Name_____ Date_____ Class _____

CHAPTER 2

TAKS TEST PREPARATION FOR MATH IN SCIENCE

Math Mini-Test TEKS

Section 1

1 Ernest Rutherford calculated that the diameter of a gold atom's nucleus was 100,000 times smaller than the diameter of the atom. How would he have represented 100,000 in scientific notation?

A 1.0×10^{-5}

B 10×10^{5}

C 1.0×10^{5}

D 100,000

2 During a simulation of Rutherford's gold foil experiment, a rubber ball rolled 12 cm and then deflected off a target and rolled 5 cm at a 90° angle from its original path. If the ball were to then travel back to its starting point along the shortest possible path, how far would it travel?

F 17 cm

G 7 cm

H 60 cm

J 13 cm

3 Sanjay made a two-dimensional model of an atom's nucleus. If the model has a diameter of 15 cm, what is the circumference of the nucleus?

A 94.2 cm

B 47.1 cm

C 176.6 cm

D 23.5 cm

4 A square's side measures 17 cm. If the sides were 3 times longer, how many times greater would the square's area be?

F 9

G 3

H 6

J 18

5 A sequence is formed using the equation $2x + 3$, where x is always the previous number in the sequence. If the first 3 numbers are 3, 9, and 21, what would the fifth number be?

A 45

B 93

C 30

D 90

STOP

Name_____ Date_____ Class _____

CHAPTER 2 TAKS TEST PREPARATION FOR MATH IN SCIENCE

Math Mini-Test TEKS

Section 2

1 There are about 3×10^{12} times as many atoms in a penny than there are people on Earth. If a penny contains 2×10^{22} atoms, about how many people are on Earth?

A 6.67×10^{9}

B 6.0×10^{34}

C 1.5×10^{-10}

D 6.67×10^{10}

2 The diameter of an atom's nucleus is $\frac{1}{100{,}000}$ the diameter of an atom. Which of the following is equivalent to $\frac{1}{100{,}000}$?

F 0.000001

G 1.0×10^{-6}

H 0.001%

J 1.0×10^{5}

3 The mass of 1 proton is equal to the mass of more than 1800 electrons. Which equation represents approximately how many electrons it would take to equal the mass of 5 protons?

A $\frac{1}{1800} = \frac{5}{x}$

B $\frac{1800}{5} = \frac{1}{x}$

C $1800x = 5$

D $5x = 1800y$

4 An atomic number is the number of protons in an atom. The mass number is equal to the number of protons and neutrons in the atom. An isotope of sodium (sodium-23) has an atomic number of 11 and a mass number of 23. How many neutrons does sodium-23 have?

F 11

G 12

H 23

J 34

5 Anita chose a card from a full deck of playing cards. The deck has 4 suits—hearts, clubs, spades, and diamonds—and there are an equal number of cards in each suit. Anita returned the card and chose again. What is the probability that she drew spades both times?

A $\frac{1}{16}$

B $\frac{1}{8}$

C $\frac{1}{4}$

D $\frac{1}{2}$

Name_____ Date_____ Class _____

CHAPTER 2

TAKS TEST PREPARATION FOR READING IN SCIENCE

Reading Mini-Test TEKS

Section 1

Read the passage. Then read each question that follows the passage. Decide which is the best answer to each question.

To explain the deflection of the particles, Rutherford thought that in the center of the atom is a tiny, very dense, positively charged region called the nucleus. Most of the atom's mass is concentrated here. Rutherford reasoned that positively charged particles that passed close by the nucleus were deflected away by the positive charges in the nucleus. A particle that headed straight for a nucleus would be deflected almost straight back in the direction from which it came. From his results, Rutherford calculated that the diameter of the nucleus was 100,000 times smaller than the diameter of the gold atom. Rutherford saw that the plum-pudding model of the atom did not explain his results. In 1911, he revised the atomic theory. He made a new model of the atom.

1 Why did Rutherford make a new model of the atom?

A The nucleus had a negative charge.

B The results of his experiments were not explained by the current model.

C Atoms did not have as much mass as was previously thought.

D He found that the diameter of a nucleus was the same as the diameter of a gold atom.

2 In the passage, the word deflected probably means

F turned from one direction to another.

G separated from atoms.

H changed from the diameter of the nucleus.

J revised from a current model.

3 According to the passage, which of these happened FIRST?

A Rutherford revised the atomic theory.

B Rutherford calculated the diameter of the nucleus from his results.

C Rutherford made a new model of the atom.

D Rutherford found that certain particles were deflected by atoms.

4 The author probably wrote this passage to

F show how powerful nuclear power can be.

G explain the plum-pudding model of the atom.

H explain how Rutherford concluded that a new model of the atom was needed.

J convince people that the plum-pudding model of the atom is the best model.

STOP

Name_____ Date_____ Class _____

CHAPTER 2 TAKS TEST PREPARATION FOR READING IN SCIENCE

Reading Mini-Test TEKS

Section 2

Read the passage. Then read each question that follows the passage. Decide which is the best answer to each question.

Each element has a limited number of isotopes that are found in nature. Some isotopes of an element have special properties because they are unstable. An unstable atom is an atom whose nucleus can change its composition. This type of isotope is radioactive. However, all isotopes of an element have most of the same chemical and physical properties. For example, the most common oxygen isotope has 8 neutrons in the nucleus. Other isotopes of oxygen have 9 or 10 neutrons. All three isotopes are colorless, odorless gases at room temperature. Each isotope has the chemical property of combining with a substance as the substance burns. Each isotope even behaves the same in chemical changes in your body.

1 Which of the following can be inferred from the passage?

A Some oxygen isotopes have as many as 10 electrons.

B A radioactive isotope is one whose nucleus can change its composition.

C Elements are colorless at room temperature.

D Isotopes are too dangerous for most kinds of experiments.

2 Which statement is the best summary of the passage?

F One oxygen isotope has 8 neutrons in the nucleus.

G Elements can have a number of different isotopes, which often share the same properties.

H Oxygen is odorless at room temperature.

J The body uses elements in chemical changes.

3 The author probably wrote this passage to

A show how radioactivity is used in modern technology.

B convince people to use isotopes more in their daily lives.

C explain what an isotope is and how isotopes are different from each other.

D explain the properties of the nucleus.

4 Each of the different oxygen isotopes mentioned in the passage

F has a different odor.

G behaves differently in the body.

H has a different number of neutrons.

J has a different color.

5 What is the meaning of odorless in this passage?

A Scented

B Full of color

C Without neutrons

D Without smell

STOP

Answer Key and TAKS Doctor for Mini-Tests

Section 1

Answers	TEKS Correlation	TAKS Objectives
1 C	M 8.1D	1
2 J	M 8.9A	4
3 B	M 8.14A, 8.7B	6, 3
4 F	M 8.10A	4
5 B	M 8.5B	2

TAKS Doctor

The following TAKS questions have been diagnosed by the TAKS Doctor. Find out what might be causing your "ailing" answers. The TAKS Doctor will see you now!

Item 2 *asks students use the Pythagorean Theorem to solve a real-life problem.*

F **Incorrect.** This answer is obtained by adding 5 cm and 12 cm (and mislabeling the answer as cm^2) instead of using the Pythagorean Theorem.

G **Incorrect.** This answer is obtained by subtracting 5 cm from 12 cm (and mislabeling the answer as cm^2) instead of using the Pythagorean Theorem.

H **Incorrect.** This answer is obtained by multiplying 5 cm by 12 cm instead of using the Pythagorean Theorem.

J **Correct.** The shortest route would form the hypotenuse (c) of a right triangle with a base (a) of 5 cm and a height (b) of 12 cm. According to the Pythagorean Theorem, $a^2 + b^2 = c^2$ or $(5\text{ cm})^2 + (12\text{ cm})^2 = 169\text{ cm}^2$. The square root of 169 cm^2 is 13 cm, so the remaining side must be 13 cm long.

Item 5 *asks students to use an algebraic expression to find the fifth number in a sequence.*

A **Incorrect.** The fourth number in the sequence is 45, not the fifth number. $(2 \times 21) + 3 = 45$

B **Correct.** Because 3 numbers were given, two more steps have to be calculated. The fourth number is found by using the equation $(2 \times 21) + 3 = 45$. The fifth number will be $(2 \times 45) + 3$, or 93.

C **Incorrect.** This answer is reached by assuming that because 30 is a multiple of three (as are the other numbers in the sequence), it must be the answer. However, it is not the answer found by using the given equation.

D **Incorrect.** This answer, 90, would be obtained if 45 were multiplied by 2. This answer does not account for the fact that 3 must be added to the product.

CHAPTER 2 TAKS TEST PREPARATION FOR MATH IN SCIENCE

Answer Key and TAKS Doctor for Mini-Tests

Section 2

Answers	TEKS Correlation	TAKS Objectives
1 A	M 8.1D	1
2 H	M 8.1A	1
3 A	M 8.3B	2
4 G	M 8.2B	1
5 A	M 8.11A	5

TAKS Doctor

The following TAKS questions have been diagnosed by the TAKS Doctor. Find out what might be causing your "ailing" answers. The TAKS Doctor will see you now!

Item 2 *asks students to find the equivalent of* $\frac{1}{100,000}$.

F Incorrect. The decimal form of $\frac{1}{100,000}$ is 0.00001, not 0.000001.

G Incorrect. This answer is equivalent to $\frac{1}{1,000,000}$, not $\frac{1}{100,000}$.

$1.0 \times 10^{-6} = 0.000001 \neq \frac{1}{100,000}$

H Correct. $\frac{1}{100,000} = 0.00001$; $0.00001 \times 100 = 0.001\%$

J Incorrect. This answer is the reciprocal of $\frac{1}{100,000}$. $1.0 \times 10^{5} = 100,000 \neq \frac{1}{100,000}$.

Item 5 *asks students to find the probability of pulling a spade twice in a row from a full deck of playing cards.*

A Correct. Because there are 4 suits (hearts, clubs, spades, and diamonds) and there are an equal number of each suit in a full deck, the probability of pulling a spade once is $\frac{1}{4}$. The probability of pulling a spade twice is $\frac{1}{4} \times \frac{1}{4}$, or $\frac{1}{16}$.

B Incorrect. This answer is obtained by multiplying $\frac{1}{4}$ by $\frac{1}{2}$, but the probability of drawing a spade is $\frac{1}{4}$ each time.

C Incorrect. This is the probability of pulling one spade once from a full deck of cards.

D Incorrect. Because there are 4 suits (hearts, clubs, spades, and diamonds), this answer is obtained by adding the two probabilities of pulling a spade rather than multiplying them. $\frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$

Answer Key and TAKS Doctor for Mini-Tests

Section 1

Answers	TEKS Correlation	TAKS Objectives
1 B	R 8.10H	4
2 F	R 8.6A	
3 D	R 8.10E	3
4 H	R 8.12A	3

TAKS Doctor

The following TAKS questions have been diagnosed by the TAKS Doctor. Find out what might be causing your "ailing" answers. The TAKS Doctor will see you now!

Item 1 *asks students to draw conclusions based on evidence in the text.*

A **Incorrect.** The third sentence states that Rutherford reasoned that the nucleus is a positively charged region.

B **Correct.** As stated in the third to last sentence, the plum-pudding model did not explain the deflection of the particles observed in Rutherford's experiments.

C **Incorrect.** This information is not stated in the passage.

D **Incorrect.** The fourth to last sentence states that the diameter of a nucleus was 100,000 times smaller than the diameter of the gold atom, not the same size. For this reason, he had to make a new model of the atom.

Item 2 *asks students to use context to determine the meaning of the word* deflected.

F **Correct.** The third and fourth sentences state that the particles in question were first heading in the direction of the nucleus, and that their direction subsequently changed.

G **Incorrect.** There is nothing in the passage that refers to atoms being separated from each other.

H **Incorrect.** There is nothing in the passage that refers to the diameter of the nucleus being changed.

J **Incorrect.** Though Rutherford did revise the current model of the atom, the use of the word *deflect* indicates that it is something that happened to the particles in Rutherford's experiments, not an action that Rutherford took.

Answer Key and TAKS Doctor for Mini-Tests

Section 2

Answers	TEKS Correlation	TAKS Objectives
1 B	R 8.10H	4
2 G	R 8.10G	1
3 C	R 8.12A	3
4 H	R 8.10G	1
5 D	R 8.6A, 8.9D	1

TAKS Doctor

The following TAKS questions have been diagnosed by the TAKS Doctor. Find out what might be causing your "ailing" answers. The TAKS Doctor will see you now!

Item 1 *asks students to determine which statement can be inferred from the passage.*

A **Incorrect.** The seventh sentence states that some oxygen isotopes have as many as 9 or 10 neutrons, but the number of electrons is not mentioned in the passage.

B **Correct.** This fact is stated in the third and fourth sentences of the passage.

C **Incorrect.** Though it is stated that all three isotopes of oxygen are colorless at room temperature, it is not true that all elements are colorless at room temperature.

D **Incorrect.** This statement is not stated or implied in the passage.

Item 3 *asks students to identify the author's purpose for writing this passage.*

A **Incorrect.** The use of radioactivity in modern technology is not mentioned in the passage.

B **Incorrect.** The author does not mention the use of isotopes in people's daily lives.

C **Correct.** The passage explains how isotopes differ from each other, and gives examples of those characteristics in the oxygen isotopes.

D **Incorrect.** The properties of the nucleus are not mentioned in the passage.