



Grade 9 FINAL Achievement Exam

(Modified)

You may do your rough work in this booklet and mark the answer you are choosing for each question.

THEN, transfer your answers onto the SCANTRON Answer Card provided.

All test items in this exam have been covered on previous unit tests and quizzes.

You should have little difficulty if you have completed a thorough review of your year's work.

You must stay for **90** minutes to complete the exam.

If you require more time to complete the exam **30** additional minutes will be allowed.

If you are unsure of a question, raise your hand and wait for the teacher to respond to you.

Bonus Questions (Attempt these only after you have completed all of the other questions)

During an investigation of a lake ecosystem, you record the following observations.

- 1 The tadpoles are changing into adult frogs.
- 2 A water lily floating on the surface of the lake has a large surface area.
- 3 There is evidence of mosquito eggs, larvae, and adults.
- 4 Hydra, living in a pond, is producing buds.

Match each observation, as numbered above, with the science term given below.

(Use each number only once)

- | | | | |
|------------|-----------------------------|---------------|-------------------------|
| _____ | _____ | _____ | _____ |
| life cycle | environmental
adaptation | metamorphosis | asexual
reproduction |

	.	.	
0	0	0	0
1	1	1	1
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

Match the Chemical name with the Chemical symbol

- | | |
|---|----------|
| 1 | N_2O |
| 2 | CO_2 |
| 3 | CCl_4 |
| 4 | N_2O_3 |

(Use each number only once)

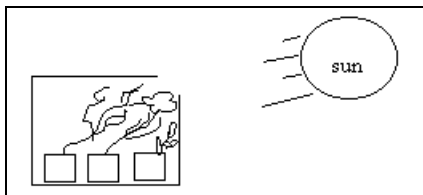
- | | | | |
|-------------------------|------------------------|---------------------|-------------------|
| _____ | _____ | _____ | _____ |
| carbon
tetrachloride | dinitrogen
trioxide | dinitrogen
oxide | carbon
dioxide |

	.	.	
0	0	0	0
1	1	1	1
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



BIOLOGICAL DIVERSITY

- The white birch tree is found in the lower elevations of the Rockies. The classification categories from the system developed by Linnaeus that appear in the white birch tree's scientific name, *Betula papyrifera*, are
 - kingdom, phylum
 - family, genus
 - phylum, order
 - genus, species
- Three different plant species are placed in the box pictured here in cross section. There is only a small opening in the box to let light in. What process is occurring in this box?



- mutualism
- symbiosis
- natural selection
- interspecies competition

- Variation within a species is crucial so that
 - individuals do not become bored with each other
 - individuals will be able to distinguish between members
 - some individuals are able to survive under different environmental conditions
 - some individuals are able to become the leaders of their group
- A population of white-tailed jackrabbits lives in an area of prairie. A disease-causing virus is introduced into the jackrabbit population. This is an example of
 - an environmental change
 - variability
 - natural selection
 - survival
- During the winter, Susan has brown hair. But as soon as summer comes, the sun makes her hair turn blonde. This change in hair colour is likely due to the effect of
 - discrete variations
 - solely the environment
 - continuous variations
 - heritable characteristics and the environment
- Tom describes himself in the following manner:
 - blood type B
 - thick hair
 - mass ranges from 60-65 kg
 - long legs

Which of the above descriptions are continuous variations?

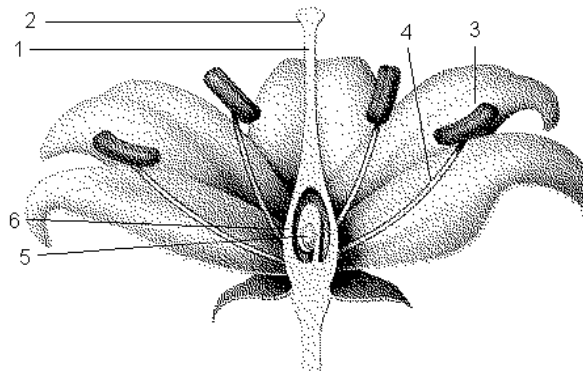
- I, II, III
- II, III, IV
- I, III, IV
- I, II, IV



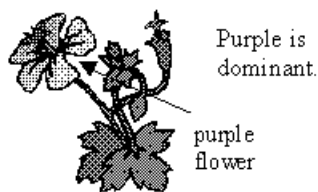
7. _____ occurs when pollen from one plant is carried to another flower by a butterfly. When this pollen falls on the correct part of the flower, a long tube develops and transports the pollen to the female gamete. When the two join, _____ has taken place.
- a. Cross-pollination, cross-fertilization
 - b. Cross-fertilization, cross-pollination
 - c. Pollination, embryo formation
 - d. Embryo formation, pollination

8. In order for pollination to occur, there must be a transfer from number _____ to number _____.

- a. 2, 6
- b. 3, 2
- c. 2, 5
- d. 1, 4



9. Cell division and asexual reproduction involve
- a. mitosis
 - b. the zygote
 - c. gamete cells
 - d. meiosis
10. In sexual reproduction, the number of inherited traits comes
- a. mostly from the male gamete
 - b. mostly from the female gamete
 - c. either the male gamete or female gamete, depending on which is the strongest
 - d. half from the male gamete, half from the female gamete
11. Which process results in genetically identical cells?
- a. gamete production
 - b. zygote formation
 - c. meiosis
 - d. mitosis
12. If these two pure-breeding flowers were to cross-pollinate, what colour would the flowers on the offspring plant be?



- a. purple
- b. red
- c. a colour between purple and red
- d. cannot be determined from the information given



13. The grizzly bear has totally disappeared from the prairies but remains in the foothills, and northern parts of Alberta. The status of the grizzly bear on the prairies is
- a. endangered
 - b. extirpated
 - c. threatened
 - d. special concern



SAFETY IN THE SCIENCE LAB

14. One of the chemicals used in a science reaction lab has the symbol shown below on its container. The student using this substance has to be careful because the chemical is

- a. an irritant
- b. corrosive
- c. toxic
- d. a biological hazard



15. A bottle container has the safety label shown below. Most likely the bottle contains

- a. hydrochloric acid
- b. radioactive uranium
- c. biohazardous infectious material
- d. oxygen gas



16. The symbol shown below appears on a cleaning container. The symbol shape indicates

- a. red / danger
- b. orange / warning
- c. yellow / caution
- d. yellow / hazard



**MATTER and CHEMICAL CHANGE**

17. To help identify substance X, Mark listed four properties:
- I) reacts with acid to form bubbles
 - II) appears to be a white crystal
 - III) is soluble in water
 - IV) has a boiling point of 1465°C
- Determine how many of the properties were chemical and physical.
- a. 3 chemical, 1 physical
 - b. 2 chemical, 2 physical
 - c. 1 chemical, 3 physical
 - d. 4 chemical, 0 physical
18. Early chemists used the solar system to represent the seven metallic elements known at that time. The Sun represented the element gold while the Moon represented:
- a. mercury
 - b. silver
 - c. carbon
 - d. oxygen
19. The common form of carbon has 6 protons and 6 neutrons in its nucleus. The sum of these two numbers (12) is referred to as
- a. atomic mass unit
 - b. atomic mass
 - c. mass number
 - d. ionic charge
20. How many elements are present in two molecules of aspirin? The formula for aspirin is $\text{C}_9\text{H}_8\text{O}_4$.
- a. 3
 - b. 6
 - c. 21
 - d. 42
21. Carbon monoxide and carbon dioxide are molecular gases produced in a started car engine. How are their structures different?
- a. carbon dioxide has one more carbon atom
 - b. carbon dioxide has one more oxygen atom
 - c. carbon dioxide has two more oxygen atoms
 - d. carbon dioxide has two more carbon atoms
22. The muffler of Eden's car rusted out very quickly. Perhaps all of the following factors contributed to the rapid rusting except
- a. excessive heat
 - b. large surface area
 - c. high concentration of water vapour
 - d. low grade of fuel used



- 23. The gas and oil industry is often concerned with having to contain the problem of "sour gas." Many industries now convert the "sour gas" into secondary products such as
 - a. hydrogen sulfide
 - b. nitrogen gas
 - c. oxygen gas
 - d. sulfur

- 24. A crop of potatoes can be quickly destroyed by the larval stage of the potato beetle. Farmers often protect their crops from the beetle by spraying with
 - a. insecticide
 - b. herbicide
 - c. fungicide
 - d. phosphide

- 25. An antacid tablet is used to treat an upset stomach. It contains 325 mg acetylsalicylic acid, 1000 mg citric acid, and 1916 mg sodium bicarbonate. What part of the tablet acts as an antacid?
 - a. acetylsalicylic acid
 - b. citric acid
 - c. acetylsalicylic acid and citric acid
 - d. sodium bicarbonate

26. The sugar test for honey requires Substance A. Use the table to determine what substance A represents.

Food Tested for Organic Molecules	Substance Tested With	Observations
honey	A	changed from a blue colour to a red-orange colour
B	iodine solution	changed from a red-brown colour to a purple colour
egg	Biuret solution	C
corn oil	D	left a translucent spot

- a. Benedict's solution
 - b. calcium hydroxide
 - c. hydrochloric acid
 - d. salt solution
-
27. The statement that describes the passive uptake of water and nutrients by green plants is
 - a. passive uptake requires no use of energy
 - b. passive uptake happens less frequently
 - c. passive uptake takes place in a low concentration area
 - d. passive uptake does not have molecular movement
-
28. Hydrolysis is a process that occurs during digestion. The word "hydrolysis" is derived from the words "hydro" and "lysis." What do these words mean?
 - a. "hydro" means hydrogen and "lysis" means to combine
 - b. "hydro" means water and "lysis" means to break down
 - c. "hydro" means water and "lysis" means to combine
 - d. "hydro" means hydrogen and "lysis" means to break down



ENVIRONMENTAL  **CHEMISTRY**

29. There are several different methods that can be used to determine air quality. Which of the following methods would provide the most useful information regarding air quality?
- identifying all pollutants present in the air
 - measuring the levels of pollutants in the air
 - determining the percent of oxygen present in the air
 - estimating the amount of emissions from pollution sources
30. Whenever materials containing carbon burn, they produce either carbon dioxide or carbon monoxide. You have been warned that carbon monoxide can be deadly if inhaled. If you wanted to start a fire in the fireplace using wood, what could you do to prevent carbon monoxide from being formed?
- Make sure the damper is open in the chimney so the smoke can escape.
 - Wood does not contain carbon so no carbon monoxide will be formed.
 - Decrease the amount of air and the wood will burn more slowly.
 - Open a window to allow some fresh air into the room.
31. Scientists drill deep into glaciers to take ice core samples. They look at _____ content in the samples to gather historical information about (the) _____.
- chlorofluorocarbon, ozone layer
 - carbon dioxide, global warming
 - chlorofluorocarbon, enhanced greenhouse effect
 - carbon dioxide, ozone layer
32. Tiny Town is a small farming community 40 km downstream of Bigville, a large urban city. The citizens of Tiny Town are concerned about pollutants originating in Bigville washing down to their community. Which pollutants will have the greatest effect on Tiny Town's water quality?
- pollutants that dissolve easily in water
 - pollutants that do not dissolve easily in water
 - pollutants that only dissolve partially in water
 - pollutants that do not dissolve at all in water
33. Sunflowers have been used to remove radioactive substances from groundwater at Chernobyl, the site of a nuclear reactor explosion. This is an example of
- phytoremediation
 - photolysis
 - nuclear decomposition
 - biodegradation



ELECTRICAL PRINCIPLES and TECHNOLOGIES



- 34. Which unit is used to measure the rate at which an electrical current flows?
 - a. ampere (A)
 - b. ohm (Ω)
 - c. watt (W)
 - d. volt (V)

- 35. In an experiment carried out in science class, you were asked to determine what simple materials would be able to produce an electric current. Which of the following combinations would result in an electric current being produced?
 - a. two copper wires placed into a lemon 1 cm apart with a voltmeter connected between the two wires
 - b. two paper clips placed into a lemon 1 cm apart with a voltmeter connected between the two paper clips
 - c. a paper clip and a copper wire placed into a lemon 1 cm apart with a voltmeter connected between the copper wire and the paper clip
 - d. a paper clip and a copper wire hung on the edge of a glass filled with pure water 1 cm apart with a voltmeter connected between the copper wire and the paper clip

- 36. On the weekend, you helped your dad replace the car battery in the family car. Your dad explains that it has to be replaced because the entire zinc electrode has reacted with the sulfuric acid. He is replacing the battery with a similar battery that has had its zinc electrode replaced. The car battery is an example of a
 - a. dry cell
 - b. primary cell
 - c. rechargeable cell
 - d. wet cell

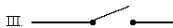
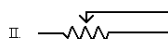
- 37. In science class, you learned that a conductor is a material that passes electrons easily and that an insulator is a material that does a poor job of conducting (or passing) electrons. How are the electrons in an insulator different from the electrons in a conductor?
 - a. The electrons in an insulator are tightly bound to the positively charged nucleus.
 - b. The electrons in an insulator are bound loosely to the positively charged nucleus.
 - c. The electrons in an insulator flow toward the negative terminal.
 - d. There are no electrons present in insulating materials.

- 38. If you wanted to design a light bulb that produces a bright light using a small amount of current, which material would best serve this purpose?
 - a. a filament with no resistance
 - b. a filament with low resistance
 - c. a filament with high resistance
 - d. a filament with complete resistance

- 39. Some electrical devices require the operator to vary the amount of electricity that passes through the circuit. Which device shown below indicates a component in a circuit that can adjust the amount of electricity passing through the device?

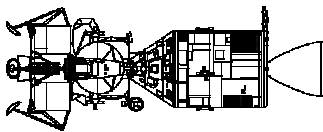


- a. I
- b. II
- c. III
- d. IV





40. While at the mall, Steve sees a person in a wheelchair. A battery powers the wheelchair and the person simply manipulates a lever to move the wheelchair. What energy conversion(s) occur in the wheelchair to make it move?
- electrical to mechanical
 - chemical to mechanical
 - electrical to chemical to mechanical
 - chemical to electrical to mechanical
41. Dave helps his dad replace the electric motor that turns the fan for the furnace in their house. After turning off the power to the furnace, Dave's dad disconnects the wires to the motor and reconnects them to the new motor, which is the same model as the old motor. When Dave turns the power back on, he realizes that the fan is now spinning in the wrong direction. Why did this happen?
- The permanent magnet inside the new motor must have been installed improperly.
 - They crossed the wire leads of the motor when reconnecting to the power supply.
 - The electromagnet that is supposed to be inside the motor must be disconnected.
 - They put the motor in backward, so the fan is spinning in the wrong direction.
42. When you turn on the fluorescent light in the laundry room, you notice one of the tubes is flickering and you decide to replace it. You look in the storage room and find a new fluorescent tube. When you unwrap the new fluorescent tube, you notice the following information on the packaging slip:
- power consumption 34 W
energy input 12.5 kJ
energy output 2.75 kJ
- The efficiency of the fluorescent tube is
- 0.22
 - 22%
 - 0.45
 - 45%
43. Your science teacher leads a discussion concerning the societal effects of energy consumption. She suggests that, as a society, we must make decisions to conserve energy. Which of the following would clearly be an example of a societal decision to save energy?
- Vladimir replaces his gasoline-operated car with an electric car.
 - A city decides to install low wattage street lamps to reduce energy use.
 - Sue and her mom wash dishes together and use the time as a chance to talk.
 - A corporation decides to install more powerful computers.



SPACE EXPLORATION

44. In history class, you have probably learned that the telegraph, invented by Samuel Morse, was first used as a means of communication in 1844. How did Morse's telegraph work?
- The telegraph sent digital messages through wires using binary numbers.
 - The telegraph used coded short and long electrical signals to send messages.
 - The telegraph converted sound into an electrical signal, and then back into sound.
 - The telegraph converted electrical pulses into sound transmitted through the wires.



Grade 9 FINAL Achievement Exam

(Modified)

45. Archeologists have dated the earliest construction at England's Stonehenge monument to well over 5000 years old. What was Stonehenge believed to have been used for?
 - a. It was an ancient zoo built to house a variety of animals.
 - b. It was an enormous home designed to shelter many families.
 - c. It was used as an ancient cemetery containing the remains of the builders.
 - d. It was an ancient observatory used to mark specific days of the year.

46. The switch from a geocentric model of the solar system to a heliocentric model suggested that planets orbited in ellipses rather than circles. What was the main problem with this idea?
 - a. The model made the solar system seem too large.
 - b. The planets revolve at different speeds.
 - c. The future position of the planets could not be predicted accurately.
 - d. The model did not match the data that had been observed in the past.

47. Which of the following stages of a star's life cycle will our Sun most likely experience?
 - a. supernova and neutron star
 - b. red giant and white dwarf
 - c. neutron star and black dwarf
 - d. nova and black hole

48. Which type of galaxy is our Milky Way galaxy?
 - a. elliptical
 - b. circular
 - c. spiral
 - d. irregular

49. The Sun crosses the celestial equator at two times in a year. This happens during
 - a. spring and fall equinoxes
 - b. summer and winter solstices
 - c. spring and summer solstices
 - d. spring and fall solstices

50. The condition in which gravitational forces are greatly reduced is called
 - a. megagravity
 - b. microgravity
 - c. negative gravity
 - d. maximum gravity

51. The purpose of the Global Positioning System (GPS) is to
 - a. pick up radio stations all over the planet
 - b. watch television stations from around the world
 - c. pinpoint the exact position of an object on the planet
 - d. be able to telephone anyone from anywhere on Earth

52. Telescopes are placed in locations with the highest elevations to
 - a. be closer to celestial objects
 - b. overcome gravity
 - c. reduce the cost of operation
 - d. reduce the interference of the atmosphere

53. Reflecting telescopes can be built larger than refracting telescopes because they
 - a. are cheaper to make
 - b. are less sensitive to heat
 - c. use a lens instead of a mirror
 - d. can use many smaller mirrors to act like a single large mirror.

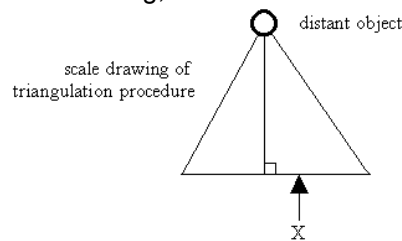


54. Which of the following would have the greatest affect on the quality of images obtained by the Hubble Space Telescope?
- a. moisture in the air
 - b. clouds blocking the view
 - c. damage from micro-meteoroids
 - d. fading due to light pollution from Earth

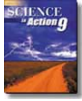
55. The accuracy of measurement can be increased for radio telescopes if they are arranged in groups. Astronomers call these groups
- a. pods
 - b. arrays
 - c. radio clusters
 - d. constellations

56. When calculating triangulation with a scale drawing, what is the name for line X?

- a. home line
- b. baseline
- c. reference line
- d. scale line



57. There are always risks associated with space travel. Which of the following disasters has not occurred?
- a. a shuttle explosion
 - b. loss of Mars probes
 - c. a fatal launch pad fire
 - d. astronauts lost in space
58. Which of the following has not been an event involving "space junk"?
- a. used fuel tanks crashing into houses
 - b. large pieces of satellites crashing into Earth
 - c. old space station burning up in the atmosphere
 - d. small pieces of debris denting the surface of the space shuttle
59. All these are considered a logical reason for investing money in space research except
- a. a possible source of natural resources
 - b. a possible location for human colonization
 - c. a possible location for photographing Earth
 - d. a possible invention of technology that can be used on Earth
60. Scientists believe that hydrogen and oxygen can be processed from Moon rock. Which of the following would not be a practical use of these materials on the Moon?
- a. Oxygen could provide life support for humans.
 - b. Hydrogen could provide fuel for vehicles.
 - c. Hydrogen and oxygen could be combined to form water.
 - d. Hydrogen could be used to inflate balloons to move heavy equipment around the surface.



Answer Key

- | | | | | | |
|-----|---|-----|---|-----|---|
| 1. | d | 21. | b | 41. | b |
| 2. | d | 22. | d | 42. | b |
| 3. | c | 23. | d | 43. | b |
| 4. | a | 24. | a | 44. | b |
| 5. | d | 25. | d | 45. | d |
| 6. | b | 26. | a | 46. | c |
| 7. | a | 27. | a | 47. | b |
| 8. | b | 28. | b | 48. | c |
| 9. | a | 29. | b | 49. | a |
| 10. | d | 30. | d | 50. | b |
| 11. | d | 31. | b | 51. | c |
| 12. | a | 32. | a | 52. | d |
| 13. | b | 33. | a | 53. | d |
| 14. | a | 34. | a | 54. | c |
| 15. | b | 35. | c | 55. | b |
| 16. | b | 36. | d | 56. | b |
| 17. | c | 37. | a | 57. | d |
| 18. | b | 38. | c | 58. | a |
| 19. | c | 39. | b | 59. | c |
| 20. | a | 40. | d | 60. | d |