

1. MATH SKILLS

These problems are intended to *supplement* the problems in the textbook, not *replace* them.

Questions

SIGNIFICANT FIGURES: Perform the following calculations and express the answer with the appropriate number of significant figures, and the correct units.

1. $136.24 \text{ cm} + 12.6 \text{ cm} - 25.42 \text{ cm}$

5. $(16.2 \text{ m/s}^2) \times (273.4 \text{ s})$

2. $(9.62 \times 10^{-4} \text{ kg/m}^3) \times (78 \text{ m}^3)$

6. $(856 \text{ g} + 97 \text{ g}) \times (0.043 \text{ mL/g})$

3.
$$\frac{(0.0321 \text{ mg}) + (0.162 \text{ mg})}{0.003746 \text{ mL}}$$

7.
$$\sqrt{\frac{(5.36 \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2})(2.000)}{(1.643 \times 10^{-22} \text{ kg})}}$$

4.
$$\frac{(6.234 \times 10^{-6} \text{ kPa})(3.47 \times 10^9 \text{ mL})}{(0.100 \text{ mol})(26 \text{ K})}$$

8.
$$\frac{(2.33 \times 10^{-3} \text{ mol}) - (1.47 \times 10^{-3} \text{ mol})}{1.89 \times 10^{-3} \text{ mol}}$$

LOGARITHMS: Evaluate “x” to the correct number of significant figures.

Note, the significant figure rules are the same for base 10 logs and natural logs :

$$\log(18.6) = 1.270$$

3 SF 3 dp

$$10^{-2.33} = 0.0047$$

2 dp 2 SF

For more examples, click on Student Help on Dr. Tracey's web page: <http://ola4.aacc.edu/ljtracey>

9. $x = \log(0.0021)$

13. $x = e^{13.6}$

17. $\ln\left(\frac{x}{27.4}\right) = 0.038$

10. $x = 10^{-5.42}$

14. $9.44 = -\log(x)$

11. $\log(x) = -6.2$

15. $\ln(x) = 57.21$

18. $\log\left(\frac{0.0156}{x}\right) = -0.00766$

12. $x = -\ln(3.396 \times 10^{-4})$

16. $-x = \log(41.1)$

ALGEBRA: Evaluate “x” (assume that whole numbers are exact here). When using the quadratic equation to find x, use the SF in A, B, and C to determine the SF for the answers.

19. $\frac{4x}{9} = 16$

23. $(2x)^2 (4x)^3 = 2.6 \times 10^{-5}$

27. $(x + 0.12)(x - 1.33) = 4.60$

20. $\frac{6.42}{3.2x} = 9.917$

24. $(0.13x)^2 (7.246) = (5.7x)^4$

28. $x^3 + 9 = 73$

21. $0.55x^2 = 1.34$

25. $\frac{x^2}{0.046 - x} = 7.2 \times 10^{-4}$

29. $(2x - 4)(x - 6) = 48$

22. $8x^3 = 216$

26. $\frac{4.0000x^2}{(0.320 - x)^2} = 1.60 \times 10^{-3}$

30. $\frac{x}{(x-3)^2} = \frac{2.60}{x}$

Answers

If you cannot figure out how to get the correct answer, go to your instructor or Science Tutoring Center.

Note: Slight differences in answers may be due to different solving techniques or due to rounding at different times during the solution process.

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|-----------------------------------|---------------------------|-------------------------|
| 1. 123.4 cm | 11. 6×10^{-7} | 21. +1.6 or -1.6 |
| 2. 0.075 kg | 12. 7.9877 | 22. 3 |
| 3. 51.8 mg/mL | 13. 8×10^5 | 23. 0.040 |
| 4. 8.3×10^3 kPa·mL/mol·K | 14. 3.6×10^{-10} | 24. +0.011 or -0.011 |
| 5. 4.43×10^3 m/s | 15. 7.0×10^{24} | 25. 0.0054 or -0.0061 |
| 6. 41 mL | 16. -1.614 | 26. 0.00628 or -0.00653 |
| 7. 2.55×10^{11} m/s | 17. 28.5 | 27. 2.87 or -1.66 |
| 8. 0.46 | 18. 0.0159 | 28. 4 |
| 9. -2.68 | 19. 36 | 29. 9.3 or -1.3 |
| 10. 3.8×10^{-6} | 20. 0.20 | 30. 7.90 or 1.85 |