A list of the IB biology assessment statements that ask for students to be able to draw or diagram:

Core

1. Prokaryotic cell (1.2.S1)
2. Eukaryotic cell (pancreas exocrine gland or leaf palisade, 1.2.S2)
3. Fluid mosaic model (1.3.S1)
4. Stages of mitosis
5. Molecules
    1. Glucose (2.1.S1)
    2. Ribose (2.1.S1)
    3. Saturated fatty acid (2.1.S1)
    4. Generalized amino acid (2.1.S1)
    5. Water
    6. formation of a peptide bond (2.4.S1)
    7. Nucleotide (2.6.S1)
6. Stages of meiosis (3.3.S1)
7. Absorption spectrum (2.9.S1)
8. Action spectrum (2.9.S1)
9. Carbon cycle (4.3.S1)
10. Digestive system (6.1.S1)
11. Heart structure (6.2.S2)
12. Male and female reproductive systems (6.6.S1)

AHL

13. Mitochondrion (8.2.S2)
14. Chloroplast (8.3.S1)
15. Xylem vessels (9.1.S1)
16. Internal structure of a seed (9.4.S1)
17. Cross section of a flower (9.4.S2)
18. Chiasmata during crossing over (10.1.S1)
19. Sarcomere (11.2.S2)
20. Human elbow (11.2.S1)
21. Human kidney (11.3.S1)
22. Nephron (11.3.S2)
23. Seminiferous tubule (11.4.S1)
24. Ovary (11.4.S1)
25. Sperm (11.4.S2)
26. Egg (11.4.S2)

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

A list of the IB biology assessment statements that ask for students to be able to graph:

Core

1. Surface area to volume ratio vs. cell size
2. Change in mass in different molarity solutions
3. Enzyme and activation energy
4. Effect of variable on enzyme activity:
    1. Temperature
    2. pH
    3. Substrate concentration
5. Effect of variable on photosynthesis rate:
    1. Temperature
    2. Light intensity
    3. CO2 concentration
6. Absorption spectrum
7. Action spectrum
8. Pedigrees
9. Pyramids of energy
10. CO2 and/or temperature over time
11. Continuous vs discrete variation
12. Cladograms
13. Pressure changes in the heart chambers during cardiac cycle
14. Action potential
15. Menstrual cycle hormones over time

AHL

16. Enzyme activation energy
17. Competitive and noncompetitive inhibition vs substrate concentration
18. Animal size vs development of young at birth
19. Effect of variable on transpiration rate:
    1. Temperature
    2. Light intensity
    3. CO2 concentration
20. Directional, stabilizing and disruptive selection
21. Antibodies concentration over time after infection/vaccination

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

A list of skills mentioned in the IB biology assessment statements:

(those in red are associated with the prescribed practicals)

1. Math and statistics
    1. Mean
    2. Standard deviation
    3. Correlation
    4. T-test
    5. Chi-square
    6. Graphing
2. Calculating surface area, volume and ratio
3. Use of a light microscope to investigate the structure of cells and tissues
4. Drawing cell structures as seen with the light microscope or electron micrograph
5. Calculate magnification of drawings and/or calculate actual size of samples given magnification
6. Interpret electron micrographs to:
    1. Identify organelles
    2. Determine cell function (exocrine gland cell or leaf palisade cell)
    3. Identify phases of mitosis
    4. Identify tissue layers of the small intestine
    5. Identify blood vessels as arteries, capillaries or veins
    6. Identify polysomes
    7. Determine state of a muscle contraction
    8. Identify exocrine gland cells
    9. Identify villus epithelium cells
    10. Identify pneumocytes, capillary and blood cells in lung tissue
    11. Identify xylem and phloem vessels
7. Estimate osmolarity
8. Determine mitotic index
9. Determine BMI
10. Identify molecules based on structure:
    1. Glucose
    2. Ribose
    3. Saturated fatty acid
    4. Generalized amino acid
    5. Water
    6. Cellulose
    7. Starch
    8. Glycogen

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

9. Triglycerides
10. Fatty acids
11. Ribosomes
12. tRNA

11. Controlled experiment to test variable on enzyme activity
12. Use of a genetic code table
13. Analysis of cell respiration rates (germinating seeds or invertebrates with respirometer)
14. Pigment chromatography
15. Controlled experiment to test variable on photosynthesis rate
16. Database comparison of DNA base sequences of a gene between two species
17. Interpreting a karyotype (for sex and Down Syndrome)
18. Using database (like NCBI) to BLAST a gene sequence to find the protein for which it codes
19. Analyzing pedigree charts
20. Creating Punnett Squares
21. Chi-square of genetic data (goodness of fit)
22. Interpreting DNA profiles
23. Testing sustainability of a mesocosm
24. Quadrat sampling
25. Chi-square of association between species
26. Analysis of CO2 and temperature data to assess impact of enhanced greenhouse effect
27. Classification of animals and plants (at phylum level) given characteristics
28. Construct and/or interpret a dichotomous key
29. Analysis of cladograms to determine evolutionary relationships
30. Dialysis tubing to model absorption in the small intestine
31. Monitoring ventilation at rest vs exercise
32. Calculating rate of enzyme reaction
33. Identifying type of inhibitor from a graph
34. Measuring transpiration rate using potometers
35. Modeling water transport in xylem using simple apparatus including blotting or filter paper, porous pots and capillary tubing.
36. Analysis of phloem transport data
37. Designing experiment to test factor affecting germination
38. Identify recombinants
39. Comparing allele frequencies in populations
40. Analysis of epidemiological data related to vaccination programs
41. Use of nutrition databases
42. Measuring heart rate
43. Interpreting systolic and diastolic blood pressure
44. Analysis of epidemiological data related to coronary heart disease

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

A list of cell types mentioned in the IB biology assessment statements:

Core

1. Stem cells
2. Striated muscle cell
3. Giant algae
4. Fungal hyphae
5. Paramecium
6. Prokaryotic cell
7. E. coli (as a representative prokaryotic cell)
8. Eukaryotic cell
9. Exocrine gland cell of pancreas
10. Leaf palisade mesophyll cell
11. Egg cell
12. Sperm cell
13. Haploid cell
14. Diploid cell
15. Zygote
16. Methanogenic archaeans
17. Villi epithelial cell
18. Platelet
19. Phagocytic white blood cells
20. Lymphocytes
21. Type 1 pneumocyte
22. Type 2 pneumocyte
23. Neuron
24. Effector cell
25. Alpha cell
26. Beta cell

AHL

27. Xylem vessel
28. Meristem cell
29. B lymphocyte
30. T lymphocyte
31. Plasma B cell
32. Memory B cell
33. Skeletal muscle fiber

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

A list of molecules mentioned in the IB biology assessment statements:

1. Carbohydrate
    1. Monosaccharide
        1. Glucose
        2. Ribose
    2. Disaccharide
        1. Lactose
        2. maltose
    3. Polysaccharide
        1. Cellulose
        2. Starch
        3. glycogen
2. Lipid
    1. Phospholipids
    2. Cholesterol
        1. Cholesterol derived hormones
            1. Testosterone
            2. Estrogen
            3. Progesterone
    3. Fatty acid
        1. Saturated
        2. Unsaturated
            1. Monounsaturated
            2. Polyunsaturated
            3. Cis-
            4. trans-
    4. triglycerides
3. Nucleic acid
    1. Nucleotide
        1. Dideoxynucleotide
    2. DNA
        1. Genes
            1. Oncogene
            2. Sickle cell gene
            3. Sex linked (color blindness and hemophilia)
            4. Cystic fibrosis
            5. Huntington's
            6. PKU
        2. Non- coding regions
            1. Tandem repeats

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

        2. promoter
    3. Chromosome (autosome vs sex)
        1. Nucleosome
        2. Chromatids
        3. homologous
    4. Plasmid
3. RNA
    1. mRNA (codon)
    2. tRNA (anticodon)

4. Protein
    1. Amino acid
    2. Polypeptide
    3. Membrane proteins
        1. Integral protein
        2. Peripheral protein
    4. Named enzymes:
        1. Helicase
        2. Gyrase
        3. Primase
        4. DNA polymerase III
        5. DNA polymerase I
        6. Ligase
        7. RNA polymerase
        8. tRNA activating enzymes (amino-acyl tRNA synthase)
        9. Taq Polymerase
        10. Rubisco
        11. Immobilized enzymes
        12. Restriction enzymes (endonucleases)
        13. ATP synthase
        14. Carboxylase
        15. Amylase
        16. Lipase
        17. Protease (pepsin and trypsin)
    5. Named hormones
        1. Insulin
        2. Glucagon
        3. Thyroxin
        4. Leptin
        5. Melatonin
        6. Epinephrine

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

7. FSH
8. LH
9. HCG
10. ADH
11. Oxytocin
12. Growth hormone
13. Prolactin
14. auxin

6. Named pigments
    1. Rhodopsin
    2. chlorophyll
7. Named transport proteins
    1. Sodium-potassium pump
    2. Potassium channel
    3. Hemoglobin
    4. Fetal hemoglobin
    5. Myoglobin
    6. Ferritin
8. Structural proteins:
    1. Silk
    2. Collagen
    3. Histones
    4. Single stranded binding proteins
9. Contraction related:
    1. Actin
    2. Myosin
    3. Tropomyosin
    4. troponin
10. Immune system related
    1. Immunoglobulin
    2. antibodies
    3. Fibrinogen
    4. Fibrin
    5. Thrombin
    6. Histamine
    7. Antigen
11. Other examples:
    1. Cyclins

5. Carbon cycle related
    1. Methane

2. Calcium carbonate
3. Nitrogen oxides

6. Cell respiration related
    1. Oxygen (O2)
    2. pyruvate
    3. ATP
    4. acetly-CoA
    5. NAD
    6. FAD
    7. Protons
    8. electrons
    9. Ethanol
    10. CO2
    11. Lactate
7. Photosynthesis related
    1. NADP
    2. Photosystems
    3. RUBP (ribulose bisphosphate)
    4. PGA (glycerate 3-phosphate)
    5. G3P (triose phosphate)
8. Important ions
    1. Sodium ion
    2. Potassium ion
    3. Calcium ion
    4. Phosphate group
    5. Iron
9. Other molecules
    1. Urea
    2. Water
    3. Glycerol
    4. Penicillin
    5. HIV virus
    6. Acetylcholine
    7. Neonicotinoid pesticides
10. Nutrition related
    1. “Vitamins”
    2. “Essential”
    3. ascorbic acid
    4. Vitamin D

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

A list of scientists mentioned in the IB biology assessment statements:

1. Davison-Danielli
2. Singer-Nicolson
3. Pasteur
4. Crick and Watson
5. Meselson and Stahl
6. Cairn
7. Mendel
8. William Harvey
9. Galen
10. Florey and Chain
11. Franklin and Wilkins
12. Hershey and Chase
13. Calvin
14. Thomas Hunt Morgan
15. Jenner
16. William Beaumont

Implied, but not specifically named:

- Van Beneden (discovery of meiosis)
- Wohler (disproving vitalism)

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

Making exams easier – some hints

Also go to: https://docs.google.com/presentation/d/1oMnL5r8jpAhWPYmc-90H_8E0fJfmv5g5KAtplhQsbwE/edit?usp=sharing

Paper 1:

- Duration: 45 mins (HL 1 hour)
- Marks: 30 (HL 40)
- 3 (HL 40) multiple-choice questions on core (and AHL) material
- The questions on paper 1 test assessment objectives 1, 2 and 3
- The use of calculators is not permitted
- Answer every question! There is no penalty for an incorrect answer. So, narrow down the answer choices, and if you must... then **guess**!

Tips for Paper 1:

1. **Read the question carefully**. Note important terms.
2. Cover the answer choices! Try to **answer the question before you read the options**. This prevents you from becoming "muddled" with wrong answers.
3. Eliminate - Eliminate - Eliminate
4. Only change answers if you are ABSOLUTELY SURE the current answer is incorrect. **Don't second guess yourself!**
5. **Avoid patterns** (i.e. selecting "C" because there hasn't been one in a while)
6. On the actual exam, you'll be able to write on the test. Mark it up like crazy!

Paper 2:

- Duration: 1 ¼ hours (HL 2 1⁄4 hours)
- Weighting: 36%
- Marks: 50 (HL 72)
- The questions on paper 2 test assessment objectives 1, 2 and 3
- The use of approved calculators is permitted.
- Section A: Data-based question, short-answer and extended-response questions on core (and AHL) material
- Section B: Choice of two out of three extended response questions on core (and AHL) material

Tips for Paper 2:

Rephrase what the question is asking to do... for example:

"Outline the mechanisms used by the ileum epithelial cells to absorb specific food molecules."

- OUTLINE: give a brief account or summary
- MECHANISMS: processes or functions of
- ILEUM: small intestine
- EPITHELIAL CELLS: cells that line the surface
- ABSORB: take in

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

- SPECIFIC … MOLECULES: named example molecules

Tips for Paper 2 Section B:

Read the question options carefully and select which you will answer. Your "gut instinct" for which questions to answer might not be the best. Take a few minutes to think of answers to EACH question before selecting the one you feel like you can best respond. Remember, you want to select the question in which you know the most *overall* about parts A, B and C. Be sure you know what the question is asking. For example, don't answer a question about speciation with a response about the limitations of the term species.

Once you have selected which question you will respond to, begin writing anoutline to your response to each part. Pay attention to the command terms, so you actually address what the question is asking. The command term "discuss" is one in which students often mistakenly "explain." When asked to discuss, be sure you address alternative hypothesis and/or give arguments for and against a claim. If you are asked to "compare", be sure to include both similarities and differences and to include differences for both items. For example, if asked to compare spermatogenesis and oogenesis, you would not get a point for saying, "spermatogenesis creates 4 sperm." You would get a point for saying, "spermatogenesis creates 4 sperm, whereas oogenesis forms only 1 egg."

Each question includes the maximum number of points possible. As you are drafting your response, predict how points will be awarded on the mark scheme The general rule of thumb is that the mark scheme used by the assessors will have 1.5X the number of "point earning" ideas as there are points that the question is worth. For example, if a question is worth 5 points, aim for AT LEAST8 ideas. You will not earn more than 5 points but including extra responses is a good idea (just don't contradict yourself).

Use the following as a guide:

1. Define any key terms in the question.
2. Where does the process happen? (In what type of cell? In what system? Where in the ecosystem?)
3. What happensWhat is the outcome of the process?
4. How does the process happen? Think of drafting a flow chart to show the process.
5. When does the process happen? What triggers the event?
6. Why is this process important? What is the reason, purpose, and/or benefit?
7. Give an example.
8. Draw a labeled diagram.
9. Are there any pros/cons? Alternatives? Limitations?

Write your final response using your outline as a guide. Be sure to use **legible** handwriting that is

dark enough to read from a scanned image. If your response is illegible or not visible, you will not earn points.

Lastly, include a sentence for each prompt (A, B and C) that ties the prompt to the others in the question. You can earn two "quality of construction" points for a response that connects the parts of the question together.

Source: https://www.biologyforlife.com/external-exam.html, 3.3.2021

Glossary of command terms

Command terms with definitions

Students should be familiar with the following key terms and phrases used in examination questions. Although these terms will be used frequently in examination questions, other terms may be used to direct students to present an argument in a specific way.

These command terms indicate the depth of treatment required.

Assessment objective 1

Define	Give the precise meaning of a word, phrase, concept or physical quantity.
Draw	Represent by means of a labelled, accurate diagram or graph, using a pencil. A ruler (straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted (if appropriate) and joined in a straight line or smooth curve.
Label	Add labels to a diagram.
List	Give a sequence of brief answers with no explanation.
Measure	Obtain a value for a quantity.
State	Give a specific name, value or other brief answer without explanation or calculation.

Assessment objective 2

Annotate	Add brief notes to a diagram or graph.
Calculate	Obtain a numerical answer showing the relevant stages in the working (unless instructed not to do so).
Describe	Give a detailed account.
Distinguish	Make clear the differences between two or more concepts or items.
Estimate	Obtain an approximate value.
Identify	Provide an answer from a number of possibilities.
Outline	Give a brief account or summary.

Assessment objective 3

Analyse	Break down in order to bring out the essential elements or structure.
Comment	Give a judgment based on a given statement or result of a calculation.
Compare	Give an account of the similarities between two (or more) items or situations, referring to both (all) of them throughout.
Compare and contrast	Give an account of similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.
Construct	Display information in a diagrammatic or logical form.
Deduce	Reach a conclusion from the information given.
Design	Produce a plan, simulation or model.
Determine	Obtain the only possible answer.
Discuss	Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence.
Evaluate	Make an appraisal by weighing up the strengths and limitations.
Explain	Give a detailed account including reasons or causes.
Predict	Give an expected result.
Sketch	Represent by means of a diagram or graph (labelled as appropriate). The sketch should give a general idea of the required shape or relationship, and should include relevant features.
Suggest	Propose a solution, hypothesis or other possible answer.