

Chemistry M11/M12/M1A Diagnostic Test Answers

1. Evaluate the following: $-4 - (-3)$

A. 1
B. 1
C. 7

D. -7
E. 12

2. Evaluate the following: $\frac{-4 - 2}{4 - 1}$

A. 2
B. 2
C. 1

D. -10
E. 5

3. Solve for x in the following equation: $3x - 5 = 7$

A. -2
B. 3
C. -4

D. 4
E. 6

4. Solve for x in the following equation: $2x - (4 + 5x) = 14$

A. 4
B. 6
C. 1

D. -1
E. -3

5. Evaluate the following: $4^3 + 3^2$

A. 18
B. 73
C. 21

D. 108
E. 70

6. Evaluate the following: $(4.1 \times 10^5)(2.0 \times 10^{-4})$

A. 0.82
B. 8.2
C. 8.2×10^{-20}

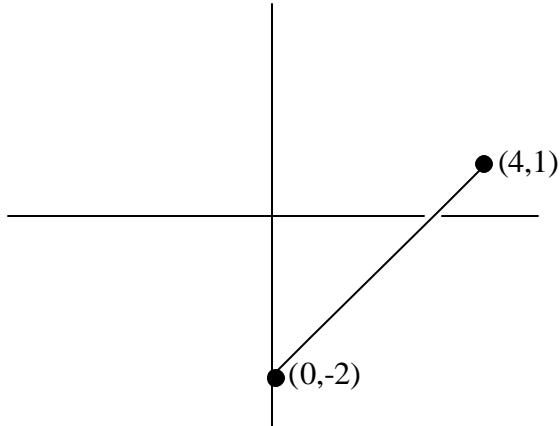
D. 82
E. -8.2

7. Convert 1.24×10^4 mm into km
- A. 12.4 km
B. 1.24×10^2 km
C. **1.24×10^{-2} km**
- D. 1.24×10^6 km
E. 1.24×10^{-6} km
8. Express the following in decimal form: 4.2×10^{-3} g
- A. 4200 g
B. 42 g
C. 0.42 g
- D. 0.042 g
E. **0.0042 g**
9. Express the following in proper scientific notation: 3600 s
- A. 3.6×10^4 s
B. **3.6×10^3 s**
C. 0.36×10^{-4} s
- D. 3.6×10^{-3} s
E. 3600×10^3 s
10. Convert 880 cm^3 to in^3 (1 in = 2.54 cm)
- A. 346 in^3
B. 1.44×10^4 in^3
C. 73.3 in^3
- D. **53.7 in^3**
E. 115 in^3
11. Convert 72.0 km/hr to m/s
- A. **20.0 m/s**
B. 1200 m/s
C. 200 m/s
- D. 260 m/s
E. 43.2 m/s
12. If $f(x) = x^2 - 2x + 3$, then $f(2)$ is equal to what?
- A. -2
B. 4
C. **3**
- D. -3
E. 2
13. Evaluate the following: $\frac{4.0 \times 10^{-5}}{2.0 \times 10^{-3}}$
- A. 2.0×10^2
B. **2.0×10^{-2}**
C. 2.0×10^{-6}
- D. 2.0×10^{-8}
E. 2.0×10^{-3}

14. Evaluate $10^{-2.2}$

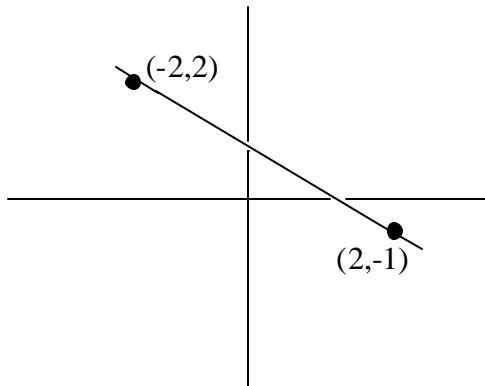
- A. **0.0063**
B. -2.2
C. 0.022
D. 0.342
E. 158

15. Consider the graph below. Determine the slope of the line.



- A. 4
B. 3
C. **3/4**
D. 4/3
E. -3/4

16. Consider the graph below. Determine the y-value at x = 0.



- A. 3/4
B. 1
C. 0.6
D. **0.5**
E. 0.7

17. The quadratic formula for the roots or solutions of a quadratic equation in the form $ax^2 + bx + c = 0$ is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. What are the solutions to $2x^2 - 3x + 1 = 0$?
- A. **1 and $\frac{1}{2}$** D. -1 and $-\frac{1}{2}$
B. $\frac{1}{2}$ and $\frac{1}{4}$ E. $\frac{1}{2}$ and $-\frac{1}{4}$
C. 1 and $-\frac{1}{2}$
18. When 20.0 g NaCl are dissolved in 180. g of water, what is the percent by mass of NaCl in the solution?
- A. 0.100% D. 11.1%
B. 0.110% E. 90.0%
C. **10.0%**
19. Perform the indicated operations below and determine your final answer in centimeters with the proper number of significant figures:
- $$12.64 \text{ cm} - 48 \text{ mm} + 0.246 \text{ m} = ?$$
- A. 32.44 cm D. **32.4 cm**
B. 60.886 cm E. 42 cm
C. 42.0 cm
20. Convert 184 °F to Kelvin. ($^{\circ}\text{F} = 1.8 \, ^{\circ}\text{C} + 32$; $K = ^{\circ}\text{C} + 273$)
- A. 84 D. 273
B. 184 E. **357**
C. 189
21. What is the name of FeCl_3 ?
- A. ferrate chloride D. **iron(III) chloride**
B. iron chloride E. iron(III) chlorine
C. iron chloride(III)
22. What is the name of SO_2 ?
- A. sulfite D. **sulfur dioxide**
B. sulfate E. monosulfur dioxide
C. sulfur oxide

For Questions 23 – 25, consider the following ion: $^{56}_{26}Fe^{+2}$

23. What are the total number of protons?

- | | |
|--------------|-------|
| A. 24 | D. 30 |
| B. 26 | E. 56 |
| C. 28 | |

24. What are the total number of neutrons?

- | | |
|-------|--------------|
| A. 24 | D. 30 |
| B. 26 | E. 56 |
| C. 28 | |

25. What are the total number of electrons?

- | | |
|--------------|-------|
| A. 24 | D. 30 |
| B. 26 | E. 56 |
| C. 28 | |

26. Consider the combustion of C₂H₄ according to the following unbalanced chemical equation: C₂H₄ + O₂ → CO₂ + H₂O. Determine the coefficient for O₂ when the equation is balanced using the smallest whole numbers.

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|-------------|------|
| A. 1 | D. 7 |
| B. 2 | E. 8 |
| C. 3 | |

27. A certain glucose solution weighing 115 g has a density of 1.23 g/cm³. Determine the volume of this solution in cm³.

- | | |
|---------------------------|-------------------------------|
| A. 0.0107 cm ³ | D. 93.5 cm³ |
| B. 114 cm ³ | E. 141 cm ³ |
| C. 116 cm ³ | |

28. Calculate the number of CCl₄ moles in 14.5 g CCl₄.

Note: atomic wt of carbon = 12.011 g/mol; atomic wt of chlorine = 35.453 g/mol

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|----------------------|--------------|
| A. 154 mol | D. 0.305 mol |
| B. 0.0943 mol | E. 2230 mol |
| C. 10.6 mol | |

29. Calculate the percent by mass of chlorine in PCl_3 .

Note: atomic wt of phosphorus = 30.974 g/mol;
atomic wt of chlorine = 35.45 g/mol

- A. 22.5 D. 25.0
B. 50.0 E. **77.4**
C. 53.4

30. A 0.125 L tank is filled with oxygen until the pressure is 75.0 atm at 298 K.
Calculate the moles of oxygen in the tank.

Note: $PV = nRT$; $R = 0.0821 \text{ L atm/K mol}$.

- A. 383 D. **0.383**
B. 4.57 E. 0.00378
C. 0.505