ESSENTIAL

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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 handling (8 marks)	Experimental (8 marks)	Mini ER (3–5 marks)	Full ER (9 marks)	
1 Human cells	1.1	1–2	1	1	1	1	1	96
	1.2	3–4	2			2		
	1.3	5–6	3					
	1.4	7–8	4				2	
	1.5	9–10	5					
	1.6	11–12	6					
	1.7	13–14	7			3		
	1.8	15–16	8					
2 Physiology and health	2.1	17–18	9	2	2	4	3	96
	2.2	19–20	10					
	2.3	21–22	11					
	2.4	23–24	12				4	
	2.5	25–26	13					
	2.6	27–28	14			5		
	2.7	29–30	15			6		
	2.8	31–32	16					
3 Neurobiology and immunology	3.1	33–34	17	3	3	7	5	96
	3.2	35–36	18					
	3.3	37–38	19			8		
	3.4	39–40	20				6	
	3.5	41–42	21					
	3.6	43–44	22					
	3.7	45–46	23			9		
	3.8	47–48	24					
SSI		49–60						12
Totals		**60**	**96**	**24**	**24**	**42**	**54**	**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 handling	SSI Experimental	Mini extended response	Full extended response	
1 Human cells	1.1	3	1	5				$\frac{}{38}$ ☐
	1.2	1, 2, 5						
	1.3	4	2					
	1.4		3					
	1.5							
	1.6	6, 7, 8, 9	4					
	1.7		6					
	1.8							
2 Physiology and health	2.1	10				13		$\frac{}{40}$ ☐
	2.2		7					
	2.3	11, 17						
	2.4	18	8					
	2.5	12, 13						
	2.6	14	11, 12					
	2.7	15	10					
	2.8		9					
3 Neurology and immunology	3.1	19			15		19	$\frac{}{42}$ ☐
	3.2		16					
	3.3	21						
	3.4	20	14					
	3.5							
	3.6	22, 24	18					
	3.7	16, 23, 25						
	3.8		17					
Totals		**25**	**67**	**8**	**8**	**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 handling	SSI Experimental	Mini extended response	Full extended response	
1 Human cells	1.1	1, 2						
	1.2		1, 2					
	1.3	3, 4						
	1.4	6			4	3		$\frac{\quad}{37}$
	1.5	7						
	1.6	5						
	1.7		5					☐
	1.8	8, 9						
2 Physiology and health	2.1		6					
	2.2							
	2.3							
	2.4	15, 16		11			17	$\frac{\quad}{37}$
	2.5							
	2.6	10, 11	13					
	2.7	12						☐
	2.8	13, 14	7					
3 Neurology and immunology	3.1	21	9					
	3.2		8					
	3.3	18, 22						
	3.4	17	12, 14					$\frac{\quad}{46}$
	3.5							
	3.6	20, 23, 24	15					
	3.7	19	10					☐
	3.8	25	16					
Totals		**25**	**66**	**6**	**9**	**4**	**10**	**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.

Top Tip!

You should spend no more than 40 minutes on Paper 1 in your examination.

In practice, some questions might take a bit longer, for example if there is a lot to read or if calculations or other information processing are involved. Others can be answered more quickly if they involve 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 rough working.

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.

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.

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.

STUDENT MARGIN

1 There are two types of human stem cell.

1 embryonic stem cells

2 tissue (adult) stem cells

Which row in the table identifies the properties of embryonic and tissue stem cells?

	Properties of stem cell		
	Self-renewal	**Can differentiate**	**Are multipotent**
A	1 only	1 only	both 1 and 2
B	both 1 and 2	both 1 and 2	2 only
C	1 only	both 1 and 2	1 only
D	both 1 and 2	1 only	both 1 and 2

Demonstrating KU

2 Cellular differentiation occurs because

A cells express some of their genes but not others

B cells all have a different genetic composition

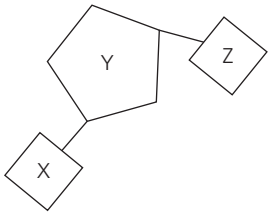
C different cells contain a different set of chromosomes

D different cells lack some genes.

Demonstrating KU

STUDENT MARGIN

3 The diagram represents the components of a single DNA nucleotide.

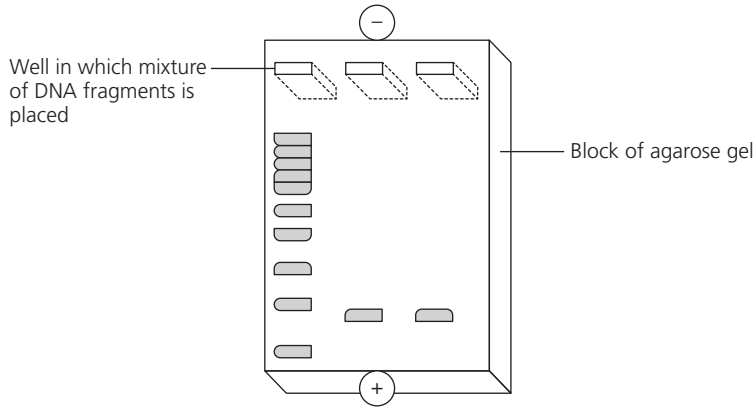


Which row in the table identifies the components in the diagram?

Applying KU

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

4 The diagram shows a technique that can be used to separate fragments of DNA to produce a profile.



This technique is

Applying KU

A electrophoresis, where fragments are separated according to their size and charge

B PCR, where fragments are separated according to their size and charge

C electrophoresis, where fragments are separated according to their solubility in agarose gel

D PCR, where fragments are separated according to their solubility in agarose gel.

5 The list shows steps in the synthesis of the protein insulin.

1 transcription of DNA

2 polypeptide chains fold

3 RNA splicing

4 translation of mRNA

Which of the following sequences shows the order in which these steps occur?

Demonstrating KU

A 1, 3, 4, 2

B 1, 4, 2, 3

C 3, 1, 2, 4

D 3, 4, 2, 1

HOW TO ANSWER

Mini extended response questions

There will usually be a maximum of two open-ended questions in Paper 2 of your examination paper, for which you will need to give extended responses. There could be a choice of question, but not always.

Each question will be short but several answer lines will be given, which will be a good clue to the answer length. You will need several sentences for a full answer in each case, and there will be 3–5 marks available for each question. Each mark is awarded separately, so the mark allocation gives a clue to the expected answer length too.

Top Tip!

Read the question very carefully. If there is a choice, be clear about which you are selecting.

Top Tip!

'Give an account of' means the same as 'describe'.

The questions test the understanding of related knowledge, so you could be asked to describe a process or to compare structures or processes. If you are asked to describe a process, remember to be logical, starting from the beginning of the process and working through in steps. If you are asked to compare two processes or structures, ensure that you describe both of them in full.

		MARKS	STUDENT MARGIN
1	Compare embryonic and tissue stem cells.	**5**	Demonstrating KU
2	Describe the main steps in the polymerase chain reaction (PCR).	**4**	Demonstrating KU
3	Give an account of lactate metabolism in muscle cells.	**5**	Demonstrating KU
4	Explain the biological basis for the stimulation of ovulation by ovulatory drugs.	**5**	Demonstrating KU
5	Describe the antagonistic action of the autonomic nervous system in the control of the cardiac cycle.	**4**	Demonstrating KU
6	Describe the process of atherosclerosis and its effect on arteries and blood pressure.	**5**	Demonstrating KU
7	Give an account of the structure and function of neural pathways.	**4**	Demonstrating KU
8	Give an account of long-term memory.	**5**	Demonstrating KU
9	Give an account of vaccination.	**5**	Demonstrating 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.

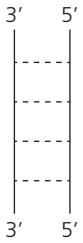
There is only one correct answer to each question.

Allow yourself 40 minutes for Paper 1.

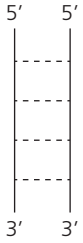
STUDENT MARGIN

1 Which of the following diagrams shows how strands of a DNA molecule are arranged?

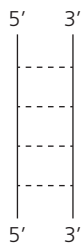
A



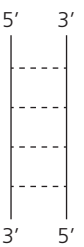
B



C



D



Applying KU

2 If 10% of the bases in a molecule of DNA are cytosine, what is the ratio of cytosine to thymine in the same molecule?

A 1 : 1
B 1 : 2
C 1 : 3
D 1 : 4

Applying KU

3 Which pathway describes the production of haploid gametes from diploid germline cells?

A diploid germline cell → mitosis → diploid germline cell → meiosis → haploid gamete
B diploid germline cell → mitosis → diploid germline cell → mitosis → haploid gamete
C diploid germline cell → meiosis → diploid germline cell → meiosis → haploid gamete
D diploid germline cell → meiosis → diploid germline cell → mitosis → haploid gamete

Demonstrating KU

Paper 2

Total marks: 95

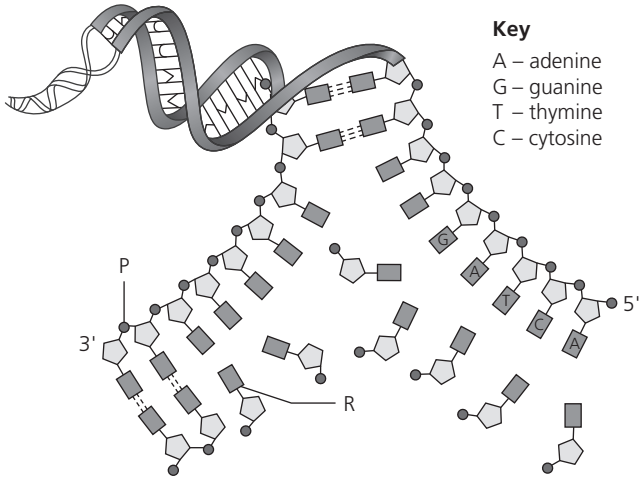
Attempt ALL questions.

Question 17 contains a choice.

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 The diagram shows part of a DNA molecule at a stage in replication.



		MARKS	STUDENT MARGIN
a	Name molecule P, which forms parts of the backbone of a DNA strand.	**1**	Applying KU
b	Name base R.	**1**	Applying KU
c	Describe how the diagram illustrates the antiparallel structure of DNA molecules.	**1**	Applying KU
d	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.	**1**	Demonstrating KU

Question			Expected answer	Marks	Demand	Commentary with hints and tips
2	a		Transcription	1	C	The name given to the copying of DNA sequences to make a primary transcript.
	b		A triplet is a sequence of three nucleotides/bases **AND** each triplet encodes a specific amino acid	1	A	Triplets of bases on DNA and mRNA are called codons. Each triplet/codon codes for a specific amino acid.
	c		RNA polymerase	1	C	Make sure you mention which polymerase is involved – no marks will be awarded for polymerase alone.
	d		(Splice site mutations) can result in introns being left in the primary transcript **OR** exons being left out of the primary transcript	1	C	Mutation at a point where coding and non-coding regions meet in a section of DNA. A single gene mutation at a splice site could result in an intron being left in the mature mRNA and so contributing to protein structure.
3	a		Missense = **1** Protein/polypeptide formed is shorter/contains fewer amino acids than it should = **1**	2	CC	Remember: • **m**issense = **m**istake in a single amino acid • **n**onsense = **n**o further translation, i.e. a new stop codon.
	b	i	A part of a chromosome is removed **AND** becomes attached to another non-homologous chromosome	1	A	Make the names and definitions of the chromosome mutations into flashcards to help you learn and remember them.
		ii	Deletion **OR** Duplication **OR** Inversion	1	C	Remember that duplication occurs when a piece of chromosome becomes attached to its homologous partner.
4	a		Q = **1** P = **1**	2	CC	'Before and after' shows substrate molecule P broken into products S and T. Inhibitor Q acts as a non-competitive inhibitor, attaches to a site on the enzyme other than the active site, changing the shape of the active site.
	b		Non-competitive = **1** Inhibitor molecule binds to the enzyme molecule **AND** changes the shape of the active site = **1**	2	CA	Enzyme inhibition by a substance that binds away from the active site but permanently alters the active site of the enzyme.
5	a	i	3.0 mM per litre	1	A	Take care with these double *y*-axis graphs. Use a ruler to intersect the correct plot and then make sure you read the value from the correct axis.