

Science 9

BIG 100

Concepts



Science 9 Exam Study Guide

After reviewing all of your "I CAN" statements and completing each unit review package, use this hand-out as a checklist to see how many concepts you need to still review before writing the provincial achievement exam.

1. Niche (organism's role)
2. Variation leading to Diversity
3. Continuous variation (range of possibilities) vs Discrete Variation (limited number of possibilities)
4. Variation within a species vs variation between species
5. Asexual Reproduction (1 parent, results in very little variation, fast and efficient)
 - Binary Fission (Amoeba)
 - Budding (Hydra)
 - Spores (Zoo spores in Fungi)
 - Plants
6. Sexual Reproduction (2 parents, results in lots of variation, requires energy)
 - Animals
 - Bacterial Conjugation
 - Plants (Including male/female reproductive parts of a flower)
 - Spores (Zygospores)
7. Gametes/Zygotes (23 chromosomes in gametes and 46 chromosomes in zygote)
8. Dominance/Recessiveness
9. Nature (DNA) vs Nurture (Environment)
10. Genes (segments of DNA that code for a specific protein)
11. Chromosomes (strands of DNA, humans have 23 pairs = 46 chromosomes in every cell except for gametes, where there are 23 chromosomes)
12. Traits (characteristics): heritable (eye color) and non-heritable traits (scars)
13. Bio-technologies:-genetic engineering, aquaculture.
14. Natural Selection (Finches beak shape a result of nature selecting the individuals who are best suited to the environment to survive) vs Artificial Selection/Selective Breeding. (Humans selecting desirable traits and deciding who mates/what gets planted etc)
15. Symbiosis (relationship between 2 organisms where 1 of them always benefits)
16. Insects are the group of organisms showing the most diversity
17. Positive Human impacts on maintaining biodiversity (seed banks, designating protected areas, global treaties, breeding programs in zoos)
18. Negative Human impacts on bio-diversity (Habitat destruction is threatening the Grizzly Bear)
19. Difference between atoms and molecules; elements and compounds.
20. Tree Map that classifies matter
21. Changes
 - Physical Changes (eg. Change of state: melting, freezing etc)
 - Chemical Changes (difficult to reverse, new substance with different properties, color change, precipitate, bubbles of gas, heat or light given off etc)
22. Properties
 - physical and chemical.
23. Law of Conservation of Mass: Mass of reactants = mass of products (can not create or destroy energy, but you can convert it from one form to another form.
24. Atomic Theory
25. Laws, Theories, Models
26. Location and charge of sub-atomic particles
 - Protons (positive, in nucleus)
 - Electrons (negative, outside nucleus)
 - Neutrons (neutral, inside nucleus)

27. Chemical Group/Family and chemical period/row.
28. Atoms are Neutral. Therefore # of protons = # of electrons for an atom.
29. Ions. (An atom that has gained or lost electrons). Therefore, an ion has a charge.
30. Atomic # = # of protons
31. Atomic mass – Atomic # = # of neutrons (remember to use your rounding rules)
32. Ionic Compound (non-metal and metal) and Molecular compounds (2 non-metals): properties of each.
33. Scientific naming of compounds:
 - Ionic (no prefixes). Remember that the charge of a transition metal ion is indicated in brackets (i.e Iron (III) oxide indicates that the iron ion had a charge of +3)
 - Molecular (prefixes)
34. Common names of compounds:

- NaCl	Salt	
- NaOH	Sodium Hydroxide	
- CH ₄	Methane	
- FeO	Rust	Iron (II) Oxide
- Fe ₂ O ₃	Rust	Iron (III) Oxide
34. Word Equations → Chemical Equations This involves understanding what the big numbers in front of a compound mean (# of molecules) and what the little subscripts mean (# of atoms of each element)
35. Chemical Equation → Word Equations
36. Products (substances produced in a reaction) and Reactants (substances used up in a reaction)
37. Exothermic Reaction (temperature of products increases) and Endothermic (requires energy) Reactions.
38. Reaction Rates can be increased by:
 - increasing temperature
 - increasing concentration of reactants
 - increasing the surface area
 - adding a catalyst
 - agitation
 - adding electrical energy to a reaction
39. Combustion Reactions (use up oxygen, produce carbon dioxide and water) and Corrosion Reactions (requires oxygen, water: Rusting is an example of corrosion). Replacement reactions (one element takes the place of another element)
40. Tree Map that classifies nutrients
 - Organic (contains Carbon) compounds include carbohydrates, proteins, lipids, and vitamins and Inorganic (no Carbon) compounds include minerals.
41. Common elements plants require (Potassium, Phosphorus, Nitrogen) and common elements that humans require (Iron in blood and Calcium for bones). Remember, too much of these is bad and too little of these is also bad.
42. Food Webs/Chains and Biological Magnification. DDT as an example of a compound that is difficult for organisms to break down and therefore gets more concentrated the higher up the web you go.
43. Acids (pH less than 7) vs Bases (pH more than 7)
44. Indicators (red litmus turning blue indicates a base, blue litmus turning red indicates an acid)
45. Acid Precipitation
46. Toxicity: using LD 50 numbers (remember, the lower the number the more toxic the substance)
47. Water Quality:
 - using biological indicators (macro-invertebrates)
 - phosphate, nitrate etc tests (these compounds are in fertilizers and may run-off into water systems and result in excessive plant growth)
48. Persistent (break down very slowly) pollutants such as fertilizers vs non-persistent pollutants.
49. Point source of pollution vs non-point source of pollution

50. Pollution as a global problem
 - wind carrying air borne pollutants all over the globe
 - ocean currents and rivers carrying water pollutants
 - porous/permeable soil can accelerate the spreading of a pollutant
51. Bio-degradable substances vs non-biodegradable substances
52. Leaching
53. Landfills:
 - Sanitary
 - Secure
54. 4 R's of Waste Management (Reduce, Reuse, Recycle, Recover)
55. Hazardous substances: WHMIS Symbols
56. Difference between Static and Current Electricity
57. 3 Laws of Electric Charges:
 - like charges repel
 - opposite charges attract
 - charged objects attract neutral objects
58. Conductors (Copper) vs Insulators (plastic)
59. 4 Components of a circuit
 - source
 - conductor
 - control
 - load
60. Current (measure in Amps by an ammeter or a galvanometer) vs Voltage (measured in Volts by a voltmeter) vs Resistance (measured in Ohms)
61. Ohm's Law $R = V/I$
62. Comparing Electrical concepts (resistance, voltage, current, load, source, conductor, control) to a hydro-flow (water) system.
63. Variable resistor = rheostat. We used nichrome wire as a resistor.
64. Series (1 path for electrons to travel) vs Parallel (more than 1 path for electrons to travel) circuits.
Houses, schools etc wired in Parallel
65. Interpreting circuit diagrams. (multiple switches, loads, etc)
66. Energy Conversions
 - motor (electrical into mechanical energy)
 - generator (mechanical into electrical energy)
 - thermocouple (heat/thermal into electrical energy)
 - Electro-chemical cell (chemical into electrical)
 - Resistor (electrical into thermal)
67. Electro-Chemical Cell (requires 2 different metals as electrodes, and an electrolyte (substance that carries a charge))
68. DC motor (St. Louis motor: parts and understanding of how each part works, including an understanding of the polarity changes)
 - terminals
 - brushes
 - split-ring commutator
 - armature (electro-magnet)
 - permanent field magnets
 - power source
69. Moving a magnet near a wire will induce a current and a current in a wire will induce a magnetic effect.

70. Electromagnet strength:
- iron core
 - more wraps of wire
 - more current
71. AC vs DC current. Easier to increase AC voltage to transmit electricity through power lines.
72. Electrical Safety: Fuses, circuit breakers.
73. Micro-electric Circuits (small digital devices) vs normal electrical circuits (transistors instead of switches, traces of copper used instead of big copper wires, lower currents than in normal circuit, etc Remember, micro means small)
74. Calculating Energy: $E = Pt$
75. Calculating Power: $P = E/t$ or $P = IV$
76. Calculating Efficiency: Efficiency = Useful Energy OUTPUT/total energy INPUT X 100%
77. Sources of Electricity: Renewable (Bio-mass, wind, hydro, geo-thermal etc) vs Non-Renewable (Coal, Natural gas, etc)
78. Advantages and Disadvantages of using renewable and non-renewable sources of energy to produce electricity.
79. Co-ordinates: Altitude (degrees above horizon) – Azimuth (degrees clockwise from north)
80. Devices needed to measure altitude-azimuth coordinates:
- astrolabe
 - compass
81. Geo-centric (Earth in middle) model vs heliocentric (sun in middle) model
82. Types of telescopes
- optical (reflecting, refracting, combination)
 - radio
83. General information about solar system compared to Earth:
- Inner planets (Mercury, Venus, Earth, Mars) are mostly rocky and terrestrial
 - Outer Planets (Jupiter, Saturn, Uranus, Neptune) are mostly gaseous
84. Advantages/Disadvantages of each type of telescope
85. Spectral Analysis (used to determine what elements are in celestial bodies)
86. Triangulation: used to calculate/estimate how far away an object is from you.
87. Distances in space: Astronomical Unit (distance from earth to sun) and light year (distance light travels in one year)
88. Rockets (staged rocket). Using gravitational assist.
89. Satellites: Remote Sensing (taking measurements from space of earth and other planets) is used to get a picture of: weather patterns, erosion, vegetation, etc.
- low-orbit
 - high orbit
 - geo-synchronous orbit
90. GPS (uses triangulation)
91. Technology that has helped to increase our understanding of space: telescopes, computers, spectral analysis etc
92. Stars, Nebula, Galaxies, Meteors, Meteor Showers (tough to predict because our orbit must cross the orbit of a comet's tail), Meteoroids, Meteorites, Asteroids, Lunar vs. Solar Eclipse etc
93. CANADARM
94. Micro-gravity : effects on human body
95. Dangers associated with space travel (space junk, fuel expenditure, etc)
96. Challenges associated with space travel (need recyclable systems to conserve water, oxygen etc)
97. Variables used in a scientific experiment (manipulated, responding, controlled).
98. GRAPHS: any of the above concepts in graph form (Be sure you know how to interpret graphs)
99. CHARTS: any of the above concepts in chart form that contains quantitative data (numbers) or qualitative data (descriptions). (Be sure you know how to draw a conclusion from a chart)
100. DIAGRAMS: any of the above concepts in graphic form (food web/chain).