Thebiotutor.com

A2 Biology OCR

Unit F215: Control, genomes and environment

Module 1.1 Cellular control

Answers

1.

1 ref to operon;
2 normally repressor substance bound to operator;
3 prevents RNA polymerase binding (at promoter) / prevents transcription;
4 lactose binds to repressor;
5 changes shape of protein molecule;
6 unable to bind (to operator);
7 RNA polymerase binds (at promoter) / transcription occurs / genes switched on;
8 AVP; e.g. production of lactose permease / production of beta-galactosidase;

Max 5

[5]

2.

a change in the genetic material;
unpredictable / AW;
extra detail; e.g.
addition / substitution / deletion / frame shift / small part of chromosome / may code for different protein / may code for no protein

[2]

3.

allow max 5 for following:
transcription;
DNA unzips / H bonds break;
exposing required, gene / sequence of bases;
RNA nucleotides align with DNA;
U with A, A with T, C with G, **and** G with C;
RNA polymerase;
mRNA formed (using DNA strand as template);
leaves nucleus through pore;

allow max 5 for following:
translation;
mRNA attaches to ribosome;
tRNA brings amino acid (to, ribosome / mRNA);
each tRNA attached to specific amino acid;
tRNA binds to mRNA using complementary, base triplet / anticodon;
peptide bond formed between amino acids;
DNA / mRNA, (nucleotide / base) sequence determines sequence of amino acids;

AVP; e.g. 2, base triplets / codons, in ribosome
AVP; e.g. ref. to : start / stop, codons
polysomes
large and small subunit in ribosome
Mg^{2+}

[10]

4.

1 mark per correct row

Look for both ticks and crosses.

If a table consists of ticks ONLY or crosses ONLY, then assume that the blank spaces are the other symbol.

If a table consists of ticks, crosses and blanks then the blanks represent no attempt at the answer.

Nucleotides line up along an exposed DNA strand.	✓	✓;	
The whole of the double helix 'unzips'.	✓	✗;	
Uracil pairs with adenine.	✗	✓;	
A tRNA triplet pairs with an exposed codon.	✗	✗;	
Both DNA polynucleotide chains act as templates.	✓	✓;	
Adjacent nucleotides bond, forming a sugar-phosphate backbone.	✓		✓;
The original DNA molecule is unchanged after the process.	✗	✓;	
Adenine pairs with thymine.	✓	✓;	

[8]

5.

(a) (i) U A C C G G A U U C A C;;

1 error = 1, 2 errors = 0

allow 1 mark for giving T throughout instead of U

(i.e. T A C C G G A T T C A C = 1 mark) 2

(ii) transcription / transcribed; **R** transcriptase 1

(b) (i) **J** anticodon; **R** anticodons
K transfer RNA / tRNA;
L ribosome / rRNA;
M codon; **R** codons 4

(ii) **1** DNA triplet / codon / **M** / mRNA triplet, codes for specific amino acid;

2 order of, triplets / bases, determines the order of amino acids;

3 tRNA / K, has, corresponding / complementary, triplet / anticodon;

4 (tRNA / K) attached to specific amino acid;

5 activation of amino acid;

6 2 (tRNA) binding sites on the ribosome;

7 codon and anticodon bind; **A** match

8 A to U and C to G;

9 adjacent amino acids join;

10 peptide bond;

4 max

(c) **1** attaches to ribosome;

2 removes, base / portion, of ribosome;
A stops ribosome assembling / changes shape of ribosome

3 prevents ribosome, attaching to / reading, mRNA;

4 prevents codons being exposed;

5 prevents, tRNA / anticodon, attaching to, mRNA / codon;

6 prevents / inhibits enzyme responsible for, formation of peptide linkages;

7 AVP; e.g. further detail of any of the above points

2 max

[13]

6.

(a) (i) mRNA leaves nucleus; *ora*
mRNA, translated / used to make, protein;
DNA, transcribed / used to make, mRNA;
mRNA short-term / DNA (long-term) store; 2 max

(ii) siRNA smaller / fewer nucleotides / only matches part of gene; *ora*
siRNA double-stranded; *ora* 2

(b) (complementary) base-pairing;
hydrogen bonding;
between purines and pyrimidines;
A with U; **R** A with T
C with G;
ref to 2 or 3 bonds (correct context);

3 max

[7]

7.

(a) provides sites for binding;
ref to, spindle fibres / microtubules;
ref to genes being spaced out along chromosome;
places to break and rejoin (during meiotic division); **A** chiasmata formation
'junk' implies no, function / purpose; *ora*
function may not yet have been discovered;
AVP; e.g. raw material for, evolution / natural selection,
required for, cell division / mitosis / meiosis

max 2

(b) straight line sloping up from left to right; (does not need to start at origin) 1

(c) ATP / NAD / NADP / RNA / phospholipid / GP / TP / RuBP / ADP /
RUP / AMP / cAMP/ phosphocreatine / AVP; **R** DNA 1

[4]