MHS Entrance Exam Sample Questions

General Science exam for students entering Grade 10

Sample Questions Exam

1. What is osmosis?

2. What is photosynthesis?

3. Complete the table below to list the reactants and products in photosynthesis. Indicate if the products are '*useful*' or '*waste*'.

Photosynthesis	
Reactants	**Products**

4. What is cellular respiration?

5. What is an element?

6. Define atomic number.

7. What are the subatomic particles that make up the nucleus?

8. Complete the table below by adding the electric charge of each particle.
[Use: 0 = neutral; 1– = negative electric charge; and, 1+ = positive electric charge]

particle	**charge**
proton	
neutron	
electron	

9. Define valence electrons.

10. What is an ion?

11. What is an anion?

12. What is a cation?

13. Define periodic table.

14. What name do we give to the columns in the periodic table.

15. Define noble gases.

16. In each case, specify whether the charges attract or repel each other.
a. like charges
b. opposite charges

17. What is a chemical bond?

18. Define double bond.

19. Define triple bond.

20. Write the chemical formula of carbon dioxide.

21. What is a catalyst?

22. What is exocytosis?

23. Define density?

24. What is an atom?

25. What is a heterogeneous mixture?

26. What is a physical change?

27. What is a chemical change?

28. Define the terms reactant and product in a chemical reaction.

29. How do particles in a liquid move?

30. What is melting?

31. What is condensation?

32. What is filtration?

33. Write the chemical equation for the reaction of decomposition of water into hydrogen and oxygen.

34. Complete the table below to show which equations are balanced or unbalanced.

Equation	balanced or unbalanced
$CH_4 + O_2 \rightarrow H_2O + CO_2$	
$N_2 + 3H_2 \rightarrow 2NH_3$	
$2Na + Cl_2 \rightarrow 2NaCl$	
$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	
$FeO_3 + C \rightarrow Fe + CO_2$	
$Na + Cl_2 \rightarrow NaCl$	
$Zn + 2CuSO_4 \rightarrow ZnSO_4 + Cu$	

35. Relate energy to breaking and forming chemical bonds.

36. Define endothermic reaction.

37. Define exothermic reaction.

38. What is radioactive decay?

39. Define nuclear reaction.

40. What is meant by the magnetic force?

41. What is meant by the magnetic field of a magnet?

42. What is meant by the electric field around a charged object?

43. What are the four layers of Earth's structure?

44. What is Earth's crust?

45. What is an earthquake?

46. What is a volcano?

47. What are the two main types of energy?

48. What are two different forms of potential energy?

49. What is the mathematical equation that represents the kinetic energy of a moving object?

50. What is the mathematical representation of gravitational potential energy?

51. What is the mechanical energy of an object?

52. What is the law of conservation of energy?

53. What is the Solar System made of?

54. What is a planet?

55. What is a moon?

56. What is static electricity?

57. What is a series circuit?

58. What is a parallel circuit?

Sample Questions Answers

1. What is osmosis?
Osmosis is the diffusion of water through a selectively permeable membrane.

2. What is photosynthesis?
Photosynthesis is the process by which plants manufacture food.
In photosynthesis sunlight energy is converted into chemical energy, in the form of glucose.

3. Complete the table below to list the reactants and products in photosynthesis. Indicate if the products are '*useful*' or '*waste*'.

Photosynthesis	
Reactants	**Products**
water	**sugars [*useful*]**
CO_2	**oxygen [*waste*]**

4. What is cellular respiration?
Cellular respiration is the process by which cells break down glucose to release energy.

5. What is an element?
An element is a form of matter that cannot be broken down by chemical or physical changes into simpler substances.

6. Define atomic number.
The atomic number of an atom is the number of protons it its nucleus.

7. What are the subatomic particles that make up the nucleus?
The particles that make up the nucleus are protons and neutrons.

8. Complete the table below by adding the electric charge of each particle.
[Use: 0 = neutral; 1– = negative electric charge; and, 1+ = positive electric charge]

particle	**charge**
proton	**1+**
neutron	**0**
electron	**1–**

9. Define valence electrons.
Valence electrons are the electrons in the outermost energy level of an atom.

10. What is an ion?
An ion is an atom, or group of atoms, having a positive or negative charge.

11. What is an anion?
An anion is a negatively charged ion.

12. What is a cation?
A cation is a positively charged ion.

13. Define periodic table.
The periodic table is a table showing all the elements arranged by their properties.

14. What name do we give to the columns in the periodic table.
The columns in the periodic table are called 'groups'.

15. Define noble gases.
The noble gases are the elements located in Group 18 of the periodic table.

16. In each case, specify whether the charges attract or repel each other.

a. like charges
Like charges repel each other.

b. opposite charges
Opposite charges attract each other.

17. What is a chemical bond?
A chemical bond is a force of attraction that holds atoms together in compounds.

18. Define double bond.
A double bond is a bond formed when two atoms share two pairs of electrons (two pairs electrons = four electrons).

19. Define triple bond.
A triple bond is a bond formed when two atoms share three pairs of electrons (three pairs electrons = six electrons).

20. Write the chemical formula of carbon dioxide.
The chemical formula of carbon dioxide is CO_2.

21. What is a catalyst?
A catalyst is a substance that speeds up a chemical reaction.

22. What is exocytosis?
Exocytosis is the process that involves the movement of large particles and waste out of the cell.

23. Define density?
Density is the measure of the mass per unit volume.

24. What is an atom?
An atom is the smallest particle that has the properties of an element.

25. What is a heterogeneous mixture?
A heterogeneous mixture is a mixture whose parts are not evenly distributed.

26. What is a physical change?
A physical change is a change in the properties of matter that does not change the substances in matter.

27. What is a chemical change?
A chemical change is a change in which one or more new substances are formed.

28. Define the terms reactant and product in a chemical reaction.
In any chemical reaction, the reactants are the substances that exist before the chemical reaction and the products are the substances formed during the chemical reaction.

29. How do particles in a liquid move?
Particles in a liquid move more freely than particles in a solid but not as freely as particles in a gas.

30. What is melting?
Melting is the change of state from solid to liquid.

31. What is condensation?
Condensation is the change of state from gas to liquid.

32. What is filtration?
Filtration is a technique used to separate a heterogeneous mixture of an insoluble solid from a liquid.

33. Write the chemical equation for the reaction of decomposition of water into hydrogen and oxygen.
Water breaks down to produce oxygen and hydrogen: $2H_2O \rightarrow 2H_2 + O_2$

34. Complete the table below to show which equations are balanced or unbalanced.

Equation	balanced or unbalanced
$CH_4 + O_2 \rightarrow H_2O + CO_2$	**unbalanced**
$N_2 + 3H_2 \rightarrow 2NH_3$	**balanced**
$2Na + Cl_2 \rightarrow 2NaCl$	**balanced**
$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	**balanced**
$FeO_3 + C \rightarrow Fe + CO_2$	**unbalanced**
$Na + Cl_2 \rightarrow NaCl$	**unbalanced**
$Zn + 2CuSO_4 \rightarrow ZnSO_4 + Cu$	**unbalanced**

35. Relate energy to breaking and forming chemical bonds.
Chemical reactions always involve a change in energy.
Energy is required to break bonds.
Energy is released when chemical bonds form.

36. Define endothermic reaction.
An endothermic reaction is a reaction that takes in heat.

37. Define exothermic reaction.
An exothermic reaction is a reaction that gives off heat.

38. What is radioactive decay?
Radioactive decay is the process by which a nucleus emits, or releases, particles or energy.

39. Define nuclear reaction.
A nuclear reaction is a reaction that changes the nucleus of an atom.

40. What is meant by the magnetic force?
The magnetic force is a force of attraction or repulsion between a magnet and certain metals.

41. What is meant by the magnetic field of a magnet?
The magnetic field of a magnet is the area around the magnet in which magnetic forces act.

42. What is meant by the electric field around a charged object?
The electric field is the area around a charged object in which electric forces act.

43. What are the four layers of Earth's structure?
The four layers of Earth's structure are the inner core, the outer core, the mantle and the crust.

44. What is Earth's crust?
The crust is Earth's solid outer surface.

45. What is an earthquake?
An earthquake is the sudden, violent shaking of the Earth.

46. What is a volcano?
A volcano is a hole in Earth's surface through which magma and other materials reach the surface.

47. What are the two main types of energy?
The two main types of energy are potential energy and kinetic energy.

48. What are two different forms of potential energy?
Two different forms of potential energy are gravitational potential energy and elastic potential energy.

49. What is the mathematical equation that represents the kinetic energy of a moving object?

$$\text{Kinetic Energy} = \frac{1}{2} \times \text{Mass} \times \text{Speed} \times \text{Speed}$$

50. What is the mathematical representation of gravitational potential energy?

$$\text{Gravitational Potential Energy} = \text{Mass} \times \text{Gravitational Acceleration} \times \text{Height}$$

51. What is the mechanical energy of an object?
The mechanical energy of an object is the sum of its kinetic energy and potential energy.

52. What is the law of conservation of energy?
The law of conservation of energy states that energy can neither be created nor destroyed.

53. What is the Solar System made of?
The Solar System is composed of the Sun, eight planets, numerous dwarf planets, nearly 200 known moons, irregular rocks, icy comets, dust, gas and an abundance of nearly empty space.

54. What is a planet?
A planet is a nearly spherical object that orbits the sun.

55. What is a moon?
A moon, or natural satellite, is an object that orbits a planet while the planet orbits the sun.

56. What is static electricity?
Static electricity is a build-up of positive or negative charges.

57. What is a series circuit?
A series circuit is a circuit that has a single pathway for electrons to follow.

58. What is a parallel circuit?
A parallel circuit is a circuit that has more than one pathway for electrons to follow.