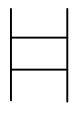


Assessment Schedule – 2006**Biology: Describe the role of DNA in relation to gene expression (90715)****Assessment Schedule**

Q	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	<p>Diagram shows:</p> <ul style="list-style-type: none"> base pairing: A-T, G-C A-T with 2 H-bonds, G-C with 3 H-bonds strands running anti-parallel (3' & 5' ends labelled)  <ul style="list-style-type: none"> new nucleotides added to 3' end of strand. <p>3 out of 4 correct.</p>		
1(b)	<p>Describes why DNA replication is necessary:</p> <ul style="list-style-type: none"> To make a copy of the genetic material. To allow cell division / mitosis / meiosis to occur. 	<p>Gives a reason as to why DNA replication occurs, eg:</p> <ul style="list-style-type: none"> Copies of DNA are passed on to daughter cells so that these have the same DNA to each other and to parent cell. To make identical copies of DNA so that cell division can occur. 	
1(c)	<p>Describes two aspects of process of DNA replication, eg:</p> <ul style="list-style-type: none"> DNA must unwind to replicate. DNA unzips. Named enzymes are involved and function is correct. The 2 new strands form differently. Free nucleotides join. DNA replication is semi-conservative. 	<p>Process complete plus one reason given for aspect of process of DNA replication, eg:</p> <ul style="list-style-type: none"> Explains roles of two enzymes involved e.g. polymerases, ligase, helicase. DNA polymerase requires an RNA primer before it can initiate replication. Okazaki fragments necessary because replication can only proceed in 5' → 3' direction and so the lagging strand must elongate in sections rather than continuously. 	<p>Process complete, supported by reasons plus why DNA replication is semi-conservative:</p> <ul style="list-style-type: none"> Strand formation semi-conservative: each new molecule will have one of the original DNA strands – the template – and one newly synthesised strand.

2(a)	<p>Describes how the DNA molecule carries genetic information:</p> <ul style="list-style-type: none"> • Information is carried in the order of the bases. • Codes for the amino acids which make up the protein. • Codes for the amino acid sequence. 	<p>Explains how base order carries information:</p> <ul style="list-style-type: none"> • Sequence of bases determines the sequence of amino acids in a protein. • Each group of 3 bases specifies an amino acid in the finished protein. 	
2(b)	<p>Provides a basic description of transcription and/or translation. Must cover THREE of place / purpose / associated molecules / nucleic acid structure, eg:</p> <ul style="list-style-type: none"> • Transcription involves making an RNA copy of a section of DNA. • Translation is the production of a polypeptide / protein using the RNA as a template. 	<p>Clearly distinguishes, giving reasons for, the differences between the two processes. Must cover TWO of place / purpose / associated molecules / nucleic acid structure, eg:</p> <ul style="list-style-type: none"> • Transcription occurs in the nucleus of the cell because DNA is the template for the production of mRNA, and it cannot leave the nucleus. Translation occurs in the cytoplasm, as the ribosomes are found there and they mediate the process. 	
2(c)	<p>Describes how enhancers work to improve efficiency of transcription, eg:</p> <ul style="list-style-type: none"> • enhancers may increase rate of transcription. • binds to transcription factors to initiate transcription. 	<p>Gives reasons how or why enhancers may have this effect, eg:</p> <ul style="list-style-type: none"> • binding to transcription factors, so that promoter sequence is properly positioned to initiate transcription. • regulates the process of transcription so that the cell can respond efficiently to changes in the environment. 	
2(d)	<p>Describes role of inducer OR repressor, eg:</p> <ul style="list-style-type: none"> • Repressor binds to the operator / DNA to prevent transcription. • Inducer binds to repressor so it cannot attach to operator / DNA. • To prevent the cell synthesising a protein when it is not needed. 	<p>Gives reason for the roles of inducer AND repressor in gene expression, eg:</p> <ul style="list-style-type: none"> • repressor occupies part of promoter, prevents polymerase from beginning transcription. • Inducer removes repressor, allows polymerase to bind and begin transcription. 	<p>Discusses the significance of these interactions, eg:</p> <ul style="list-style-type: none"> • Transcription will occur only when necessary substrate is present. • OR when substrates that can be used more efficiently are absent. • Thus maximising energy efficiency in cell.

3(a)	Diagram clearly identifies allele pairs as AA, Bb, rr. NB order of the gene loci is not important.											
3(b)	i) $X^M X^M$, $X^M X^m$ ii) $X^m X^m$ iii) $X^m Y$ iv) $X^M Y$ All correct.											
3(c)(i)	<table border="1"><tr><td></td><td>X^m</td><td>Y</td></tr><tr><td>X^M</td><td>$X^M X^m$</td><td>$X^M Y$</td></tr><tr><td>X^m</td><td>$X^m X^m$</td><td>$X^m Y$</td></tr></table> All genotypes given.		X^m	Y	X^M	$X^M X^m$	$X^M Y$	X^m	$X^m X^m$	$X^m Y$		
	X^m	Y										
X^M	$X^M X^m$	$X^M Y$										
X^m	$X^m X^m$	$X^m Y$										
3(c)(ii)	Phenotypic proportions: Male 1:1 normal:affected Female 1:1 normal:affected Genotypic proportions: Male 1:1 $X^M Y$: $X^m Y$ Female 1:1 $X^M X^m$ (carrier): $X^m X^m$ Ratios can be expressed in any form but must include descriptions of phenotype and genotype.											
3(d)	Describes male or female difference: <ul style="list-style-type: none">Absence of normal DMD allele on Y chromosome.Females would need to have both recessive alleles.	Uses these differences: <ul style="list-style-type: none">Because females have 2 copies of the gene, a recessive mutant allele on one chromosome may be masked by the presence of a normal allele on the other chromosome.Because males have only a single copy of the gene, a recessive mutant allele will be expressed.										
3(e)	Recognises that a disabling mutation in one gene will disrupt function of other genes further down the pathway . OR: Recognises that the absence of a disabling mutation will allow the pathway to proceed as each step can be completed.	Explains that different individuals may have mutations in different genes in the skin pigment pathway . OR: Recognises that if the mutation occurs in the same gene in the pathway , it must be a dominant mutation.	Discusses the significance of this information, eg: <ul style="list-style-type: none">If the mutation for albinism is recessive, albino parents are affected at different genes on the pathway. The child inherits a normal (dominant) allele at each gene, and therefore the pathway is able to be complete and pigment produced. OR: <ul style="list-style-type: none">If the mutation for albinism is dominant AND each parent is heterozygous for that mutation, a child of this pair may inherit a normal (recessive) allele from each parent. Provided the other genes are normal, the pathway is able to be complete and the child will have normal pigmentation.									

Judgement Statement**Biology: Describe the role of DNA in relation to gene expression (90715)**

Achievement	Achievement with Merit	Achievement with Excellence
SIX questions answered correctly. Minimum of $6 \times A$	EIGHT questions answered correctly, including at least FOUR at Merit level. Minimum of $4 \times M + 4 \times A$	EIGHT questions answered correctly, including at least ONE at Excellence level and at least FOUR at Merit level. Minimum of $1 \times E + 4 \times M + 3 \times A$