

# ANSWERS TO TEXTBOOK REVIEW QUESTIONS

## UNIT I Creating the Beam

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### CHAPTER 1

#### Basic Mathematics

1.  $4115$   
 $_{-} + = \underline{\hspace{1cm}} 7214$
2.  $\frac{2}{9} \cdot \frac{3}{8} = \frac{1}{12}$
3.  $571.1 - 182.572 = 388.528$  (significant digits not considered)
4.  $725 \div 0.25 = 2,900$  (significant digits not considered)
5. **Change .325 to a percent.**  
32.5%
6. **What are the significant digits of each of the following?**
- a. **20.10**      a. 4  
b. **192**      b. 3  
c. **38.04**      c. 4  
d. **2,700**      d. 2  
e. **1,800.004**      e. 7
7. **Add the following numbers, leaving the results with the correct number of significant digits if each number is assumed to be approximate.**
- a. **2.1 + 2.824**      a. 4.9  
b. **3.2 + 4.19**      b. 7.4
8. **Change the following numbers to scientific notation:**
- a. **.0081**      a.  $8.1 \times 10^{-3}$   
b. **7,811.2**      b.  $7.8112 \times 10^3$

- c. .00024      c.  $2.4 \times 10^{-4}$   
 d. 78,432      d.  $7.8432 \times 10^4$

9. **Change the following numbers to ordinary notation:**

- a.  $3.614 \times 10^{-2}$       a. 361.4  
 b.  $1.876 \times 10^{-4}$       b. .0001876  
 c.  $1.823 \times 10^3$       c. 1,823  
 d.  $5.67 \times 10^6$       d. 5,670,000

10. **Convert 1,500 seconds to hours.**

.42 hour

11. **Convert 10 meters<sup>2</sup> to centimeters<sup>2</sup>.**

100,000 cm<sup>2</sup>

12. **Simplify the following algebraic expressions:**

- a.  $-3(x + y) + 7(2x + 1)$       a.  $11x - 3y + 7$   
 b.  $-4(x + 2y) - 8(2x - y)$       b.  $-20x$

13. **Simplify the following expressions, leaving the answer with only positive exponents:**

- a.  $a^2 \cdot b^3 \cdot a^4 \cdot b^2$       a.  $a^6b^5$   
 b.  $(a^4)^3 \cdot (a^2)^{-3}$       b.  $a^6$

14. **Evaluate the expression for a = 5 and b = 3.**

$$\frac{3}{8(a_2 - b)_2}$$

6

15. **Evaluate the expression for a = 2, b = -4, and c = 6.**

$$3(a + b) - c$$

-12

16. **Solve for x:  $2x - 8 = 4$ .**

$$x = 6$$

17. Solve for x:  $2(3x - 8) = 3(4 - x) + 6x$ .

$$x = \frac{28}{3}$$

18. Solve for a:  $\frac{2}{3} = \frac{a}{15}$

a. = 10

## WORKBOOK WITH LAB EXERCISES— ANSWERS TO WORKSHEETS AND LABORATORIES

Because some of the laboratory and worksheet activities require a visual analysis of images, it is sometimes necessary to grade the exercises in this laboratory manual and workbook by viewing the images produced by the students. Whenever an answer is definitive, or by far the usual results of the exercise, we have provided guidelines in this key.

### ANSWERS REQUIRING EXPOSURE TECHNIQUE FACTORS

The use of these laboratories requires fine adjustment of exposure technical factors for each exercise. Though many of the experiments have been converted to CR/DR, the experiments that use radiographic film are based on the use of a 400 relative speed film/screen combination. Because of the complex variations in diagnostic imaging systems, it is impossible to suggest exposure factors that will produce ideal results in all situations. Faculty members may wish to produce the images for each experiment in order to obtain exact technical factors prior to assigning the laboratories to students.

If students are working individually or in small groups, the entire group will most likely learn a more valuable lesson by adjusting our suggested technical factors until an ideal density/exposure has been achieved for each activity. This process provides students with problem-solving skills that incorporate analysis of image quality as well as synthesis of previously learned knowledge.

In all cases, the **exposure should be adjusted by mAs changes only** (unless otherwise stated in the laboratory instructions). **Kilovoltage levels have been chosen for specific effects in many experiments and should not be changed unless absolutely necessary due to equipment limitations.**

### WORKSHEET 1-1

#### Basic Mathematics Review

##### *PROBLEMS FOR FRACTIONS*

1.  $5/9$
2.  $2/9$
3.  $8/15$
4.  $3/20$
5.  $14/15$

***PROBLEMS FOR DECIMALS***

1. 37,631
2. 929.365
3. 2900
4. 0.85
5. 8.1%

***PROBLEMS FOR COMPUTATION WITH VALUES (NUMBERS)***

- 1a. 328.1
- 1b. 1.3
- 1c.  $2.71 \times 10^3$  (2,710)
- 2a. 2.8
- 2b. 19.6
- 3a. 147
- 3b. 2.9
- 4a. 42.7
- 4b. 110
- 5a. 3
- 5b. 2
- 5c. 4
- 5d. 2
- 5e. 5

***PROBLEMS WITH POWER OF 10***

- 1a. 820,000
- 1b. 18,000
- 1c. 1400

***PROBLEMS FOR SCIENTIFIC NOTATION***

- 1a.  $7.842 \times 10^2$
- 1b.  $4.31 \times 10^{-3}$
- 1c.  $7,821 \times 10^7$
- 1d.  $6.7 \times 10^{-6}$

- 1e.  $7.4 \times 100$
- 2a. 284,000
- 2b. 0.0000284
- 2c. 6.18
- 2d. 0.0618
- 2e. 61.8

***PROBLEMS FOR SIGNED NUMBERS***

- 1. -3
- 2. -48
- 3.  $-15/13$  (-1.2)
- 4. -13
- 5. 2

***PROBLEMS FOR ORDER OF OPERATION***

- 1a. 22.04
- 1b. -19
- 1e. -16
- 1d. -46
- 1e. 139
- 2a. 27
- 2b. 66
- 2c. 98
- 2d. 16
- 2e. -16
- 2f. 43

***PROBLEMS FOR ALGEBRAIC EXPRESSIONS***

- 1a.  $7x + 7y$
- 1b.  $-4x - 20y$
- 1c.  $-12x + 24y$
- 1d.  $30x + 24y$
- 2a.  $7x + 7y$

2b.  $-3x - 12y$

2c.  $-4x + 24y$

2d.  $-48 - 32y$

***PROBLEMS FOR EXPONENTS***

1a.  $a^{12}$

1b.  $b^7 \cdot 6_b \cdot 10$

1c.  $a$

1d.  $b^3 / a^3$

2a.  $a^{14}$

2b.  $b^3 \cdot 7_b \cdot 7$

2c.  $a$

2d.  $b^6 / a^3$

***PROBLEMS FOR EVALUATING ALGEBRAIC EXPRESSIONS***

1a.  $-1$

1b.  $10$

1c.  $37$

2a.  $-32$

2b.  $-52$

2c.  $-76$

***PROBLEMS FOR EQUATIONS***

1.  $x = 18$

2.  $y = 3$

3.  $b = 0$

4.  $x = 33/18$  or  $1.83$

5.  $a = 1$

***PROBLEMS FOR VARIATION***

1.  $y = 55$

2.  $c = 63/2$

3.  $x = 32/5$