CHEMISTRY ONLINE
TUITION

Phone: +442081445350

www.chemistryonlinetuition.com

Email:asherrana@chemistryonlinetuition.com

BIOLOGY

THE CONTROL OF GENE EXPRESSION

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

Recombinant DNA - 1

1.

(a)

Restriction endonucleases produce 'sticky ends'

Ligase joins 'sticky ends'

(b)

Cell division has occurred

Gametes do not receive the gene

2.

(a)

No overlap in SDs

Significant increase/difference in growth/mass

(b)

Large sample size so representative

12 months so can allow growth

3.

(a) Single-stranded cDNA can prevent p34 gene transcription by altering the mutated promoters, changing the binding site for transcription factors and halting transcription.

OR

Binds to transcription factor gene/DNA

(b) If two pieces of DNA have matching ends, ligase can link them to form a single, unbroken molecule of DNA. In DNA cloning, restriction enzymes and DNA ligase are used to insert genes and other pieces of DNA into plasmids.

OR

Restriction endonuclease/enzyme to cut plasmid/vector

Ligase joins gene/DNA to plasmid/vector

(c)

R group

mass of amino acids

4.

(a)

Reverse Transcription PCR

First, the enzyme reverse transcriptase uses the mRNA template to produce a complementary single-stranded DNA strand called cDNA in a process known as reverse transcription. Next, DNA polymerase is used to convert the single-stranded cDNA into double-stranded DNA.

OR

Produces cDNA using mRNA

(b) Joins nucleotides to produce complementary strand/s of DNA

(c) Hydrolyzing removes extraneous DNA, preventing non-specific amplification in PCR reactions. b) Prevents unintended replication of non-target DNA in the PCR process for accuracy and specificity. a) Hydrolyzing any DNA in the sample before adding it to the PCR reaction mixture is essential to remove any existing DNA.

OR

To remove any DNA present

As this DNA would be amplified / replicated

5.

(a) Ratio in range of 1.4 :1 to 1.5 :1

(b) Limited number of nucleotides

(c)

Base sequences differ

Different complementary primers required

6.

(a) Methods 2 and 3 produce DNA/HGH without introns; E. coli cannot remove introns/cannot splice mRNA/cannot splice pre-mRNA;

(b) The geneticist concluded it would be faster to create the HGH gene using a gene machine than by using reverse transcriptase to convert mRNA for HGH into cDNA.

OR

Faster to use gene machine than all the enzyme-catalysed reactions involving reverse transcriptase

(c)

Cut the plasmid with a restriction endonuclease;

So that both have complementary / sticky ends

Mix together and add ligase to join the complementary / sticky ends

DR. ASHAR RANA

CHEMISTRY ONLINE TUITION

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, and Math's Tutor

CONTACT INFORMATION FOR **CHEMISTRY ONLINE TUITION**

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK