

Exam Booster Separate Science

State

Name

Identify

Describe

Determine/calculate

Design/Plan an investigation

Explain

Justify

Compare

Evaluate

Here is a list of the **most** common command words used in Science papers. Use the following slides to improve your understanding of these words, which will be found at the beginning of each question. This will help to ensure that you gain the maximum marks possible.

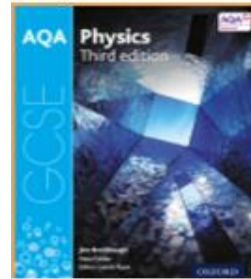
Biology



Chemistry



Physics



Describe

Read the content given, highlighting or underlining key points

Describe data/graph trends:

- Find a pattern in the data

*“As x increases/decreases y.....
..until point A”*

- *Make sure you describe everything – if the graph increases slowly and then increases more quickly tell them this!*

Describe a process:

- Think of the keywords for this topic
- Write a full sentence

“I would..... by.....”

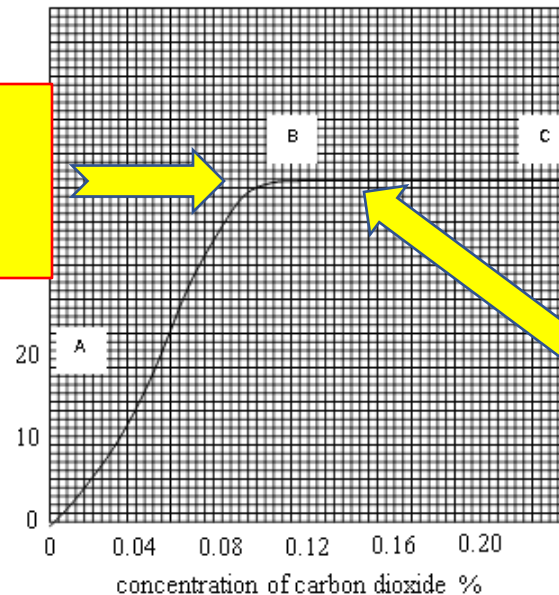
*You can do this question without knowing any **SCIENCE!***



Describe (example)

Describe the effect of CO₂ concentration on the rate of photosynthesis. (2)

Rate of photosynthesis increases from 0 to 0.1% carbon dioxide.



... After 0.1% there is no further increase in the rate of photosynthesis.

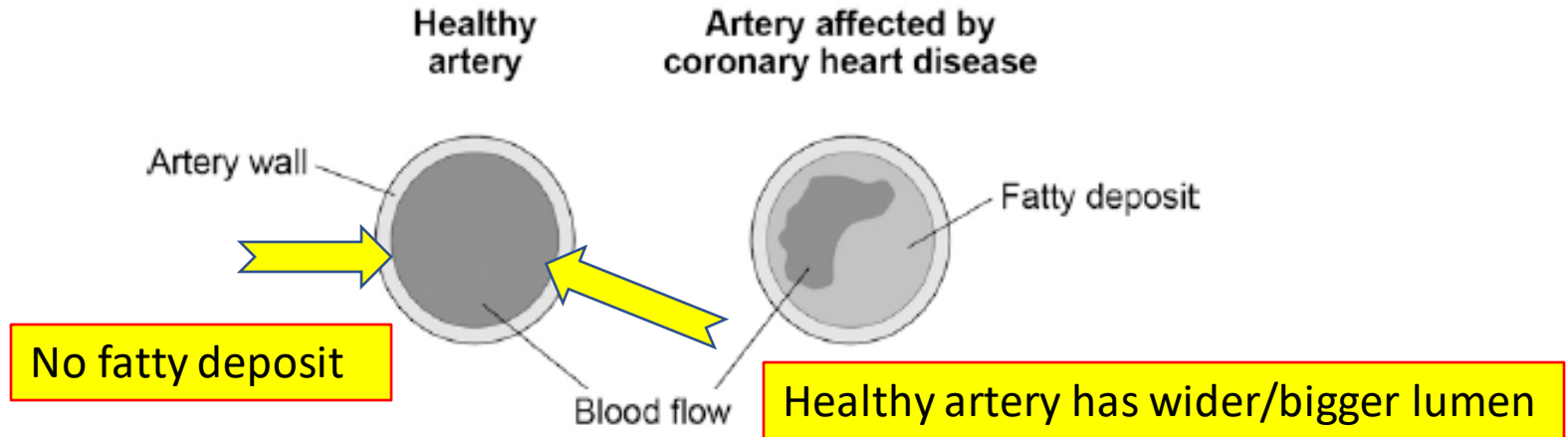


Describe (example 2)

The coronary arteries supply blood to the heart.

Figure 2 shows two coronary arteries.

Figure 2



Describe **two** ways the healthy artery is different from the artery affected by coronary heart disease.



Explain

Read the content given, highlighting or underlining key points

Start by describing your data/graph:

- Find a pattern in the data
“As x increases/decreases y.....
..until point A”
- *Make sure you describe everything – if the graph increases slowly and then increases more quickly tell them this!*

Check for your connectives:

The rate increased with temperature
BECAUSE.....

When running a person needs to respire more SO...

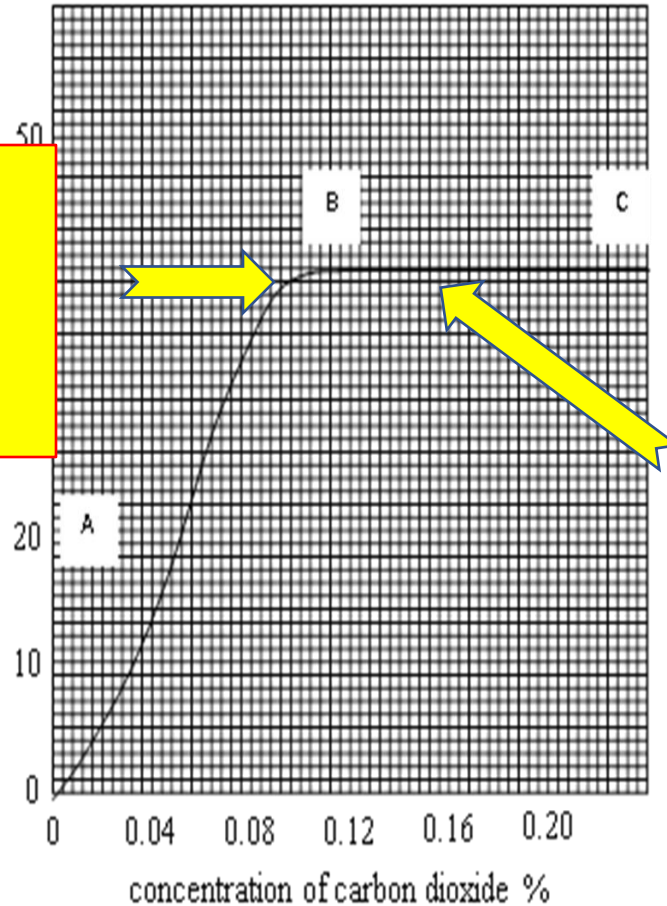
- *Work out the science topic the question is on – write out all the relevant **KEYWORDS***
- *For each description you now need to explain WHY it happens e.g. why does rate increase with temperature
– this is adding in your **SCIENCE!***
- *Check your answer for **keywords**.*



Explain (example)

Explain the effect of CO₂ conc. on the rate of photosynthesis. (3)

Rate of photosynthesis increases from 0 to 0.1% carbon dioxide **because** carbon dioxide is one of the reactants for photosynthesis.



After 0.1% there is no further increase in the rate of photosynthesis **because** other limiting factors are involved e.g. light, temperature.

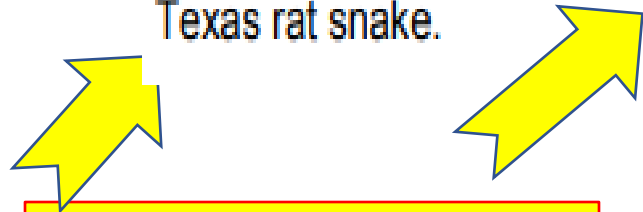


Explain (example 2)

The different types of rat snake have evolved from similar ancestors.

The rat snakes have evolved to suit their environments.

Explain how the Japanese rat **snake** evolved to be different from the Texas rat snake.



Highlight keywords in question.

Identify keywords associated with question – evolve:
Variation/mutation, natural selection, genes, offspring



Design/Plan

1. Know what you want to find out – write a prediction
(Prediction – what do you think will happen & why?)
2. Identify your variables for the practical
 - Independent variable – what are you changing?
 - Dependent variable – what are you measuring?
 - Control variable – what you need to keep the same?
3. List your equipment
4. Write a step by step method of how you will carry out the practical
Make sure you discuss your variables - how you will control or change them
5. Think about what data you will collect and what you can do with it afterwards
 - Can you draw a graph? - What type?
 - Do you need to do any calculations?
6. Identify what the hazards and risks are for this practical



Calculate

- Read through the whole question.
- Underline any quantities and data.
- Identify what you are trying to find out.
- Identify what you already know.
- State the equation that links all of the quantities
- Convert any data into the correct units eg KJ into J
- Substitute the numbers into the equation.
- Rearrange the equation.
- Calculate the answer
- Round the answer to the same number of significant figs as the question.
- Give units to the answer
- Make sure the units are uppercase not lower case eg N instead of n. J instead of j.

A scientist observed a cell using an electron microscope.

The size of the image was **25 mm**.

The magnification was **× 100 000**

Calculate the **real size** of the cell.

Use the equation:

magnification = image size/real size

Give your answer in micrometres.

$$100\,000 = 25 / \text{real size}$$

$$25 / 100\,000 = \text{real size}$$

$$\text{Real size} = 0.00025\text{mm}$$

$$0.00025 = 0.25\mu\text{m}$$



Multistep calculations (H tier)

When a gun is fired, a very large force acts on the bullet for a very short time.

The change in momentum of the bullet is given by the following relationship:

force (N) \times time(s) = change in momentum (kg m/s)

(a) An average force of **4000 newton** acts for **0.01 seconds** on a bullet of **mass 50g**.

Calculate the speed of the bullet. (*Show your working.*)

$$50\text{g} = 0.05\text{kg}$$

$$4000 \times 0.01 = \text{change in momentum}$$

$$40 = \text{change in momentum}$$

$$\text{Change in momentum} = \text{mass} \times \text{velocity}$$

$$40 = 0.05 \times \text{velocity}$$

$$40 / 0.05 = \text{velocity}$$

$$\text{Velocity} = 800$$

$$= 800 \text{ m/s}$$

Converting units from g to kg

Substitution

Stating the equation

Substitution

Rearranging

Units



Justify

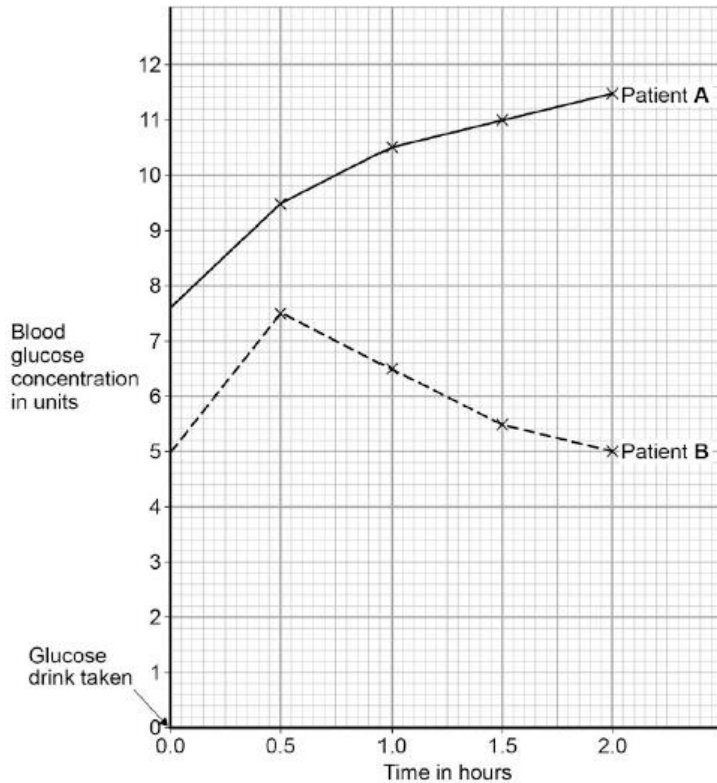
Exam board definition: Use evidence from the information supplied to support an answer.

YOU MUST:

1. Read the content given, highlighting or underlining key points.
2. If a table of results, graph or picture is given ensure you know what it is telling you (check your table headings or graph axes)
3. Give an answer to the question.
4. Use the information given to back up what you are saying.



Justify



The diagram below shows the results of a glucose tolerance test for two patients, **A** and **B**.

Which patient has diabetes? Justify your answer.

Example answer:

Patient A has diabetes. Their glucose levels are much higher than patient B. Also, patient A's glucose level stays high and doesn't go back to normal.



Justify

	Glass milk bottle	Plastic milk bottle
Raw materials	Sand, limestone, salt	Crude oil
Bottle material	Soda-lime glass	HD poly(ethene)
Initial stage in production of bottle material	Limestone and salt used to produce sodium carbonate.	Production of naphtha fraction.
Maximum temperature in production process	1600 °C	850 °C
Number of times bottle can be used for milk	25	1
Size(s) of bottle	0.5 dm ³	0.5 dm ³ , 1 dm ³ , 2 dm ³ , 3 dm ³
Percentage (%) of recycled material used in new bottles	50 %	10 %

The table below gives information about milk bottles.

Which material would be best for making milk bottles?

Use the information given and your knowledge and understanding to justify your choice of material for milk bottles.

Example answer:

I think glass should be used to make milk bottles. This is because the raw materials, sand limestone and salt are easily available and not limited. Also, glass can be used 25 times to contain milk which is more than a plastic milk bottle. Finally, the percentage of recycled material used in milk bottles is much higher than in plastic bottles.



Compare

State and describe the both the **SIMILARITIES** and **DIFFERENCES** between 2 or more things, not just how they are similar or different.

Additional strategies include use of subheadings to break up your answer. If you're comparing, stick to "similarities" and "differences".

You could,, put your ideas into a table or diagram with annotations.

You must use the information given, but adding a little information of your own is usually required to access the higher mark



Compare: Worked Example

Q1. The pie chart below shows the composition of the atmosphere on the planet Mars.

Simple repeat of the information, Band 1 style answer

Interpretation of the information given, Band 2 style response

Use recalled information in your comparison. Band 3 answer.

Compare the atmosphere of Mars with the Earth's current atmosphere.

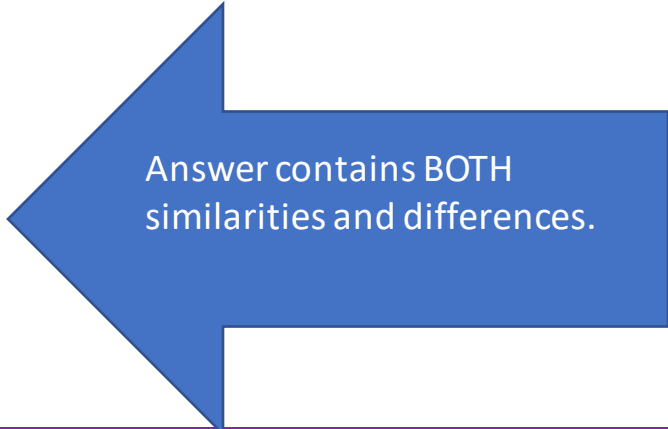
Similarities.

Both Earth and Mars have carbon dioxide, oxygen, water and nitrogen in the atmosphere.

The concentration of Argon is below 2% on both planets.

Differences.

The Earth's atmosphere is mainly nitrogen at 78%, Mars' is 95% carbon dioxide. Mars is less than 5% oxygen, the Earth is 21%.

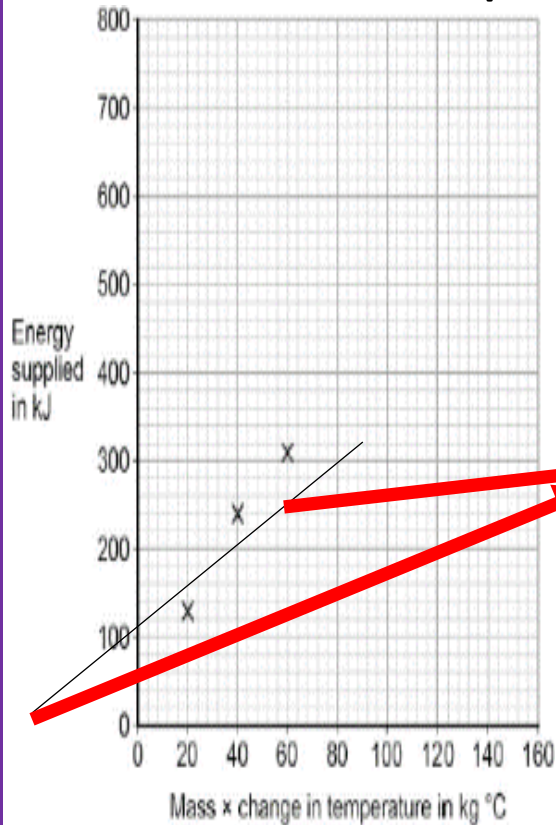


Answer contains BOTH similarities and differences.



Determine

- Use given data or information to obtain and answer the question.



Use the graph to **determine** the mean value of the specific heat capacity of water, for the student's investigation.

The specific heat capacity can be found by the gradient of the graph

Change in y axis = 400kJ - 80kJ = 320KJ

Change in x axis = 80 - 0 = 80 kg °C

Gradient = 320/80 = 4KJ/kg °C

Data has been extracted from the graph which has been given to the student

The data taken from the graph has then been used to **Calculate** an answer.



Evaluate

- In an **evaluate** question, the examiner is looking for you to use information given in the question, along with your own knowledge, to provide evidence for and against. The question may also ask for your view point or for you to say if XXX should or should not be allowed to take place.

When approaching an evaluate question, use the following sentence starters:

I believe that XXX should/should not take place. – you may not need to use this part.

The advantages of XXX are....

In contrast, the disadvantages of XXX are....

Always look at the marks allocated and make half the points

advantages/for arguments and half disadvantages/against arguments.

EXAM QUESTION

A hormone called mifepristone is used in low doses as a female contraceptive. Higher doses can be used to induce an abortion. As a consequence mifepristone is often referred to as 'the morning-after pill'. The use of mifepristone is currently tightly controlled by the medical profession.

Evaluate the **benefits** and **problems** which might arise from making this hormone more freely available (4)

2 points made for (benefits) and 2 against (problems)

The benefits of making this hormones freely available are that it prevents an unwanted pregnancy, particularly if the mother's health is at risk. It would also be beneficial to use this hormone to prevent pregnancy, for example in difficult circumstances such as rape where a woman has not consented to sex and therefore the resulting pregnancy. In contrast, a problem that arises from this hormone being more freely available is that it involves the 'killing' of a foetus rather than it preventing gametes (sperm and egg) from meeting. Additionally, it may lead to people having irresponsible attitudes towards sexual behaviour and people may rely on this as a form of contraception rather than it being used in a genuine 'emergency'.



Top Tips

- Take the time to learn what exam command words are asking you to do
- Read the question carefully – underline the command word and any relevant information given in the question
- Always pay attention to how many marks a question is worth.
- Think about extended writing questions before you start writing. Use bullet points, however clearly structure your answer.
- Have you drawn the correct line of best fit – this can be a curve
- Check your calculations. Did you convert to the correct units? Have you included units in your answer?
- Never leave a question unanswered especially a multiple choice question.

