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BIOLOGY

THE CONTROL OF GENE EXPRESSION

Level & Board	AQA (A-LEVEL)
TOPIC:	DNA PROBE & GEL ELECTROPHORESIS
PAPER TYPE:	SOLUTION - 1
TOTAL QUESTIONS	6
TOTAL MARKS	33

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DNA probe and Gel Electrophoresis - 1

1.

(a)

Extract DNA and add restriction endonucleases/restriction enzymes

Separate fragments using electrophoresis

Treat DNA to form single strands

The probe will bind to/hybridise/base pair with the SUT1/gene

Use autoradiography to show the bound probe

(b)

Antisense mRNA is complementary to 'sense' mRNA

Antisense mRNA would bind/base pair to sense mRNA

Ribosomes would not be able to bind

Preventing/less translation of mRNA

2.

(a) A probe is a single-stranded sequence of DNA or RNA used to search for its complementary sequence in a sample genome. The probe is placed into contact with the sample under conditions that allow the probe sequence to hybridize with its complementary sequence.

OR

Short single strand of DNA

Bases complementary with allele

(b)

Restriction mapping

DNA sequencing of fragments

3.

(a) Isolated DNA is first cut into readily separable fragments with restriction nucleases. The double-stranded fragments are then separated on the basis of size by gel electrophoresis, and those complementary to a DNA probe are identified by blotting and hybridization, as just described for RNA.

OR

Restriction endonuclease enzymes

Cuts the DNA at specific base sequence

(b) So DNA probe can attach

4.

(a)

Lane 1 has DNA fragments of known sizes

Allows for comparison

(b) 3, 4, 5 with these numbers in any sequence

5.

(a) Non-coding base sequences are DNA that do not code for proteins and they are positioned between genes.

(b) Deletion mutation

(c)

Introns not translated / not in mRNA / exons code for amino acids / introns do not code for amino acids

Mutations of these exons affect amino acid sequences that produce faulty protein / change tertiary structure of protein

So important to know if parents' exons affected, rather than any other part of DNA / introns

6.

(a) The polymerase chain reaction

(b)

Probes are single stranded / have a specific base sequence

Complementary base sequence on (specific) spacer

Complementary/specific to particular spacer

In white squares probe binds to single-stranded spacer and glows/produces light/fluoresce

(c)

To see if strain is resistant to any antibiotics

So can prescribe effective/right antibiotic

To see whether any vaccine works against this strain/ see which vaccine to use/ to produce specific vaccine

So can vaccinate potential contacts/to stop spread

Can test other people to see if they have the same strain/ to trace where people caught TB

Allowing control of spread of disease/vaccinate/treat contacts of people with same strain before they get TB

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I am Sorry !!!!!

