

## Course Start

Course Start is independent learning you need to complete as a fundamental part of your introduction to the course. It should take you approximately 5 hours to complete.

Course Name	IB HL Biology
How this <b>Course Start</b> fits into the first term of the course	<i>A review of your skills obtained from your previous school</i>
How will my <b>Course Start</b> learning be used in lessons?	<i>Includes, knowledge, understanding and data analysis all of which are embedded into the course</i>
<b>Course Start</b> learning objectives	<ul style="list-style-type: none"> <li>• <i>To develop mathematical, data analysis and practical skills</i></li> <li>• <i>To assess you learning and understanding from GCSE</i></li> </ul>
Study Skills	<ul style="list-style-type: none"> <li>• <i>Mathematical Skills</i></li> <li>• <i>Data Analysis Skills</i></li> <li>• <i>Data Presentation Skills</i></li> <li>• <i>Application of Knowledge</i></li> </ul>

# IB COURSE START

Let's see how much biology you can remember from Science GCSE.

Are the following statements true or false? If "false", then why?

		True	False	If you have chosen false explain why.
1	Enzymes make reactions happen.			
2	Photosynthesis converts carbon dioxide to oxygen			
3	All arteries carry oxygenated blood.			
4	Particle only move in one direction when they diffuse.			
5	An adult human lung contains 750 million alveoli. This is to provide a large surface area for gaseous exchange.			
6	Skin is a tissue			
7	Arteries have a thick muscular wall so that they can pump blood.			
8	Muscles expand and contract.			
9	Pasta and potatoes are examples of carbohydrates.			
10	Plants breathe carbon dioxide whereas animals breathe oxygen.			
11	The coronary arteries supply the heart muscle with oxygen and glucose.			
12	Proteins are long chain polymers made up of the monomer glucose.			
13	Nerves carry messages.			
14	Plant cells have a cell wall. Animal cells have a cell membrane.			
15	A gene is a length of DNA that carries the genetic code for a single protein.			
16	Meitosis is a form of cell division.			
17	The more ice-creams sold in a day the more cases of heat stroke are reported. Therefore ice-cream causes heat stroke.			
18	The overuse of antibiotics <u>make</u> bacteria mutate into resistant strains.			
19	Enzymes are killed at a high temperature.			
20	Respiration means the same thing as breathing.			



- You **may use a translator** (word for word only) if English is not your native language.
- Please **do not worry** about questions you cannot answer!
- This review covers ‘expected knowledge’ and skills for IB Biology, but everyone will start with a different background, and this review will help us understand yours!

*Part A. Answer on this sheet.*

A1 **Skills.** For each of the skills given below, please rate your experience and competence using one of the following numbers. **Please DO NOT spend more than 2-3 minutes on this question!**

0: have had no experience at all.

1: have had limited experience, and am not competent

2: have had reasonable experience, but am not sure I am competent

3: have had plenty of experience of this, and feel I am competent

Skill	Description	Rating
<b>a) Graph plotting</b>	Plots graphs accurately, and with correctly labelled axes. Chooses the correct format for the data, and adds a best-fit line when appropriate.	
<b>b) Calculations.</b>	Can use calculator (+ mental check) to calculate: %, % change, ratios, averages, solutions for simple equations.	
<b>c) ICT production (e.g. ‘Word’)</b>	Can produce a well-formatted document, including pictures & diagrams. Uses Header & Footer, paragraph headings, etc.	
<b>d) ICT analysis (e.g. ‘Excel’)</b>	Can enter data and use ‘formulae’ to calculate averages etc. Can format data to print out neatly, and create graphs with correct axes, labels, etc.	
<b>e) Lab technique.</b>	Handles standard lab-ware confidently to perform dilutions, measurements, dissection, sterile technique, etc.	
<b>f) Research Notes</b>	Extracts key points from text into notes; uses highlighter / colour; avoids sentences & copying; uses abbreviations.	
<b>g) Presentation skills;</b>	Speaks from notes without reading; maintains eye-contact; uses emphasis; maintains suitable pace; uses visual aids.	
<b>h) References</b>	Always records details of sources, and uses a standard format to list them where appropriate.	
<b>i) Terminology.</b>	Expresses both written and oral answers using scientific vocabulary, not ‘thingy-wotsits!’. Takes care to learn word-forms (e.g. ‘data’ are plural, ‘species’ both sing. & pl.)	
<b>j) Writing essays / reports.</b>	Thinks & plans before writing. Maintains logical ‘flow’. Uses concise, grammatical English & correct terms. Uses effective ‘introduction’. Always gives examples.	
<b>k) Questioning approach;</b>	Always asks if unable to relate new info’ to existing understanding. Sources not ‘taken for granted’ – spots inconsistencies etc.	
<b>l) Factual recall / learning.</b>	Absorbs detail during course (not just when revising), by relating it to existing knowledge. Can use mnemonics etc to memorise less ‘meaningful’ details.	
<b>m) Analytical thinking</b>	Sees connections between concepts. Can apply concepts in new situations. Can break a problem down into small steps. Thinks logically, aware of what is biologically plausible.	
<b>n) Group / team skills.</b>	Contributes constructively, and listens to others. Stays ‘on-task’. Values others’ comments.	

**A2. Experimental Skills.**

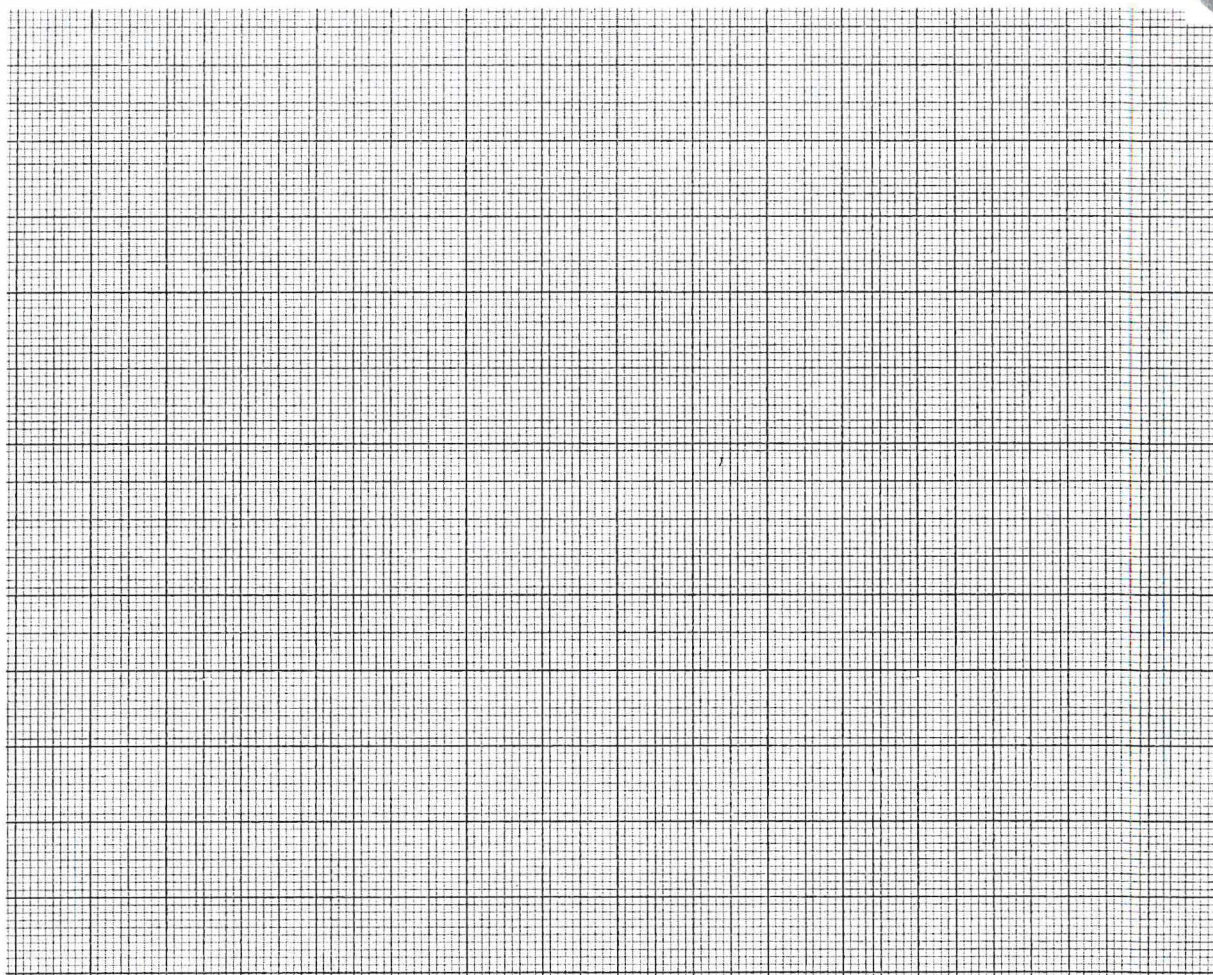
Jack read in a book that caffeine is a stimulant drug, so he wanted to see whether the human heart-rate is affected by the amount of caffeine they drink. He found five different volunteers in his year, and measured their heart rate when they first came into school in the morning. He then gave them a 200cm<sup>3</sup> cup of coffee made with either 0, 5, 10, 20 or 30 cm<sup>3</sup> of fresh espresso coffee. Ten minutes later he measured their heart rate again.

a) What is the **independent variable** in this investigation? .

b) What **equipment** would be best for measuring the coffee?

c) Here are Jack's results. Use these results to plot a graph on the grid below that will help Jack answer his original question.

Name of volunteer	Volume of coffee / cm <sup>3</sup>	Heart rate on arrival at school / beats per minute	Heart rate 10 minutes after coffee / beats per minute
Jane	0	96	82
Hannah	5	78	84
Michael	10	68	76
Elisa	20	72	78
Johannes	30	62	66



d) Briefly suggest two ways you could improve this investigation:

i)

ii)



e) Write 'T' for true or 'F' for false against each of the following statements:

i) A **graduated pipette** is the most accurate way to measure small amounts of fluid.

ii) A **Bunsen burner** should be lit with the air-hole closed.

iii) To read a **measuring cylinder** accurately, hold it up at eye-level and read from the top of the meniscus (the highest point where the fluid touches the side)

iv) The '**scientific method**' is not about proof or facts, but about making hypotheses and testing them with experiments.

v) Using a very precise instrument will ensure your data are **reliable**.

vi) A '**fair test**' is achieved by keeping all the important factors constant, other than the independent variable.

vii) The **units** should be written after every number in a results table.

A3. **Calculation.**

a) Last year, farmer Fred used **40kg** of fertiliser per hectare, this year he used **32kgHa<sup>-1</sup>**. What is the percentage change in his fertiliser use? Show your working

b) During one human heart-beat, **70cm<sup>3</sup>** of blood is ejected into the aorta. Carla's heart rate is **82** beats per minute. Calculate the rate of flow through her aorta in litres per hour.



A4. **Understanding.** Giving an example when possible, state the **function** (role) of:

a) Chloroplasts.

b) Meiosis

c) Enzymes

d) Cell membranes

*Part B- Multiple Choice on 'Expected Knowledge'*  
*Answer on the grid provided, by crossing out one letter for each question.*

- The three elements found in all organic molecules are:  
A. C, N & O                      B. C, H & O                      C. N, H & O  
D. C, H & N                      E. C, N & O
- Which of the following features are characteristics of **all enzymes**?  
I. They can only work at body temperature.  
II. They are manufactured in the gut.  
III. They each act only on particular substances.  
IV. They can each work only in a particular range of pH.  
A. I, II, III & IV.                      B. II & III only.                      C. III & IV only.  
D. I, III & IV only.                      E. I & IV only.
- To make 'lactose-free milk', normal milk is passed over beads containing the enzyme lactase. If the temperature of the reaction is increased from 30°C to 80°C for 10 minutes, and then back to 30°C, it is most likely that:  
A. The rate of reaction will not be affected by this  
B. The rate of reaction will increase and remain at the high rate  
C. The rate of reaction will increase for 10 mins, then return to the original rate  
D. The rate of reaction will decrease and remain at the low rate  
E. The rate of reaction will decrease for 10 mins, then return to the original rate
- Osmosis can be correctly described as:  
A. Diffusion of water from a strong sugar solution to a weak one.  
B. Diffusion of water across a selectively permeable membrane.  
C. Diffusion of sugar from a high concentration to a low concentration.  
D. The bursting of a cell when placed in strong sugar solution.
- When plant cells are placed in distilled water for some time, they will  
A. Swell and burst.                      B. Excrete the water via their vacuoles.  
C. Become very turgid.                      D. Dissolve                      E. Become plasmolysed.
- Which of the following can be explained by osmosis?  
A. Erection of the penis.  
B. The uptake of minerals by plant roots.  
C. The stiffness of an oak twig.  
D. The stiffness of a celery stalk.





13. A young athlete took 20 breaths per minute after doing exercise. The volume of each breath was  $2000 \text{ cm}^3$ . At each breath 20% of the inspired air was oxygen and 16% of the expired air was oxygen. What volume of oxygen was the athlete absorbing per minute?  
A  $40 \text{ cm}^3$     B  $1600 \text{ cm}^3$     C  $4000 \text{ cm}^3$     D  $16\,000 \text{ cm}^3$     E  $40\,000 \text{ cm}^3$
14. Which substance is mainly responsible for carrying oxygen in the blood?  
A. Fibrinogen    B. Glucose    C. Glycogen    D. Haemoglobin
15. The function of the white blood cells called phagocytes is to  
A. Carry oxygen.  
B. Carry carbon dioxide.  
C. Make the blood clot at the site of injury.  
D. Produce antigens.  
E. Engulf invading micro-organisms.
16. Which of the following descriptions accurately describes blood in a vein in the leg?  
A. Low pressure, low oxygen, flowing in pulses.  
B. High carbon dioxide, high pressure, no pulses.  
C. High oxygen, high pressure, flowing in pulses.  
D. High carbon dioxide, low pressure, no pulses.
17. Which of these is a correct pathway for blood in a mammal? (each arrowhead represents flow through **vessels** only, not heart chambers or other organs).  
A. Left ventricle  $\rightarrow$  body organs  $\rightarrow$  right atrium.  
B. Left ventricle  $\rightarrow$  lungs  $\rightarrow$  right atrium.  
C. Right atrium  $\rightarrow$  lungs  $\rightarrow$  left ventricle.  
D. Right ventricle  $\rightarrow$  lungs  $\rightarrow$  right atrium.  
E. Right ventricle  $\rightarrow$  body organs  $\rightarrow$  left atrium.
18. Which substance is mainly responsible for carrying oxygen in the blood?  
A. Fibrinogen    B. Glucose    C. Glycogen    D. Haemoglobin
19. Which of the following would result in glucose being excreted in the urine?  
A. Eating a large meal with extra protein.  
B. Eating a packet of sweets.  
C. Vigorous exercise (e.g. a squash game).  
D. Production of too little insulin.  
E. An increase in blood pressure.

20. Which one of the following statements is correct?
- Stimuli are nervous impulses from receptors.
  - Responses are changes in the internal or external environment.
  - Receptors are chemicals that carry messages in the bloodstream.
  - Effectors are muscles and glands that respond to a stimulus.
  - Neurones are sensory cells that detect stimuli.
21. Our understanding of evolution would be seriously undermined by the discovery of
- A fossilised animal with a combination of human and ape features
  - A gene with the same function in both humans and daisies
  - A human fossilised in the same rock as a dinosaur
  - An ape which can be taught human sign language
  - A fossil with feathers on both front and hind limbs
22. Which of the following does NOT form part of the theory of evolution proposed by Darwin & Wallace?
- All organisms can produce more offspring than needed to replace the parents
  - Organisms show variation in their features
  - During their life, organisms adapt themselves to their environment
  - Offspring inherit features from their parents
  - Some offspring are more likely to survive and breed than others
23. Which combination of features can be found **only** in cells from the plant kingdom.
- Membrane, mitochondria and nucleus.
  - Cytoplasm, nucleus, and cell membrane.
  - Mitochondria, nucleus and chloroplasts.
  - Storage granules, nucleus & cytoplasm.
  - Mitochondria, nucleus and cell wall.
24. If a multicellular organism is found which has cells without chloroplasts but with nuclei and cell walls made of chitin, what Kingdom does it belong to?
- Animals
  - Plants
  - Fungi
  - Bacteria / Prokaryotae
  - Protoctista
25. Arthropods can be distinguished from all other invertebrates because they have
- fur.
  - antennae
  - segmented bodies.
  - jointed legs.
  - a hard external covering.

End of Review

**IB Biology (Higher Level) Flying Start Exercise**  
(to be completed by the time of your first lesson)

1. Complete the following table for the classification of some examples of diseases by stating whether each is inherited, infectious, degenerative, immunological or congenital:

Disease	Classification
1. Cystic fibrosis	
2. Down's syndrome	
3. Ebola	
4. Parkinson's Disease	
5. Multiple Sclerosis	
6. Rheumatoid Arthritis	
7. Dementia	
8. Malaria	
9. Motor Neurone Disease	
10. Microencephaly (caused by the zika virus)	

(10 marks)

2. Blood pressure decreases from 15 to 3 units as it moves from the capillaries into the veins. Calculate the percentage decrease in blood pressure when blood moves from the capillaries into the veins. Show your working.

(2 marks)

3. Look at the following table for different coloured birds. If you have 30 black birds then how many red and blue birds do you have?

Red	Black	Blue
3	2	1
	30	

(2 marks)

4. Look at the following table for two types of carbohydrates: starch and maltose which is present in the ratio of 14: 29. If there was 145mg maltose, complete the table by calculating the quantity (weight) for starch in mg.

	Starch	Maltose
Weight (mg)		145
Ratio	14	29

(2 marks)

5. Which one of the following is the range of this data? Tick the correct answer.

**25, 16, 18, 10, 12, 16, 17**

- 12 to 16
- 10 to 17
- 10 to 25
- 25 to 17

(1 mark)

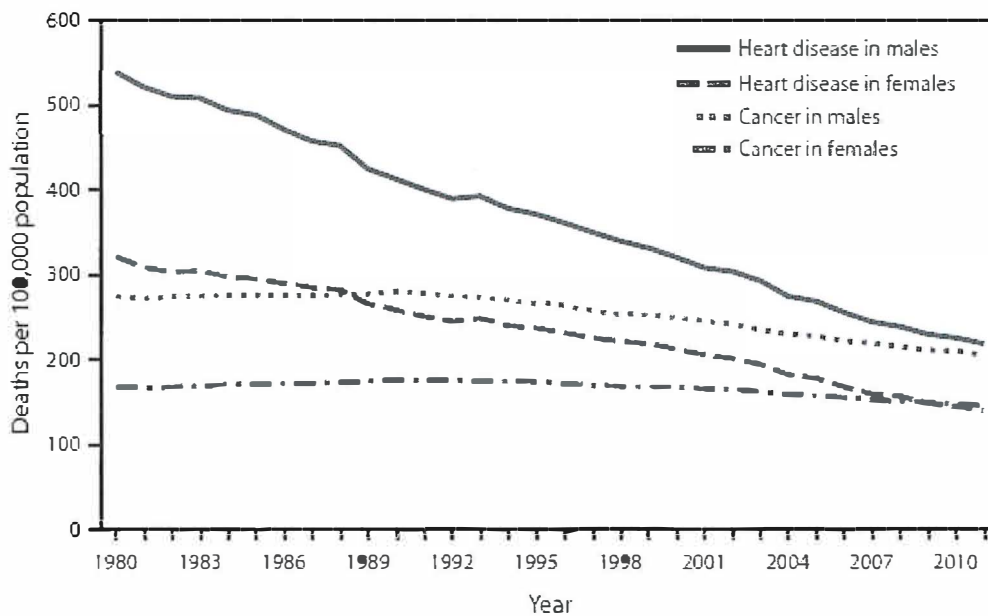
6. Calculate the range of the following data. Tick the correct answer.

**12, 14, 16, 13, 17, 19**

- Six
- Seven
- Eight
- Nine

(1 mark)

7. The line graph below represents the number of deaths per 100,000 men and women who died from heart disease and cancer between 1980 and 2010.



a. Calculate the % decrease in deaths from heart disease in females from 1983 to 2004.

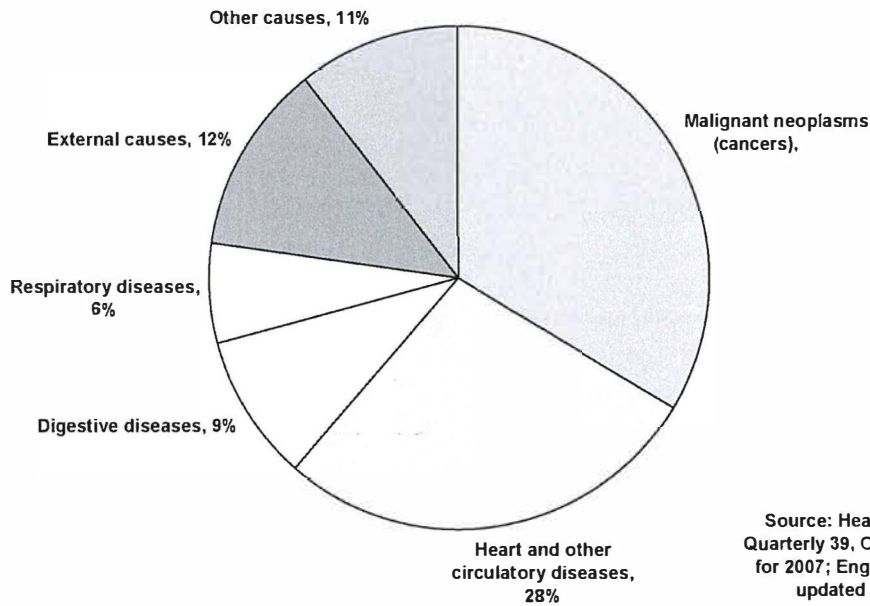
(2 marks)

b. Calculate the difference in cancer deaths between men and women in 1980.

(2 marks)

8. The pie chart below represents the causes of death in men aged 25-64 from 2009.

**The two biggest causes of death among men aged 25 to 64 are cancers and circulatory diseases (including heart disease)**

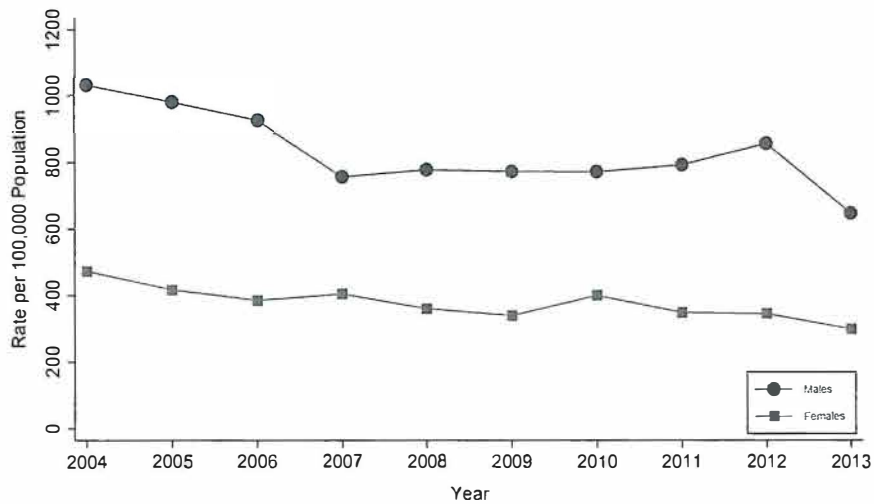


Source: Health Statistics Quarterly 39, ONS; the data is for 2007; England & Wales; updated Jun 2009

a. What are the two lowest causes of death in the age group? (1 mark)

b. Calculate the percentage of deaths caused by malignant neoplasms? Show your working. (2 marks)

9. The line graph below represents the rate of ischaemic heart disease in both men and women between years 2004 to 2013.



- a. What is the rate of this ischaemic heart disease per 100,000 population for women between 2007 and 2010? (1 mark)
- b. Calculate the average rate per 100,000 per year for men between 2005 and 2011. Assume that the incidence rate for 2005 is 1000 per 100,000. Show your working. (2 marks)
10. One elephant costs the same as ninety nine flamingos. If the price of flamingos increases by 10% and the price of elephants decreases by 10%, how many flamingos are now needed to buy one elephant? (2 marks)

<b>Total Score =    /30</b>
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