- 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

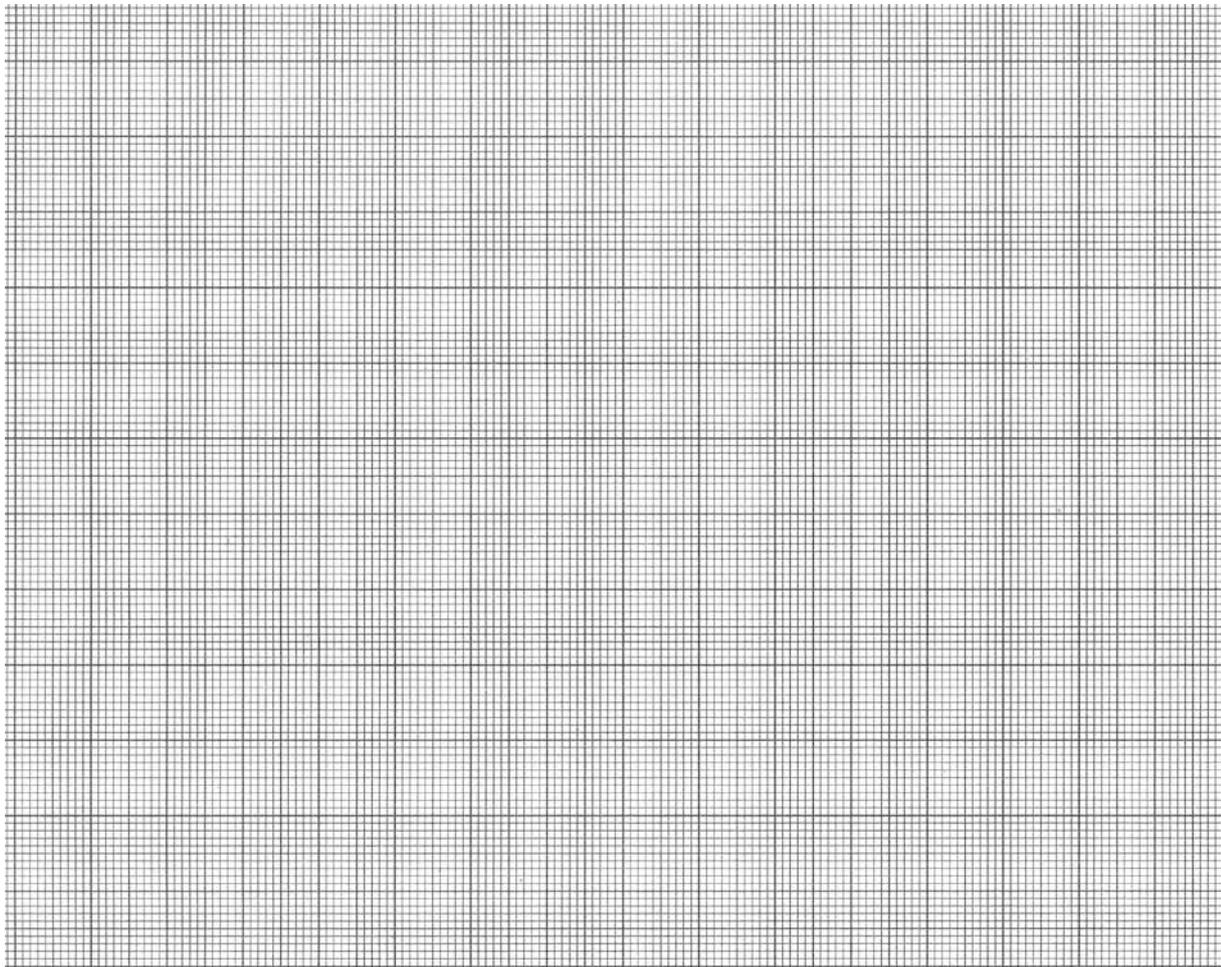| Skill	Description	Rating
a) **Graph plotting**	Plots graphs accurately, and with correctly labelled axes. Chooses the correct format for the data, and adds a best-fit line when appropriate.	
b) **Calculations.**	Can use calculator (+ mental check) to calculate: %, % change, ratios, averages, solutions for simple equations.	
c) **ICT production (e.g. 'Word')**	Can produce a well-formatted document, including pictures & diagrams. Uses Header & Footer, paragraph headings, etc.	
d) **ICT analysis (e.g. 'Excel')**	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.	
e) **Lab technique.**	Handles standard lab-ware confidently to perform dilutions, measurements, dissection, sterile technique, etc.	
f) **Research Notes**	Extracts key points from text into notes; uses highlighter / colour; avoids sentences & copying; uses abbreviations.	
g) **Presentation skills;**	Speaks from notes without reading; maintains eye-contact; uses emphasis; maintains suitable pace; uses visual aids.	
h) **References**	Always records details of sources, and uses a standard format to list them where appropriate.	
i) **Terminology.**	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.)	
j) **Writing essays / reports.**	Thinks & plans before writing. Maintains logical 'flow'. Uses concise, grammatical English & correct terms. Uses effective 'introduction'. Always gives examples.	
k) **Questioning approach;**	Always asks if unable to relate new info' to existing understanding. Sources not 'taken for granted' – spots inconsistencies etc.	
l) **Factual recall / learning.**	Absorbs detail during course (not just when revising), by relating it to existing knowledge. Can use mnemonics etc to memorise less 'meaningful' details.	
m) **Analytical thinking**	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.	
n) **Group / team skills.**	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^3 cup of coffee made with either 0, 5, 10, 20 or 30 cm^3 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^3	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 **40**kg of fertiliser per hectare, this year he used **32**kgHa^{-1}. What is the percentage change in his fertiliser use? Show your working

b) During one human heart-beat, 70cm^3 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 <u>crossing out one letter</u> for each question.

1.   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

2.   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.

3.   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

4.   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.

5.   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.

6.   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.

7.   Choose the correct combination from the table below to complete this passage: "As a baby boy grows, his cells divide by -P-. When he is mature, his testes start to produce sperm by -Q-. At fertilisation the sperm and egg join to form a -R- which divides by -S-.

Answer	P	Q	R	S
A	mitosis	meiosis	zygote	mitosis
B	meiosis	mitosis	zygote	meiosis
C	meiosis	meiosis	embryo	mitosis
D	mitosis	meiosis	embryo	mitosis
E	meiosis	mitosis	embryo	meiosis

8.   What chromosomes are present in an unfertilised human egg cell?

A. 23 pairs plus X and Y.   B. 22 pairs plus X and Y.

C. 23 plus X and Y.   D. 22 plus Y.   E. 22 plus X.

9.   Which of the following is an example of genetic engineering?

A.   Matching DNA from suspect's blood sample with that from the crime scene.

B.   Extracting DNA from an unborn foetus to diagnose genetic disease.

C.   Washing a bald scalp with shampoo containing DNA from bacteria.

D.   Making strawberries resistant to frost with DNA from arctic fish.

E.   Producing insulin by solvent extraction from pigs' pancreases.

10.   Choose the correct combination of words from the table below to complete this passage: "Genetic information is held in the -P- of a cell, as long molecules of -Q-. Sections of these molecules are called -R- and act as coded instructions for making -S-.

Answer	P	Q	R	S
A	Chloroplasts	Protein	Chromosomes	Genes
B	Cytoplasm	DNA	Genes	Proteins
C	Cytoplasm	Protein	Chromosomes	Genes
D	Nucleus	Protein	Chromosomes	Genes
E	Nucleus	DNA	Genes	Proteins

11.   If there are 'n' different types of amino acid in living things and a cell makes a protein 'q' amino acids long, the number of possible combinations is

A   n x q   B q^n C $q(n^2)$

D   q x n!   E n^q

12.   In mammals, **gas exchange** occurs mainly in the

A.   Larynx   B. Trachea   C. Bronchi

D.   Alveoli   E. Diaphragm

13.   A young athlete took 20 breaths per minute after doing exercise. The volume of each breath was 2000 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 cm^3 B 1600 cm^3 C 4000 cm^3 D 16 000 cm^3 E 40 000 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 →body organs → right atrium.
   B.   Left ventricle → lungs → right atrium.
   C.   Right atrium → lungs → left ventricle.
   D.   Right ventricle → lungs → right atrium.
   E.   Right ventricle → body organs → 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?
   A. Stimuli are nervous impulses from receptors.
   B. Responses are changes in the internal or external environment.
   C. Receptors are chemicals that carry messages in the bloodstream.
   D. Effectors are muscles and glands that respond to a stimulus.
   E. Neurones are sensory cells that detect stimuli.

21. Our understanding of evolution would be seriously undermined by the discovery of
   A. A fossilised animal with a combination of human and ape features
   B. A gene with the same function in both humans and daisies
   C. A human fossilised in the same rock as a dinosaur
   D. An ape which can be taught human sign language
   E. 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?
   A. All organisms can produce more offspring than needed to replace the parents
   B. Organisms show variation in their features
   C. During their life, organisms adapt themselves to their environment
   D. Offspring inherit features from their parents
   E. 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.
   A. Membrane, mitochondria and nucleus.
   B. Cytoplasm, nucleus, and cell membrane.
   C. Mitochondria, nucleus and chloroplasts.
   D. Storage granules, nucleus & cytoplasm.
   E. 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?
   A. Animals   B. Plants   C. Fungi
   D. Bacteria / Prokaryotae   E. Protoctista

25. Arthropods can be distinguished from all other invertebrates because they have
   A. fur.   B. antennae   C. segmented bodies.
   D. jointed legs.   E. a hard external covering.

End of Review