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| 1. What is a scientific theory?

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|   | a.  | It is a collection of experimental data. |
|   | b.  | It is an assertion of scientific fact. |
|   | c.  | It is a guess or conjecture about natural phenomena. |
|   | d.  | It is a fundamental relationship of nature. |
|   | e.  | It is an explanation of natural phenomena that has undergone significant testing. |

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| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.2 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.1 - Understand how the scientific method is an approach to performing science. |
| *TOPICS:* | general conceptsscientific method |
| *OTHER:* | general chemistry |

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| 2. An *untested* explanation of a series of experimental observations is called \_\_\_\_\_.

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|   | a.  | a hypothesis |
|   | b.  | a theory |
|   | c.  | a law |
|   | d.  | an experiment |
|   | e.  | the scientific method |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.2 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.1 - Understand how the scientific method is an approach to performing science. |
| *TOPICS:* | general conceptsscientific method |

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| 3. Which of the following statements concerning experiment and explanation is/are true?

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|   | 1. | A *law* is always given in the form of a mathematical expression. |
|   | 2. | Once a *hypothesis* passes one or two tests it is considered a theory. |
|   | 3. | Observation is a key component of the *scientific method*. |

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|   | a.  | 1 only |
|   | b.  | 2 only |
|   | c.  | 3 only |
|   | d.  | 1 and 2 |
|   | e.  | 1, 2, and 3 |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.2 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.1 - Understand how the scientific method is an approach to performing science. |
| *TOPICS:* | general conceptsscientific method |

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| 4. A saline solution similar to that used for intravenous drips is made by dissolving 0.45 g sodium chloride in 50.00 g water.  Which of the following statements concerning the saline solution and the law of conservation of mass is/are correct?

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| --- | --- | --- |
|   | 1. | The mass of the saline solution is greater than the mass of water. |
|   | 2. | The mass of the saline solution is equal to the combined mass of sodium chloride and water. |
|   | 3. | The mass of the saline solution is greater than the mass of the sodium chloride. |

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|   | a.  | 1 only |
|   | b.  | 2 only |
|   | c.  | 3 only |
|   | d.  | 1 and 2 |
|   | e.  | 1, 2, and 3 |

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| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.2 - Apply the law of the conservation of mass. |
| *TOPICS:* | general conceptsmatter |

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| 5. A 54.0-g sample of sodium is completely burned in air to form sodium oxide. The mass of sodium oxide must be

|  |  |  |
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|   | a.  | less than 54.0 g. |
|   | b.  | greater than 54.0 g. |
|   | c.  | equal to 54.0 g. |
|   | d.  | all of the above. |
|   | e.  | none of the above. |

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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.3 - Apply the law of the conservation of mass. (Example 1.1) |
| *TOPICS:* | general conceptsmatter |

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| 6. A sample of magnesium is burned in oxygen to form magnesium oxide.  What mass of oxygen is consumed if 74.62 g magnesium oxide is formed from 45.00 g magnesium?

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| --- | --- | --- |
|   | a.  | 29.62 g |
|   | b.  | 119.62 g |
|   | c.  | 3358.06 g |
|   | d.  | 0.60 g |
|   | e.  | none of the above. |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.2 - Apply the law of the conservation of mass. |
| *TOPICS:* | general conceptsmatter |

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| 7. In a certain chemical reaction, 9.11 g of compound A is added to 8.82 g of compound B.  Once the reaction is complete, 1.38 g of compound A and 1.61 g of compound B remain.  What mass of products was produced?

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| --- | --- | --- |
|   | a.  | 20.92 g |
|   | b.  | 7.21 g |
|   | c.  | 14.94 g |
|   | d.  | 7.73 g |
|   | e.  | 2.99 g |

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| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.3 - Apply the law of the conservation of mass. (Example 1.1) |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | Law of Conservation of Mass |
| *OTHER:* | general chemistry |

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| 8. A 7.45 g sample of calcium carbonate completely decomposes into calcium oxide (lime) and carbon dioxide gas when heated.  If 4.17 g calcium oxide is produced, what mass of carbon dioxide must have been formed?

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| --- | --- | --- |
|   | a.  | 3.28 g |
|   | b.  | 11.62 g |
|   | c.  | 31.10 g |
|   | d.  | 0.56 g |
|   | e.  | 2.48 g |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.2 - Apply the law of the conservation of mass. |
| *TOPICS:* | general conceptsmatter |

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| 9. A sample of cesium carbonate, weighing 3.80 g, requires 1.90 g of hydrogen bromide gas to completely decompose to water, cesium bromide, and carbon dioxide gas.  The total mass of water and cesium bromide formed is 5.20 g and no hydrogen bromide or cesium carbonate remains.  According to the law of conservation of mass, what mass of carbon dioxide must have been formed?

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| --- | --- | --- |
|   | a.  | 0.50 g |
|   | b.  | 1.40 g |
|   | c.  | 5.49 g |
|   | d.  | 10.90 g |
|   | e.  | 1.90 g |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.2 - Apply the law of the conservation of mass. |
| *TOPICS:* | general conceptsmatter |

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| 10. Sodium oxide reacts with water to produce sodium hydroxide.  Suppose 11.1 g of sodium oxide is combined with 38.7 g of water.  When the reaction is complete, all the sodium oxide has been consumed.  According to the law of conservation of mass, which is a true statement?

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| --- | --- | --- |
|   | a.  | The mass of sodium hydroxide produced must equal 49.8 g. |
|   | b.  | The mass of unreacted water must equal 27.6 g. |
|   | c.  | The mass of sodium hydroxide produced must equal 11.1 g. |
|   | d.  | The mass of water consumed must equal 11.1 g. |
|   | e.  | The mass of sodium hydroxide produced plus the mass of unreacted water must equal 49.8 g. |

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| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.3 - Apply the law of the conservation of mass. (Example 1.1) |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | Law of Conservation of Mass |
| *OTHER:* | general chemistry |

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| 11. After a certain chemical reaction has completed, it is found that 19.6 g of product was produced.  According to the law of conservation of mass, which statement must be true?

|  |  |  |
| --- | --- | --- |
|   | a.  | The total mass consumed of all reactants was 19.6 g. |
|   | b.  | The mass consumed of each reactant was 19.6 g. |
|   | c.  | The mass of reactants consumed depends on the number of reactants present. |
|   | d.  | Before the reaction started, there was 19.6 g total of all reactants. |
|   | e.  | Before the reaction started, there was 19.6 g of each reactant. |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.3 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.3 - Apply the law of the conservation of mass. (Example 1.1) |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | Law of Conservation of Mass |
| *OTHER:* | general chemistry |

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| 12. The state of matter for an object that has both definite volume and definite shape is the

|  |  |  |
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|   | a.  | gaseous state. |
|   | b.  | solid state. |
|   | c.  | mixed state. |
|   | d.  | elemental state. |
|   | e.  | liquid state. |

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| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.4 - Compare and contrast the three common states of matter: solid, liquid, and gas. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 13. The state of matter for an object that has a definite volume but not a definite shape is the

|  |  |  |
| --- | --- | --- |
|   | a.  | elemental state. |
|   | b.  | gaseous state. |
|   | c.  | mixed state. |
|   | d.  | liquid state. |
|   | e.  | solid state. |

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| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.4 - Compare and contrast the three common states of matter: solid, liquid, and gas. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 14. Two types of pure substances are

|  |  |  |
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|   | a.  | compounds and heterogeneous solutions. |
|   | b.  | compounds and elements. |
|   | c.  | elements and homogeneous solutions. |
|   | d.  | compounds and homogeneous solutions. |
|   | e.  | elements and heterogeneous solutions. |

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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 15. A sample that cannot be separated into two or more substances by physical means is

|  |  |  |
| --- | --- | --- |
|   | a.  | a heterogeneous mixture. |
|   | b.  | a compound. |
|   | c.  | either a compound or an element. |
|   | d.  | an element. |
|   | e.  | a homogeneous mixture. |

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| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 16. A solution is a

|  |  |  |
| --- | --- | --- |
|   | a.  | pure element. |
|   | b.  | pure mixture. |
|   | c.  | heterogeneous mixture. |
|   | d.  | homogeneous mixture. |
|   | e.  | pure compound. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 17. Which of the following is a mixture?

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| --- | --- | --- |
|   | a.  | a homogeneous solution of sugar dissolved in water |
|   | b.  | bromine (a liquid with the formula Br2) |
|   | c.  | sucrose (table sugar: the formula is C12H22O11) |
|   | d.  | graphite (an allotrope of carbon) |
|   | e.  | calcium oxide (CaO or lime) |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |

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| 18. A clear colorless liquid in an open beaker was heated to boiling. The liquid began to boil at 110°C, and as vapors escaped, the temperature of boiling gradually increased to 115°C, at which point the heating was stopped. On the basis of this information, we can say that the material in the beaker was a

|  |  |  |
| --- | --- | --- |
|   | a.  | pure compound. |
|   | b.  | homogeneous solution. |
|   | c.  | pure substance. |
|   | d.  | pure element. |
|   | e.  | heterogeneous solution. |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 19. Heating a certain pure solid completely decomposes it into a solid and a gas, each of which is also a pure substance. Which of the following is/are reasonable conclusions regarding these observations?

|  |  |  |
| --- | --- | --- |
|   | 1. | The solid is a compound and the gas is an element. |
|   | 2. | At least one of the products is an element. |
|   | 3. | The original solid is not an element. |

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 only |
|   | b.  | 2 only |
|   | c.  | 3 only |
|   | d.  | 1 and 2 |
|   | e.  | 1, 2, and 3 |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |

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| 20. All of the following are examples of mixtures except

|  |  |  |
| --- | --- | --- |
|   | a.  | supermarket salt. |
|   | b.  | distilled water. |
|   | c.  | soft water. |
|   | d.  | hard water. |
|   | e.  | drugstore hydrogen peroxide. |

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| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 21. All of the following are homogeneous mixtures except

|  |  |  |
| --- | --- | --- |
|   | a.  | sodium chloride and potassium chloride. |
|   | b.  | hydrogen gas and chlorine gas. |
|   | c.  | sodium chloride and potassium chloride solution. |
|   | d.  | mercury-zinc solution. |
|   | e.  | hydrochloric acid solution. |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 22. Which of the following is a homogeneous mixture?

|  |  |  |
| --- | --- | --- |
|   | a.  | gasoline |
|   | b.  | vegetable oil and water |
|   | c.  | sugar dissolved in water |
|   | d.  | A and C |
|   | e.  | A, B, and C |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.5 - Describe the classifications of matter: elements, compounds, and mixtures (heterogeneous and homogeneous). |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | states of matter |
| *OTHER:* | general chemistry |

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| 23. Which of the following statements is not correct?

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| --- | --- | --- |
|   | a.  | The combustion of methane (a component of natural gas) is a chemical change. |
|   | b.  | The melting of ice is a physical change. |
|   | c.  | The dissolution of sugar in water is a chemical change. |
|   | d.  | The decomposition of sugar into carbon and water when mixed with sulfuric acid is a chemical change. |
|   | e.  | The evaporation of gasoline is a physical change. |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.6 - Understand the difference between chemical changes (chemical reactions) and physical changes. |
| *TOPICS:* | general conceptsmatter |

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| 24. All the following are examples of chemical changes except

|  |  |  |
| --- | --- | --- |
|   | a.  | aging. |
|   | b.  | photosynthesis. |
|   | c.  | fermentation. |
|   | d.  | perspiration. |
|   | e.  | respiration. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.6 - Understand the difference between chemical changes (chemical reactions) and physical changes. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | physical and chemical change |
| *OTHER:* | general chemistry |

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| 25. Which of the following is an example of a chemical change?

|  |  |  |
| --- | --- | --- |
|   | a.  | alcohol evaporating |
|   | b.  | water boiling |
|   | c.  | skin burning in the sun |
|   | d.  | iodine vaporizing |
|   | e.  | ice melting |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.6 - Understand the difference between chemical changes (chemical reactions) and physical changes. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | physical and chemical change |
| *OTHER:* | general chemistry |

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| 26. Which of the following is an example of a chemical change?

|  |  |  |
| --- | --- | --- |
|   | a.  | silver tarnishing |
|   | b.  | iodine sublimating |
|   | c.  | alcohol boiling |
|   | d.  | sucrose dissolving |
|   | e.  | sodium chloride melting |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.6 - Understand the difference between chemical changes (chemical reactions) and physical changes. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | physical and chemical change |
| *OTHER:* | general chemistry |

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| 27. The boiling of water is a

|  |  |  |
| --- | --- | --- |
|   | a.  | physical change because the water merely disappears. |
|   | b.  | chemical change because heat is needed for the process to occur. |
|   | c.  | physical change because the gaseous water is chemically the same as the liquid. |
|   | d.  | chemical and physical change. |
|   | e.  | chemical change because a gas (steam) is given off. |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.6 - Understand the difference between chemical changes (chemical reactions) and physical changes. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | physical and chemical change |
| *OTHER:* | general chemistry |

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| 28. Which of the following is a chemical property of copper?

|  |  |  |
| --- | --- | --- |
|   | a.  | It is easily malleable. |
|   | b.  | It melts at 1085°C. |
|   | c.  | It conducts electricity. |
|   | d.  | Its density is 8.92 g/cm3. |
|   | e.  | It dissolves in certain acids. |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.7 - Distinguish between chemical properties, and physical properties. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | physical and chemical properties |
| *OTHER:* | general chemistry |

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| 29. All the following are characteristic properties of phosphorus. Which one is a chemical property?

|  |  |  |
| --- | --- | --- |
|   | a.  | When exposed to air, white phosphorus will burn spontaneously, but red phosphorus will not. |
|   | b.  | Red phosphorus and white phosphorus are solid allotropic forms. |
|   | c.  | The white form is soluble in liquid carbon disulfide but is insoluble in water. |
|   | d.  | The red form of phosphorus is insoluble in both water and carbon disulfide. |
|   | e.  | The red form melts at about 600°C, and the white form melts at 44°C. |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.4 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.7 - Distinguish between chemical properties, and physical properties. |
| *TOPICS:* | general conceptsmatter |
| *KEYWORDS:* | physical and chemical properties |
| *OTHER:* | general chemistry |

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| 30. The term that is related to the reproducibility (repeatability) of a measurement is

|  |  |  |
| --- | --- | --- |
|   | a.  | accuracy. |
|   | b.  | qualitative. |
|   | c.  | quantitative. |
|   | d.  | precision. |
|   | e.  | property. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.8 - Define and use the terms precision and accuracy when describing measured quantities. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | accuracy and precision |
| *OTHER:* | general chemistry |

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| 31. The property of a series of repeated measurements that is most directly related to precision is

|  |  |  |
| --- | --- | --- |
|   | a.  | the number of place holders in each measurement. |
|   | b.  | the reproducibility of each measurement. |
|   | c.  | the exactness of each measurement. |
|   | d.  | the accuracy of each measurement. |
|   | e.  | the number of significant figures in each measurement. |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.8 - Define and use the terms precision and accuracy when describing measured quantities. |
| *TOPICS:* | general conceptsmeasurement |

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| 32. The figure below represents the bull’s eye target for an archer. The black dots represent where the archer’s arrows hit:How can this archer be described?

|  |  |  |
| --- | --- | --- |
|   | a.  | precise but not accurate |
|   | b.  | neither accurate nor precise |
|   | c.  | accurate and precise |
|   | d.  | accurate but not precise |
|   | e.  | cannot be described from the data presented |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.8 - Define and use the terms precision and accuracy when describing measured quantities. |
| *TOPICS:* | general conceptsmeasurement |

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| 33. Which of the following statements concerning accuracy and precision is/are correct?

|  |  |  |
| --- | --- | --- |
|   | 1. | It is possible for a series of measurements to be both precise and inaccurate. |
|   | 2. | Accuracy is a measure of how close multiple measurements are to each other. |
|   | 3. | The more significant figures in a measurement the more accurate the measurement. |

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 only |
|   | b.  | 2 only |
|   | c.  | 1 and 2 |
|   | d.  | 2 and 3 |
|   | e.  | 1, 2, and 3 |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.8 - Define and use the terms precision and accuracy when describing measured quantities. |
| *TOPICS:* | general conceptsmeasurement |
| *NOTES:* | NEW |

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| 34. Two students determined the volume of a glass container three separate times (see table below).  The *true* volume of the container is 24.20 mL.  Which statement correctly describes the students’ results?

|  |  |
| --- | --- |
| **Student A** | **Student B** |
| 24.3 mL | 24.89 mL |
| 24.4 mL | 24.87 mL |
| 24.5 mL | 24.88 mL |

|  |  |  |
| --- | --- | --- |
|   | a.  | Student A’s results are the most accurate.  Student B’s results are the most precise. |
|   | b.  | Student A’s results are the most accurate and precise. |
|   | c.  | Student B’s results are the most accurate and precise. |
|   | d.  | Student A’s results are the most precise.  Student B’s results are the most accurate. |
|   | e.  | The precision and accuracy of the two data sets are identical. |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.8 - Define and use the terms precision and accuracy when describing measured quantities. |
| *TOPICS:* | general conceptsmeasurement |

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| 35. The number of significant figures in 7.3748 × 10–1 dm is

|  |  |  |
| --- | --- | --- |
|   | a.  | 5. |
|   | b.  | 6. |
|   | c.  | 3. |
|   | d.  | 7. |
|   | e.  | 4. |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.9 - Learn the rules for determining significant figures in reported measurements. |
| *TOPICS:* | general conceptsmeasurement |

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| 36. How many significant figures are there in the value 0.0227 nm?

|  |  |  |
| --- | --- | --- |
|   | a.  | 4 |
|   | b.  | 3 |
|   | c.  | 2 |
|   | d.  | 5 |
|   | e.  | 6 |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.9 - Learn the rules for determining significant figures in reported measurements. |
| *TOPICS:* | general conceptsmeasurement |

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| 37. How many significant figures are there in the measured value 73.150?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 3 |
|   | c.  | 6 |
|   | d.  | 5 |
|   | e.  | 4 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.9 - Learn the rules for determining significant figures in reported measurements. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 38. The number of significant figures in 0.090900 × 10–4 is

|  |  |  |
| --- | --- | --- |
|   | a.  | 6. |
|   | b.  | 4. |
|   | c.  | 3. |
|   | d.  | 7. |
|   | e.  | 5. |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.9 - Learn the rules for determining significant figures in reported measurements. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | scientific notation | significant figures |
| *OTHER:* | general chemistry |

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| 39. How many significant figures are there in the number 8.100?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 |
|   | b.  | 5 |
|   | c.  | 3 |
|   | d.  | 4 |
|   | e.  | 2 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.9 - Learn the rules for determining significant figures in reported measurements. |
| *TOPICS:* | general conceptsmeasurement |

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| 40. How many significant figures are there in the number 0.04560700?

|  |  |  |
| --- | --- | --- |
|   | a.  | 4 |
|   | b.  | 9 |
|   | c.  | 8 |
|   | d.  | 5 |
|   | e.  | 7 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.9 - Learn the rules for determining significant figures in reported measurements. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 41. ​The correct value of the expression  is

|  |  |  |
| --- | --- | --- |
|   | a.  | ​1×10. |
|   | b.  | ​1×10510. |
|   | c.  | ​1×10-350. |
|   | d.  | ​1×10-430. |
|   | e.  | ​1×10-120. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.10 - Know how to represent numbers using scientific notation. |
| *TOPICS:* | general concepts | measurement |
| *KEYWORDS:* | significant figures | scientific notation |
| *OTHER:* | general chemistry |

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| 42. Express the result of the following calculation in scientific notation: 503 cm × 355 cm

|  |  |  |
| --- | --- | --- |
|   | a.  | 17.9 × 104cm2 |
|   | b.  | 17.9 × 105cm2 |
|   | c.  | 2 × 104cm2 |
|   | d.  | 2 × 106cm2 |
|   | e.  | 2 × 105cm2 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.10 - Know how to represent numbers using scientific notation. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | scientific notation | significant figures |
| *OTHER:* | general chemistry |

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| 43. Express the result of the following calculation in scientific notation: 0.0557 cm2 ÷ 98.4 cm

|  |  |  |
| --- | --- | --- |
|   | a.  | 6 × 105cm |
|   | b.  | 6 × 104cm |
|   | c.  | 6 × 10–3cm |
|   | d.  | 6 × 10–4cm |
|   | e.  | 6 × 103cm |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.10 - Know how to represent numbers using scientific notation. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | scientific notation | significant figures |
| *OTHER:* | general chemistry |

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| 44. ​Express the number 0.000114 in scientific notation.

|  |  |  |
| --- | --- | --- |
|   | a.  | ​0.114 × 10–3 |
|   | b.  | 1.14 ​× 104 |
|   | c.  | 1.14 ​× 102 |
|   | d.  | ​1.14 × 10–4 |
|   | e.  | 114 ​× 10–6 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.10 - Know how to represent numbers using scientific notation. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures | scientific notation |
| *OTHER:* | general chemistry |

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| 45. What is the best answer to the following expression?(59.54 cm + 0.773 cm + 4.7403 cm – 53.1 cm)

|  |  |  |
| --- | --- | --- |
|   | a.  | 12 cm |
|   | b.  | 11.9533 cm |
|   | c.  | 11.953 cm |
|   | d.  | 11.95 cm |
|   | e.  | 12.0 cm |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.11 - Apply the rules of significant figures to reporting calculated values. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 46. How many significant figures should be reported for the difference between 235.9237 mL and 235.57 mL?

|  |  |  |
| --- | --- | --- |
|   | a.  | 7 |
|   | b.  | 1 |
|   | c.  | 2 |
|   | d.  | 3 |
|   | e.  | 5 |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.11 - Apply the rules of significant figures to reporting calculated values. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 47. The mass of a sample is measured by difference: first the mass of a beaker is measured (71.6 g), and a small amount of the sample is added to the beaker.  The mass of the sample plus beaker is then measured to be 78.836 g.  The number of significant figures that should be reported for the mass of the sample is

|  |  |  |
| --- | --- | --- |
|   | a.  | 2. |
|   | b.  | 1. |
|   | c.  | 5. |
|   | d.  | 4. |
|   | e.  | 3. |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.11 - Apply the rules of significant figures to reporting calculated values. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 48. What is the best answer to the following expression involving a sum of measurements?(52.706 cm + 0.734 cm + 14.4 cm)

|  |  |  |
| --- | --- | --- |
|   | a.  | 68 cm |
|   | b.  | 67.8400 cm |
|   | c.  | 67.84 cm |
|   | d.  | 67.840 cm |
|   | e.  | 67.8 cm |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 49. What is the correct answer to the following expression?2.96 × 10–10 + 1.01 × 10–12

|  |  |  |
| --- | --- | --- |
|   | a.  | 2.9701 × 10–10 |
|   | b.  | 2.970 × 10–10 |
|   | c.  | 3 × 10–10 |
|   | d.  | 3.0 × 10–10 |
|   | e.  | 2.97 × 10–10 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | scientific notation | significant figures |
| *OTHER:* | general chemistry |

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| 50. What is the best answer to report for ?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2.900 g/mL |
|   | b.  | 2.9003 g/mL |
|   | c.  | 2.9 g/mL |
|   | d.  | 2.90 g/mL |
|   | e.  | 2.90025 g/mL |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 51. The best answer to report for 352.94 – 36.0342 is \_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
|   | a.  | 317 |
|   | b.  | 316.9058 |
|   | c.  | 316.906 |
|   | d.  | 316.9 |
|   | e.  | 316.91 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 52. Three different samples were weighed using a different type of balance for each sample. The three were found to have masses of 0.1900411 kg, 2.119 mg, and 4635.0 g. The total mass of the samples should be reported as

|  |  |  |
| --- | --- | --- |
|   | a.  | 4825.0 g. |
|   | b.  | 4825 g. |
|   | c.  | 4825.043 g. |
|   | d.  | 4825.043219 g. |
|   | e.  | 4825.0432 g. |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 53. The measurements of three different masses on three different balances are 1.21 kg, 536 mg, and 23.14 g. The total mass should be reported as

|  |  |  |
| --- | --- | --- |
|   | a.  | 1233.68 g. |
|   | b.  | 1234 g. |
|   | c.  | 1233.7 g. |
|   | d.  | 1.23 × 103 g. |
|   | e.  | 1233.676 g. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 54. Four samples were weighed using three different balances. (All are as accurate as the precision indicates.) The masses are 0.94 kg, 58.2 g, 1.55 g, and 250 mg. The total mass should be reported as

|  |  |  |
| --- | --- | --- |
|   | a.  | 1.000 kg. |
|   | b.  | 1.0000 kg. |
|   | c.  | 1.00 kg. |
|   | d.  | 1.00000 kg. |
|   | e.  | 1.0 kg. |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 55. The answer that should be reported for the total mass of solution when 77.46 mg of benzene is added to 3.87 g of toluene is

|  |  |  |
| --- | --- | --- |
|   | a.  | 3.94746 g. |
|   | b.  | 3.95 g. |
|   | c.  | 3.9475 g. |
|   | d.  | 3.947 g. |
|   | e.  | 3.9 g. |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 56. The radius of a circle is measured to be 4.03 cm.  How should the circle's area be reported? (*A* = π*r*2)

|  |  |  |
| --- | --- | --- |
|   | a.  | 51 cm2 |
|   | b.  | 51.022 cm2 |
|   | c.  | 51.02225 cm2 |
|   | d.  | 51.0222 cm2 |
|   | e.  | 51.02 cm2 |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.5 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.12 - Use significant figures in calculations. (Example 1.2) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | significant figures |
| *OTHER:* | general chemistry |

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| 57. Which of the following statements concerning the SI system is/are correct?

|  |  |  |
| --- | --- | --- |
|   | 1. | Prefixes are used to indicate a power of ten multiplier for a given SI base unit of measurement. |
|   | 2. | Degrees Celsius (°C) is the SI base unit for temperature. |
|   | 3. | The kilogram (kg) is the SI base unit for mass. |

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 only |
|   | b.  | 2 only |
|   | c.  | 3 only |
|   | d.  | 1 and 3 |
|   | e.  | 1, 2, and 3 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |

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| 58. Which of the following statements concerning the common temperature scales is/are true?

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|   | 1. | Fahrenheit is an absolute temperature scale. |
|   | 2. | The normal boiling point of water (100°C) is equal to 273 K. |
|   | 3. | The *difference* between the boiling point and freezing point of a substance is the same for the Celsius and the kelvin scales. |

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 only |
|   | b.  | 2 only |
|   | c.  | 3 only |
|   | d.  | 2 and 3 |
|   | e.  | 1, 2, and 3 |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |

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| 59. A student is working on converting a number that has a unit with the SI prefix milli- to a unit that has the prefix mega-. Using your knowledge about the relative sizes that milli- and mega- represent, how should the student convert the number?

|  |  |  |
| --- | --- | --- |
|   | a.  | The student should multiply the number by 109. |
|   | b.  | The student should multiply the number by 106. |
|   | c.  | The student should divide the number by 106. |
|   | d.  | The student should use the number as is. |
|   | e.  | The student should divide the number by 109. |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 60. In the area of nano-chemistry, particles defined as nanoparticles range in size from 1-2500 nm.  1 nm is equivalent to 1 × 10–9 m. If the size of the particles that make up a particular material is 1.23 × 10–8 cm, what is this size in nanometers?

|  |  |  |
| --- | --- | --- |
|   | a.  | 12,300 nm |
|   | b.  | 1.23 nm |
|   | c.  | 0.123 nm |
|   | d.  | 1230 nm |
|   | e.  | 123 nm |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |

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| 61. The distance between atoms is sometimes given in picometers, where 1 pm is equivalent to 1 × 10–12 m.  If the distance between the layers of atoms in a particular compound is given as 338 pm, what is the distance in cm?

|  |  |  |
| --- | --- | --- |
|   | a.  | 3.38 × 10–6 cm |
|   | b.  | 3.38 × 10–14 cm |
|   | c.  | 3.38 × 10–12 cm |
|   | d.  | 3.38 × 10–8 cm |
|   | e.  | 3.38 × 10–10 cm |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 62. Order the four metric units from smallest to largest.1) kiloliter     2) centiliter     3) nanoliter     4) milliliter

|  |  |  |
| --- | --- | --- |
|   | a.  | 1) < 2) < 4) < 3) |
|   | b.  | 3) < 4) < 2) < 1) |
|   | c.  | 4) < 3) < 2) < 1) |
|   | d.  | 2) < 3) < 1) < 4) |
|   | e.  | 1) < 2) < 3) < 4) |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |

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| 63. Which is the largest mass?

|  |  |  |
| --- | --- | --- |
|   | a.  | 10 dg |
|   | b.  | 10 cg |
|   | c.  | 10 pg |
|   | d.  | 10 ng |
|   | e.  | 10 mg |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 64. ​One-hundredth of a nanogram is

|  |  |  |
| --- | --- | --- |
|   | a.  | ​10–14 g. |
|   | b.  | ​​10–10 g. |
|   | c.  | ​​10–8 g. |
|   | d.  | ​​10–11 g. |
|   | e.  | ​​10–12 g. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | prefixes |
| *OTHER:* | general chemistry |

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| 65. How many 100-mg aspirin tablets can be made from 10.0 kg of aspirin?

|  |  |  |
| --- | --- | --- |
|   | a.  | 10,000,000 |
|   | b.  | 1,000,000 |
|   | c.  | 1000 |
|   | d.  | 10,000 |
|   | e.  | 100,000 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 66. Which of the following sets of units is not in the order of increasing size?

|  |  |  |
| --- | --- | --- |
|   | a.  | cPa < dPa < kPa |
|   | b.  | μL < dL < L |
|   | c.  | ns < ms < s |
|   | d.  | pm < mm < nm |
|   | e.  | μg < mg < cg |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 67. The mass of 99 kg equals

|  |  |  |
| --- | --- | --- |
|   | a.  | 990 g. |
|   | b.  | 9900 g. |
|   | c.  | 9.9 × 104 g. |
|   | d.  | 0.099 g. |
|   | e.  | 0.99 g. |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 68. 4.9 seconds contain this many picoseconds.

|  |  |  |
| --- | --- | --- |
|   | a.  | 4.9  × 109 |
|   | b.  | 4.9  × 1012 |
|   | c.  | 4.9  × 10–9 |
|   | d.  | 4.9  × 10–12 |
|   | e.  | 4.9  × 1015 |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 69. 4.41 seconds contain this many nanoseconds.

|  |  |  |
| --- | --- | --- |
|   | a.  | 4.41 × 109 |
|   | b.  | 4.41 × 1010 |
|   | c.  | 4.41 × 1012 |
|   | d.  | 4.41 × 108 |
|   | e.  | 4.41 × 107 |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.13 - Become familiar with the SI (metric) system of units including the SI prefixes. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | prefixes | SI unit |
| *OTHER:* | general chemistry |

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| 70. The boiling point of chlorine is 172 K. This temperature corresponds to

|  |  |  |
| --- | --- | --- |
|   | a.  | –82°C. |
|   | b.  | 101°C. |
|   | c.  | 172°C. |
|   | d.  | –172°C. |
|   | e.  | –101°C. |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 71. The melting point of nitrogen is 63 K. What is this temperature in degrees Celsius?

|  |  |  |
| --- | --- | --- |
|   | a.  | 63°C |
|   | b.  | –336°C |
|   | c.  | –63°C |
|   | d.  | –210.°C |
|   | e.  | 483°C |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 72. The melting point of a solid is 41°F. This corresponds to

|  |  |  |
| --- | --- | --- |
|   | a.  | 296 K. |
|   | b.  | 314 K. |
|   | c.  | 289 K. |
|   | d.  | 278 K. |
|   | e.  | 314 K. |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 73. A particular liquid boils at –260°F. What is its boiling point on the Kelvin scale?

|  |  |  |
| --- | --- | --- |
|   | a.  | 146 K |
|   | b.  | 129 K |
|   | c.  | 111 K |
|   | d.  | 161 K |
|   | e.  | 229 K |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 74. The melting point and the normal boiling point of water can be used to calibrate thermometers.  What are these respective temperatures in kelvins?

|  |  |  |
| --- | --- | --- |
|   | a.  | 273 and 373 |
|   | b.  | 32 and 212 |
|   | c.  | 100 and 273 |
|   | d.  | 0 and 100 |
|   | e.  | 0 and 373 |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 75. The melting point of a certain solid is –39°C. This corresponds to

|  |  |  |
| --- | --- | --- |
|   | a.  | –13°F. |
|   | b.  | –39°F. |
|   | c.  | –38°F. |
|   | d.  | –128°F. |
|   | e.  | 10°F. |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 76. The melting point of a particular solid is 2631 K. This corresponds to

|  |  |  |
| --- | --- | --- |
|   | a.  | 4276°F. |
|   | b.  | 2904°C. |
|   | c.  | 2297°C. |
|   | d.  | 4212°F. |
|   | e.  | 1342°F. |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 77. The Rankine (oRa) temperature scale is often used in engineering.  Like the Kelvin scale, the Rankine scale is an absolute temperature scale; but the size of a Rankine degree is the same as the size of a Fahrenheit degree.  Thus, 0 K = 0oRa and 0oF = 459.67oRa.  What is the temperature23.3oC expressed on the Rankine scale?

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|   | a.  | 533.6oRa |
|   | b.  | 296.5oRa |
|   | c.  | 23.3oRa |
|   | d.  | 41.9oRa |
|   | e.  | 315.1oRa |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 78. The Rankine (oRa) temperature scale is often used in engineering.  Like the Kelvin scale, the Rankine scale is an absolute temperature scale; but the size of a Rankine degree is the same as the size of a Fahrenheit degree.  Thus, 0 K = 0oRa and 0oF = 459.67oRa.  What is the temperature 330.7oRa expressed on the Fahrenheit scale?

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|   | a.  | 790.4oF |
|   | b.  | 1054.9oF |
|   | c.  | 603.9oF |
|   | d.  | 330.7oF |
|   | e.  | –129.0oF |

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| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.6 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.14 - Convert from one temperature scale to another. (Example 1.3) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | temperature |
| *OTHER:* | general chemistry |

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| 79. Which of the following is an incorrect statement regarding derived SI units?

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|   | a.  | The SI unit of volume is derived from the SI unit of length. |
|   | b.  | One milliliter is equivalent to one cubic centimeter. |
|   | c.  | A derived SI unit may also contain a non-SI unit. |
|   | d.  | Density is a derived SI unit. |
|   | e.  | The SI unit of energy (joule) is equivalent to kg⋅m2⋅s-2. |

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| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.15 - Define and provide examples of derived units. |
| *TOPICS:* | general conceptsmeasurement |

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| 80. What is the volume of a cube that has an edge length of 0.017 m?

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|   | a.  | 4.9 × 10–3 m3 |
|   | b.  | 4.9 × 10–3 km3 |
|   | c.  | 4.9 × 10–3 cm3 |
|   | d.  | 4.9 × 10–3 mm3 |
|   | e.  | 4.9 cm3 |

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| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.15 - Define and provide examples of derived units. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | SI unit | volume |
| *OTHER:* | general chemistry |

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| 81. The specific heat is the amount of heat required to raise the temperature of one gram of a substance one degree Celsius. A 75.0-g sample of an unknown substance absorbed 2.93 kJ of energy as it changed from a temperature of 23.2°C to 95.4°C. What is the specific heat of the unknown substance?

|  |  |  |
| --- | --- | --- |
|   | a.  | 541 kJ/(g ⋅°C) |
|   | b.  | 0.541 J/(g ⋅°C) |
|   | c.  | 5.41 kJ/(g ⋅°C) |
|   | d.  | 54.1 kJ/(g ⋅°C) |
|   | e.  | 0.541 kJ/(g ⋅°C) |

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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.15 - Define and provide examples of derived units. |
| *TOPICS:* | general conceptsmeasurement |
| *OTHER:* | general chemistry |

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| 82. A particular sheet of paper measures 8.5 × 6.5 inches. What is the surface area of one side of the paper in cm2? (2.54 cm = 1 in exactly)

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|   | a.  | 1 × 102 cm2 |
|   | b.  | 6 × 101 cm2 |
|   | c.  | 4 × 102 cm2 |
|   | d.  | 2 × 101 cm2 |
|   | e.  | 8.6 cm2 |

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| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.15 - Define and provide examples of derived units. |
| *TOPICS:* | general conceptsmeasurement |
| *OTHER:* | general chemistry |

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| 83. A piece of metal (mass = 18.300 g) is placed in 11.00 mL of chloroform (*d* = 1.498 g/mL) in a 25-mL graduated cylinder. The chloroform level increases to 15.46 mL. The best value for density of this metal from these data is

|  |  |  |
| --- | --- | --- |
|   | a.  | 1.18 g/mL. |
|   | b.  | 2.74 g/mL. |
|   | c.  | 4.103 g/mL. |
|   | d.  | 6.15 g/mL. |
|   | e.  | 4.10 g/mL. |

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| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.16 - Calculate the density of a substance. (Example 1.4) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 84. An irregularly shaped metal was weighed by the following difference:Watch glass + metal = 56.7813 gWatch glass = 35.4725 gThe volume of the metal was determined by placing the metal in a graduated cylinder that had water in it and measuring the volume difference.Graduated cylinder + water + metal = 14.15 mLGraduated cylinder + water = 11.25 mLThe density should be reported as

|  |  |  |
| --- | --- | --- |
|   | a.  | 7.348 g/mL. |
|   | b.  | 7.35 g/mL. |
|   | c.  | 7.4 g/mL. |
|   | d.  | 7.3 g/mL. |
|   | e.  | 7.3479 g/mL. |

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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.16 - Calculate the density of a substance. (Example 1.4) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 85. In addition to mass, which property of matter must be known to calculate its volume?

|  |  |  |
| --- | --- | --- |
|   | a.  | specific heat |
|   | b.  | temperature |
|   | c.  | molecular weight |
|   | d.  | density |
|   | e.  | pressure |

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| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 86. A 0.391-kg sample of methylene chloride has a density of 1.326 g/cm3. Calculate its volume.

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|   | a.  | 3390 cm3 |
|   | b.  | 0.000295 cm3 |
|   | c.  | 391 cm3 |
|   | d.  | 295 cm3 |
|   | e.  | 518 cm3 |

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| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 87. Calculate the mass of aluminum that occupies the same volume as 95.7 g of cobalt. The density of cobalt is 8.90 g/cm3 and the density of aluminum is 2.71 g/cm3.

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|   | a.  | 0.252 g |
|   | b.  | 29.1 g |
|   | c.  | 2 × 103 g |
|   | d.  | 0.00318 g |
|   | e.  | 3.96 g |

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| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 88. Four cubes of equal mass are made of lead (density = 11.3 g/cm3), silver (10.5 g/cm3), iron (7.90 g/cm3), and aluminum (2.70 g/cm3). Which cube has the longest edge?

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| --- | --- | --- |
|   | a.  | lead |
|   | b.  | iron |
|   | c.  | silver |
|   | d.  | all four cubes have the same length edge |
|   | e.  | aluminum |

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| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 89. What volume of a pure liquid (density 0.860 g/mL) has a mass of 0.360 kg?

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|   | a.  | 4.19 × 102 mL |
|   | b.  | 2.39 × 10–3 mL |
|   | c.  | 3.10 × 10–1 mL |
|   | d.  | 2.380 mL |
|   | e.  | 4.19 × 10–1 mL |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 90. A thin sheet of iridium metal that is 3.12 cm by 5.21 cm has a mass of 87.2 g and a thickness of 2.360 mm. What is the density of iridium?

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| --- | --- | --- |
|   | a.  | 22.600 g/cm3 |
|   | b.  | 2.260 g/cm3 |
|   | c.  | 3.36 × 103 g/cm3 |
|   | d.  | 0.044 g/cm3 |
|   | e.  | 0.441 g/cm3 |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 91. What length of a cylindrical piece of tungsten wire having a radius of 2.11 mm has a mass of 66.6 g? The density of tungsten is 19.25 g/cm3.

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|   | a.  | 2.47× 10–3 m |
|   | b.  | 1.79 × 102 m |
|   | c.  | 2.47 × 10–1 m |
|   | d.  | 4.04 × 10–2 m |
|   | e.  | 4.04 × 10–4 m |

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| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 92. What is the mass of NH3 in a 80.0-cm3 sample that has a density of 0.92 g/cm3 and consists of 20% (by mass) NH3?

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| --- | --- | --- |
|   | a.  | 15 g |
|   | b.  | 20 g |
|   | c.  | 45 g |
|   | d.  | 74 g |
|   | e.  | 25 g |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 93. What is the mass of H2SO4 in a 41.8-cm3 sample of sulfuric acid that has a density of 1.49 g/cm3 and consists of 51.9% H2SO4?

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| --- | --- | --- |
|   | a.  | 120 g |
|   | b.  | 62.3 g |
|   | c.  | 14.6 g |
|   | d.  | 1.85 g |
|   | e.  | 32.3 g |

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| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.7 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.17 - Use density to relate mass and volume. (Example 1.5) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | density | SI unit |
| *OTHER:* | general chemistry |

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| 94. A 3.60 cm3 sample of solid tin metal has a density of  5.770 g/cm3.  What volume does this sample of tin occupy in its liquid state?  The density of liquid tin is 6.990g/cm3.

|  |  |  |
| --- | --- | --- |
|   | a.  | 2.97 cm3 |
|   | b.  | 4.36 cm3 |
|   | c.  | 0.09 cm3 |
|   | d.  | 145.00 cm3 |
|   | e.  | 0.23 cm3 |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.18 - Use density to relate mass and volume. |
| *TOPICS:* | general conceptsmeasurement |

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| 95. How many feet (ft) are contained in 0.496 km, given that 1 mi = 1.609 km and 5280 ft = 1 mi (exact).

|  |  |  |
| --- | --- | --- |
|   | a.  | 1620.000 ft |
|   | b.  |  ft |
|   | c.  |  ft |
|   | d.  | 4218.700 ft |
|   | e.  |  ft |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.18 - Use density to relate mass and volume. |
| *TOPICS:* | general conceptsmeasurement |

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| 96. Convert 12.36 cm3 to cubic inches (in3) given that 1 inch = 2.54 cm (exact).

|  |  |  |
| --- | --- | --- |
|   | a.  | 0.754 in3 |
|   | b.  | 4.865 in3 |
|   | c.  | 31.390 in3 |
|   | d.  | 202.500 in3 |
|   | e.  | 1.325 in3 |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.19 - Convert from any unit to another unit. |
| *TOPICS:* | general conceptsmeasurement |

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| 97. Which response has the correct number of significant figures and units for the following mathematical operation?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1.804 × 10–5 J/cal |
|   | b.  | 2 × 10–5 kcal |
|   | c.  | 1.804 × 10–5 kcal |
|   | d.  | 1.80 × 10–5 kcal |
|   | e.  | 1.8 × 10–5 kcal |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.20 - Apply dimensional analysis to solving numerical problems. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 98. The average speed of oxygen molecules at 690°C is 1.60 × 105 cm/s. Which of the following calculations would convert this speed to units of miles per hour?

|  |  |  |
| --- | --- | --- |
|   | a.  | ​ |
|   | b.  |  |
|   | c.  | ​ |
|   | d.  |  |
|   | e.  |  |

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| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.20 - Apply dimensional analysis to solving numerical problems. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 99. The distance from St. Louis, Missouri, to Lincoln, Nebraska, is 444 miles by car. Which of the following series of calculations will yield this distance in units of kilometers?(1 in = 2.54 cm (exact), 1 mi = 5280 ft (exact), 1 ft = 12 in (exact))

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  | ​ |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.20 - Apply dimensional analysis to solving numerical problems. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 100. A car averages 28.5 miles per gallon of gasoline. How many liters of gasoline will be needed for a trip of 415 km? Some conversion factors that may be helpful are the following:1 qt = 0.946 L1 mile = 1.609 km4 qt = 1 gal (exact)1 ft = 12 in (exact)

|  |  |  |
| --- | --- | --- |
|   | a.  | 3 × 101 L |
|   | b.  | 5 × 103 L |
|   | c.  | 2 × 103 L |
|   | d.  | 9 × 101 L |
|   | e.  | 3 × 104 L |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.20 - Apply dimensional analysis to solving numerical problems. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 101. Which of the following sequence of conversions will yield the correct number of scruples in 66.1 lb?  Some equivalents that may be helpful are given below:1.00 scruple = 20.0 grains1.00 g = 15.4 grains1.00 grain = 0.0648 g1.00 lb = 453.6 g1.00 kg = 2.205 lb

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |
|   | e.  |  |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.20 - Apply dimensional analysis to solving numerical problems. |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 102. 6.8 kilogram(s) contains this many grams:

|  |  |  |
| --- | --- | --- |
|   | a.  | 6.8 × 102 |
|   | b.  | 0.68 |
|   | c.  | 6.8 × 10–3 |
|   | d.  | 68 |
|   | e.  | 6.8 × 103 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.21 - Convert from one metric unit to another metric unit. (Example 1.6) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 103. Convert 4523.0 g to mg.

|  |  |  |
| --- | --- | --- |
|   | a.  | 45.230 mg |
|   | b.  | 452.30 mg |
|   | c.  | 4.5230 × 106 mg |
|   | d.  | 4.5230 × 103 mg |
|   | e.  | 4.5230 mg |

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| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.21 - Convert from one metric unit to another metric unit. (Example 1.6) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 104. The enthalpy of combustion of benzoic acid is –26.4 kJ/g. What is the enthalpy of combustion expressed in joules per kilogram?

|  |  |  |
| --- | --- | --- |
|   | a.  | –2.64 × 103 J/kg |
|   | b.  | –2.64 × 104 J/kg |
|   | c.  | –2.64 × 101 J/kg |
|   | d.  | –2.64 × 107 J/kg |
|   | e.  | –2.64 × 1010 J/kg |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.21 - Convert from one metric unit to another metric unit. (Example 1.6) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 105. The enthalpy of combustion of *n*-octane, C8H18, is –4.79 × 107 J/kg. What is the enthalpy of combustion expressed in kJ/g?

|  |  |  |
| --- | --- | --- |
|   | a.  | –4.79 × 1010 kJ/g |
|   | b.  | –4.79 × 107 kJ/g |
|   | c.  | –4.79 × 103 kJ/g |
|   | d.  | –4.79 × 101 kJ/g |
|   | e.  | –4.79 × 104 kJ/g |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.21 - Convert from one metric unit to another metric unit. (Example 1.6) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 106. How many milligrams of ammonium nitrate are equivalent to 1.09 × 10–5 kg of ammonium nitrate?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1.09 × 1010 |
|   | b.  | 1.09 × 104 |
|   | c.  | 1.09 × 107 |
|   | d.  | 1.09 × 10–7 |
|   | e.  | 1.09 × 101 |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.21 - Convert from one metric unit to another metric unit. (Example 1.6) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 107. The density of a particular solid is 4.51 g/cm3 at 25°C. What is its density in kilograms per cubic meter (kg/m3)?

|  |  |  |
| --- | --- | --- |
|   | a.  | 4.51 × 1010 |
|   | b.  | 4.51 × 101 |
|   | c.  | 4.51 × 10–2 |
|   | d.  | 4.51 × 103 |
|   | e.  | 4.51 × 107 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.21 - Convert from one metric unit to another metric unit. (Example 1.6) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 108. Express the volume 657.8 cm3 in liters.

|  |  |  |
| --- | --- | --- |
|   | a.  | 6.578 L |
|   | b.  | 0.06578 L |
|   | c.  | 0.6578 L |
|   | d.  | 65.78 L |
|   | e.  | 657.8 L |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.22 - Convert from one metric volume to another metric volume. (Example 1.7) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 109. How many cubic millimeters equal one cubic meter?

|  |  |  |
| --- | --- | --- |
|   | a.  | 104 |
|   | b.  | 10–9 |
|   | c.  | 103 |
|   | d.  | 109 |
|   | e.  | 10–3 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.22 - Convert from one metric volume to another metric volume. (Example 1.7) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 110. A certain substance makes up 4.8 × 10–4 percent by mass of a normal healthy human being. How many grams of that substance would be found in the body of a person weighing 120 lb? (1.0 kg = 2.2 lb)

|  |  |  |
| --- | --- | --- |
|   | a.  | 2.6 g |
|   | b.  | 0.26 g |
|   | c.  | 580 g |
|   | d.  | 260 g |
|   | e.  | 1.3 g |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 111. How many liters are in 15.1 fluid ounces of a soft drink?  (1 fl oz = 28.35 mL)

|  |  |  |
| --- | --- | --- |
|   | a.  | 5 × 10–4 L |
|   | b.  | 5 × 102 L |
|   | c.  | 4 × 105 L |
|   | d.  | 4 × 102 L |
|   | e.  | 0.428 L |

|  |  |
| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 112. How many joules are there in 1.86 kcal? (1 calorie = 4.184 J)

|  |  |  |
| --- | --- | --- |
|   | a.  | 8 × 10–3 J |
|   | b.  | 8 × 103 J |
|   | c.  | 7.780 J |
|   | d.  | 4 × 102 J |
|   | e.  | 0.444 J |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 113. A hogshead is an old English unit of volume equal to 238.48 L.  What is the volume of a cube with an edge length of 48.0 m expressed in units of hogshead?  (1000 L = 1 m3)

|  |  |  |
| --- | --- | --- |
|   | a.  | 4.64 × 105 hogshead |
|   | b.  | 4.64 × 102 hogshead |
|   | c.  | 4.64 × 10–1 hogshead |
|   | d.  | 2.64 × 1010 hogshead |
|   | e.  | 2.64 × 104 hogshead |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 114. A barn is an atomic unit of area equal to 10–28 m2.  What is the surface area of the Earth expressed in units of barn?  Assume the Earth is a sphere with a radius of  km.  (The surface area of a sphere is 4π*r*2.)​

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|   | a.  | ​5.12 × 1042 barn |
|   | b.  | ​5.12 × 10–20 barn |
|   | c.  | ​5.12 × 1036 barn |
|   | d.  | ​5.12 × 10–14 barn |
|   | e.  | ​5.12 × 1030 barn |

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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | difficult |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 115. ​A lightyear is a unit of length equal to the distance that light travels in 1 year.  What is 1 lightyear  expressed in units of meters?  The speed of light is 3.00 × 108 m/s.

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| --- | --- | --- |
|   | a.  | ​9.51 × 100 m |
|   | b.  | ​9.46 × 1015 m |
|   | c.  | ​3.00 × 108 m |
|   | d.  | ​1.05 × 10–1 m |
|   | e.  | ​1.06 × 10–16 m |

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| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 116. The SI unit for the diffusion coefficient is m2/s, but older texts sometimes report diffusion coefficients in units of in2/min.  What is the value of a diffusion coefficient of 18.5 in2/min expressed in SI units?  (2.54 cm = 1 in exactly)

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| --- | --- | --- |
|   | a.  | 7.83 × 10–3 m2/s |
|   | b.  | 2.82 × 105 m2/s |
|   | c.  | 12.100 m2/s |
|   | d.  | 4.78 × 102 m2/s |
|   | e.  | 1.99 × 10–4 m2/s |

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| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 117. How many rundlets are there in 218 in3? Some conversion factors that may be useful are given below:1.00 barrel = 42.0 gal1.00 gal = 231 in31.00 gal = 3.78 L1.00 rundlet = 6.81 × 104 mL1.00 L = 1000.0 mL1.00 barrel = 4.00 firkins

|  |  |  |
| --- | --- | --- |
|   | a.  | 0.524 |
|   | b.  | 13,000,000 |
|   | c.  | 24,300 |
|   | d.  | 907,000 |
|   | e.  | 0.0524 |

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| --- | --- |
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 118. A barleycorn is an English unit of length equal to 1/3 of an inch.  What is the height of the Empire State Building (449 m) expressed in barleycorn?  (2.54 cm = 1 in)

|  |  |  |
| --- | --- | --- |
|   | a.  | 3 × 105 barleycorn |
|   | b.  | 6 × 103 barleycorn |
|   | c.  | 5 × 104 barleycorn |
|   | d.  | 4 × 104 barleycorn |
|   | e.  | 6 × 10–1 barleycorn |

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| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 119. A sample of milk is found to have arsenic at a concentration of 3.76 μg/L. What is the concentration in ounces per gallon?1 qt = 946.4 mL1 gal = 4 qt16 oz = 1 lb1 lb = 0.4536 kg

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| --- | --- | --- |
|   | a.  | 2.82 × 103 oz/gal |
|   | b.  | 5.02 × 10–7 oz/gal |
|   | c.  | 2.59 oz/gal |
|   | d.  | 4.04 × 10–4 oz/gal |
|   | e.  | 3.50 × 10–8 oz/gal |

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| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | moderate |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 120. The daily dietary energy requirement for an adult is 2.00 × 103 kcal (1 cal = 4.184 J). This is equivalent to

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| --- | --- | --- |
|   | a.  | 8.37 × 103 J. |
|   | b.  | 8.37 × 103 kJ. |
|   | c.  | 478 kJ. |
|   | d.  | 2.00 × 103 kJ. |
|   | e.  | 47.8 × 104 kJ. |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 1.8 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.23 - Convert from any unit to another unit. (Example 1.8) |
| *TOPICS:* | general conceptsmeasurement |
| *KEYWORDS:* | factor label method |
| *OTHER:* | general chemistry |

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| 121. ​Which of the following discovery led mankind to observe changes in certain rocks and minerals which further led to the development of ceramics, glass, and metals?

|  |  |  |
| --- | --- | --- |
|   | a.  | ​Fire |
|   | b.  | ​Rubber |
|   | c.  | ​Plastic |
|   | d.  | ​Neoprene |
|   | e.  | ​Plasma |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | Easy |
| *REFERENCES:* | 1.1 |
| *HAS VARIABLES:* | False |
| *TOPICS:* | Modern Chemistry: A Brief Glimpse |

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| 122. ​\_\_\_\_\_ have replaced copper wires in long-distance communication as they are cheaper and less bulky than copper cables carrying the same information.

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| --- | --- | --- |
|   | a.  | ​Aluminum wires |
|   | b.  | ​Ethernet cables |
|   | c.  | ​Optical fibers |
|   | d.  | ​Semaphore lines |
|   | e.  | ​Wireless antennas |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | Easy |
| *REFERENCES:* | 1.1 |
| *HAS VARIABLES:* | False |
| *TOPICS:* | Modern Chemistry: A Brief Glimpse |

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| 123. ​Individual organisms store their genetic information in \_\_\_\_\_, which consist of two intertwined molecular chains.

|  |  |  |
| --- | --- | --- |
|   | a.  | ​deoxyribonucleic acids |
|   | b.  | ​prokary​otic cells |
|   | c.  | ​peptide amino ac​ids |
|   | d.  | ​eukaryotic​ cells |
|   | e.  | ​thylakoid membranes |

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| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *DIFFICULTY:* | Easy |
| *REFERENCES:* | 1.1 |
| *HAS VARIABLES:* | False |
| *TOPICS:* | Modern Chemistry: A Brief Glimpse |

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| 124. ​A(n) \_\_\_\_\_ is an observation of natural phenomena carried out in a controlled manner so that the results can be duplicated and rational conclusions made.

|  |  |  |
| --- | --- | --- |
|   | a.  | ​theory |
|   | b.  | ​experiment |
|   | c.  | ​hypothesis |
|   | d.  | ​anomaly |
|   | e.  | ​law |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | Easy |
| *REFERENCES:* | 1.2 |
| *HAS VARIABLES:* | False |
| *TOPICS:* | Experiment and Explanation |

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| 125. ​A(n) \_\_\_\_\_ is a concise statement or mathematical equation about a fundamental relationship or regularity of nature.

|  |  |  |
| --- | --- | --- |
|   | a.  | ​experiment |
|   | b.  | ​hypothesis |
|   | c.  | ​anomaly |
|   | d.  | ​law |
|   | e.  | ​theory |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *DIFFICULTY:* | Moderate |
| *REFERENCES:* | 1.2 |
| *HAS VARIABLES:* | False |
| *TOPICS:* | Experiment and Explanation |

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