

Practice Worksheet — Grade 10 Science

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Cells

1. Which organelle is often called the 'powerhouse' of the cell?
 - a) nucleus
 - b) mitochondrion
 - c) chloroplast
 - d) cell wall
2. What is the function of the mitochondrion in a cell?
 - a) It provides rigid structural support to the cell
 - b) It captures light energy to make glucose
 - c) It releases energy from glucose during cellular respiration
 - d) It controls what enters and leaves the cell

Chemical bonding and reactions

3. An ionic bond forms between a metal and a:
 - a) an isotope
 - b) non-metal
 - c) a noble gas
 - d) another metal
4. A bond formed by sharing electrons between two non-metals is called a(n):
 - a) covalent bond
 - b) metallic bond
 - c) ionic bond
 - d) hydrogen bond

Cycling of matter in cells

5. Which organelle is the site of photosynthesis in plant cells?
 - a) nucleus
 - b) ribosome
 - c) chloroplast
 - d) mitochondrion
6. The overall products of photosynthesis are glucose and:
 - a) nitrogen
 - b) oxygen
 - c) water only
 - d) carbon dioxide

Earth's energy budget

7. The primary source of energy driving Earth's climate system is:
- a) the Sun
 - b) ocean currents alone
 - c) the Moon
 - d) the Earth's core
8. Gases like carbon dioxide and methane that trap heat in Earth's atmosphere are called:
- a) trace elements
 - b) greenhouse gases
 - c) inert gases
 - d) noble gases

Ecosystems and land use

9. In a wetland ecosystem, which of these is an abiotic factor?
- a) The bacteria breaking down dead material
 - b) The cattails growing at the edge
 - c) The amount of dissolved oxygen in the water
 - d) The frogs living in the shallows
10. A deer population starts the year at 1 200. Over the year there are 340 births and 180 deaths, 45 deer move into the area and 60 move away. What is the population at the end of the year?

Answer: _____

Energy efficiency

11. A machine is supplied with 875 J of energy and does 700 J of useful work. What is its percent efficiency?

Answer: _____ (%)

Energy transfer technologies

12. A metal spoon left in a pot of hot soup becomes hot along its whole length. Which method of thermal energy transfer is mainly responsible?
- a) Evaporation, because the soup is losing water from its surface
 - b) Convection, because the metal in the spoon circulates as it warms
 - c) Radiation, because the hot end of the spoon glows and emits energy
 - d) Conduction, because the energy passes along through the material itself

13. Why does Vancouver have milder winters than Calgary, despite being at a similar latitude?
- a) The ocean reflects winter sunlight back onto the coast, adding warmth that Calgary never receives
 - b) The nearby ocean has a high specific heat capacity, so it warms and cools slowly and moderates the climate
 - c) Vancouver sits at a much lower latitude than Calgary, so the Sun is far higher in its winter sky
 - d) Air over water holds almost no moisture, and dry air loses its heat far more slowly than damp air does

Food webs

14. Why does an energy pyramid narrow sharply at each level going upward?
- a) Energy is destroyed at each transfer, so there is simply less of it in existence at every level up
 - b) Organisms higher up each need less energy, so a smaller number of them can be supported there
 - c) Most of the energy at each level is used for life processes or lost as heat, so little passes on
 - d) Sunlight cannot reach the upper levels of the pyramid, so they survive on stored energy alone
15. In a grassland food chain, grass is eaten by grasshoppers, which are eaten by mice, which are eaten by hawks. How many levels are there in this food chain, counting the grass as the first?

Answer: _____

Heat transfer

16. How much thermal energy is needed to raise the temperature of 250 g of water by 30 °C? Water has a specific heat capacity of 4.19 J/(g·°C). Give your answer in joules.

Answer: _____ (J)

Matter and energy in living systems

17. What is the relationship between photosynthesis and cellular respiration?
- a) Photosynthesis happens in animals and respiration happens in plants
 - b) Photosynthesis stores the Sun's energy in glucose; respiration frees it
 - c) Both processes release stored energy from glucose in the cell
 - d) Both processes store the Sun's energy in glucose molecules
18. Where does most of the absorption of nutrients into the bloodstream take place?
- a) In the large intestine, where water and salts are taken back into the blood
 - b) In the stomach, where food is churned with acid into a liquid paste
 - c) In the oesophagus, as food is squeezed downward by muscle contractions
 - d) In the small intestine, whose lining is folded and covered in villi to increase surface area

Properties of matter

19. A bottle of household vinegar contains acetic acid dissolved in water. How is this classified?
- a) A compound, because the acid and the water are chemically bonded
 - b) A solution, which is a homogeneous mixture
 - c) A pure element, because vinegar cannot be separated any further
 - d) A heterogeneous mixture, because the acid settles below the water

Speed and acceleration

20. A 60 kg student climbs a staircase that rises 5.0 metres. Using $g = 9.81 \text{ m/s squared}$, how much gravitational potential energy does the student gain, in joules?

Answer: _____ (J)