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A LEVEL

BIOLOGY B

H422

For first teaching in 2015

Exam hints for students

Version 1

www.ocr.org.uk/science

Exam hints for students

General

Answer : ~~1008~~ -504

Cross out answers if you need to change them. Trying to correct an answer by writing over it can make it unclear.

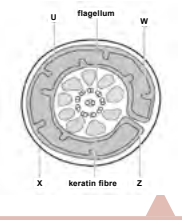
1. ~~~~~~~~~~~~~~~~~~~~

(iii) ~~~~~~~~? ↑

Data may be presented at the start of the question and not repeated in each subsequent part.

Calculate the speed of rotation of the drum and the absolute uncertainty in this value.

Underline key instructions when reading the question and refer back to them to ensure all of them have been addressed.



?

Practice is required in applying knowledge to unusual contexts. Weird diagrams can still be stuff you know!

using figure 18, calculate the area under the curve

Candidates should refer to figures provided in the question if the question asks them to.

Chimpanzees have a shorter thumb relative to humans. ✓

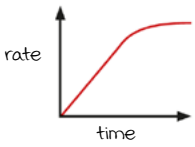
Comparative statements should be unambiguous.

mitosis vs. meiosis

glycogen vs. glucagon

transcription vs. translation

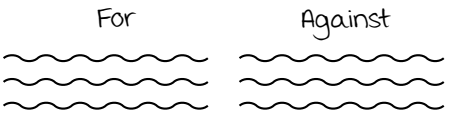
When technical terms are similar candidates should ensure they're answering about the right one!



the rate increases steadily ✗

in the first minute, the rate increases steadily ✓

When explaining the shape of graphs, be clear which part of the graph you are referring to.



You should always aim to give a balanced discussion in ethical based questions.

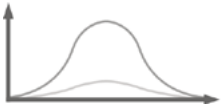
Animal A has smaller legs than animal B ✗

Animal A has shorter legs than animal B ✓

When describing differences, the language used must be precise and use comparative terms such as 'more' or 'less'.

NO_2^- ✗ NO_3^- ✓

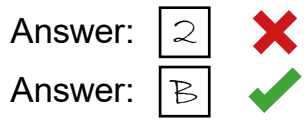
If formulae are used instead of naming ions then they must be correct to gain credit.



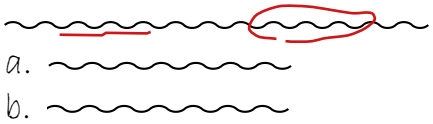
Compare the changes in the graph

When asked to compare, describe or evaluate make sure you quote relevant data, including units.

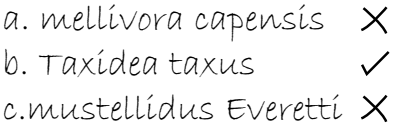
MCQ



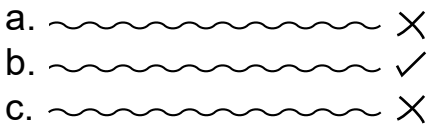
Some candidates used numbers for multiple choice questions. They should use only letters A-D.



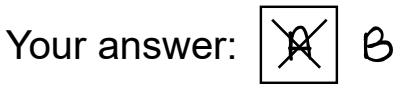
Underlining or circling key information in MCQs is sensible, as is jotting down ideas and equations.



Considering which answers to multiple choice questions are impossible is a good approach.



For MCQs, if you don't know the answer try eliminating options by annotating. Don't leave MCQ answers blank!

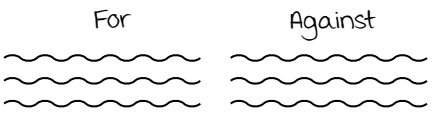


If changing the answer for an MCQ, completely cross out the wrong letter and write the correct one anew.

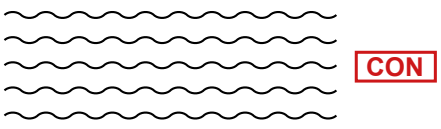
Level of response

TLC separates substances by relative adsorption with the stationary phase.

Using key terms correctly is likely to be helpful, if not essential, in Level of Response question answers.



When discussing whether evidence supports a claim, ensure both sides of an argument are considered.



Longer answers don't always lead to more marks. If correct responses are contradicted, marks can be lost.

Maths

$R_f = 2.0 \div 5.0$

Answer: 4.0 ✓ ECF

Show clear working for calculations. Error carried forward may mean a response still gains marks if a mistake is made.

0.34564524 ✓

0.346 ✗

It's always more accurate to round once, for the final answer, and work with unrounded values on the calculator.

mass = 125 g

time = 25 ms

2 s.f.

The 'appropriate number of significant figures' is the lowest number of significant figures provided in the data.

346

0.346

0.0346

3 significant figures

Make sure you give answers to the number of significant figures asked for after performing calculations.

100% increase = ×2

800% increase = ×9

A 100% increase means double, not equal. An 800% increase is nine times as much, not eight times.

Percentage of DNA bases that are different = 0.177%

Some candidates tried to convert small numbers into percentages when they were already percentages (albeit tiny ones).

No. of phospholipid molecules: 150,000 ✗

No. of phospholipid molecules: 150.5 ✓

Students need to consider whether their numerical answer is reasonable and realistic.

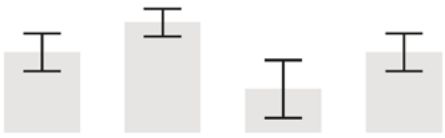
$mm^2\ s^{-1}$ ✓

mm^2/s ✓

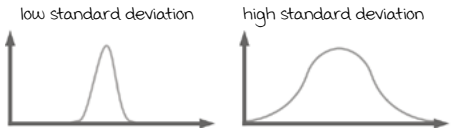
$mm^2\ sec^{-1}$ ✗

mm^2/s^{-1} ✗

Avoid combining two conventions such as a slash and '-1'. Correct abbreviations of units must be used.



Plotting standard deviations appears to be challenging. Some candidates drew additional bars with little understanding of requirements.



Standard deviation cannot tell us if a difference is significant.

Answer: 65000

Answer: 6.5×10^4

You need to be able to convert results between decimal form and standard form (e.g. a × 10n).

0.00	0.02	2.71	3.84
0.10	0.21	4.61	5.99
0.35	0.58	6.27	7.82

Ringing the value being used from a critical values table can sometimes be sufficient to be credited a mark.

probability ≠ chance

The word 'chance' in statistics refers to the random deviations from 'probability' that can occur.

$$\% \text{ uncertainty} = \frac{2 \times \text{absolute uncertainty}}{\text{quantity measured}} \times 100$$

The percentage uncertainty equation is one of the mathematical formulae students are expected to recall.

$$\% \text{ change} = \frac{\text{new value} - \text{original value}}{\text{original value}} \times 100$$

Percentage change is a formulae that students need to recall. A negative value indicates a % decrease.

1.1.1 Planning

The same amount of water should be used ✗

The same volume of water should be used ✓

The term 'amount' is vague. Where possible, more precise terms should be used instead.

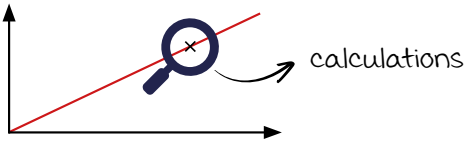
1.1.3 Analysis

0.00	0.02	2.71	3.84
0.10	0.21	4.61	5.99
0.35	0.58	6.27	7.82

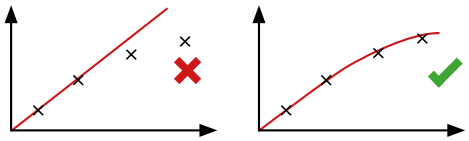
Candidates should comment on or analyse the data provided – not their assumptions about what it should be.

	Volume (cm^3)		
Time (mins)	Test 1	Test 2	Test 3
1	50.2	30.4	46.7
2	70.6	40.7	67.3

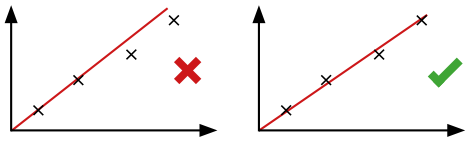
Anomalous results should only be excluded if there is a clear explanation for why they occured.



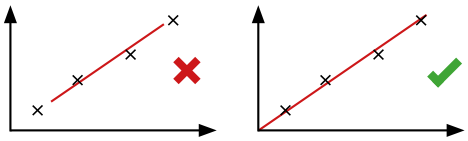
Read the scales on graphs carefully and check any reading is correct before using it in subsequent calculations.



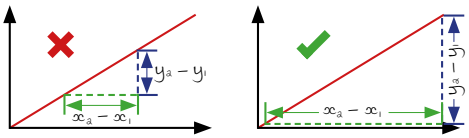
Lines of best fit can be straight or curved. They don't have to extend to the axes or origin if not appropriate.



When drawing graphs, lines of best fit should have a fair distribution of points above and below the line.



Lines of best fit must cover the full range of points. They don't need to extend to the axes or the origin if not appropriate.



Triangles for gradient calculation should be as large as possible – too small a triangle gives a larger error in the value.

1.1.4 Evaluation

Remember that precision is the closeness of agreement between different results. It is not the same as accuracy.

Accuracy is a measure of how close a result is to the true value.

What might have caused the incaccuracy in this result?

They might have misread the reading. ✖

Answers to practical questions that cite avoidable human error are unlikely to gain marks.

How would you improve the accuracy of the results obtained?

Changes to experiments that improve accuracy are those which reduce either systematic or random errors.

State three variables necessary for a **valid** comparison.

Validity is about controlling the variables around the collection of data so that is not affected by inconsistencies.

The data in the table shows that...

In questions which ask you to 'evaluate', make sure that you quote relevant data to support your answer.

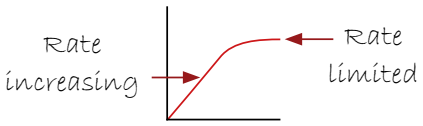
This shows the results are reliable ✖

This shows the results are repeatable ✔

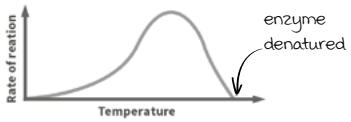
This shows the results are reproducible ✔

Use of the term 'reliability' is not encouraged. 'Repeatability', 'confidence' and 'reproducibility' are more appropriate.

2.1.3 Proteins and enzymes



A common misconception was that limiting factors slow the rate of reaction. Rather, rate plateaus and is prevented from increasing further.



Enzymes do not denature at low temperature. They have lower kinetic energy therefore there is lower activity.

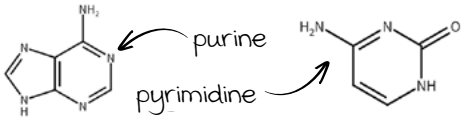
2.1.4 Nucleic acids

Reverse transcriptase produces DNA ✗

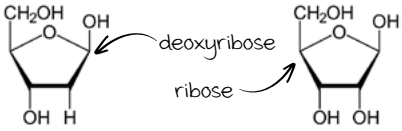
Reverse transcriptase produces cDNA ✓

Precise use of technical terms is important at this level.

Remember that DNA consists of a sequence of bases, not a sequence of amino acids.



Purines (A, G) have a double carbon ring structure while the pyrimidines (T, C, U) have a single.



Distinguishing between DNA and RNA structure seemed to be a challenge.

2.2.1 The heart and monitoring heart function

It is a common misconception that insects have a lower surface area to volume ratio than mammals.

2.2.2 Transport systems in mammals

veins are travelling closer to the skin ✖

veins are closer to the skin surface ✔

Avoid terms like veins are 'travelling', 'pushing' or 'moving' closer to the skin.

2.2.4 Transport systems in plants

Remember, the xylem is on the inside of each bundle and the phloem on the outside.

3.1.3 The development of species: evolution and classification

biodiversity levels ≠ areas of a habitat

biodiversity levels ≠ classification

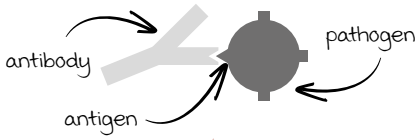
When referring to biodiversity at different levels this is habitat, species and genetic biodiversity.

Humans

Homo sapiens

The term 'species' doesn't refer to an individual organism. Using it in the wrong context could lose you marks.

3.2.2 The immune system



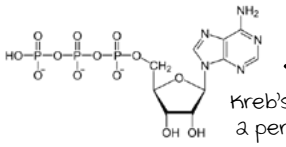
Antigen is a protein on the outside of a foreign organism. Antibody is the protein produced by the body's immune system.

4.1.1 Cellular respiration

breaking bonds makes energy ✗

breaking bonds releases energy ✓

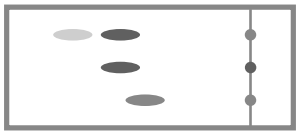
Energy cannot be created or destroyed, so any response that states that it can tends not to be credited in science examinations.



Kreb's cycle: 1 per cycle
2 per glucose molecule

Many were unclear how many ATP were generated in the Krebs cycle, and where in the cycle it would be made.

4.3 Photosynthesis, food production and populations



Few candidates could name a material used as the stationary phase in thin layer chromatography.

5.1.1 Patterns of inheritance

genes ≠ alleles genetic diversity ≠ biodiversity

resistance ≠ immunity species ≠ variety

A number of terms relating to genetics were confused with each other. Make sure you're clear on their meanings.

χ^2 ?

Candidates should understand where the expected values for chi-squared come from.

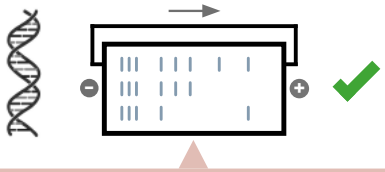
5.1.2 Population genetics and epigenetics

Allele frequency is the fraction of all chromosomes within a population that carry that allele.

The term 'allele frequency' does not mean the same thing as a change in the number of alleles in a population.

The idea that antibiotic resistance is an example of genetic drift was a common misconception.

5.1.3 Gene technologies



There was confusion between anode and cathode in DNA electrophoresis, as well as which way the DNA moved.

5.2.1 The nervous system and the identification and consequences of damage

An action potential signals to the brain

An action potential is transmitted to the brain

Avoids terms like 'signals' and 'messages' to refer to action potentials. Instead, use 'transmitted' or 'propogated'.

5.3.1 The principles and importance of homeostasis

Vasoconstriction prevents heat loss ✗

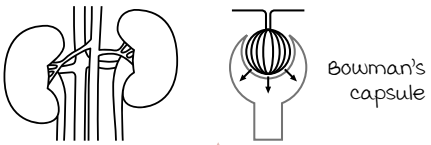
Vasoconstriction reduces heat loss ✓

Vasoconstriction does not happen in the capillaries and doesn't prevent heat loss – it only reduces it.

5.3.3 Kidney functions and malfunctions

Podocytes are usually unable to undergo mitosis as they have lost the necessary organelles ✗

It was a common misconception that podocytes could not undergo mitosis as they no longer had a nucleus or organelles.



In the kidneys, ultrafiltration occurs at the Bowman's capsule and nowhere else in the kidney tubule.

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