Worksheet 1 - ATP Structure and Cell Work

IB Biology C1.2 - Trimester assessment practice
SL core emphasis with IB-style questioning.

IB Biology C1.2	**Total marks:** 24
Suggested time: 40 minutes	**Name:** _____ **Class:** _____ **Date:** _____

Section A - Multiple choice

Q1. Which statement correctly describes ATP? [1]

A. ATP is a polysaccharide used for long-term energy storage.

B. ATP is a nucleotide made of adenine, ribose and three phosphate groups.

C. ATP is a protein that transports electrons in mitochondria.

D. ATP is only made during photosynthesis.

Q2. Why is ATP suitable as an energy currency in cells? [1]

A. It stores energy permanently and is not recycled.

B. Its phosphate groups are negatively charged, making the terminal bond relatively easy to hydrolyse.

C. It can only be used for active transport.

D. It contains carbon dioxide in its structure.

Q3. Which process directly uses ATP? [1]

A. Diffusion through a membrane

B. Active transport across membranes

C. Passive water movement by osmosis

D. Gas exchange in the lungs

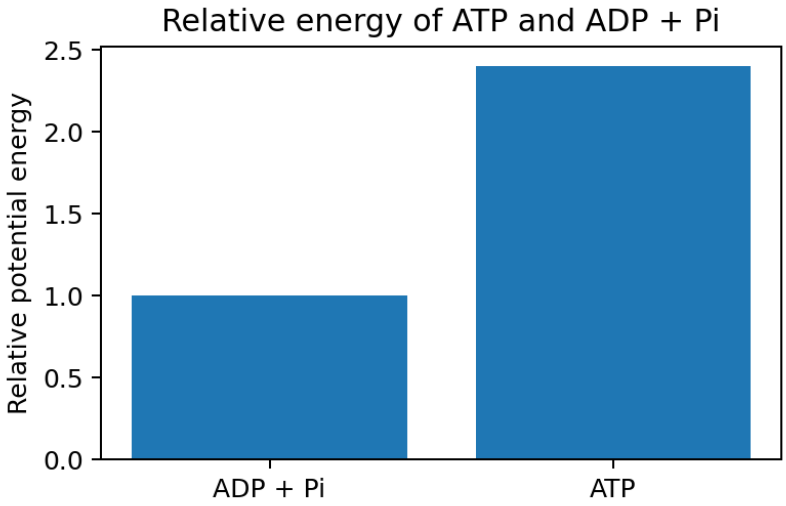
Section B - Short answer

Q4. Describe the structure of ATP and explain how this structure is linked to its function. [4]

Q5. State three types of cellular work that ATP supplies with energy. [3]

Section C - Data response / case study

A biologist compared the relative potential energy of ADP + Pi and ATP in a cell extract.



Q6.

(a) State which molecule has the higher potential energy. [1]

(b) Explain why ATP has the higher potential energy shown in the graph. [2]

(c) Predict what happens to energy when ATP is hydrolysed to ADP and phosphate. [2]

(d) Explain why ATP is described as a renewable resource in the cell. [3]

Section D - Extended response

Q7. Explain why ATP, rather than glucose, is used directly to distribute energy inside cells. [6]

Continue on extra paper if needed.

Answer key and marking guidance

Teacher guidance is indicative and is designed for classroom assessment practice rather than as an official IB markscheme.

Section A - Multiple choice

Q1. Correct answer: **B**. Award [1] for B only.

Q2. Correct answer: **B**. Award [1] for B only.

Q3. Correct answer: **B**. Award [1] for B only.

Section B - Short answer

Q4. Indicative answer:

- ATP is adenosine triphosphate, a nucleotide.

- It contains adenine, ribose and three phosphate groups.

- The final phosphate bonds are associated with a high energy transfer potential because the phosphate groups repel one another.

- Hydrolysis of ATP to ADP + Pi releases usable energy for cellular work.

Marking guidance: [1] ATP named / nucleotide ; [1] adenine + ribose + three phosphates ; [1] high-energy transfer bond / phosphate repulsion ; [1] hydrolysis releases usable energy

Q5. Indicative answer:

- Active transport across membranes

- Synthesis of macromolecules / anabolism

- Movement of whole cells or cell parts such as cilia, flagella or chromosomes

Marking guidance: Award [1] for each correct example, maximum [3].

Section C - Data response / case study

Q6.

(a) **Answer:** ATP.

(a) **Marking guidance:** [1] ATP

(b) **Answer:** ATP contains an additional phosphate linked by a high-energy transfer bond. Energy is required to form this bond when ADP and phosphate are combined.

(b) **Marking guidance:** [1] extra phosphate / high-energy bond, [1] energy required to form ATP

(c) **Answer:** Energy is released and can be used for cellular work such as transport, movement or biosynthesis.

(c) **Marking guidance:** [1] energy released, [1] linked to cellular work

(d) **Answer:** ATP is continuously hydrolysed to ADP and phosphate, then regenerated from ADP and phosphate using energy released by respiration. Cells do not store large amounts of ATP, so the ATP cycle must turn continuously.

(d) **Marking guidance:** [1] ATP hydrolysed to ADP + Pi, [1] regenerated using energy from respiration, [1] continuous cycle / not stored in large amounts

Section D - Extended response

Q7. Indicative content for a high-scoring response:

- Glucose contains stored energy but cannot be used directly for most cellular tasks.

- ATP is a small, mobile molecule that can be hydrolysed rapidly wherever needed.

- Hydrolysis of ATP releases manageable amounts of energy.

- ATP couples energy release to specific tasks such as active transport and biosynthesis.

- ATP is regenerated continually from ADP and phosphate using energy from respiration.

- This makes ATP a short-term energy carrier rather than a long-term fuel store.

Suggested level guidance:

- 5-6: Scientifically accurate, well linked explanation using correct terminology and relevant examples or evidence.
- 3-4: Some correct biology with partial linkage between ideas; minor omissions or limited detail.
- 1-2: Limited or fragmented response with a few correct points only.
- 0: No relevant content.