

**GRADE 9 SCIENCE**

Final Practice Exam Answer Key



# GRADE 9 SCIENCE

## Final Practice Exam Answer Key

Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

Attending  Non-Attending

Phone Number: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

For Marker's Use Only

Date: \_\_\_\_\_

Final Mark \_\_\_\_\_ /100 = \_\_\_\_\_ %

Comments:

### Instructions

- You have a maximum of 2 hours to write this exam.
- Supplies required: calculator, paper, and ruler

### Multiple Choice

Each question has a single best answer. Make your choice by circling the letter beside your answer. (18 x 1 mark each = 18 marks)

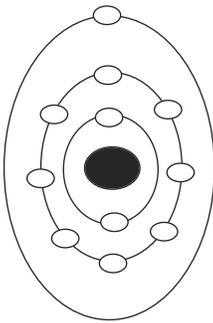
1. In Western history, the first recorded scientist to propose that Earth revolved around the Sun was
  - a. Galileo
  - b. Copernicus
  - c. Ptolemy
  - d. Aristarchus**
2. Sperm and egg cells are referred to as
  - a. gametes**
  - b. zygotes
  - c. diploid cells
  - d. homologous cells

3. Which of the following elements has a total of six electrons in its valence shell?
  - a. nickel
  - b. chromium
  - c. sulphur**
  - d. bromine
  
4. Jupiter, Saturn, Neptune, and Uranus are considered a family known as
  - a. the galactic planets
  - b. gas giant planets**
  - c. terrestrial planets
  - d. solar planets
  
5. What is the azimuth of Polaris when observed from Winnipeg, Manitoba?
  - a. 0°**
  - b. 15°
  - c. 35°
  - d. 50°
  
6. An example of a naturally occurring diatomic molecule is
  - a. gold
  - b. copernicium
  - c. carbon dioxide
  - d. hydrogen gas**
  
7. Twelve coulombs of electric charge travels through a resistor which uses 24 joules of energy. What is the potential difference across the resistor?
  - a. 2 J/C**
  - b. 12 J/C
  - c. 36 J/C
  - d. 288 J/C
  
8. Ernest Rutherford is credited for the discovery of
  - a. the moons of Jupiter
  - b. the nucleus of the atom**
  - c. deoxyribonucleic acid (DNA)
  - d. the piezoelectric effect

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9. Human egg cells are produced in the
- ovaries**
  - vagina
  - cervix
  - uterus
10. The unit for measuring electric current is the
- joule
  - ohm
  - ampere**
  - tesla

11. The diagram below represents



- an atom of magnesium
  - a molecule of sodium
  - an alkali metal**
  - a chalcogen
12. How long does it take the Moon to revolve around Earth?
- 24 hours
  - 27 days**
  - 12 days
  - 1 week
13. A mother is homozygous recessive for a sex-linked trait. Which statement is true?
- Half of her daughters will display the dominant phenotype.
  - All of her daughters will display the recessive phenotype.
  - All of her sons will display the dominant phenotype.
  - All of her sons will display the recessive phenotype.**

14. Stars such as our Sun produce their energy
- through the nuclear fission of helium into hydrogen
  - through the nuclear fusion of hydrogen into helium**
  - through the nuclear fission of hydrogen into helium
  - through the combustion of hydrocarbons
15. A diploid human cell contains
- 64 chromosomes
  - 23 pairs of chromosomes**
  - 46 pairs of chromosomes
  - 23 chromosomes
16. A rod that has been negatively charged touches an electroscope.
- Negative charges move out of the electroscope.
  - Positive charges move out of the electroscope.
  - Negative charges move into the electroscope.**
  - Positive charges move into the electroscope.
17. A metal that can be hammered into thin sheets demonstrates the property called
- malleability**
  - conductivity
  - ductility
  - lustre
18. Which scientist contributed to the first periodic table?
- Tycho Brahe
  - Dimitri Mendeleev**
  - Aristotle
  - Isaac Newton

Name: \_\_\_\_\_

## Matching

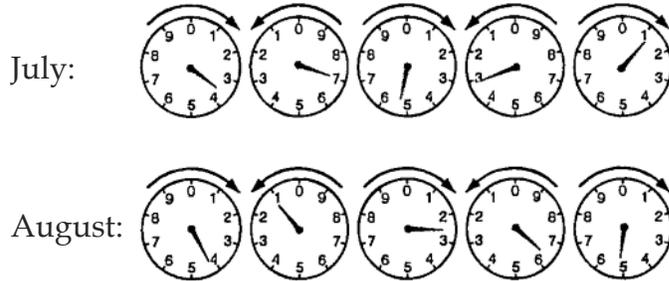
Place a letter in the space provided that gives the best match.

(18 x 0.5 marks each = 9 marks)

- |                         |  |
|-------------------------|--|
| <u>f</u> insulator      | a. discovered the moons of Jupiter                   |
| <u>q</u> astrolabe      | b. contain genes                                     |
| <u>c</u> Bohr           | c. developed a model of electron orbitals            |
| <u>b</u> chromosome     | d. the protons in a nucleus                          |
| <u>e</u> halogen        | e. chlorine  |
| <u>a</u> Galileo        | f. does not conduct electricity                      |
| <u>k</u> Punnett square | g. provides only one path for electrical current     |
| <u>i</u> light year     | h. a vertical coordinate                             |
| <u>g</u> series circuit | i. the distance that light travels in 365 Earth days |
| <u>d</u> atomic number  | j. the movement of electrons through a conductor     |
| <u>j</u> current        | k. a model for predicting genotypes                  |
| <u>m</u> neutron        | l. female gonad                                      |
| <u>r</u> joule          | m. found in the nucleus of an atom                   |
| <u>n</u> potassium      | n. an alkali metal                                   |
| <u>o</u> electroscope   | o. detects electric charge                           |
| <u>h</u> altitude       | p. claimed that Earth orbited the Sun                |
| <u>l</u> ovaries        | q. Arabic instrument for observing stars             |
| <u>p</u> Copernicus     | r. unit of energy                                    |

## Short Answer (29 marks)

1. There are two hydro meter readings shown below. One meter reading is for July and the other is for August. (4 marks)



- a. What is the energy reading for July and August? Show the units. (2 marks)
- July = 37,531 kWh**  
**August = 41,265 kWh**
- b. What is the energy consumption between July and August in this example? (1 mark)
- 3,734 kWh**
- c. If the cost for energy were \$0.24 per kilowatt hour, what will this household pay for energy? (1 mark)
- The household would pay \$896.16 for the energy.**

2. Name two types of asexual reproduction. For each type, name one species that uses the method. (4 marks)

**Vegetative propagation → apple tree**

**Binary fission → bacteria**

**Regeneration → starfish, grass**

**Sporulation → fungus, mushrooms, mold**

**Budding → yeast**

3. Identify the following elements by name and symbol. (5 marks)
- This element is the lightest in existence. **Hydrogen (H)**
  - This element is the most reactive non-metal. **Fluorine (F)**
  - The atomic mass of this element is approximately 32. **Sulphur (S)**
  - This element contains two more protons than nickel. **Zinc (Zn)**
  - On the periodic table, this element is located on the fourth period and the second family. **Calcium (Ca)**

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4. What is a phenotype? How is it different from a genotype? (3 marks)

**A phenotype is an inherited characteristic that can be seen, such as physical appearance, behaviours, and functions. A genotype is the set of genes that determine a characteristic. Genotypes determine traits; phenotypes are the display of traits.**

5. What is a geosynchronous orbit, and how does it benefit telecommunications systems? (2 marks)

**A geosynchronous orbit refers to an object that rotates around Earth at the same speed as the planet. This is useful in telecommunications because a satellite launched into geosynchronous orbit will maintain an exact position above the planet, allowing satellite dishes on the ground to receive constant information. Because the satellite is always in the same position, it is unnecessary to track it.**

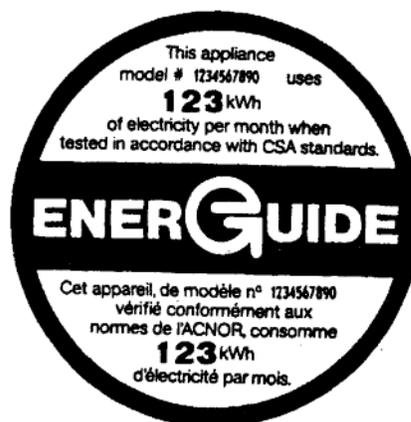
6. What is a nebula, and how does it form a star? (3 marks)

**A nebula is a cloud of gases and dust that swirl around in space. When this cloud of dust and gas gathers into a large clump, it increases the magnitude of its gravitational force. Once enough gas has bunched together under enough pressure, a fusion reaction begins, creating a star.**

7. Fill in the blanks in the following sentences about cell division. (5 marks)

Mitosis takes place in somatic cells, while meiosis occurs in reproductive cells. Mitosis produces two diploid cells, while meiosis produces a total of 4 cells, each with a haploid chromosome count.

8. Use the Energuide symbol below to answer the following questions. (3 marks)



- a. How much energy would be used by this appliance in a typical month of use?

**The appliance uses 123 kWh of electricity per month, on average.**

- b. If you were paying 7.5 cents per kWh for electrical energy in your area, what would it cost to use this appliance for three months?

$$\text{Cost/month} = \text{kWh} \times (\text{cost per kWh})$$

$$\text{Cost/month} = 123 \text{ kWh} \times \$0.075$$

$$\text{Cost/month} = \$9.225 \rightarrow \$9.23$$

$$\text{Cost/month} \times 3 \text{ months} = \$9.23 \times 3 = \$27.69$$

It would cost \$27.69 to use the appliance for three months.

### Diagrams and Long Answers (44 marks)

1. In a species of dog, the gene for long hair (H) is dominant over the gene for short hair (h). A licensed breeder mates a long-haired male (Hh) with a long-haired female (Hh). (7 marks)

- a. Draw a Punnett square showing the potential genotypes of this pairing's offspring. (1 mark)

		Father	
		H	h
Mother	H	HH	Hh
	h	Hh	hh

- b. What are the possible genotypes of the offspring? In what percentages are they predicted to appear? (3 marks)

**Twenty-five percent of the puppies will be homozygous dominant (HH).**

**Fifty percent of the puppies will be heterozygous (Hh).**

**Twenty-five percent of the puppies will be homozygous recessive (hh).**

- c. What phenotypes will the puppies display, and in what percentage? (2 marks)

**Seventy-five percent of the puppies are expected to show the long hair phenotype and 25 percent are expected to show the short hair phenotype.**

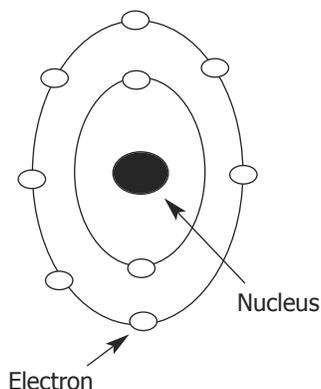
- d. How can the breeder alter the pairing to ensure that only long-haired puppies are born? (1 mark)

**The breeder must ensure that at least one of the parents is homozygous dominant (HH) for the hair gene.**

Name: \_\_\_\_\_

2. Draw a Bohr atom of fluorine. (6 marks)

a. Draw the atom, labelling the nucleus and one of the electrons. (2 marks)



b. How many neutrons are there in fluorine? (1 mark) **10 neutrons**

c. What is the mass number for fluorine? (1 mark) **19 amu**

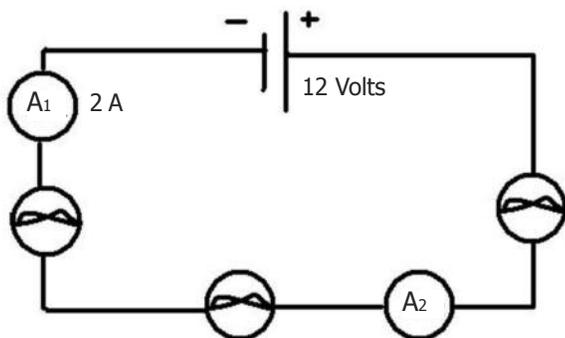
d. To what family does fluorine belong? (1 mark) **halogen family**

e. What is one trait shared by this family? (1 mark)

**Any one of the following:**

- **extremely reactive**
- **always one electron short of a complete valence shell**
- **all non-metals**

3. Use the diagram below to answer the following questions. (5 marks)



a. Are the three bulbs connected in series or parallel? **Series**

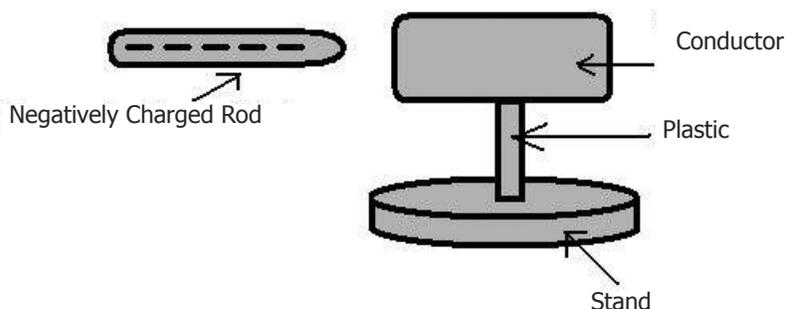
b. What is the reading in A2? **2 A**

c. What is the total current in the circuit? **2A**

d. The three light bulbs all have the same resistance. What is the voltage across each of the light bulbs? **4 volts**

- e. Draw an arrow on the diagram indicating the direction of electron flow.  
**The arrow should point away from the negative terminal of the battery and towards the positive terminal.**

4. Use the diagram below to answer the following questions. (5 marks)



- a. Draw the charge distribution for the conditions shown on the conductor. (2 marks)  
**Positive charges should be gathered to the left side of the conductor, nearest the negatively charged rod. Negative charges should be gathered to the right side of the conductor, farthest from the negatively charged rod.**

- b. How would you give the conductor a permanent charge without moving the charged rod? (1 mark)

**I would ground the conductor.**

- c. What charge would be left on the conductor after completing part (b)? (1 mark)

**A positive charge would be left.**

- d. What name is given to this method of charging an object? (1 mark)

**This method of charging a conductor is called induction.**

5. Describe how seasons are produced in the Northern Hemisphere. (4 marks)

- **Earth revolves around the sun; has a tilted axis of rotation.**
- **As the "tilted" Earth revolves around the Sun, one hemisphere will be angled towards the Sun, while the other is angled away.**
- **When the Northern Hemisphere is angled towards the Sun, the Northern Hemisphere experiences an increased number of daylight hours, and enters summer.**
- **When the Northern Hemisphere is angled away from the Sun, the Northern Hemisphere experiences few hours of daylight, and enters winter.**

Name: \_\_\_\_\_

6. Why are you unlikely to find snow in countries along the equator? (2 marks)

**The equator runs along the centre of Earth and is always angled towards the Sun. This region of Earth experiences roughly the same number of daylight hours throughout the year, so the temperature never drops low enough to freeze water.**

7. What is the purpose of mitosis and meiosis within the human body? (2 marks)

**Humans use mitosis in order to create identical copies of cells for the purposes of growth and repair.**

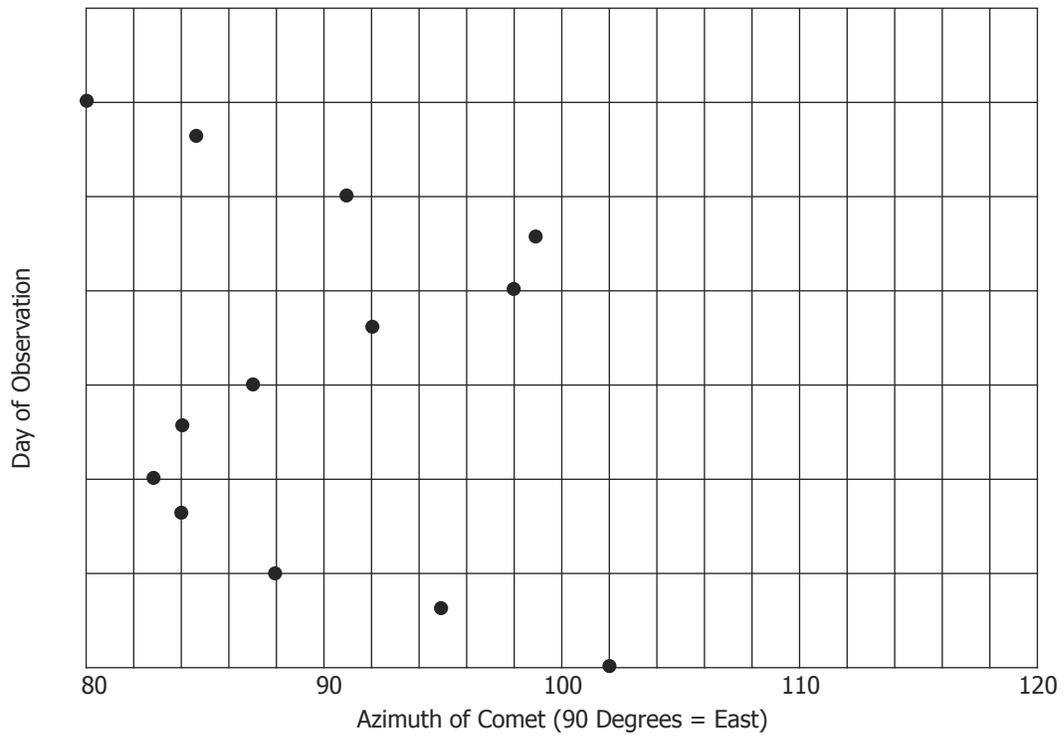
**Humans use meiosis to produce gametes specifically for reproduction.**

8. Darren has been observing a newly discovered comet through his telescope. (8 marks)

- a. Using the data provided in the table below, plot a graph showing the position of this new comet over the months of April to October. (5 marks – 1 mark for title, 4 marks for graph)

Observation Date	Comet Azimuth	Day within Study
April 1	102.0	0
April 15	95.0	15
May 1	88.0	30
May 15	84.0	45
May 30	83.0	60
June 14	84.0	75
June 29	87.0	90
July 14	92.0	105
July 29	98.0	120
August 13	99.0	135
August 28	91.0	150
September 12	85.0	165
September 27	80.0	180

Title: \_\_\_\_\_



- b. When Darren shows his data table to Karen, she exclaims that he must have made an error, because the comet is clearly changing the direction of its revolution around the Sun. How might Darren defend his observations? (3 marks)

**What Darren observed was the phenomenon of retrograde motion. Comets further from the Sun move more slowly in their orbits compared with Earth. This allows Earth to complete a revolution around the Sun before the new comet. From the perspective of someone on Earth, this act of "lapping" the new comet will cause it to appear as though it is zig-zagging east and west through the night sky.**

9. What are five indicators of a chemical change? (5 marks)

**When a chemical change occurs, you can expect to note**

- a change in colour
- heat or light being given off
- the formation of bubbles (from escaping gas)
- the appearance of a solid (precipitate) in a liquid
- that the changes are irreversible