

# **IB STUDENTS**

## **Command Terms in IB Biology**

All IB Biology **questions** and **assessment statements** are built around these **command terms**, which let you know exactly what is expected of you.

All definitions of command terms are taken from the **IB Biology Subject Guide**:

<http://xmltwo.ibo.org/publications/migrated/production-app2.ibo.org/publication/7/part/1/chapter/7.html>



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Design      Annotate      Analyse      State      Comment  
Define      Explain      Discuss      Apply  
Distinguish      Derive      Label      Determine      Measure  
Compare      Describe      Construct      Outline      Deduce  
Solve      List      Evaluate      Sketch      Suggest      Draw  
Estimate      Show      Calculate      Identify  
Predict

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*They are grouped according to the **objectives of IB Biology**:*

**Objective 1:** Demonstrate an understanding of:

- scientific facts and concepts
- scientific methods and techniques
- scientific terminology
- methods of presenting scientific information

Define

Measure

Draw

Label

List

State

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**Objective 2:** Apply and Use:

- scientific facts and concepts
- scientific methods and techniques
- scientific terminology to communicate effectively
- appropriate methods of presenting scientific information

Distinguish

Describe

Identify

Calculate

Outline

Estimate

Apply

Annotate

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Distinguish      Describe      Identify  
Calculate      Outline      Estimate  
Apply      Annotate

**Objective 3:** Construct, Analyse and Evaluate:

- hypotheses, research questions and predictions
- scientific methods and techniques
- scientific explanations

Suggest      Predict      Analyse      Discuss  
Sketch      Deduce      Show  
Construct      Comment      Explain      Solve      Design  
Determine      Compare      Evaluate      Derive

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# General Revision and Learning Tips

**Read** the **questions** and **assessment statements** carefully

**Learn** and **review** all of the **command terms**

**Highlight** the **command terms** - in the **syllabus/ handbook**

**Underline** the **command terms** - in the **Exam**

**Understand** what the **question wants:**

- *outline, explain and describe* are not the same!
- *label and annotate* are not the same!
- *discuss, evaluate and explain* are not the same!
- *distinguish and compare* are not the same!
- *analyse, evaluate and suggest* are not the same!

**Present** your **answers neatly** and **clearly**

# Using this presentation

## **You can use this presentation as a tool for:**

- Learning the command terms
- Picking up some examination tips
- Testing your understanding of exam question types

## **Suggestions:**

- Use the sample questions as a revision test:
  - try to answer each question on scrap paper before showing the answer key
- Make up a collection of questions for each command term:
  - use past papers, the syllabus and the QuestionBank CD Rom.



# Define

*"Give the precise meaning of a word, phrase or physical quantity."*

Example:

**Define** *diffusion and osmosis.*"

## Tips:

- *Definitions are in the subject guide*
- *Break the definition into its component parts – this will help with explanations*
- *Make up a vocab list or use an online glossary to help with define questions*

# Define

*"Give the precise meaning of a word, phrase or physical quantity."*

Example:

**Define** *diffusion and osmosis.*

*Diffusion* is the passive movement of particles from regions of high concentration to lower concentration.

*Osmosis* is the passive movement of water molecules, across a partially (selectively) permeable membrane, from a region of lower solute concentration to a region of higher solute concentration.

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# Draw

*"Represent by means of pencil lines."*

Example:

“**Draw** a **labeled** graph showing a typical sigmoidal population growth curve .”

## Tips:

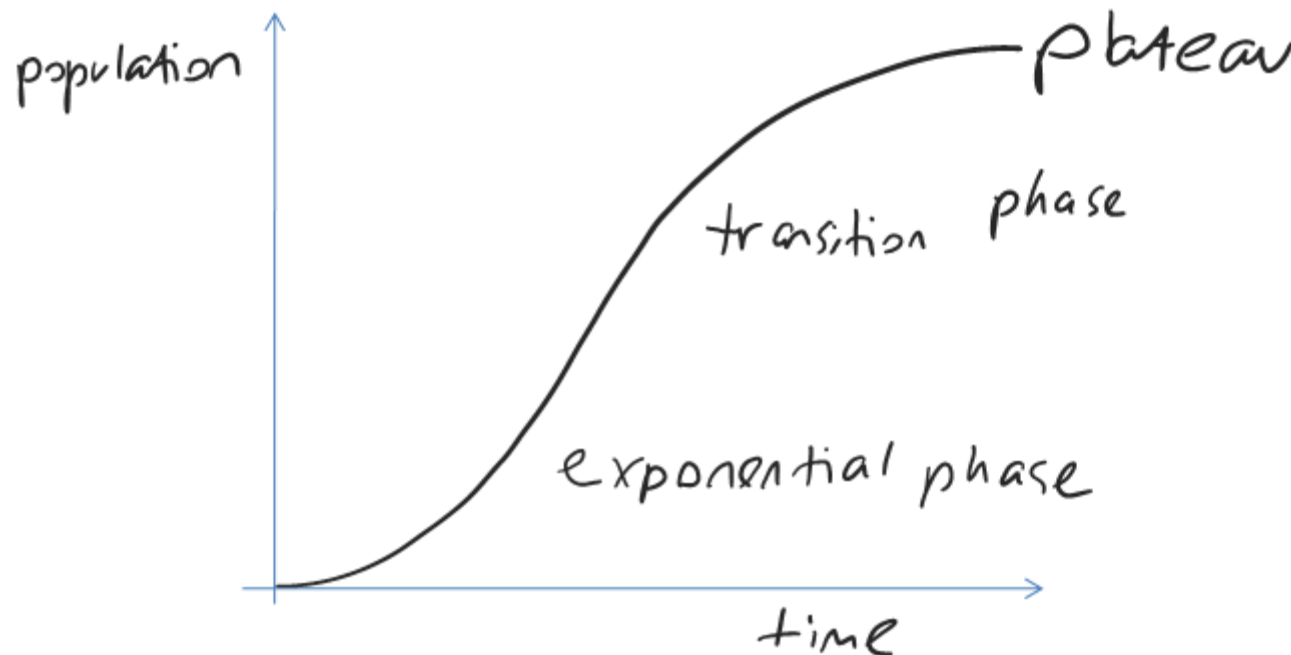
- *Draw using clear, dark pencil lines (no colours)*
- *Pay attention to whether it needs to be labeled or annotated*
- *Make up drawings, graphs and diagrams revision book, and test each other*

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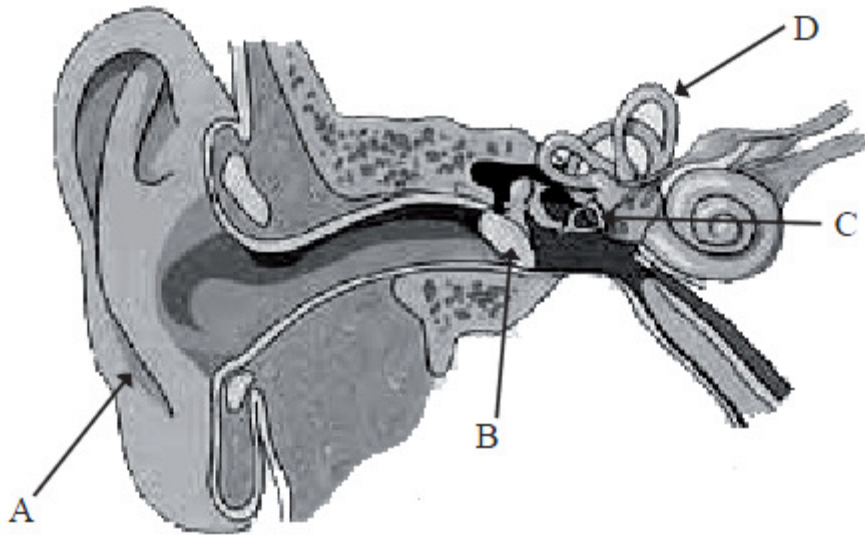
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# Label

"Add labels to a diagram."

Example:

"**Label** the structures of the human ear."



[Source: [www.msjensen.gen.umn.edu/webanatomy\\_archive/wa\\_nervous/wa\\_ear\\_1.html](http://www.msjensen.gen.umn.edu/webanatomy_archive/wa_nervous/wa_ear_1.html)]

## Tips:

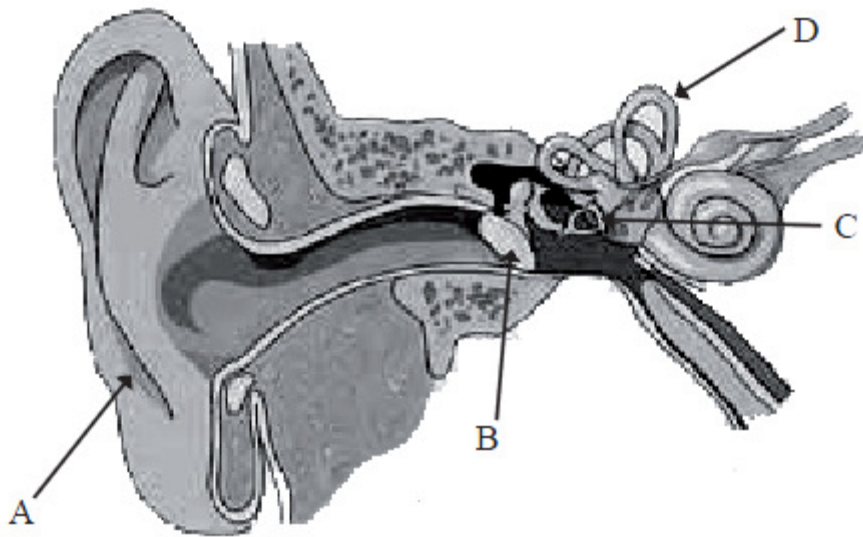
- Generally, two correct labels are worth one mark
- Make up drawings, graphs and diagrams revision book, and test each other
- Revise and make links with regard to structures and their functions

# Label

"Add labels to a diagram."

Example:

"**Label** the structures of the human ear."



A = pinna

B = eardrum

C = stapes/ bones of middle ear

D = semicircular canals

[Source: [www.msjsen.gen.umn.edu/webanatomy\\_archive/wa\\_nervous/wa\\_ear\\_1.html](http://www.msjsen.gen.umn.edu/webanatomy_archive/wa_nervous/wa_ear_1.html)]

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# List

*"Give a sequence of names or other brief answers with no explanation."*

Example:

**List** seven levels in the hierarchy of taxa”

**List** two examples of fibrous proteins”

## Tips:

- *Lists can be used to present examples of any of the assessment statements*
- *Use mnemonics for memory where the order of the list is important*
- *Try to use examples that can link topics together, across the course*

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*Keratin, collagen*

## Tips:

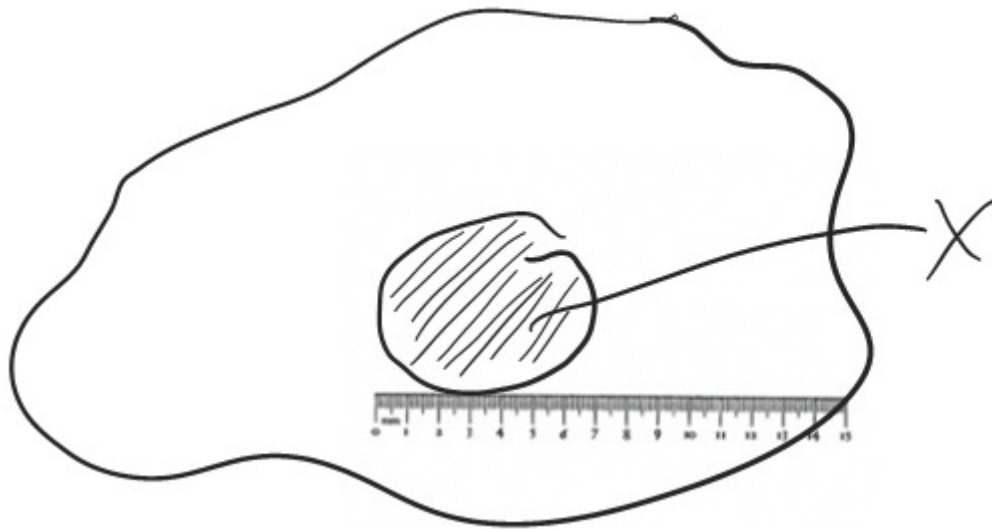
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# Measure

*"Find a value for a quantity."*

Example:

**Measure** the length of organelle x."



## Tips:

- *Bring a ruler to the exam !*
- *Generally, you'll need to calculate from a measurement, rather than measure directly*
- *Present all answers in metric, SI units*

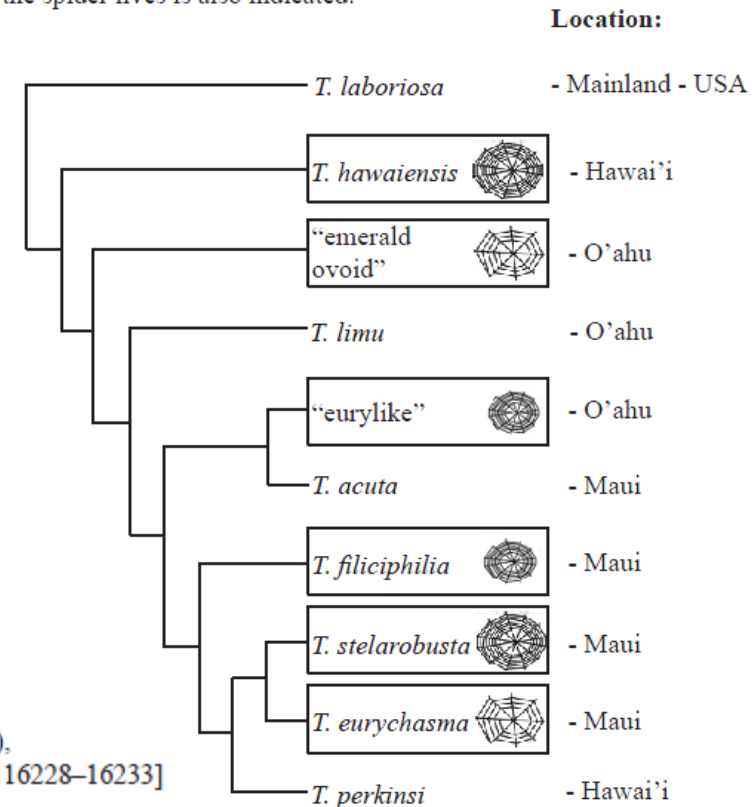
# State

"Give a specific name, value or other brief answer without an explanation or calculation."

### Example:

"**State** which species is most distantly related to *T. perkinsi* on the basis of the tree diagram."

The tree diagram (cladogram) below shows how closely related a group of species of spiders are on the Hawaiian island group. Two of the species have not been given a scientific name. Three pairs of the spiders spin very similar webs. These are shown on the diagram. The island on which the spider lives is also indicated.



[Source: T A Blackledge and R G Gillespie (November 2004),  
*Proceedings of the National Academy of Sciences*, 101, (46), pages 16228–16233]

### Tips:

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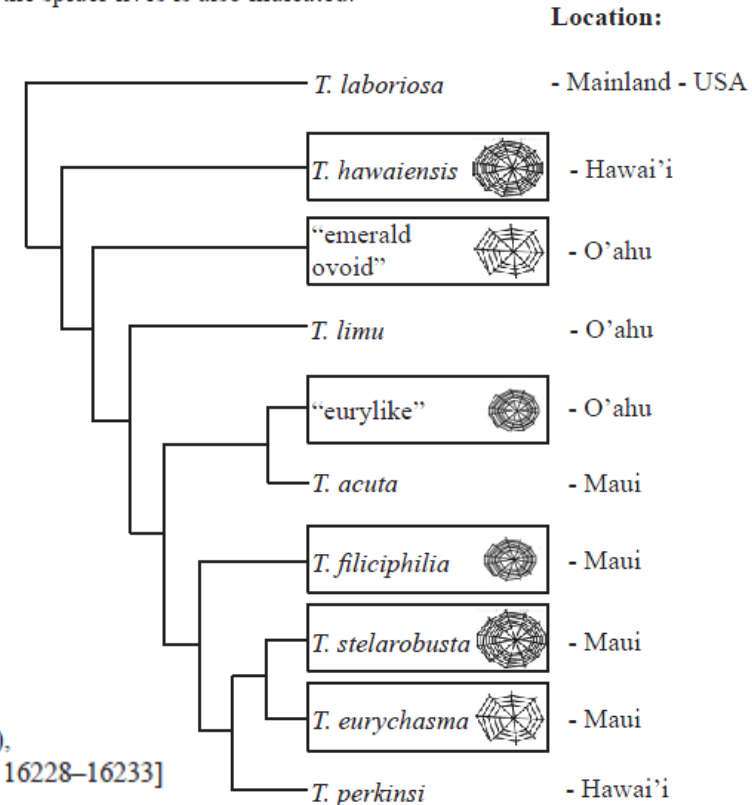
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*T. laboriosa*

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# Annotate

*"Add brief notes to a diagram or graph."*

Example:

“**Annotate** a graph showing hormone levels in the menstrual cycle.”

## Tips:

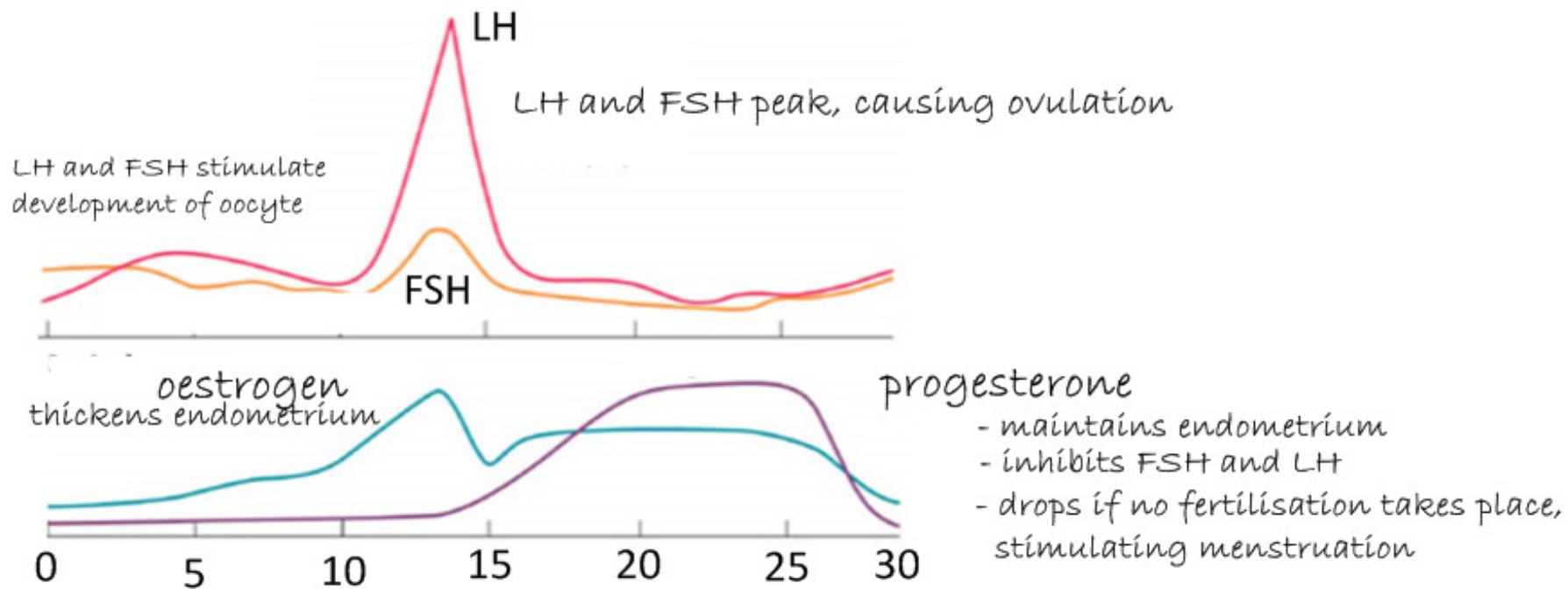
- *Annotate is more than just 'label' – some causes or explanation must be given*
- *Make up a gallery of annotated graphs, diagrams, flow-charts etc, and use them as visual organisers in your revision of complex concepts*

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# Apply

*"Use an idea, principle, theory, law or equation in a new situation."*

Example:

**Apply** the dichotomous key to identify ribosomes."

- |    |                                    |         |
|----|------------------------------------|---------|
| 1. | Enclosed in a membrane             | go to 2 |
|    | Not enclosed in a membrane         | go to 3 |
| 2. | Diameter less than 100 nm          | A.      |
|    | Diameter greater than 100 nm       | B.      |
| 3. | Composed of one globular structure | C.      |
|    | Composed of two sub-units          | D.      |

## Tips:


- *Put an idea or technique into action*
- *Make up some of your own dichotomous keys, for any topic or process*
- *Learn the equations needed, as they too might need to be 'applied'*

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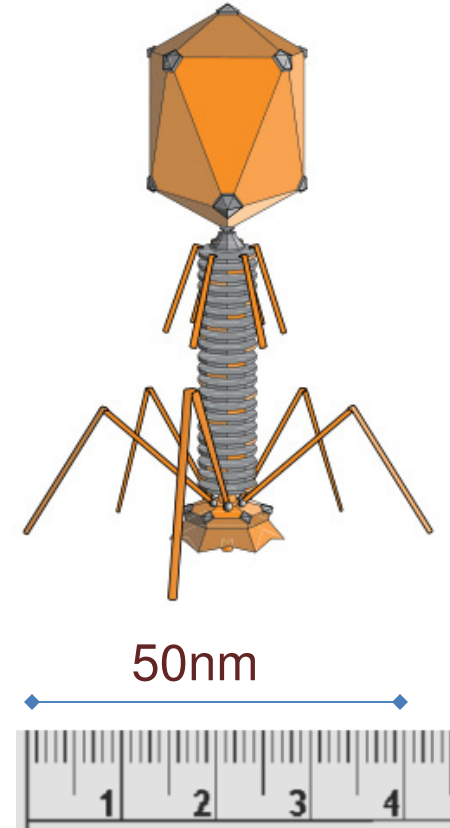
# Calculate

## Objective 2

*"Find a numerical answer, showing the relevant stages of working."*

Example:

**Calculate** the magnification of the image of the bacteriophage."



### Tips:

- *Show your working unless otherwise told to*
- *Make sure you use the correct SI unit in your answer*
- *Make up a booklet of all the possible types of calculations you have learned to use*

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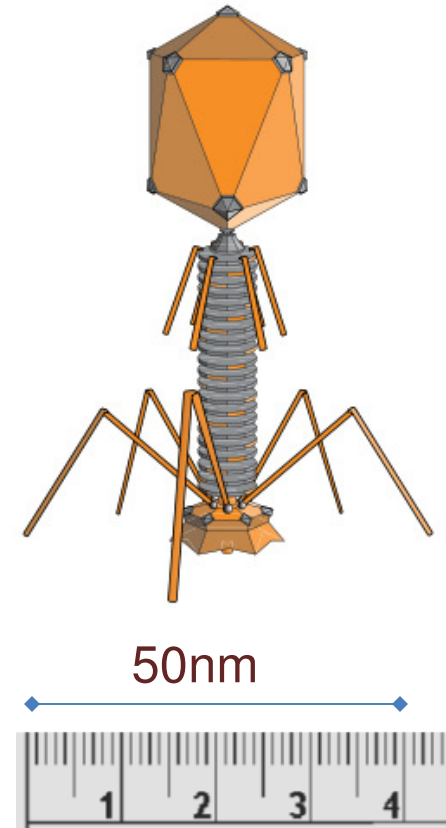
## Objective 2

*"Find a numerical answer, showing the relevant stages of working."*

Example:

**Calculate** the magnification of the image of the bacteriophage.

- Measure the scale bar image length (in mm)  
= 40mm
- Convert to the same unit as the scale bar label  
=  $40 \times 1000 \times 1000 = 40,000,000\text{nm}$
- Divide out to get the multiplication factor  
=  $40,000,000 / 50 = \mathbf{800,000 \times \text{magnification}}$



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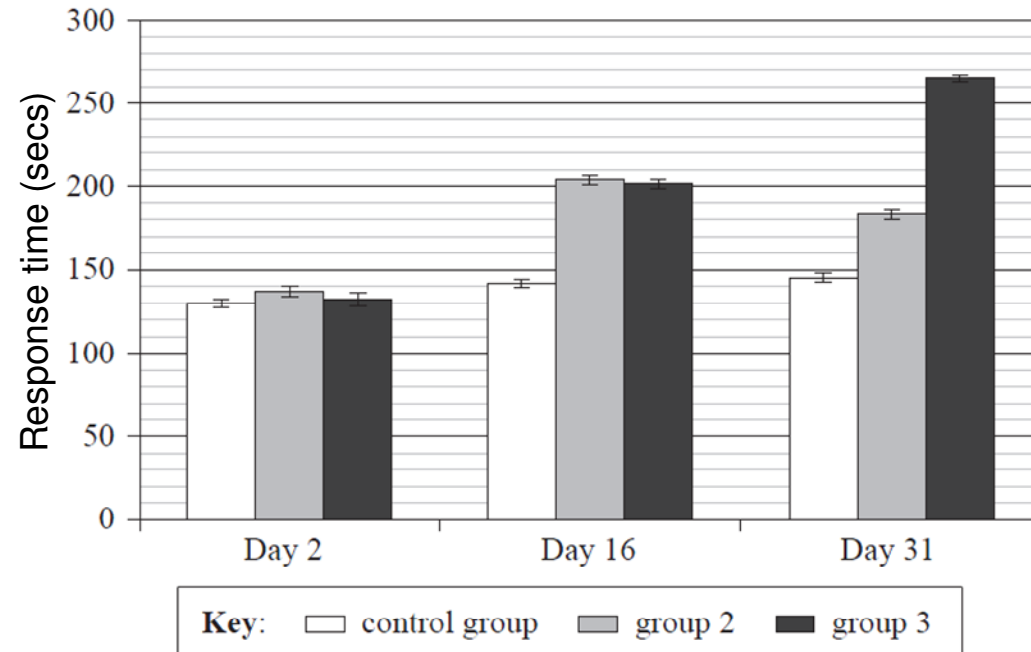
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# Calculate

"Find a numerical answer, showing the relevant stages of working."

Example:

"**Calculate** the percentage difference in .”response time of the control group from day 2 to day 31



May2009TZ1SLP3

[Source: Adapted and reprinted from the *Journal of Sports Science and Medicine*, Vol. 4, Milind Parle, Mani Vasudevan and Nirmal Singh, "Swim every day to keep dementia away", pp. 37–46, 2005, with permission from the *Journal of Sports Science and Medicine*.]

## Tips:

- Learn all the different 'calculate percentage...' methods.
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# Calculate

"Find a numerical answer, showing the relevant stages of working."

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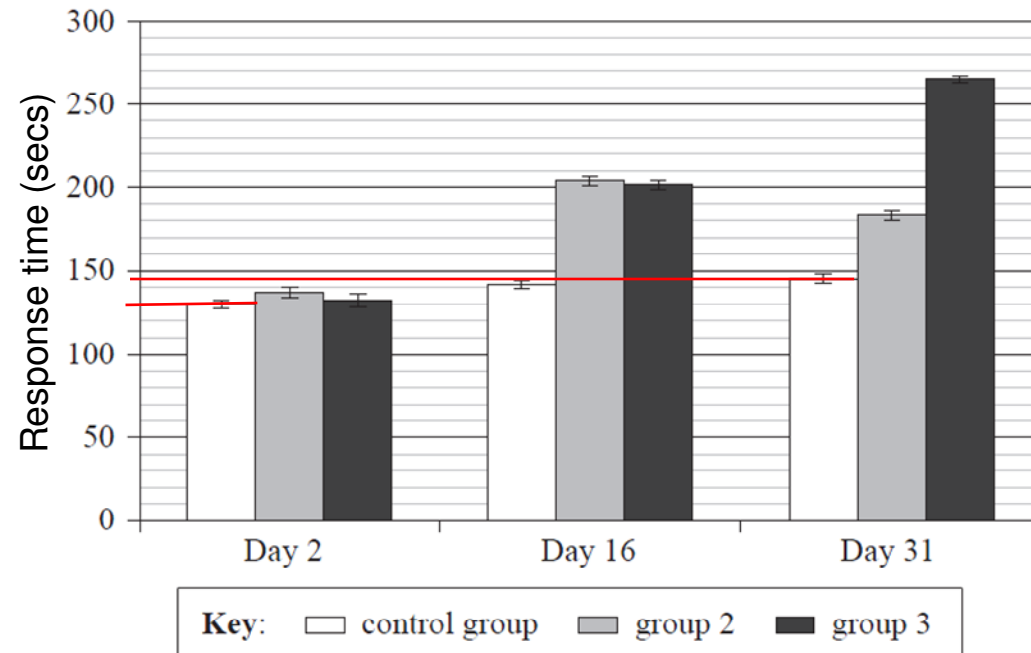
"**Calculate** the percentage difference in .”response time of the control group from day 2 to day 31

- increases from 130s to 145s

-  $145 - 130 = 15\text{s}$

- Percentage difference = of the original measurement?

$$\begin{aligned} \text{So: } \% \text{ diff} &= (15/130) \times 100 \\ &= \mathbf{11.5\%} \end{aligned}$$



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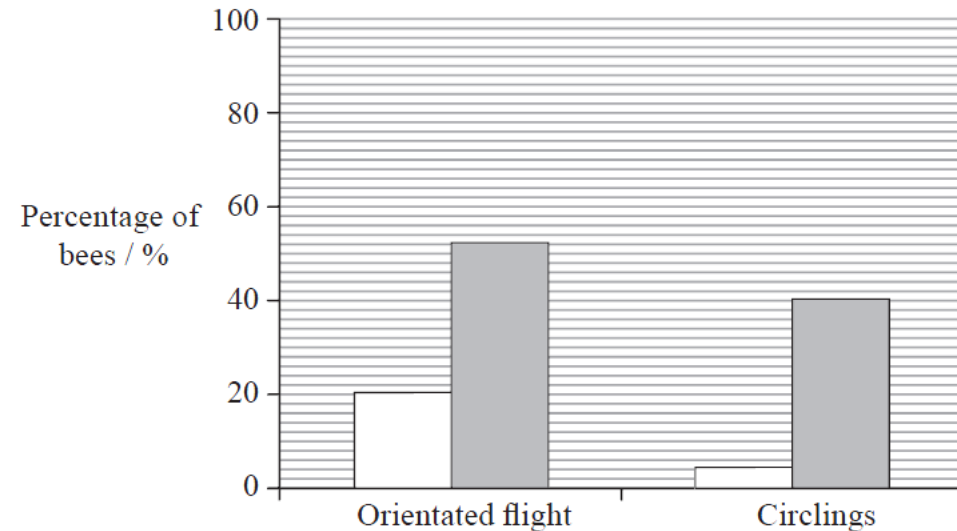
# Describe

*"Give a detailed account."*

Example:

**Describe** the effect of previous exposure to the odor on the flight of bees." (2)

Key:  control group  experimental group



[Source: adapted from A Chaffiol, *et al.*, (2005), *Journal of Experimental Biology*, 208, pages 3731–3737]

**Describe** how biomass may be measured." (2)

May2009TZ1SLP3

## Tips:

- *Descriptions are not explanations*
- *Pay attention to the number of marks available*
- *Descriptions can be of processes or of parts of a data response graph*

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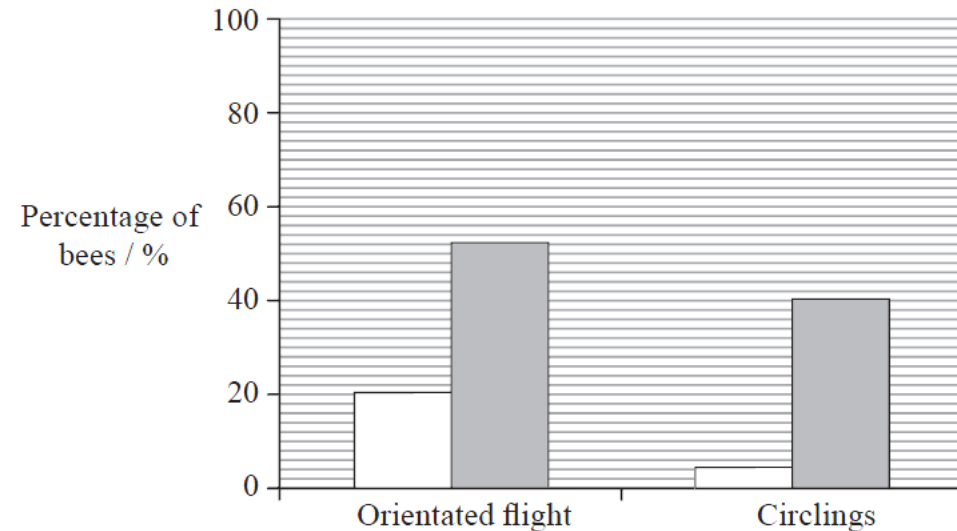
"Give a detailed account."

Example:

"**Describe** the effect of previous exposure to the odor on the flight of bees." (2)

Experimental group fly more around odor source;  
Greater circling in experimental group;  
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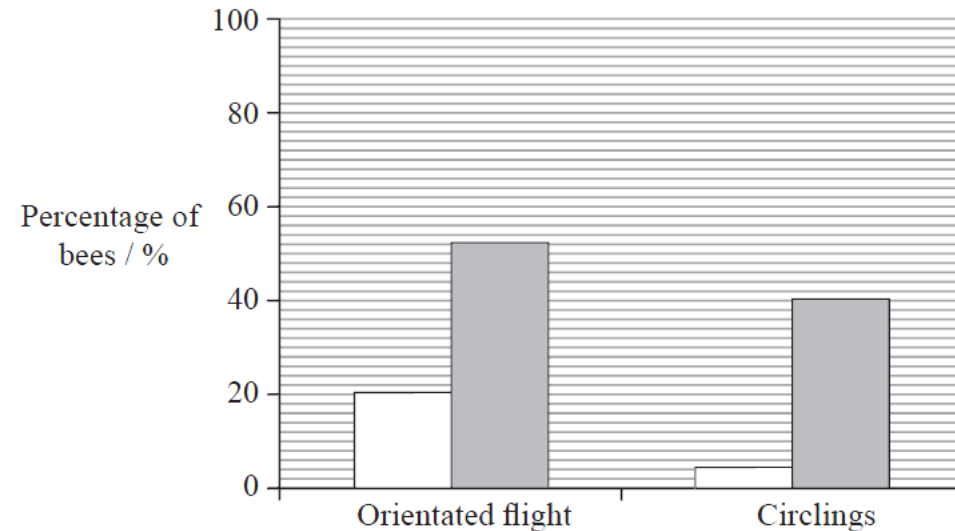
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**Describe** how biomass may be measured." (2)

*Organism is cleaned of dirt or soil;*  
*Mass is recorded;*  
*Organism is dried in an oven until constant mass reached;*  
*Biomass is total dry mass.*

May2009TZ1SLP3

## Tips:

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# Distinguish

*"Give the differences between two or more different items."*

Example:

**"Distinguish** between *autotroph* and *heterotroph*."

## Tips:

- *Looking for as many differences as there are marks awarded*
- *No need to present similarities*
- *Build a chart, with all possible compare/ distinguish questions you can think of*



# Distinguish

"Give the differences between two or more different items."

Example:

“**Distinguish** between *autotroph* and *heterotroph*.”

*Autotroph*: organism that synthesises its organic molecules from simple inorganic substances.

*Heterotroph*: organism that obtains organic molecules from other organisms.

## Tips:

- *Looking for as many differences as there are marks awarded*
- *No need to present similarities*
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# Estimate

*"Find an approximate value for an unknown quantity."*

Example:

“**Describe** one technique used to **estimate** population size of an animal species, based on capture-mark-recapture methods.”

## Tips:

- *Estimations may come from graphical questions*
- *Estimation techniques are used in ecology , rather than direct measurement*
- *Make a note of all instances of 'estimate' in the subject guide*

# Estimate

*"Find an approximate value for an unknown quantity."*

Example:

“**Describe** one technique used to **estimate** population size of an animal species, based on capture-mark-recapture methods.”

Capture (humanely) a sample of the population;

Control for time and area;

Example of capture method;

Count and apply mark (non-harmful) to organism;

Release back to habitat;

Second capture takes place;

Count all individuals with and without marks;

Apply Lincoln Index to estimate population size;

$n_1$  = first capture,  $n_2$  = total in second capture,  $n_3$  = recapture with marks.

$$\text{Population size} = \frac{n_1 \times n_2}{n_3}$$

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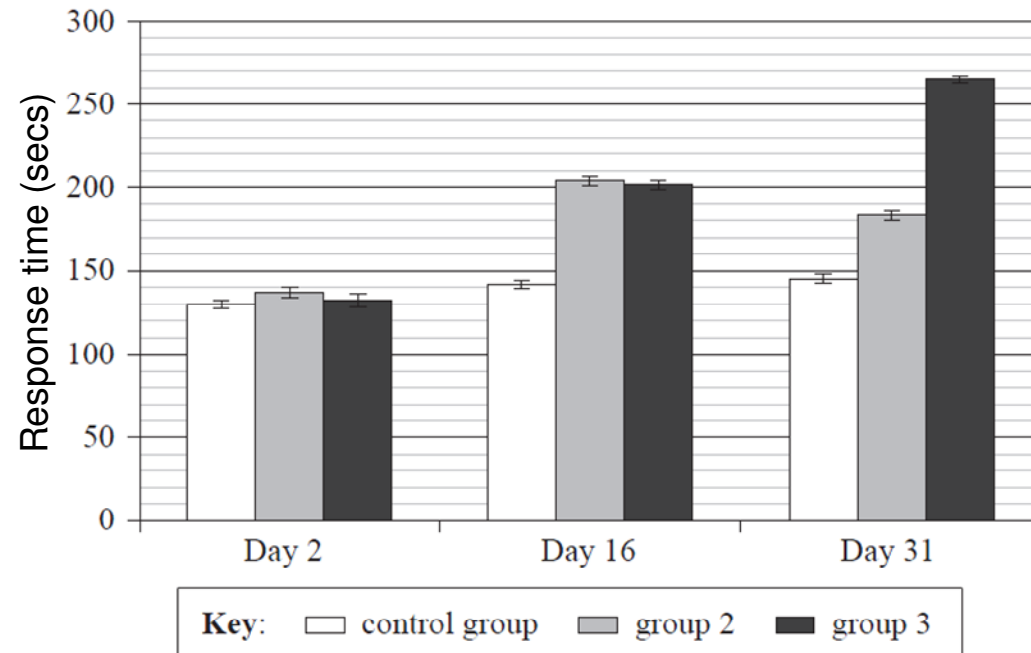
# Identify

*"Find an answer from a given number of possibilities."*

Example:

**"Identify** the response time of group 2 on day 31 of the study."

**"Identify** the group with the largest difference in response time from day 2 to day 31."



May2009TZ1SLP3

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## Tips:

- *Identify* – pick one single answer
- Practice making your own 'identify' questions using different types of graphs
- *Identify* can also be used for parts of diagrams, such as curves, organelles etc.

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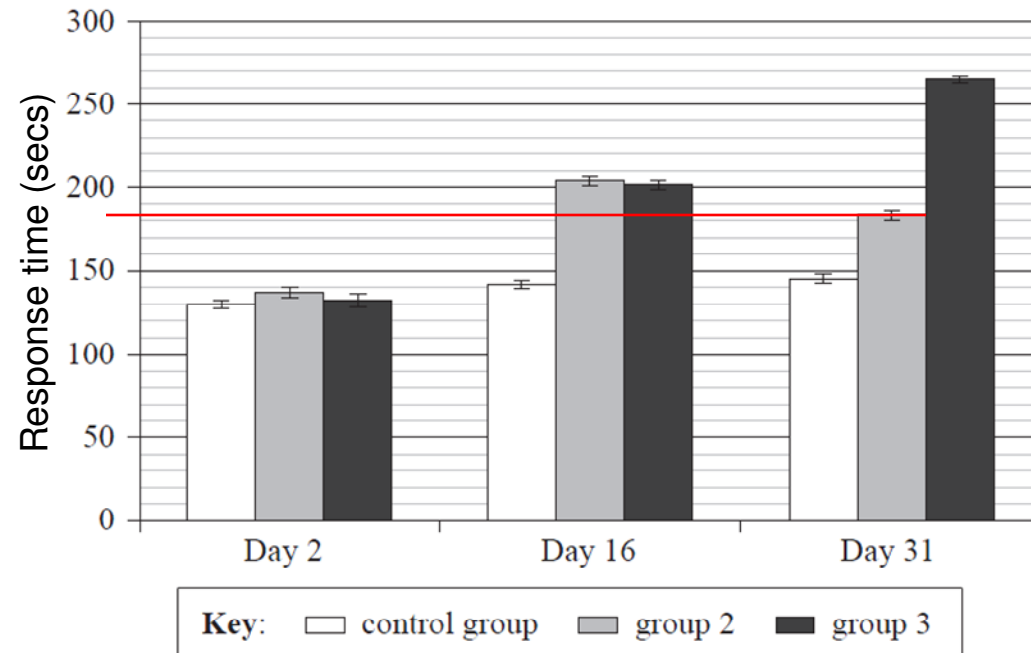
"Find an answer from a given number of possibilities."

Example:

"**Identify** the response time of group 2 on day 31 of the study."

183 seconds (unit needed)

"**Identify** the group with the largest difference in response time from day 2 to day 31."



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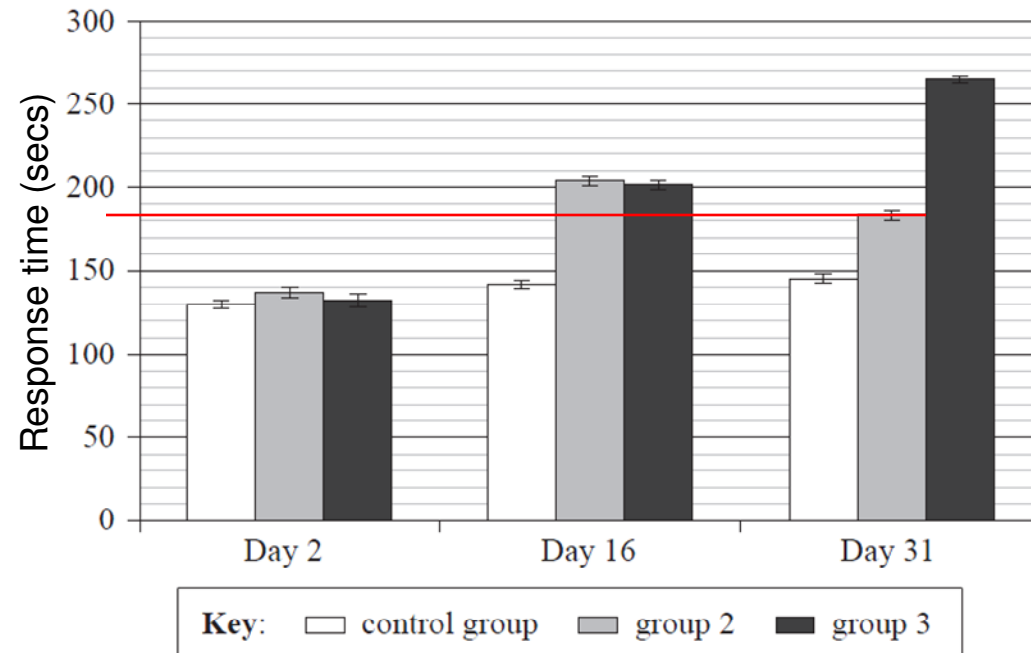
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Group 3



May2009TZ1SLP3

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## Tips:

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- *Identify can also be used for parts of diagrams, such as curves, organelles etc.*

# Outline

*“Give a brief account or summary.”*

Example:

“**Outline** the light dependent reactions of photosynthesis (HL, 6 marks).”

## Tips:

- *Pay close attention to the number of marks available*
- *Present answers clearly to get the complete number of marks*
- *Outline is a summary or account, without reasons or explanation (step-by-step)*

# Outline

*“Give a brief account or summary.”*

Example:

**“Outline** the light dependent reactions of photosynthesis (HL, 6 marks).”

Light energy is absorbed by photosystem II;

Electrons excited/ photoactivated by absorption of light energy;

Electron passed along a series of carriers;

NADP<sup>+</sup> reduced to NADPH + H<sup>+</sup>;

Photolysis of water produces oxygen and hydrogen;

Called non-cyclic photophosphorylation;

H<sup>+</sup> pumped across thylakoid membrane, through ATP synthase (by chemiosmosis), generating ATP.

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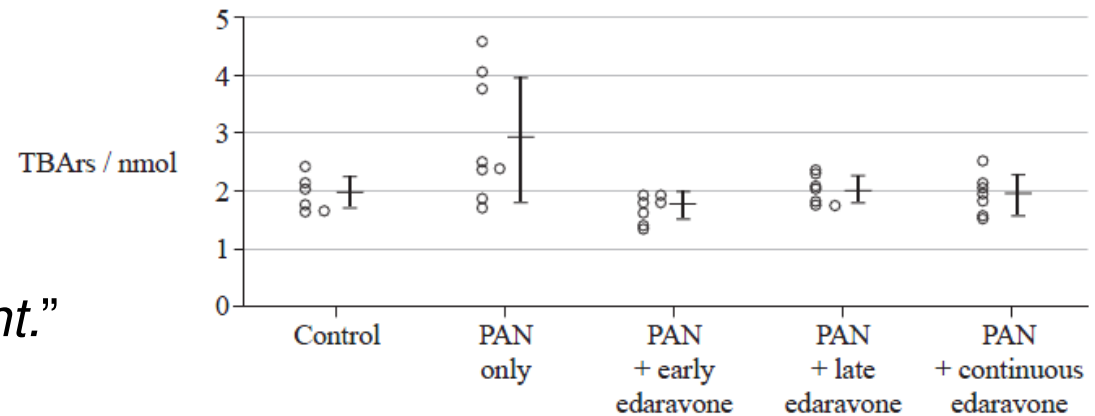
# Analyse

## Objective 3

"Interpret data to reach conclusions."

Example:

"Analyse the results of this experiment."



Oxidation reactions can cause damage to cells. Thiobarbituric acid reactive substances (TBArS) are produced when membrane lipids are damaged by oxidation. Experiments were carried out to investigate the effect of edaravone on the production of TBArS.

[Source: H. Matsumura, A. Ashida, K. Hirano, H. Nakakura and H. Tamai, "Protective effect of radical scavenger edaravone against puromycin nephrosis", *Clinical Nephrology*, Vol. 66, no. 6/2006, pp. 405-410. Reprinted with permission.]

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### Tips:

- Use the data to reach a conclusion – it must agree with the data
- Pay attention to the number of marks available
- Practice by analysing all the graphs from data-based questions that you can find

# Analyse

## Objective 3

"Interpret data to reach conclusions."

Example:

"Analyse the results of this experiment."

PAN increases TBArS levels/ levels highest in PAN-only group;

PAN causes oxidation of / damage to

Membranes/ lipids;

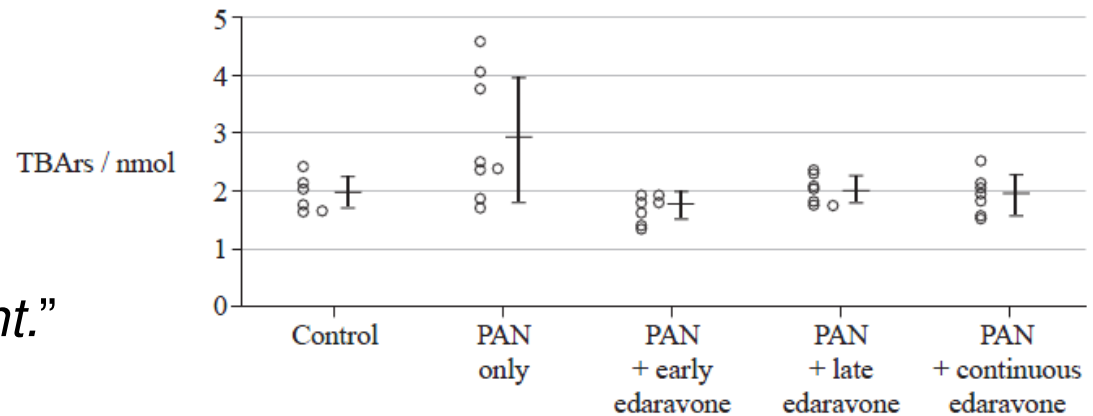
Edaravone prevents increase in TBArS levels;

Edaravone prevents oxidation of / damage to

Membranes/ lipids;

Early edaravone is more effective than late/ continuous;

Overlap of error bars suggests results may not be significant.



Oxidation reactions can cause damage to cells. Thiobarbituric acid reactive substances (TBArS) are produced when membrane lipids are damaged by oxidation. Experiments were carried out to investigate the effect of edaravone on the production of TBArS.

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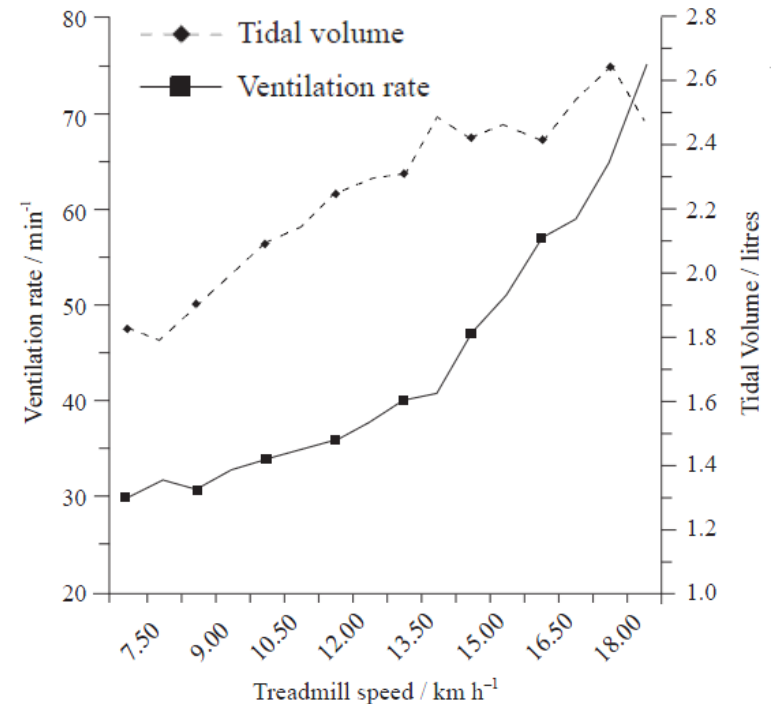
# Compare

"Give an account of similarities and differences between two (or more) items, referring to both (all) of them throughout."

Example:

"**Compare** the trend in ventilation rate with the trend in tidal volume at high treadmill speeds."

"**Compare** rod and cone cells."



[Source: [www.home.hia.no/~stephens/ventphys.htm](http://www.home.hia.no/~stephens/ventphys.htm)]

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## Tips:

- Marks are available for similarities and differences – often found in data questions
- Create comparison charts for as many topics as possible
- Present answers in tables for clarity

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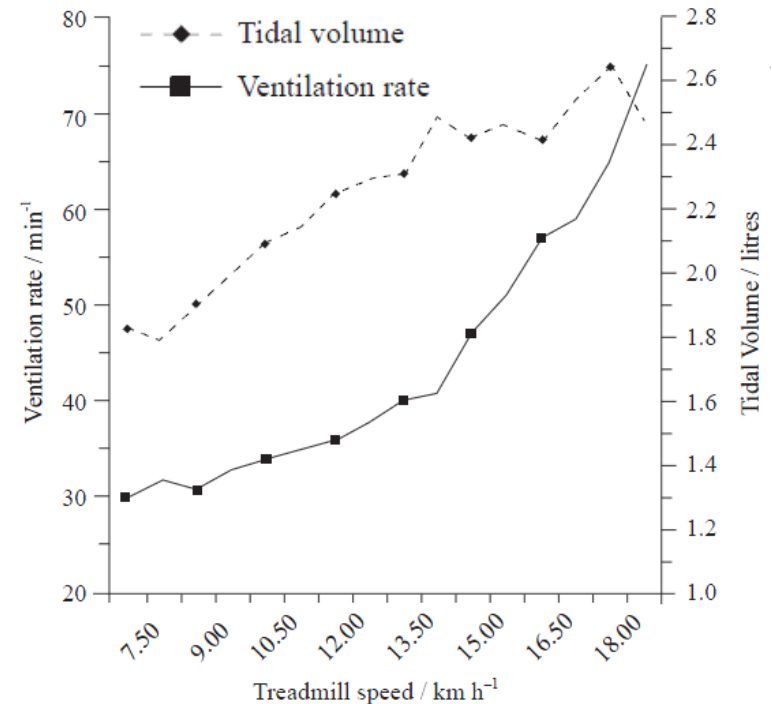
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Ventilation rate continues to increase, where tidal volume approaches a plateau.

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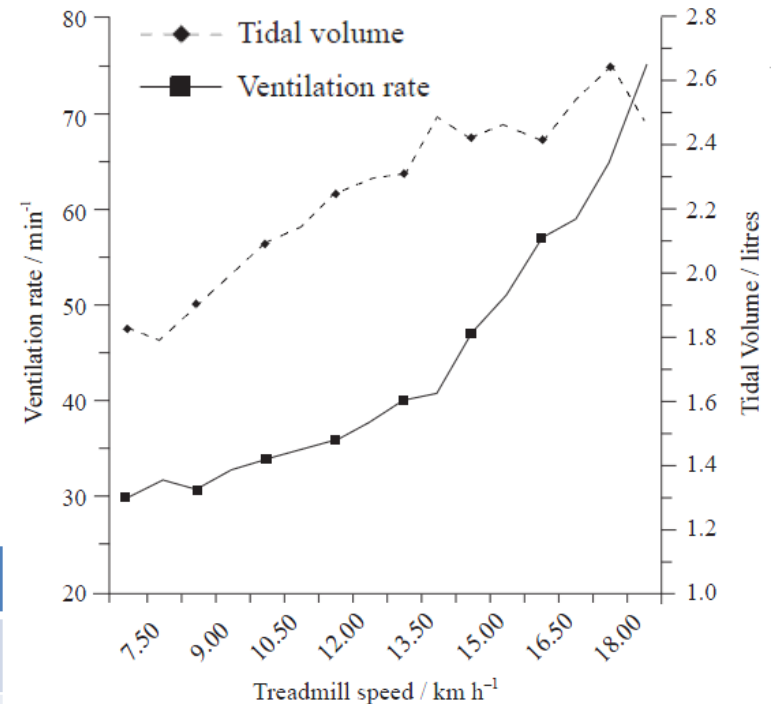
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"**Compare** the trend in ventilation rate with the trend in tidal volume at high treadmill speeds."

Ventilation rate continues to increase, where tidal volume approaches a plateau.

"**Compare** rod and cone cells."

Rod cells	Cone cells
Dim light conditions	Bright light conditions;
One type, sensitive to all wavelengths of light	Three types, sensitive to specific wavelengths;
Multiple cones feed into one sensory neuron	One cone feeds into one sensory neuron;



[Source: [www.home.hia.no/~stephens/ventphys.htm](http://www.home.hia.no/~stephens/ventphys.htm)]

QuestionBank CD Rom

## Tips:

- Marks are available for similarities and differences – often found in data questions
- Create comparison charts for as many topics as possible
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# Construct

*"Represent or develop in graphical form."*

Example:

**Construct** a pyramid of energy for this grassland:

*The total solar energy received by a grassland is  $5 \times 10^5 \text{ kJ m}^{-2} \text{ y}^{-1}$ . The net production of the grassland is  $5 \times 10^2 \text{ kJ m}^{-2} \text{ y}^{-1}$  and its gross production is  $6 \times 10^2 \text{ kJ m}^{-2} \text{ y}^{-1}$ . The total energy passed on to primary consumers is  $60 \text{ kJ m}^{-2} \text{ y}^{-1}$ . Only 10 % of this energy is passed on to the secondary consumers."*

## Tips:

- *Read the information passages very carefully and underline important points*
- *Use scrap paper before committing your answer to the exam paper*
- *Practice by making construct questions for your friends*

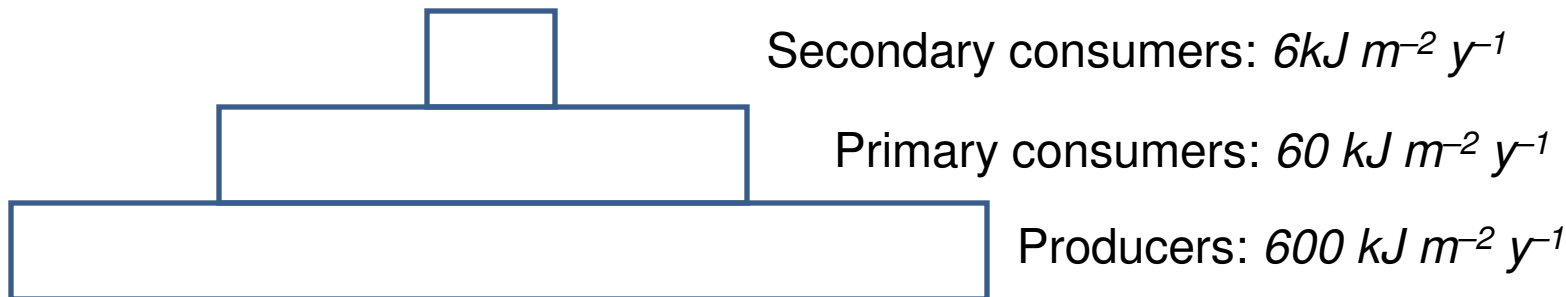
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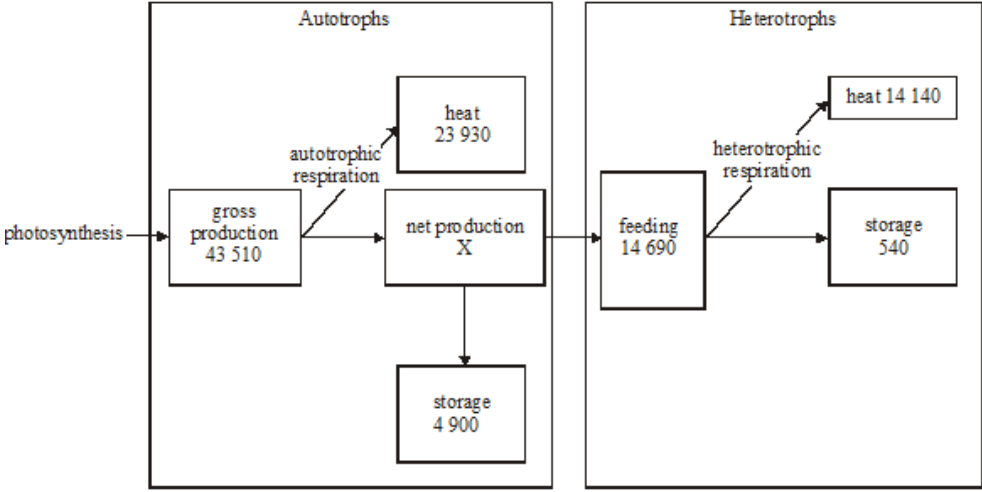
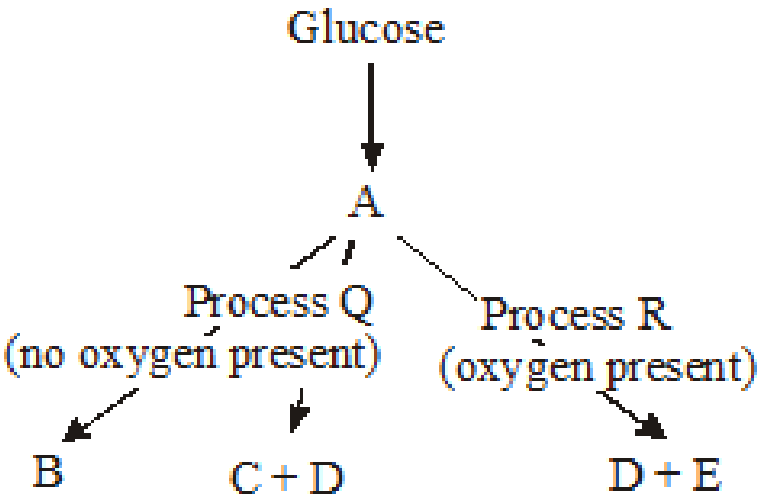
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# Deduce

"Reach a conclusion from the information given."

Example:

"Deduce the names of substances B and D."



"Deduce the effects of sustained pollution which kills decomposers on autotrophic productivity."

### Tips:

- Deduce means 'work it out'!
- When revising, make deduce questions for your friends, asking them to explain how they arrived at their answer



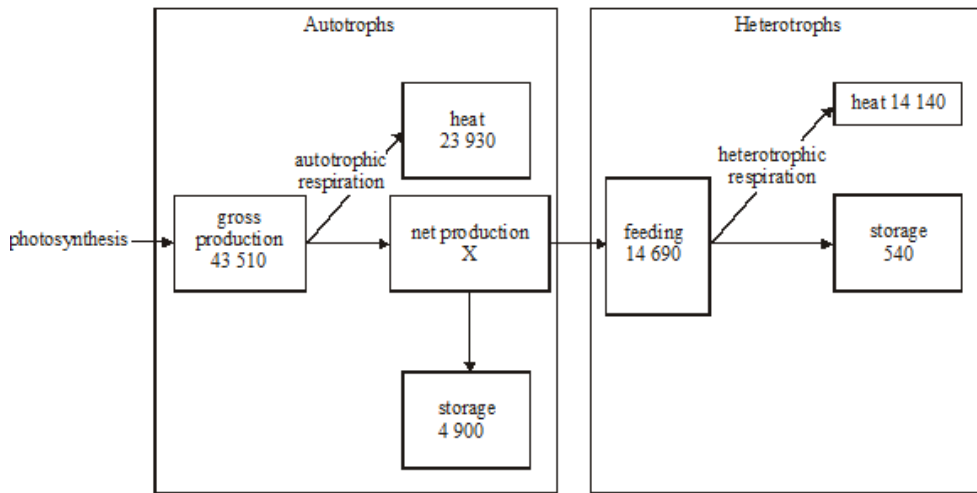
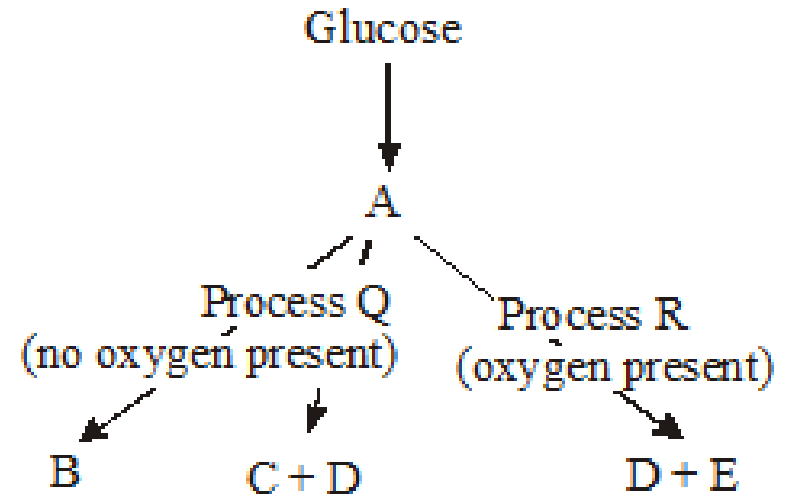
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"Reach a conclusion from the information given."

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"**Deduce** the names of substances B and D."

*B = lactic acid    D = carbon dioxide*



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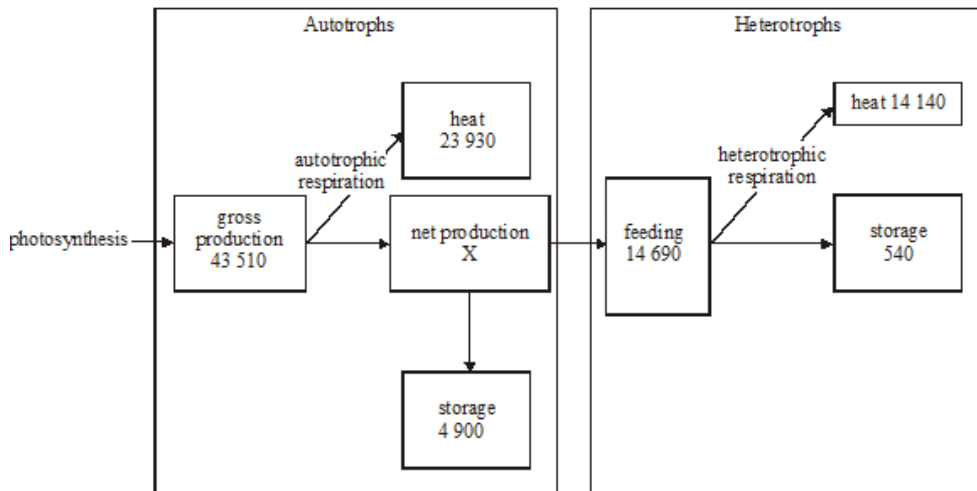
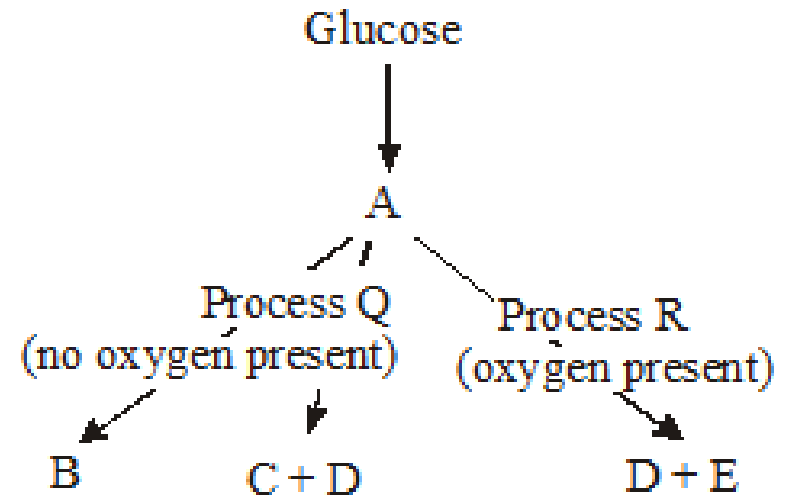
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"**Deduce** the names of substances B and D."

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"**Deduce** the effects of sustained pollution which kills decomposers on autotrophic productivity."

Autotrophs need nutrients;  
Decomposers recycle nutrients into soil;  
Fewer decomposer, reduced recycling of nutrients;  
Therefore reduced productivity.

## Tips:

- *Deduce means 'work it out'!*
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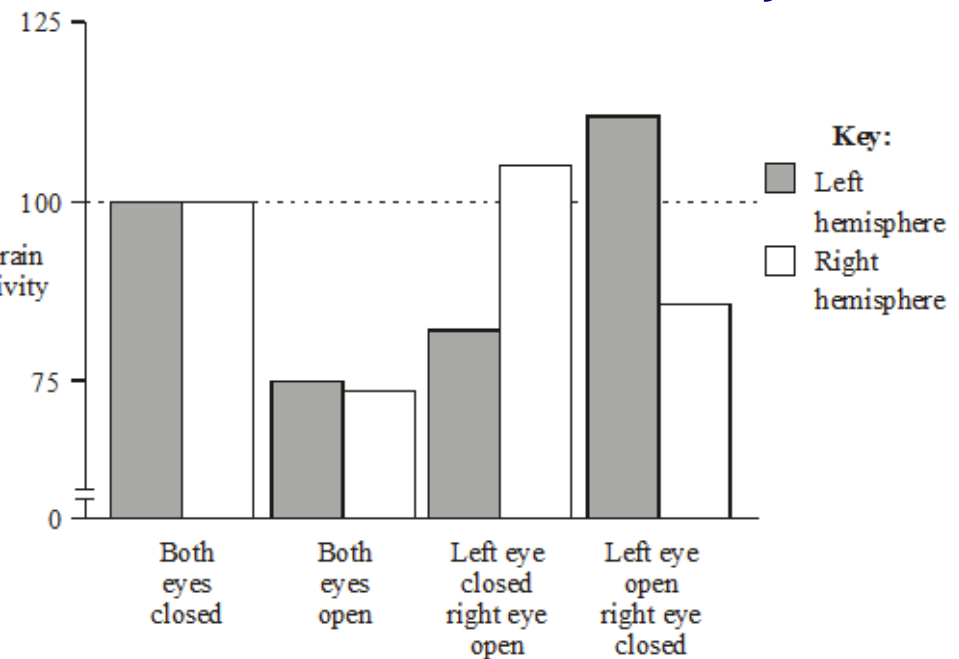
# Determine

*"Find the only possible answer."*

Example:

**"Determine** which hemisphere is most awake when the right eye is open."

Activity of the brain region (% of activity with both eyes closed)



[Source: Rattenborg, *et al*, *Nature*, 1999, 397, pages 397–398]

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## Tips:

- 'Determine' often means you need to go a step further than just 'identify'
- Try to design your own 'determine' questions, based on graphical data or tables

# Determine

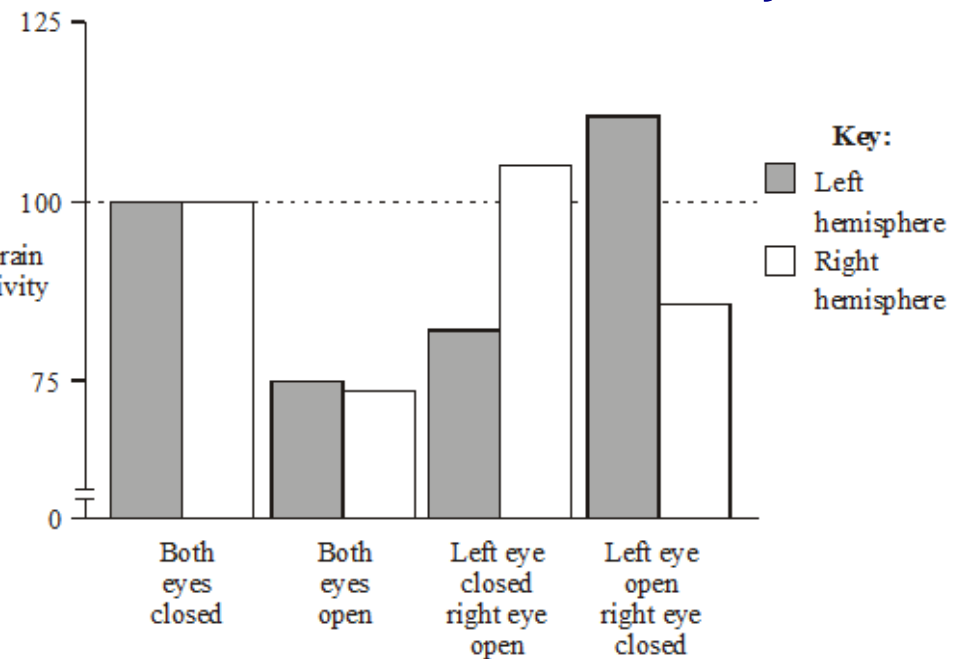
"Find the only possible answer."

Example:

**"Determine** which hemisphere is most awake when the right eye is open."

Left hemisphere  
(shows biggest change from activity when both eyes are closed)

Activity of the brain region (% of activity with both eyes closed)



[Source: Rattenborg, et al, Nature, 1999, 397, pages 397-398]

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## Tips:

- 'Determine' often means you need to go a step further than just 'identify'
- Try to design your own 'determine' questions, based on graphical data or tables

# Discuss

*"Give an account including, where possible, a range of arguments for and against the relative importance of various factors, or comparisons of alternate hypotheses."*

Example:

*"**Discuss** the benefits and perceived risks of vaccination against bacterial and viral pathogens." (HL, 8 marks)*

## Tips:

- *Pay close attention to the number of marks available and present answer clearly*
- *Look out for qualifiers in the question, such as 'named example', etc.*
- *Include two or more perspectives in the answer*
- *Practice will all 'discuss' assessment statements in the subject guide*

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Example:

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## **Benefits:**

- Prevent disease;
- Prevent epidemics;
- Healthier population;
- More cost-effective than treating disease;
- Economical benefit, less absenteeism;
- Eradicate diseases, e.g. smallpox;
- Quicker immune response to disease;
- Prevent disease-related disability

## **Perceived risks:**

- Some minor side effects
- Some might be allergic
- Might show symptoms of illness
- Risks might be perceived, though lack evidence base, such as MMR scare

## **Tips:**

- Pay close attention to the number of marks available and present answer clearly
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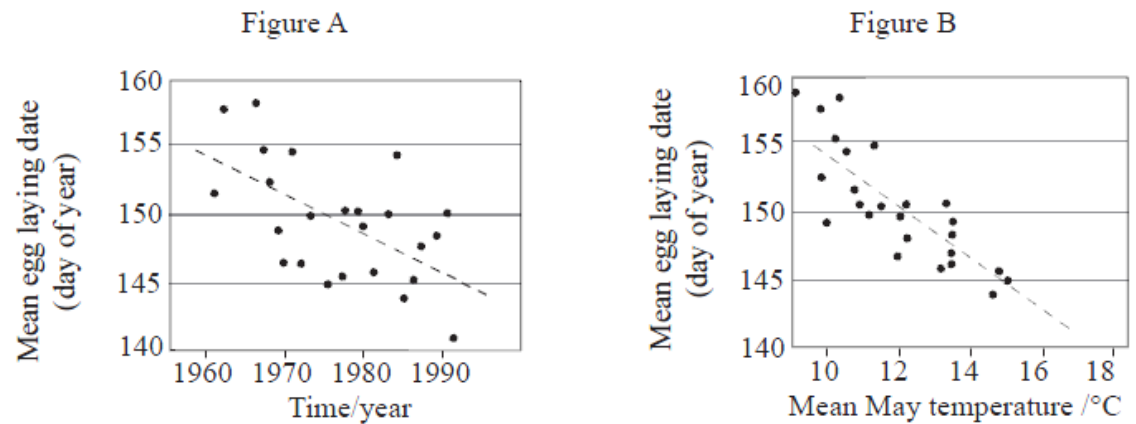
# Evaluate

"Assess the implications and limitations."

Example:

"**Evaluate** the evidence for global warming using figures A and B (2)."

The timing of breeding in tree swallows (*Tachycineta bicolor*) was studied in the United States and Canada from 1959 to 1991. Figure A represents the mean egg laying date for each year. The date is indicated as number of days after January 1st. Figure B shows the correlation between mean May temperature ( $^{\circ}\text{C}$ ) and mean laying date over the same period.



[Source: [www.pewclimate.org/docUploads/final%5FObsImpact%2Epdf](http://www.pewclimate.org/docUploads/final%5FObsImpact%2Epdf)]

*Biology Specimen Paper, 2009*

## Tips:

- Do not just describe the graphs or methods, use evaluative language
- Read the introductory passage very carefully – to what extent do the data address the aims of the investigation?
- Pay attention to the number of marks available

# Evaluate

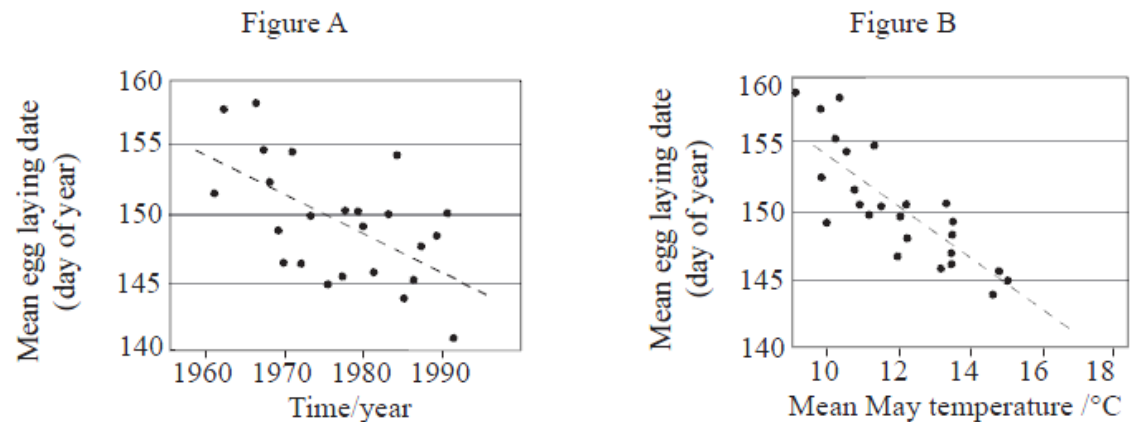
"Assess the implications and limitations."

Example:

“**Evaluate** the evidence for global warming using figures A and B (2).”

- Trend for egg laying moving earlier over the study period;
- Correlation with increasing mean may temperatures;
- Higher temperature leads to earlier egg laying;
- Data are highly variable, especially in figure A/ correlation not strong.

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# Explain

*"Give a detailed account of causes, reasons or mechanisms."*

Example:

**“Explain two** examples of evolution due to environmental change.”

## Tips:

- *Pay attention to the number of marks available*
- *Read the question carefully – are there any other qualifiers (e.g. ‘named example’) that must be addressed in order to get the marks?*

# Explain

*"Give a detailed account of causes, reasons or mechanisms."*

Example:

**“Explain two** examples of evolution due to environmental change.”

Populations tend to produce more offspring than the environment can support;

Variation exists within populations;

**e.g. Antibiotic resistance in antibiotics**

- Environmental change is application of antibiotics;
- some bacteria are killed;
- some survive;
- reproduce and pass on alleles that allowed resistance to antibiotics;
- characteristics of population change over time (evolution);

**e.g. Peppered moths**

- Environmental change is black pollution of the air and trees;
- white moths more visible to predators;
- black variants better camouflaged;
- survive to reproduce and pass on alleles for black colour;
- characteristics of population change over time (evolution), becoming blacker;

## Tips:

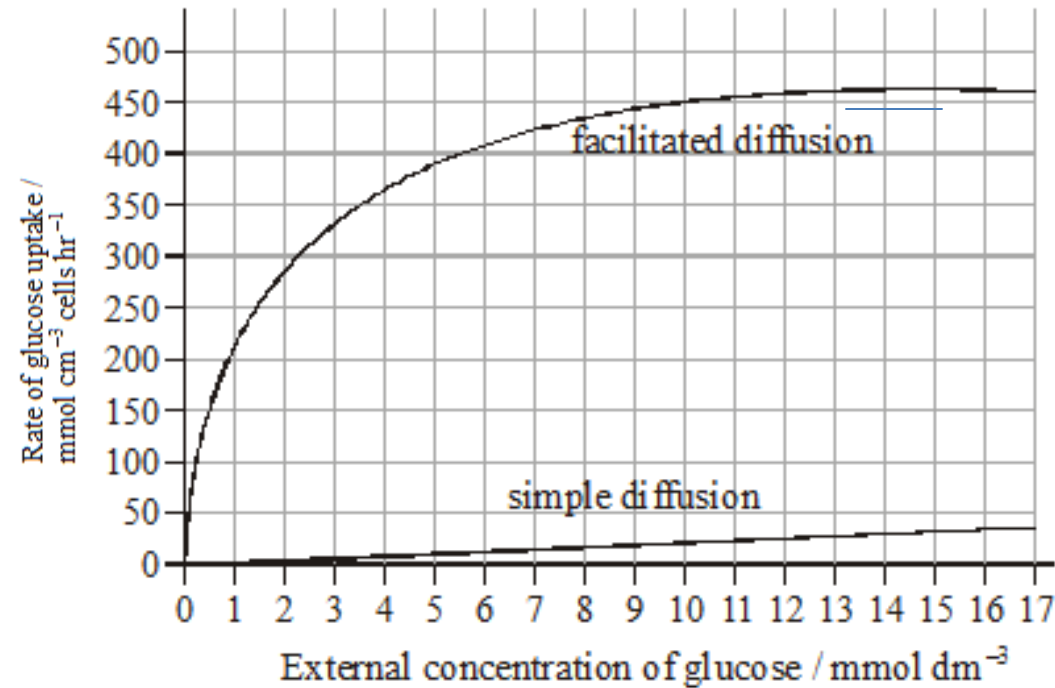
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# Predict

"Give an expected result."

Example:

“**Predict**, with a reason, the effect on glucose uptake by facilitated diffusion of increasing the external glucose concentration to  $30\text{mmol dm}^{-3}$ .”



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## Tips:

- Pay attention to number of marks and qualifiers, e.g. 'with a reason'.
- Look for trends in the data and continue them onward
- When practicing, test yourself by looking at datasets and making predictions

# Predict

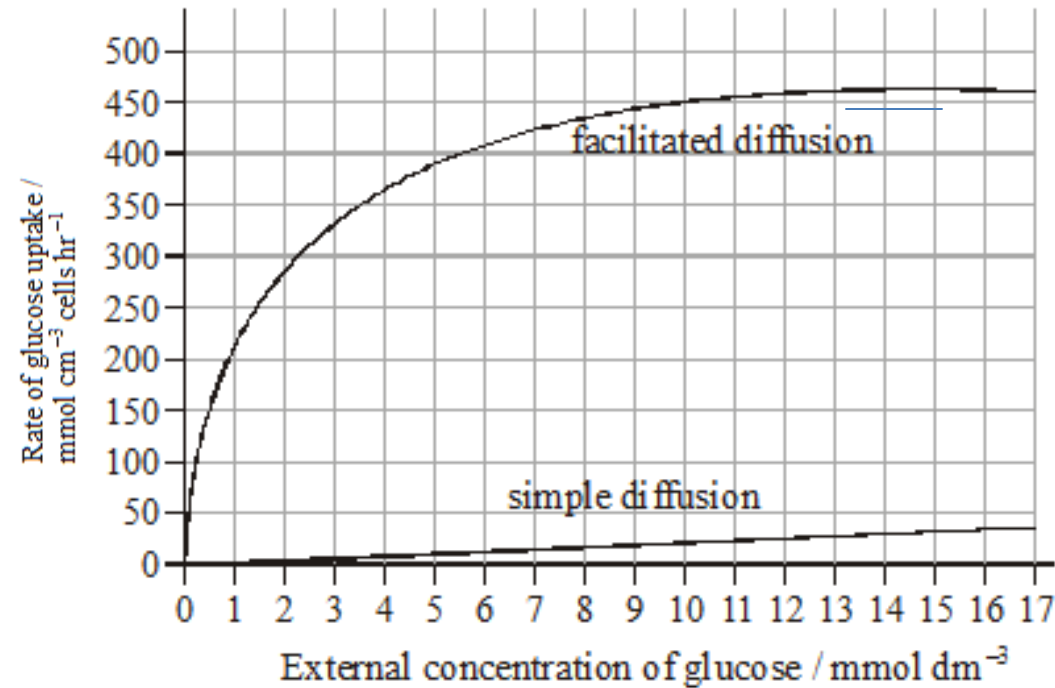
"Give an expected result."

Example:

“**Predict**, with a reason, the effect on glucose uptake by facilitated diffusion of increasing the external glucose concentration to  $30\text{mmol dm}^{-3}$ .”

*Glucose uptake will remain constant.*

*Most or all protein channels are in use.*



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## Tips:

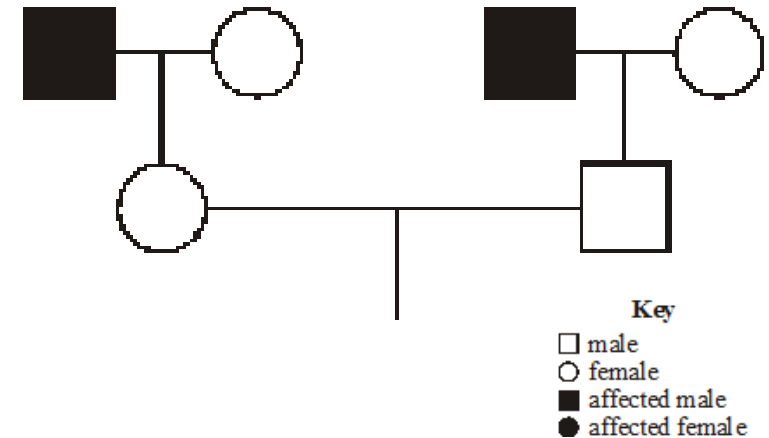
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# Show

"Give the steps in a calculation or derivation."

Example:

"A male and female with normal colour vision each have a father who is colour blind. They are planning to have children. **Predict, showing your working**, the possible phenotypes and genotypes of male and female children."



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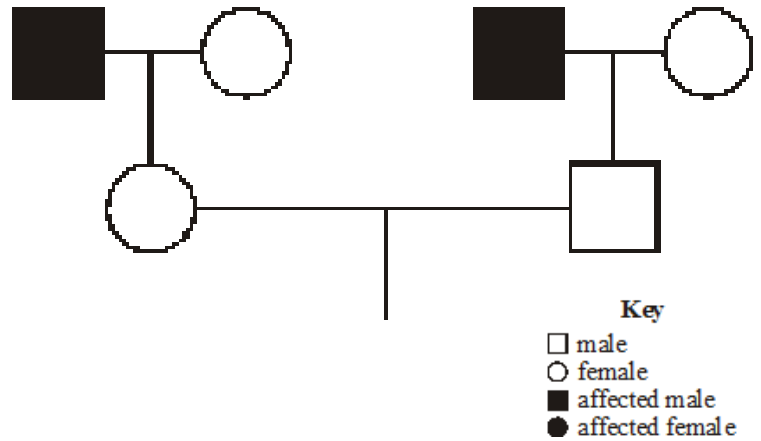
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- Present all working clearly and step-wise to ensure examiner understands it

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*Colour blindness is X-linked, recessive;  
 Key to alleles:  $X^N$  = normal,  $X^n$  = colour blind;  
 Male must be  $X^N Y$ , to be unaffected, Female must be  $X^N X^n$ ;  
 Daughters will be 100% normal phenotype;  
 Sons will be 50% normal, 50% colour blind.*

	female	
male	$X^N$	$X^n$
$X^N$	$X^N X^N$	$X^N X^n$
Y	$X^N Y$	$X^n Y$

**Tips:**

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# Sketch

*"Represent by means of a graph showing a line and labeled but unscaled axes - with important features (for example intercept) clearly indicated."*

Example:

“**Sketch** a graph to predict the effect of manipulating pH on the activity of an enzyme which has an optimal pH of 7.”

## Tips:

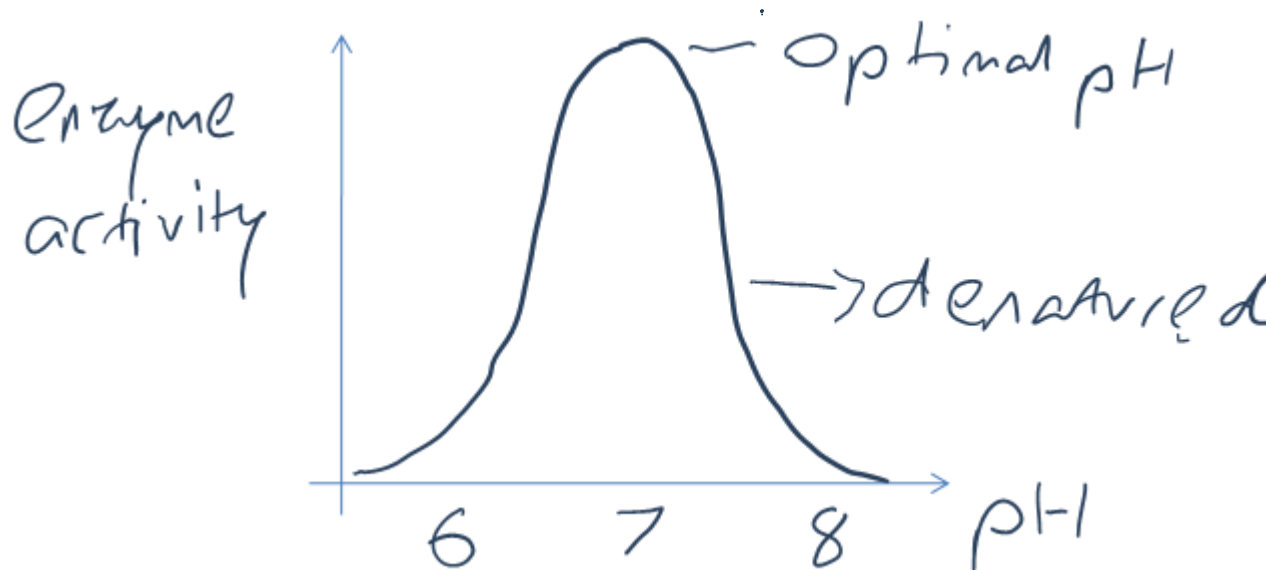
- *Definitions are in the subject guide*
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- *Make up a vocab list or use an online glossary to help with define questions*

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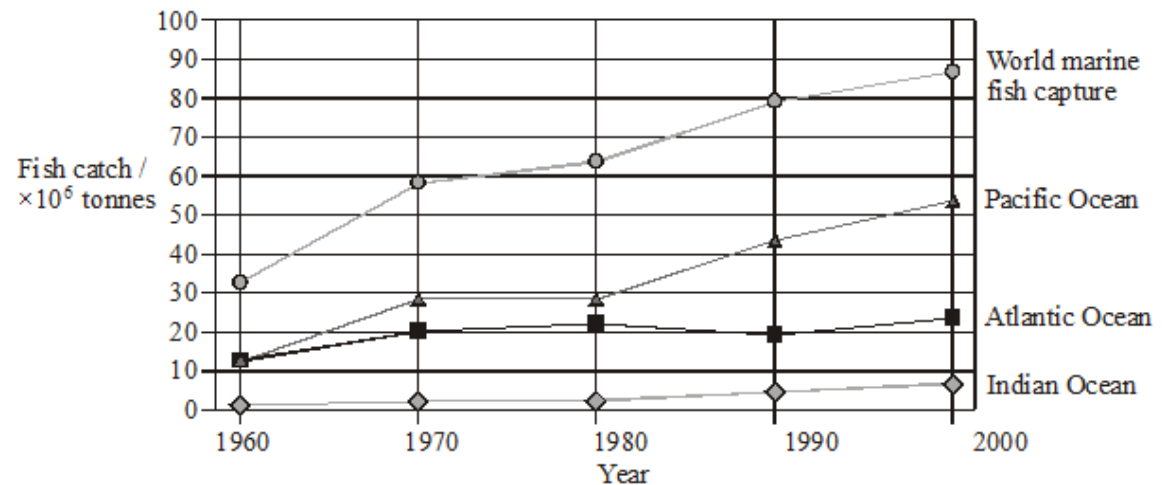
# Suggest

"Propose a hypothesis or other possible answer."

Example:

"**Suggest** one reason in each case for the change in quantity of fish captured in the Atlantic and Indian Oceans from 1980 to 1990."

The Food and Agricultural Organization (FAO) gathered information to determine if marine ecosystems were being damaged by overfishing. The total fish captured in each of three oceans from the years 1960 to 2000 was compared to the overall world marine capture.



[Source: R. Buckley (editor), *World Fishing: Beyond Sustainability*, (2002), Understanding Global Issues Limited, pages 8–9]

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## Tips:

- Apply your reasoning to a possibly unknown situation
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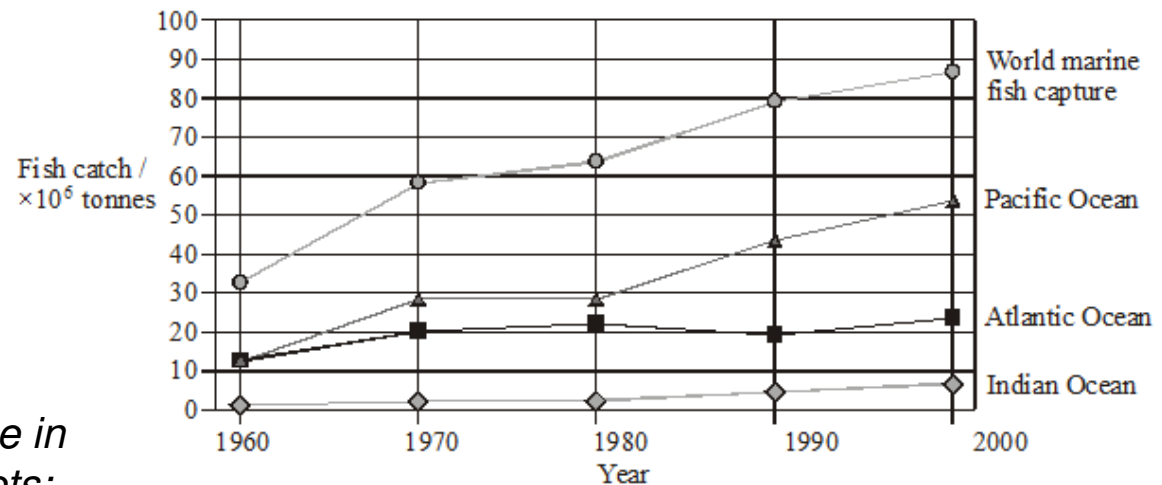
## **Atlantic:**

*Quotas decreased/ stocks depleted/ change in market tastes/ yield decreased/ smaller fleets;*

## **Indian Ocean:**

*Quotas increased/ better technology/ bigger fleets/ yield increased/ market change in tastes*

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# More exam tips & resources

*“You may never know what results come of your action, but if you do nothing there will be no result.” ~ Mahatma Gandhi*

**Make up** books or portfolios for equations, diagrams, explanations and data analysis practice.

**Pair up** with people who will help you succeed – not necessarily your dense mates. Test your understanding by explaining to others.

**Open up** loads of past paper examples. Get them from class or on the IBO store: <http://store.ibo.org/>

**Cough up** from some revision guides or the *QuestionBank CD Rom* for loads of practice: [http://store.ibo.org/product\\_info.php?products\\_id=1224](http://store.ibo.org/product_info.php?products_id=1224)

**Look up** some of the free review internet sources:

**Click4Biology:**

<http://click4biology.info>

**Open Door Website:**

<http://www.saburchill.com/chapters/bio.html>

**MrT's Site:**

<http://sciencevideos.wordpress.com>

**Wake up** each day, after a good night's sleep. *Don't do all-nighters*, they're bad for your brain. Definitely don't sleep through the exam.





For more IB Biology resources:  
<http://sciencevideos.wordpress.com>



**Biology4Good**

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