

This **Science 9 Final Achievement Exam** is provided to allow students, who for various reasons will be unable to write the Provincial Achievement Exam. All questions on this exam have been developed from the Science Focus 9 Textbook approved in Alberta. Students using the Science in Action 9 Textbook should be able to answer most questions. A Modified Final Exam using Science in Action is also available on the Edquest site.

This test includes **15 Multiple Choice Questions**
1 Numerical Response Question for each Unit of Study
 and **4 SKILL** questions

Students on a Modified Science Program (IPP)
 and students who have used the **Science Focus 9**



can be tested using this modified exam.



Unit A

Biological Diversity

- Every organism needs to adapt in order to survive in its environment. There are two types of adaptations -structural and behavioral. Which of the following is a structural adaptation?
 - feathers**
 - predation
 - migration
 - hibernation
- What it eats, its habitat, nesting site, range and habits, what effect it has on the other populations and what effect it has on the environment is the role that an organism has within a particular ecosystem called a ...
 - niche**
 - species
 - variation
 - adaptation
- Some bird species, like warblers, share resources by accessing these resources in different ways. They avoid direct competition for the same resource, by practicing a technique called ...
 - food supply sharing
 - nutrient cooperation
 - resource partitioning**
 - interspecies sharing
- When a single-celled organism duplicates its contents, including its nucleus and other organelles and then splits into two cells with each one being identical (*bacteria, amoeba, algae*)

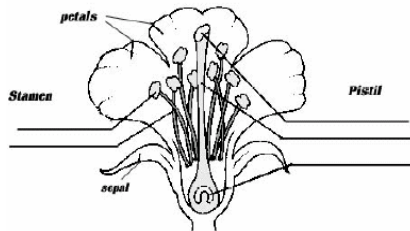


it is called ...

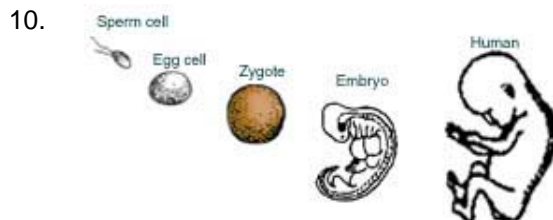
- budding
- tuber formation
- binary fission**
- spore production

5. Plants continue to grow throughout their lives. The rapidly growing tips of roots and stems contain specialized cells called meristems that function in the process of ...

A. reproduction
B. transportation
C. photosynthesis
D. respiration



6. The pistil is composed of the following flower parts ...
- A. ovary, filament, stigma**
B. stamen, stigma, ovary
C. anther, ovary, stigma
D. stigma, style, ovary
7. Inherited (heritable) characteristics are those traits that are passed on to offspring directly from their parents. Heritable traits include structural and distinguishing characteristics. All of the following are heritable traits, except ...
- A. earlobes**
B. skin color
C. eye color
D. artistic ability
8. Two different types of traits are passed on from parents to offspring during sexual reproduction. When these trait types are mixed, the one that will show up in the offspring is the ...
- A. continuous trait**
B. recessive trait
C. dominant trait
D. discrete trait
9. 46 tightly coiled strands of DNA in humans represent the full compliment of ...
- A. gametes**
B. sperm cells
C. egg cells
D. chromosomes



This type of sexual reproduction within a species increases ...

A. variation
B. mutations
C. vulnerability
D. specialization

11. Moving pieces of one strand of DNA to other cells is a relatively new technique that has emerged. In the science of genetics, this technique has enabled scientists to create individuals within a species with desirable traits and is called ...
 - A. biodiversity
 - B. biomagnification
 - C. genetic diversity
 - D. genetic engineering

12. The specimens and observations made by Charles Darwin about the diversity of life on the Galapagos Islands is detailed in his most famous book, *Origin of the Species*. Darwin was the first scientist to explain that selection process occurred ...
 - A. automatically
 - B. instinctively
 - C. artificially
 - D. naturally

13. Diseases and natural events occur all the time and when they do, the loss of an entire species, within a particular area, causes that species to be ...
 - A. extinct
 - B. extirpated
 - C. threatened
 - D. endangered

14. The Grizzly Bear helps us to determine the human impact on an ecosystem. This large carnivore's ability to survive or disappear is historically a sign that human interference in an ecosystem is occurring or not. Grizzly Bears are considered to be ...
 - A. Bioaccumulated species
 - B. Biomagnified species
 - C. Biodiverse species
 - D. Bioindicator species

15. Zoos didn't become public until the early 1800's – in London. They were not originally started to preserve diversity. They were ...
 - A. exotic collections for private collectors
 - B. specialized keepsakes for royalty
 - C. black market species for criminals
 - D. formed to prevent species over-population

NR 1 Match the description numbered below with the type of asexual reproduction it describes.

- 1 - the parent produces a smaller version of itself
- 2 - the parent cell splits in two
- 3 - reproduction not involving seeds
- 4 - reproduction similar to seeds, but produced by the division of cells

___3___ ___4___ ___2___ ___1___
 Vegetative Spore Binary Budding
 reproduction production fission

3	4	2	1
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2	2	2	2
3	3	3	3
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9	9	9	9

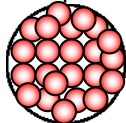


Unit B

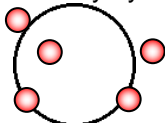
Matter and Chemical Change

16. The particle model helps us to understand the state of a substance. A liquid substance would be represented most likely by model ...

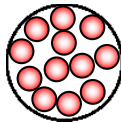
A.



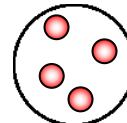
B.



C.

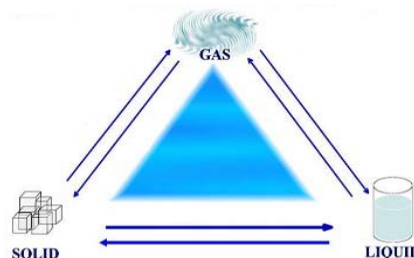


D.




17. When a substance undergoes a change of state it can use energy or give off energy. The change that occurs when a substance changes **from a liquid to a gas** is referred to as ...

- A. deposition
 B. sublimation
 C. **vaporization**
 D. condensation



18. Brass is a mixture of two metals that is best classified as ...
- A. colloid
 B. **solution**
 C. suspension
 D. mechanical
19. It is often difficult to decide if a change is physical or chemical, so certain clues will help you decide if a chemical change has occurred. The only evidence that will guarantee a chemical change has occurred is ...
- A. a change in colour and/or odour
 B. the release or absorption of energy (heat)
 C. **that a new material is formed**
 D. the formation of a solid (precipitate) in a liquid
20. An unknown substance can be identified by measuring a property of the substance (eg. density) and compare it to known values of other substances. If the test property matches a known value, it is likely that substance, because each substance has its own unique ...
- A. range of densities
 B. combined properties
 C. **distinguishing properties**
 D. color and chemical properties
21. Allesandro Volta made the first practical battery (the voltaic pile), by piling zinc and copper plates on top of each other, separating them with paper discs soaked in ...
- A. electrodes
 B. **electrolyte**
 C. pure water
 D. animal blood

22. In science, these do not explain anything. They simply describe and summarize what happens.
- A. models
 - B. theories
 - C. ideas
 - D. laws
23.  Early chemists used the planets to identify the elements known to them. This later was a problem, when more elements were discovered, because they ran out of planets.
- This symbol represent the planet and element ...
- A. Mars - iron
 - B. Venus - copper
 - C. Mercury - mercury
 - D. Jupiter - tin
24. The 6 elements in this group all have the maximum number of electrons possible in their outer shell which makes them **stable**. They are known as the ...
- A. Halogens
 - B. Alkali Metals
 - C. Noble Gases
 - D. Alkaline Earth Metals
25. Mendeleev arranged the element cards into a 'solitaire-like' table. He played with them, by sorting and arranging the elements in many different combinations. He was able to identify gaps where elements, would be able to fit, that were ...
- A. known to exist
 - B. not yet discovered
 - C. rare earth elements
 - D. identified by alchemists
26. Substances dissolved in water use a symbol following the chemical formula to identify it as a water-based solution ...
- A. liquefied
 - B. dissolved
 - C. distilled
 - D. aqueous
27. Some ions can also form when certain atoms of elements combine. These ions are called **polyatomic** ions (*poly* meaning "*many*"). **Polyatomic atoms** are a group of atoms acting as one. The compound that contains a polyatomic ion is ...
- A. $\text{H}_2\text{O}_{(l)}$
 - B. $\text{NaCl}_{(s)}$
 - C. $\text{C}_6\text{H}_{12}\text{O}_6_{(s)}$
 - D. $\text{CaCO}_3_{(s)}$
28. The following word equation identifies what happens when hydrogen peroxide is left out in the sun. It changes to water and oxygen gas.
- A. Water + Oxygen \longrightarrow Hydrogen peroxide
 - B. Hydrogen peroxide + Energy \longrightarrow Water + Oxygen
 - C. Water + Energy + Oxygen \longrightarrow Hydrogen peroxide
 - D. Hydrogen peroxide + Oxygen \longrightarrow Water + Energy

29. To treat an injury in sport, **cold packs** are used to reduce the swelling where the injury occurs. These cold packs are examples of ...
- A. **Endothermic reactions**
 - B. Exothermic reactions
 - C. Combustion reactions
 - D. Corrosion reactions
30. Some substances are used in foods to slow down decomposition. Plant seeds prevent germination until the right conditions are present by these natural ...
- A. reactors
 - B. **enzymes**
 - C. catalysts
 - D. **inhibitors**

NR 2 Match the WHMIS Hazardous Symbol with the description of the Hazard.



3
Toxic with other serious effects



1
Toxic with immediate serious effects



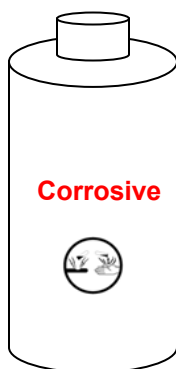
4
Combustible and highly flammable



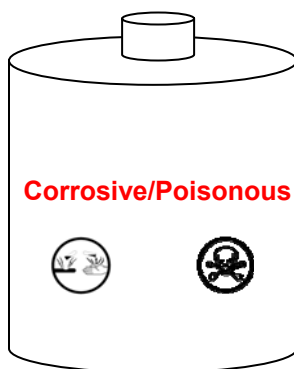
2
Oxidizing Reacts with oxygen

3	1	4	2
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0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
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8	8	8	8
9	9	9	9

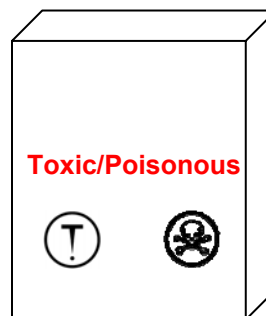
SKILLS 1 – On the following household chemical illustrations below, identify a caution and a hazardous symbol you would likely find on each of the containers.



VINEGAR



BLEACH



DETERGEANT



Unit C

Environmental Chemistry

31. The process of digestion breaks down the chemicals present in food. Chemicals which are organic compounds contain ...
- A. hydrogen
 - B. oxygen
 - C. carbon
 - D. nitrogen
32. Some organisms attach themselves to it or get their nutrients from it. This material, on which an organism moves or lives, is called a ...
- A. niche
 - B. substrate
 - C. ecosystem
 - D. habitat
33. The three numbers on a bag of fertilizer refer to the percentage of chemicals used as plant nutrient supplements. A bag of fertilizer is numbered **5 - 10 - 5** which means there are equal amounts of two chemicals and twice as much of this chemical ...
- A. carbon
 - B. nitrogen
 - C. phosphate
 - D. potassium
34. The planting of only one crop increases the chance of disease spreading through the entire crop. This type of farming practice is called ...
- A. strip farming
 - B. monoculture
 - C. summer fallow
 - D. irrigation
35. As you move up the food chain concentrations of DDT are higher and are called ...
- A. Bioactivation
 - B. Bioacceleration
 - C. Bioconcentration
 - D. Bioaccumulation
36. Sodium hydroxide is used in household cleaners and as a reagent in film processing. The properties that identify it as a base are, it ...
- A. feels slippery, and has a pH of more than 7
 - B. feels rough with texture, and has a pH of 7
 - C. is insoluble, and has a pH of 7
 - D. is soluble in water and has a pH of less than 7

37. Red cabbage juice, grape juice and tea were used by a student in an experiment to act as an indicator because each changed color when added to a test substance. These types of Indicators were used to ...
- A. identify the pH of the substance it was added to
 - B. identify a substance as an acid, a base, or neutral**
 - C. change the taste of the substance being tested
 - D. test the substance for the presence of carbon dioxide
38. In neutralization reactions acids and bases react together when they are mixed. These types of reactions produce ...
- A. a salt and water**
 - B. carbon dioxide gas
 - C. neutral acids
 - D. neutral bases
39. 'Percent' of weight, or volume, means how much there is in a weight or volume sample of 100. Concentrations of chemicals are usually measured in ...
- A. percentage of minute parts in one million
 - B. how many million parts are present
 - C. millions to one or grams to kilograms
 - D. parts per million or milligrams per Litre**
40. Scientists measure toxins in LD50 amounts. 50 represents 50% of the subject group that will die, if they are given the specified dose, ...
- A. In 50 doses
 - B. all at once**
 - C. over 50 hours
 - D. 50 times
41. Dissolved oxygen, acidity, heavy metals, nitrogen, phosphorus, pesticides, and salts are
- A. physical factors that determine water quality
 - B. biological indicators of water quality
 - C. chemical indicators of water quality**
 - D. chemical compounds that pollute water
42. A septic tank is a large underground container that traps grease and large solids. The remaining liquid waste is distributed through these, which lead into a drainage area containing gravel.
- A. perforated pipes**
 - B. wide-mouth tubes
 - C. plastic cylinders
 - D. filtering sieves
43. Permeable ground collects naturally filtered drinking water in underground cavities called ...
- A. aquifers**
 - B. aquaseas
 - C. water caves
 - D. water bowls
44. Bioreactors, a new technology in a sanitary landfill site, speed up the rate of organic waste biodegradation by adding
- A. oxygen
 - B. acid
 - C. base
 - D. water**

45. Plants able to absorb and accumulate large amounts of harmful chemicals are grown, harvested and processed. This technique – to reduce soil or groundwater contamination – is called ...
- A. Photosynthesis
 - B. **Phytoremediation**
 - C. Plant Meiosis
 - D. Photolysis

NR 3 Indicators are used to identify different types of **organic molecules**. Match the indicator used for each type of Organic molecule listed.

Indicators:

- 1 - Benedict's solution
- 2 - Biuret solution
- 3 - Iodine solution
- 4 - Translucent Spot on Brown paper

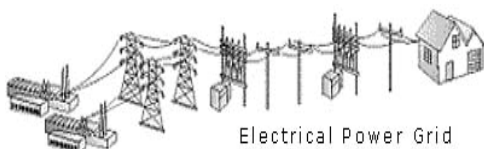
4
Fat/Oil
3
Starch
2
Protein
1
Glucose

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SKILL 2 - Electrical Principles

Illustrate a schematic diagram of an electrical circuit that contains 2 lamps, 1 motor, 1 variable resistor and 4 switches. The lamps and motor should be able to be operated independently of each other and one switch should control the entire circuit.

Student illustration of the solution
should be a parallel circuit



Unit D

Electrical Principles and Technologies

46. Materials can be conductors, semiconductors, superconductors, or insulators. Which of the following materials would make a good insulator?
- A. aluminum
 - B. human body
 - C. silicon
 - D. porcelain
47. The purpose of a 'static strap' worn by electronic technicians, when working with electronic components, is to make sure the static charge on the technician's hand or body is ...
- A. reinforced
 - B. neutralized
 - C. dissipated
 - D. discharged
49. A waterfall can be used to model current, voltage and resistance. If a waterfall is wide and free flowing, it models high ...
- A. voltage
 - B. current
 - C. amperage
 - D. resistance
50. Different resistors are used for different applications, especially in electronics. The major application for resistors is to control ...
- A. current or voltage
 - B. heat and temperature
 - C. direction and intensity
 - D. strength and distance
51. 4 factors affect the resistance of wire. The gauge of the wire (AWG #) represents the ...
- A. length
 - B. temperature
 - C. material
 - D. cross-section area
52. A *thermo-electric generator* is a device based on a thermocouple that converts heat directly into electricity without moving parts. Several thermocouples connected in a series is called a ...
- A. thermodore
 - B. thermostat
 - C. thermopile.
 - D. thermal farm
53. A device which converts sound energy (vibrations) into electrical energy is a ...
- A. thermostat
 - B. rheostat
 - C. photoelectric cell
 - D. piezoelectric crystals

54. The **electrolyte paste**, which enables a dry cell to conduct electricity, does so because, it contains ...
A. an insulator
B. static electrical charges
C. chemicals that form ions
D. metal plates that release electrons
55. Rechargeable cells use an external electrical source to which can be recharged because the ...
A. wet cells are drying out
B. electrodes can be reversed
C. electrolyte is being replaced
D. chemical reactions can be reversed
56. A **DC generator** is much the same as a DC motor, and is often called a **dynamo**. The DC generator's pulsating electricity is produced ...
A. back and forth
B. in one direction
C. across the circuit
D. In reversed directions
57. A power use meter is connected from the power lines to the outside of your home. It is then routed to a central service panel that is full of ...
A. transistors
B. transformers
C. conductors
D. circuit breakers
58. Microcircuits are circuits that are miniaturized to fit into a small space and perform many functions. Transistors in these modern digital circuits act as ...
A. fuses
B. loads
C. valves
D. switches
59. A system that can produce two different types of energy for industrial, or commercial use is called ...
A. regeneration
B. cogeneration
C. electrolysis
D. biogeneration
60. James Moore was inspecting the wiring in a new house and found that the green wire had not been connected properly in the electrical panel. The wiring did not pass safety inspection because the ...
A. panel had a short circuit
B. electrical outlets were not grounded
C. electrical circuits were overloaded
D. green wire was the hot wire

NR 4 There are many different alternative energy sources including:

- 1 – Tidal
- 2 – Wind
- 3 – Solar
- 4 – Waterfall

Match the type of alternative energy you would most likely find in each region.

 2 1 4 3
 Alta N.S. B.C. Ont.

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Unit E

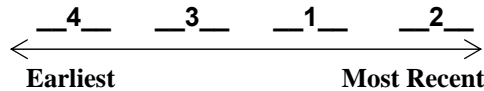
Space Exploration

61. Ancient people used points of reference in the sky to help them find directions on the Earth. The North Star (Polaris) was used in the Northern Hemisphere and in the Southern Hemisphere they used the constellation *Crux*, the ...
- A. South Star
 - B. South Pole
 - C. Southern Star
 - D. Southern Cross
62. *Ptolemy and Copernicus* each developed a model of celestial bodies in our universe that explained the 'epicycles' of the planets. The biggest difference between their representations was that ...
- A. Ptolemy had the sun at the centre
 - B. Copernicus had the sun at the centre
 - C. Ptolemy had the Earth revolving around the Sun
 - D. Copernicus had the Sun revolving around the Earth
63. In order to get finer detail in a telescopic image, the telescope must improve it's ...
- A. ocular power
 - B. resolving power
 - C. telescopic power
 - D. reflective power
64. The tendency of a planet to move straight as it travels through the solar system is due to ...
- A. size
 - B. shape
 - C. gravity
 - D. velocity
65. With thousands of closely spaced slits much better detail in the spectrum can be produced using this device ...
- A. deflector dish
 - B. reflective grid
 - C. refracting prism
 - D. diffraction grating
66. The spectrum of an *approaching star* shows the dark bands shift to the
- A. blue end of the spectrum
 - B. center of the spectrum
 - C. violet part of the spectrum
 - D. red part of the spectrum
67. The *winkling effect* of a star is created by the ...
- A. atmospheric motion
 - B. debris in space
 - C. size of the star
 - D. composition of the star

68. Triangulation is based on a process of estimation, using these 3 steps:
1. Making a scale drawing
 2. Creating a baseline
 3. Measuring angles from the end of the baseline
- The correct order of the steps to follow in this method of estimating distance is ...
- A. 1 2 3
B. 2 3 1
C. 2 1 3
D. 3 2 1
69. Many different energy forms make up the different parts of the electromagnetic spectrum. Radio waves have ...
- A. low frequency and long wavelengths
B. low frequency and short wavelengths
C. high frequency and long wavelengths
D. high frequency and short wavelengths
70. The advantage radio telescopes have over optical telescopes is that radio telescopes are...
- A. less expensive to construct and operate
B. not affected by electromagnetic radiation
C. used during the day, as well as at night
D. can be easily moved from one location to another
71. All fuels create exhaust which comes out the end of the rocket. The speed of the exhaust leaving the rocket is called the *exhaust velocity*, which determines the ...
- A. speed of the rocket
B. range of the rocket
C. direction of the rocket
D. altitude of the rocket
72. A method of acceleration which enables a spacecraft to achieve extra speed by using the gravity of a planet is called ...
- A. elliptical acceleration
B. *gravitational assist*
C. momentum acceleration
D. orbital velocity
73. In the 1920's, Ejnar Hertzsprung and Henry Norris Russell compared the surface temperature of stars with its luminosity. They graphed their data to show the relationship between ...
- A. color and intensity
B. heat and temperature
C. temperature and age
D. brightness and temperature
74. In the summer of 1969 *Neil Armstrong* and *Edwin Aldrin* were the 1st humans to set foot on another place in space, when they landed on the Moon. Their first words spoken were ...
- A. 'Houston, we are alive and well, we made it'
B. 'One small step for man, one giant leap for mankind'
C. 'The surface is rocky, but the sight is incredible'
D. 'A new world, a new hope and a dream fulfilled'
75. In 1839 Sir Edward Sabine (a Canadian) established the 1st magnetic observatory and discovered that the Aurora Borealis is associated with ...
- A. sunspot activity
B. electromagnetism
C. atmospheric interference
D. ozone depletion

NR 5 Place these events that represent a small part of the early achievements of space science in the order they happened, beginning with the earliest.

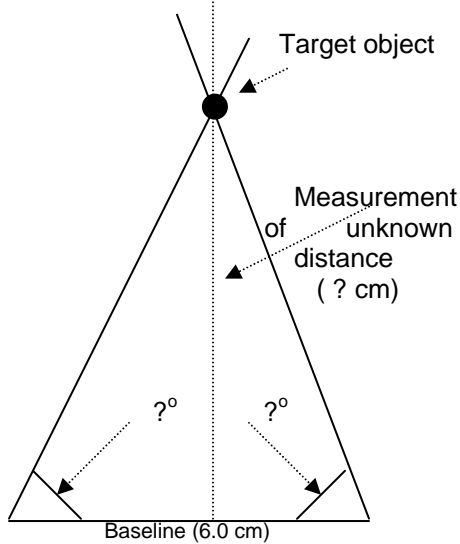
- 1 – Sputnik 1
- 2 – International Space Station
- 3 – Goddard’s liquid fuel
- 4 – Archytas’s pigeon



4	3	1	2
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2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

SKILL 3 – Space Exploration

Measure the ‘unknown distance’ in the Illustration using the **triangulation** technique.



Show your work

Mark this as you wish -

Student should calculate angles to be **64°** and **70°**

Measurement of unknown distance is **5.1 cm**
 Conversion (1 cm = 20 m) Answer is **> < 120 m**

(This activity can be completed even without knowing the angles – just measure the unknown distance in cm and convert using the scale.)

Scale of drawing: 1 cm = 20 m

SKILL 4 – Space Exploration

Use your *Solar System Data Cards* to complete the table (This skill is analyzing data)

- Mark this as you wish -

	Inner Planets	Outer Planets
Planets	Mercury , Venus, Earth, Mars	Jupiter, Saturn, Uranus, Neptune
Composition	terrestrial	gaseous
Total # of Moons	3	64
Average Diameter	.7 times Earth’s Diameter	7 times Earth’s diameter
Average Temperature	151°	-190°