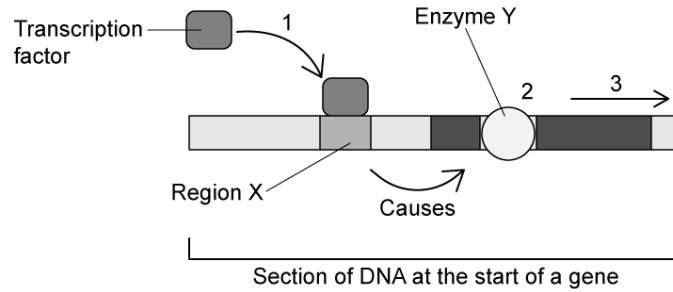
Course	CIEA Level Biology
Section	16. Inheritance
Topic	16.3 Gene Control
Difficulty	Easy

**Time allowed:** 30  
**Score:** /23  
**Percentage:** /100

**Question 1a**

Transcription factors are proteins that influence the process of transcription.

Fig. 1 shows one mechanism of action.



**Fig. 1**

Identify region X and enzyme Y.

[2 marks]

**Question 1b**

Stage 1 in Fig. 1 shows the transcription factor binding to region X which then results in stages 2 and 3 occurring.

Describe the events that take place during stages 2 and 3 of Fig. 1.

[2 marks]

**Question 1c**

The transcription factor shown in Fig. 1 is a protein.

Suggest and explain how a mutation in the gene that codes for the transcription factor might affect the expression of the gene shown in Fig. 1.

[2 marks]

### Question 1d

The transcription factor shown in Fig. 1 is an example of an activator, which means that it initiates transcription or increases the rate of transcription.

Explain how a transcription factor might have the opposite effect and function as a repressor.

[2 marks]

### Question 2a

The *lac* operon is a cluster of genes found in some bacterial cells that controls the production of the enzyme lactase.

(i)

Identify the genes of the *lac* operon as structural or functional.

[1]

(ii)

Give a reason for your answer at part (i).

[1]

[2 marks]

### Question 2b

The enzyme lactase is an example of an inducible enzyme.

Define the term *inducible enzyme*.

[1 mark]

### Question 2c

State the purpose of lactase in some bacterial cells.

[2 marks]

### Question 2d

Upstream of the *lac* operon on the bacterial DNA is the regulatory gene *lacI*.

(i)

State the name of the protein that *lacI* codes for.

[1]

(ii)

Describe the role of this protein identified at part (i).

[2]

[3 marks]

### Question 3a

Fig. 1 shows a gene control mechanism that occurs within germinating seeds.

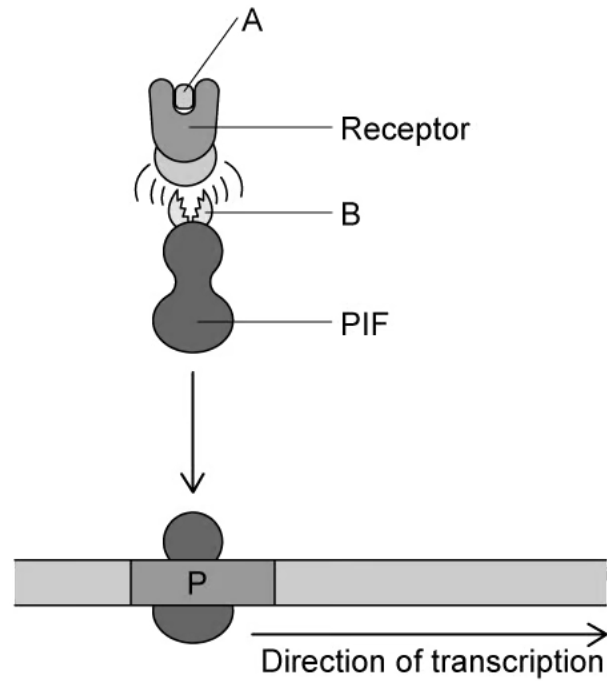


Fig. 1

Identify molecules **A** and **B** in Fig. 1.

[2 marks]

### Question 3b

Molecule **A** binds to its receptor, as shown in Fig. 1.

Describe the effect of this on molecule **B**.

[1 mark]

### Question 3c

PIF in Fig. 1 is a transcription factor.

Define the term *transcription factor*.

[2 marks]

**Question 3d**

Explain the importance of **PIF** binding to the promoter region (**P**) as shown in Fig. 1.

[2 marks]