

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

- (a) What is a gene?

(1)

- (b) Describe how the production of messenger RNA (mRNA) in a eukaryote cell is different from the production of mRNA in a prokaryote cell.

(2)

- (c) Scientists produced a short, single-stranded, artificial nucleic acid, called PNA. The PNA binds to a small section of DNA.

The scientists introduced PNA into cells and discovered that these cells produced less mRNA than cells that did not contain PNA.

Suggest how PNA affected the transcription of the section of DNA.

(2)

- (d) Describe the role of ATP in the process of translation in protein synthesis.

(2)
(Total 7 marks)

Q2.

- (a) *Clostridium difficile* is a bacterial species that causes disease in humans.

Antibiotic-resistant strains of *C. difficile* have become a common cause of infection acquired when in hospital.

Explain how the use of antibiotics has led to antibiotic-resistant strains of bacteria becoming a common cause of infection acquired when in hospital.

(3)

- (b) Scientists suggested that factors, other than antibiotic use, led to the increase in antibiotic-resistant *C. difficile* infections. One suggested factor is people eating more trehalose in their diet.

Trehalose is a disaccharide formed from two glucose molecules.

Name another disaccharide formed from two glucose molecules.

(1)

Scientists investigated the effect of trehalose on the growth rate of *C. difficile*.

They grew populations of non-resistant and antibiotic-resistant *C. difficile* on separate agar plates with:

- no carbohydrate added
- trehalose added.

They measured the growth rate of the *C. difficile*.

The graph below shows the scientists' results.

[illegible]

(3)
(Total 10 marks)