

LEVEL 3 ALTERNATIVE ACADEMIC QUALIFICATION
CAMBRIDGE ADVANCED NATIONAL IN

APPLIED SCIENCE

Gap Task

Preface

Applied Science requires you to understand many aspects of the GCSE Science Course that you have recently completed. While we are looking forward to teaching these to you from September, having as deep an understanding of them, before you arrive, would be beneficial. To this end, your Applied Science Gap Task involves watching the following videos and having a go at the following questions.

Please bring your answers to the first lesson.

Biology

Cell Structure: <https://www.youtube.com/watch?v=qHkUOIC8Nbo>

Characteristics of Living Things: <https://www.youtube.com/watch?v=aGDFNZApXXI>

Converting between Units of Distance: <https://www.youtube.com/watch?v=rJrR8h-DtA>

Chemistry

Atoms: <https://www.youtube.com/watch?v=zuQ469vjwgo>

Elements and Isotopes: <https://www.youtube.com/watch?v=-FBk8cNvJds>

Compounds, Molecules and Mixture: <https://www.youtube.com/watch?v=E15yF8dNGr8>

Physics

Energy Stores and Transfers: <https://www.youtube.com/watch?v=JGwcDCeYRYo>

Kinetic Energy: <https://www.youtube.com/watch?v=WrfCHt21kVA>

Gravity, Weight and Gravitational Potential Energy: <https://www.youtube.com/watch?v=rNS-W7k0jts>

Have questions? Please send your questions to info@guiseleyschool.org.uk

Cells Structure Video Questions

1. Which of the following are **Eukaryotes**? (Select all that apply)

- A. Plants
- B. Animals
- C. Bacteria

2. The _____ contains the cell's genetic material (in the form of DNA), and so controls the cell's activities.

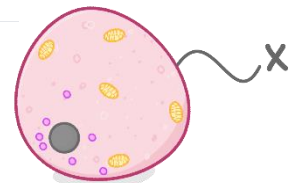
- A. Mitochondria
- B. Nucleus
- C. Cell membrane
- D. Cytoplasm

3. The _____ are where proteins are made. We sometimes call them the site of protein synthesis.

- A. Mitochondria
- B. Nuclei
- C. ribosomes

4. The diagram shows an animal cell. What is the structure labelled X?

- A. Ribosome
- B. Cell membrane
- C. Nucleus
- D. Mitochondria

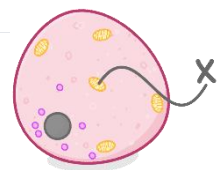


5. What is 'cytoplasm'?

- A. An organelle that controls what passes in and out of the cell
- B. A jelly-like material containing nutrients and salts, where chemical reactions take place
- C. An organelle that makes proteins
- D. The site of photosynthesis

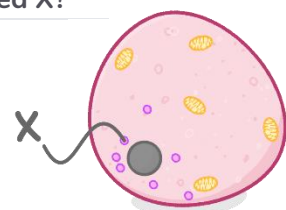
6. The diagram shows an animal cell. What is the structure labelled X?

- A. Mitochondria
- B. Nucleus
- C. Ribosome
- D. Cell membrane



7. The diagram above shows an animal cell. What is the structure labelled X?

- A. Nucleus
- B. Cell membrane
- C. Mitochondria
- D. Ribosome



8. Which of the following are found in plant cells, but **not** in animals cells? (Select all that apply)

- A. Chloroplast
- B. Nucleus
- C. Ribosomes
- D. Permanent Vacuole
- E. Cell wall
- F. Cell membrane



9. Using the correct words from the list, complete the paragraph...

sun / wind / photosynthesis / phagocytosis / chlorophyll / auxin

Chloroplasts carry out the process of _____, which involves using light energy from the _____ to make glucose. The green pigment that absorbs the light energy is called _____. This is what makes plants green.

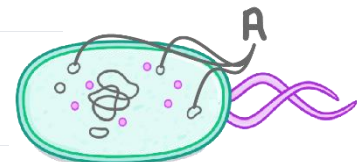
10. The _____ is a large sac in the middle of the cell that contains a watery solution of sugars and salts (cell sap). It helps maintain the structure and shape of the cell.

11. The _____ is made of cellulose. This makes it strong and allows it to maintain the shape of the cell.

- A. Cell membrane
- B. Nucleus
- C. Chloroplast
- D. Cell wall

12. Bacteria are classed as _____ organisms.

- A. prokaryotic
- B. eukaryotic



13. In the image, which structure is labelled A?

14. True or false? Bacteria have both a cell membrane and a cell wall.

15. Are bacterial cells larger or smaller than animal cells?

16. Bacteria are _____ (only consist of a single cell). Chose from: multicellular / unicellular

17. Which of the following are **not** found in bacteria?

- A. Nucleus
- B. Cell wall
- C. Cytoplasm
- D. Ribosomes

Units of Distance Video

1. Convert 3 mm to μm .

2. Convert 560 nm to μm .

3. Convert 0.78 km to m.

4. Convert 270 μm to nm.

5. Convert 23 mm to nm.

- A. 23,000 (2.3×10^4) nm
- B. 23,000,000 (2.3×10^7) nm
- C. 0.023 (2.3×10^{-2}) nm
- D. 0.000023 (2.3×10^{-5}) nm

6. Convert 4.7 μm to m.

- A. 4,700 (4.7×10^3) m
- B. 4,700,000 (4.7×10^6) m
- C. 0.0047 (4.7×10^{-3}) m
- D. 0.0000047 (4.7×10^{-6}) m

7. What is the smallest size the human eye can see?

- A. A virus particle
- B. A bacterial cell
- C. The width of a human hair

8. Which type of microscope allows us to see smaller objects?

- A. Light microscope
- B. Electron microscope

9. How many mm are there in 1 cm?

10. Convert 3.2 cm to mm.

Atoms Video Questions

1. What is the charge on a proton?

- A. Negative B. Neutral C. Positive



2. Which of the following make up the nucleus of an atom? (Select all that apply)

- A. Electron B. Proton C. Neutron

3. Which particle determines what element an atom is?

- A. Neutrons B. Electrons C. Protons

4. Which particles within an atom have a relative mass of 1? (Select all that apply)

- A. Neutrons B. Electrons C. Protons

5. Which sub-atomic particle does **NOT** have a charge?

6. What do we call an atom that has a positive or negative charge?

- A. An ion B. A molecule C. A positron D. An element

7. What is the charge on an electron?

- A. Negative (-1) B. Neutral C. Positive (+1)

8. If an atom has 6 protons and 5 electrons, what charge will it have overall?

- A. -2 B. -1 C. 0 D. +1 E. +2

Elements and Isotopes Video Questions

1. Use the words to complete the two definitions you can use to describe isotopes:

mass / protons / neutrons

Definition 1: 'Isotopes are atoms with the same atomic number, but different _____ numbers.'

or

Definition 2: 'Isotopes are atoms with the same number of _____, but different numbers of _____.'

2. An atom has 13 protons and 14 neutrons. What is its mass number?

- A. 14 B. 27 C. 13

3. What are isotopes?

- A. Atoms of the same element with different numbers of electrons
- B. Atoms of the same element with different numbers of protons
- C. Atoms of the same element with different numbers of neutrons

4. Four atoms have the numbers of protons and neutrons given below. Which two atoms are isotopes of the same element?

Atom W: 11 protons and 10 neutrons

Atom X: 10 protons and 10 neutrons

Atom Y: 9 protons and 9 neutrons

Atom Z: 10 protons and 9 neutrons

5. Lithium naturally exists as two isotopes: lithium-6, with an abundance of 7.6%, and lithium-7, with an abundance of 92.4%.

What is the relative atomic mass of lithium?

- A. 6.08 B. 6.92 C. 6.50

6. Uranium-235 has 92 protons. How many neutrons does it have?

Compounds, Molecules and Mixture Video Questions

1. True or false? Something counts as a 'molecule' when it's made from 2 or more atoms, and those atoms are held together by chemical bonds.

2. O₂ consists of 2 oxygen atoms, covalently bonded together. Does oxygen count as a molecule?

3. Which of the following are molecules?

- A. O₂ B. Cl₂ C. He D. N₂

4. Is carbon dioxide (CO₂) a molecule, a compound, or both?

- A. Molecule B. Compound C. Both
B.
C.

5. How many oxygen atoms are there in 1 molecule of H₂SO₄?

- A. 1 B. 2 C. 3 D. 4

6. Is the air all around us a compound or a mixture?

7. Is seawater a compound or a mixture?

Energy Stores Video Questions

1. Name the different energy stores:

- Th
- G _____ potential
- Ela _____ potential
- M _____
- Ch _____
- Elec _____
- Nu _____
- K _____

2. Which of the following is correct?

- Energy can be created, but not destroyed
- Energy can be destroyed, but not created
- Energy cannot be created or destroyed

3. An open system:

- Can gain or lose energy to the 'outside world'
- Cannot gain or lose energy to the 'outside world'

4. Is the energy stored in a battery stored in its kinetic, or chemical energy store?

5. Can a **closed system** gain energy from the 'outside world'?

6. When you burn fuel, energy is transferred from the fuel's c _____ energy store to the t _____ energy store of the surroundings.

7. When you throw a ball up in the air, it moves through a gravitational field.

The reason it slows down as it rises is because energy from it's kinetic energy store is being transferred to its:

- Chemical energy store
- Gravitational potential energy store
- Elastic potential energy store

8. Energy is transferred to a light bulb electrically. How is energy transferred away from a light bulb?

(Select all that apply)

- By heating
- Mechanically
- Via light

9. As an object falls, energy is from its _____ potential energy store, to its _____ energy store.

Kinetic Energy Video

1. The kinetic energy of an object is the energy that it possesses due to its motion. Which **two** measurements are required to calculate the kinetic energy of an object?

- A. Mass B. Force C. Distance D. Velocity

2. The units for kinetic energy are:

- A. Joules (J) B. Newtons (N) C. Pascals (Pa) D. Kilograms (kg)

12. The units for mass when calculating kinetic energy should be:

- A. Kilograms (kg) B. Grams (g) C. Litres (L) D. Pounds (lb)

B.

3. The units for velocity are:

- A. m/s B. m/s^2 C. ms D. km/hr

4. An object has a mass of 2 kg, and is travelling at a velocity of 5 m/s. How much kinetic energy does the object have?

Gravity, Weight and Gravitational Potential Energy Video

1. What are the units of mass?

- A. Joules (J) B. Newtons (N) C. Kilograms (kg)

2. True or false? The weight of an object is determined by both the strength of the gravitational field acting upon it, and the object's mass.

3. What is the formula for weight?

4. What are the units of weight?

- A. Joules (J) B. Kilograms (kg) C. Newtons (N)

5. What is the weight of a 70 kg object on earth? (The Earth's gravitational field strength is 9.8 N/kg)

- A. 70 N B. 686 N C. 7.1 N

6. A car on earth experiences a downwards weight of 8820 N, what is the mass of the car?

(The Earth's gravitational field strength is 9.8 N/kg)

- A. 86,436 N B. 900 N C. 86,436 kg D. 900 kg

7. Tony has a mass of 65 kg on Earth. What is Tony's mass on the moon?

8. Tony's mass is 65 kg. What is his weight on Earth?

(The Earth's gravitational field strength is 9.8 N/kg)

9. What is Tony's weight on the moon? (The moon's gravitational field strength is 1.6 N/kg)

10. Every object in the universe exerts a force of gravitational attraction on every other object in the universe. Which **two** factors determine the strength of the gravitational force of attraction?

- A. The shape of the objects
- B. The distance between the objects
- C. The mass of the objects
- D. The charge of the objects

11. What are the units of gravitational potential energy (GPE)?

- A. Newtons (N)
- B. Kilograms (kg)
- C. Joules (J)

12. What is the formula for gravitational potential energy?

13. Tony, who has a mass of 65 kg, climbed the stairs from the ground floor, up to the fourth floor, which is 20 m higher. What is Tony's gravitational potential energy on the fourth floor?

(The Earth's gravitational field strength is 9.8 N/kg)

14. Freya, who has a mass of 60 kg, jumps from a boat into the sea. Just before she hits the water, she has lost 1,470 J of gravitational potential energy. How far did she fall?