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EXAM
PRACTICE**



HIGHER
BIOLOGY

Practice Questions & Exam Papers

**QUESTIONS
& PAPERS**

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Practice Questions

This Key Area index grid will guide you when looking for questions by question type or by Area of Study.

Course Areas		Multiple choice (1 mark)	Structured and extended response (ER) questions					Check
Area of Study	Key Area		Short answer (4 marks)	Data (8 marks)	Experimental (8 marks)	Mini ER (4–6 marks)	Full ER (7–10 marks)	
DNA and the genome	1.1	1–2	1	1	1	1	1	$\overline{102}$ <div></div>
	1.2	3–4	2			2		
	1.3	5–6	3					
	1.4	7–8	4				3	
	1.5	9–10	5					
	1.6	11–12	6					
	1.7	13–14	7					
	1.8	15–16	8					
	SSI	17–21						
Metabolism and survival	2.1	22–23	9	3	2	4	3	$\overline{95}$ <div></div>
	2.2	24–25	10				4	
	2.3	26–27	11					
	2.4	28–29	12			5		
	2.5	30–31	13					
	2.6	32–33	14					
	2.7	34–35	15					
	SSI	36–39				6		
Sustainability and interdependence	3.1	40–41	16	2	3	7	5	$\overline{103}$ <div></div>
	3.2	42–43	17				8	
	3.3	44–45	18					
	3.4	46–47	19			9		
	3.5	48–49	20					
	3.6	50–51	21					
	3.7	52–53	22					
	3.8	54–55	23					
	SSI	56–60						
Totals		60	92	24	24	45	55	300

Practice Exam A

This Key Area index grid will guide you when looking for questions by question type or by Area of Study.

Course Areas		Paper 1	Paper 2					Check
Area of Study	Key Area	Multiple choice	Short answer	SSI Data	SSI Experimental	Mini extended response	Full extended response	
DNA and the genome	1.1	2, 3					18	<div>40</div> <div></div>
	1.2	1	5					
	1.3	5	1, 2					
	1.4							
	1.5	6						
	1.6	4	4					
	1.7	7	3					
	1.8	8						
Metabolism and survival	2.1	9, 10, 12			6			<div>40</div> <div></div>
	2.2	11	9					
	2.3	13	8					
	2.4	14						
	2.5		7					
	2.6		10					
	2.7	15, 16	11					
Sustainability and interdependence	3.1	17, 18, 23, 24	15	12		13		<div>40</div> <div></div>
	3.2	21						
	3.3	22, 25	14					
	3.4	19						
	3.5		16					
	3.6		17					
	3.7	20						
	3.8							
Total		25	67	9	7	4	8	120

Practice Exam B

This Key Area index grid will guide you when looking for questions by question type or by Area of Study.

Course Areas		Paper 1	Paper 2					Check
Area of Study	Key Area	Multiple Choice	Short Answer	SSI Data	SSI Experimental	Mini extended response	Full extended response	
DNA and the genome	1.1	1, 2		4		5		<div>40</div> <div></div>
	1.2		1					
	1.3		2					
	1.4	3, 5	3					
	1.5	4						
	1.6	6						
	1.7	9						
	1.8	7	6					
Metabolism and survival	2.1	8, 12			8			<div>42</div> <div></div>
	2.2	11	7					
	2.3	15						
	2.4		9					
	2.5	13	12					
	2.6	14	11					
	2.7	10	10					
Sustainability and interdependence	3.1	16, 17	14				16	<div>38</div> <div></div>
	3.2	18	15					
	3.3	20						
	3.4							
	3.5	22	13					
	3.6	21, 23						
	3.7	24						
	3.8	19, 25						
Total		25	68	6	8	4	9	120

Question type: Multiple-choice

»» HOW TO ANSWER

In your examination, Paper 1 consists entirely of multiple-choice questions. There are 25 questions for 1 mark each. Each question should take about 1.5 minutes and has only **one** correct answer. In practice, some questions might take a bit longer if there is a lot to read or if calculations or genetic crosses are involved. Others can be answered more quickly if they require straightforward recall. The time for these questions is taken up in reading and thinking – there is no writing, only a mark in a grid, although you may need to do some working. You should spend no more than 40 minutes on Paper 1 in your examination.

When tackling multiple-choice questions, read the question thoroughly and try to think of the answer without studying the options. Then look at the options:

- ▶ If your answer is there, that's the job done.
- ▶ If you are not certain of an answer, read through the question again and choose the option that seems the best fit.
- ▶ Or, you can try to eliminate options that you are sure are not correct, before making your choice.

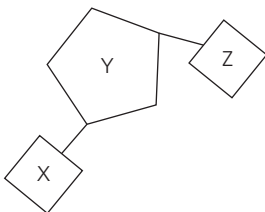
Try not to leave any question without an answer marked – complete the grid for each question as you work through.

For these multiple-choice practice questions, you may circle the letter corresponding to your chosen answer, or write your answers on a separate piece of paper.

Top Tip!

In your examination, any rough working for Paper 1 should be done on the additional space for answers and rough work, provided at the end of the supplied answer booklet.

- 1 The diagram represents the components of a single DNA nucleotide.



Which row in the table identifies these components?

	X	Y	Z
A	phosphate	sugar	base
B	base	sugar	phosphate
C	sugar	phosphate	base
D	sugar	base	phosphate

STUDENT MARGIN

Applying KU

Question type: Structured and extended response

Paper 2 of your examination is made up of structured and extended response questions for a total of 95 marks. Again, a mark should take about 1.5 minutes, but questions with lots of reading or thinking time or those with calculations or information to process will take longer, while some straightforward questions can be done more quickly.

In all cases you should pay careful attention to the mark allocation and the number of answer lines or space provided. Each individual mark is awarded separately, so if a question is worth 2 marks there will be two parts to the answer required. If several answer lines are provided, you will probably need to use them.

For the practice questions given here, you should write your answers on a separate piece of paper.

The structured questions are of different types: short answer, data handling and experimental, but these will be mixed together in the actual examination paper and there is some overlap.

There are two types of extended response question: mini extended response and full extended response.

Top Tip!

Remember, Paper 2 of your examination should take no more than 2 hours and 20 minutes.

»» HOW TO ANSWER

Short-answer questions

Most of the short-answer questions in your exam are focused on testing knowledge. They are often introduced by a short sentence about a Key Area and it is very common to have a labelled diagram presented here. There are likely to be 4–5 marks available for related answers. Very occasionally you may be given a choice of question.

Many of the questions will be at the demand level for Grade C, where you need to name, state or give answers or identify structures. These questions test your memory of the Key Areas (in other words, Demonstrating KU – demonstrating knowledge and understanding).

Some of the questions will be at the demand level for Grade A, which often ask for descriptions, explanations or suggestions.

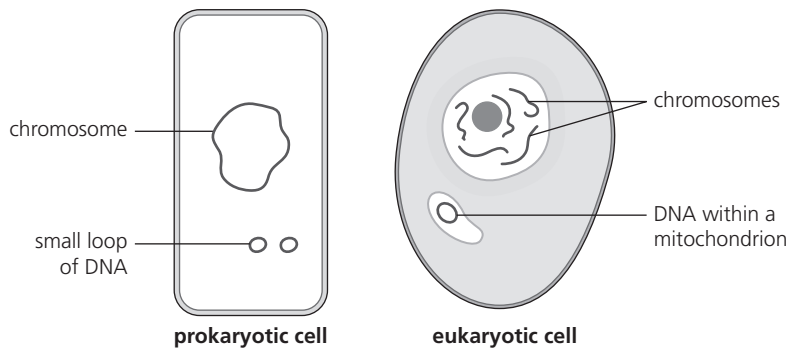
These questions are testing your understanding of Key Areas (that is, Applying KU – application of knowledge and understanding). There are also likely to be some Skills of Scientific Inquiry (SSI) marks mixed in with these questions.

Make sure that you revise your Key Areas thoroughly and systematically, and be aware that the words and terms sought in the answers are those which are given in the Course Specification for Higher Biology – this is crucial.

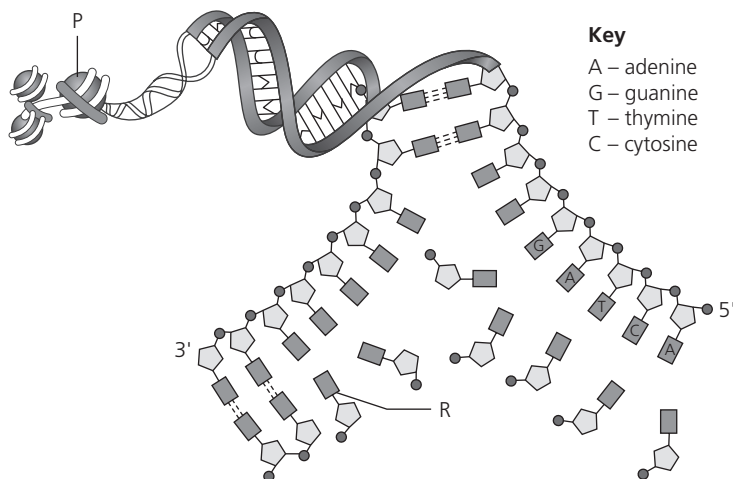
Top Tip!

- Questions that ask for descriptions, explanations or suggestions often are worth multiple marks, so remember to give a statement for each mark.
- 'Explain' questions will always require you to bring in correctly selected additional knowledge. There may be several acceptable answers to 'Suggest' questions.

- 1 DNA holds the genetic information in chromosomes in both prokaryotic and eukaryotic cells.
The diagram shows the simplified structure of a prokaryotic and eukaryotic cell.



- a Describe **two** differences between the organisation of DNA in prokaryotic and eukaryotic chromosomes.
b Name the small loop of DNA shown in the prokaryotic cell.
c Describe why yeast can be thought of as a special example of a eukaryote.
- 2 The diagram shows part of a DNA molecule and other molecules associated with it at a stage in replication in a eukaryotic cell.



- a Name molecule P, which is associated with the tightly coiled DNA.
b Name base R.
c i Describe how the diagram illustrates the antiparallel structure of DNA molecules.
ii The diagram shows synthesis of the leading strand of DNA.
Describe **one** difference between the replication of this strand and the other strand of the molecule.

MARKS

STUDENT MARGIN

2

Demonstrating KU

1

Applying KU

1

Demonstrating KU

1

Demonstrating KU

1

Applying KU

1

Applying KU

1

Applying KU

Paper 1

Total marks: 25

Attempt ALL questions.

The answer to each question is either A, B, C or D. Decide what your answer is, then circle the appropriate letter.

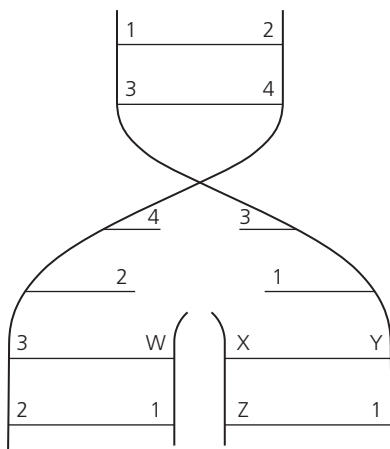
There is only one correct answer to each question.

Allow yourself 40 minutes for Paper 1.

STUDENT MARGIN

- 1 The diagram shows part of a DNA molecule during replication. The bases are represented by numbers and letters.

Base 1 represents adenine and base 3 represents guanine.



Which row in the table identifies bases W, X, Y and Z?

	W	X	Y	Z
A	cytosine	guanine	guanine	thymine
B	guanine	cytosine	cytosine	adenine
C	cytosine	guanine	cytosine	thymine
D	guanine	cytosine	guanine	adenine

- 2 The diagram represents part of the base sequence and direction of a strand of DNA. Which sequence and direction would be found on the complementary DNA strand?

5' - - GAATTCGAT - - 3'

- A 5' - - GAATTCGAT - - 3'
 B 5' - - CTTAAGCTA - - 3'
 C 3' - - CUUAAGCUA - - 5'
 D 3' - - CTTAAGCTA - - 5'
- 3 Which of the following structures would be found in **both** prokaryotic and eukaryotic cells?
- A ribosomes
 B mitochondria
 C chloroplasts
 D nuclei

Applying KU

Applying KU

Demonstrating KU

Paper 2

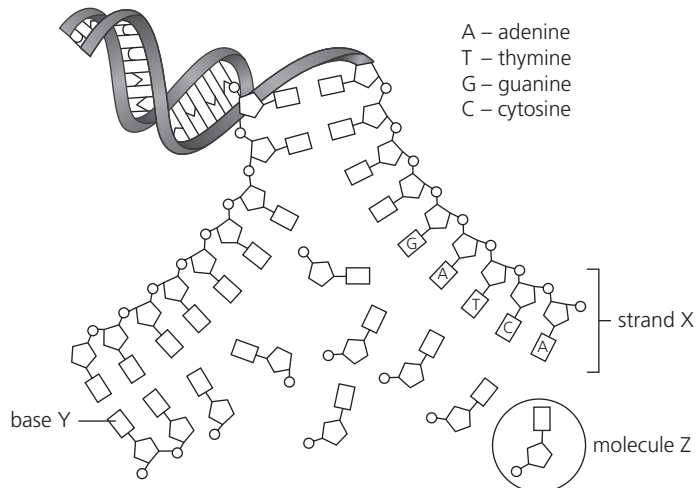
Total marks: 95

Attempt ALL questions.

Write your answers clearly in the spaces provided. If you need additional space for answers or rough work, please use separate pieces of paper.

Allow yourself 2 hours and 20 minutes for Paper 2.

- 1 a** The diagram shows a stage in the replication of a DNA molecule.



- i Identify the feature, shown in the diagram, which confirms that strand X is the lagging strand.

 - ii Name base Y.

 - iii Name molecule Z.

- b** The polymerase chain reaction (PCR) is a laboratory technique which uses thermal cycles to amplify DNA.
- i Give the temperature in a thermal cycle at which strands of DNA are separated from each other.
_____ °C
 - ii Calculate how many molecules of DNA would be produced after a single molecule of DNA went through five complete thermal cycles of PCR.
_____ molecules

MARKS

STUDENT MARGIN

1

Applying KU

1

Applying KU

1

Applying KU

1

Demonstrating KU

1

Applying KU

Paper 2

Question			Expected answer	Mark	Demand	Commentary with hints and tips
1	a		RNA is single-stranded AND DNA is double-stranded OR RNA is non-helical AND DNA is helical OR RNA has ribose AND DNA has deoxyribose OR RNA has uracil AND DNA has thymine (Any 2, 1 mark each)	2	CC	RNA molecules are differently shaped to DNA molecules and their nucleotides have different sugars; in RNA the base uracil replaces thymine as complementary to adenine. Remember, this question referred to structural differences but you could be asked about functional differences too, so make sure you know them!
	b		RNA polymerase adds complementary RNA nucleotides to form a primary RNA transcript = 1 Unwinds and unzips the double helix of DNA = 1	2	CA	Remember to refer to the complementary nucleotides as RNA nucleotides; remember that the enzyme also unwinds and unzips the DNA.
	c		Introns are removed from the primary transcript = 1 Exons are joined/spliced together to make mature mRNA = 1	2	CC	Introns are always removed; in alternative splicing some exons are treated as introns and removed to produce the mature mRNA. Remember – exons are expressed and introns interrupt the gene.
	d		Carries a complementary copy of the DNA code from the nucleus to the cytoplasm/ribosome	1	C	It's good practice to say that the copy is complementary and state where the copy is coming from and where it is going to.
2	a	i	C G U	1	C	Just have to remember to use Uracil not Thymine here.
		ii	Label at longer end of the RNA chain on the left of the diagram	1	C	The amino acid is bonded to the 3' end of the RNA chain which sticks out beyond the 5' end – you don't need this detail, only the place it bonds.
	b		An anticodon is a group of three bases on the tRNA (which relates to a specific amino acid) = 1 The anticodon aligns with/is complementary to a codon on mRNA to bring its specific amino acid into place (on the forming polypeptide) = 1	2	CA	Tricky to put into words but the key words are specific, complementary and aligns. Try to use all of these words in this sort of description.