Brown & Mulholland: Drug Calculations: Ratio and Proportion Problems for Clinical Practice, 10th Edition

ESSAY

Directions: Solve the following problems.

1. Add and reduce to lowest terms: $\frac{7}{8} + \frac{1}{8}$

   ANS:
   $\frac{7}{8} + \frac{1}{8} = \frac{8}{8} = 1$

2. Add: $\frac{1}{3} + \frac{1}{8}$

   ANS:
   $\frac{1}{3} + \frac{1}{8} = \frac{8}{24} + \frac{3}{24} = \frac{11}{24}$

3. Multiply and reduce to lowest terms: $\frac{2}{3} \times \frac{1}{8}$

   ANS:
   $\frac{2}{3} \times \frac{1}{8} = \frac{2}{24} = \frac{1}{12}$

4. Multiply and reduce to lowest terms: $\frac{1}{4} \times \frac{1}{10}$

   ANS:
   $\frac{1}{4} \times \frac{1}{10} = \frac{1}{40}$

5. Divide and reduce to lowest terms: $\frac{1}{4} \div \frac{3}{8}$

   ANS:
   $\frac{1}{4} \div \frac{3}{8} = \frac{1}{4} \times \frac{8}{3} = \frac{8}{12} = \frac{2}{3}$

6. Divide and reduce to lowest terms: $\frac{1}{2} \div \frac{1}{6}$

   ANS:
   $\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times \frac{6}{1} = 3$

7. Which is greater, $\frac{1}{7}$ or $\frac{1}{9}$?

   ANS:
   $\frac{1}{7}$

8. Which is smaller, $\frac{1}{6}$ or $\frac{1}{8}$?

   ANS:
   $\frac{1}{8}$

9. Change to a decimal: $\frac{1}{8}$

   ANS:
   0.125

10. Change to a fraction: 0.008

    ANS:
    $\frac{8}{1000}$ (reduce to $\frac{1}{125}$)

11. Which is smaller, 0.125 or 0.25?

    ANS:
    0.125

12. Which is greater, 0.25 or 0.05?

    ANS:
    0.25

13. Round to the nearest tenth: 3.124

    ANS:
    3.1

14. Round to the nearest hundredth: 0.42877

    ANS:
    0.43

15. Round to the nearest whole number: 5.742

    ANS:
    6

16. Round to the nearest ten thousandth: 0.576391

ANS:
0.5764

17. Divide 7.35 by 0.25.

ANS:
29.4

18. Multiply 4.25 by 0.2.

ANS:
0.85

19. Find 5% of 75.

ANS:
$0.05 \times 75 = 3.75$ (10% of 75 is 7.5; 5% would be one half of that)

20. Find 55% of 120.

ANS:
$0.55 \times 120 = 66$ (a little more than one half of 120)

21. Write $\frac{1}{10}$ as a percentage and as a decimal.

ANS:
10%, 0.1

22. Write 0.05 as a fraction and as a percentage.

ANS:
$\frac{5}{100}$ (reduce to $\frac{1}{20}$), 5%

23. Write 85% as a fraction and as a decimal.

ANS:
$\frac{85}{100}$ (reduce to $\frac{17}{20}$), 0.85

24. Change $1\frac{1}{5}$ to an improper fraction.

ANS:
$\frac{6}{5}$

25. Change $\frac{20}{3}$ to a whole or mixed number.

ANS:
$6\frac{2}{3}$

26. Which is larger, tens or tenths?

ANS:
Tens

27. Write three hundred seventy seven thousandths as a decimal.

ANS:
0.377

28. Make 150 mL of a 50% strength solution. How many mL of the solute will be needed?

ANS:
75 mL

Know *Want to Know*

1 mL : 2 mL = x mL : 150 mL

$2x = 1 \times 150 = 150$

$x = 75$ mL

Proof: $1 \times 150 = 150$

$2 \times 75 = 150$

29. You need to make a 75% Betadine solution for a total of 250 mL. How much Betadine will you need?

ANS:
187.5 mL

Know *Want to Know*

75 mL : 100 mL = x mL : 250 mL

3 : 4 = x : 250

$4x = 3 \times 250 = 750$

$4x = 750$

x = 187.5 mL of Betadine. Add 62.50 mL of solution for a total of 250 mL.

Proof: $3 \times 250 = 750$

$4 \times 187.5 = 750$

30. You need to make a 10% solution of hydrogen peroxide for a total of 500 mL. You are using normal saline (NS) as the solvent. How many mL of hydrogen peroxide will you need?

ANS:
50 mL

Know *Want to Know*

10 mL : 100 mL = x mL : 500 mL

1 : 10 = x mL : 500 mL

$10x = 1 \times 500 = 500$

x = 50 mL of hydrogen peroxide. Add 450 mL of NS to make 500 mL of a 10% solution.

Proof: $50 \times 10 = 500$

$1 \times 500 = 500$

Directions:
CALCULATING SOLUTIONS
Health care professionals need to know how to prepare solutions from stock solutions. A solution consists of a solute (concentrate) plus a solvent (liquid). A solute can be either liquid or a powder, and a solvent can be either water or NS. The resulting reconstituted solution will be a weaker strength than the original. The strength of the solution is represented by a ratio of solute to solvent. Many times health care workers have to prepare solutions for irrigations, tube feedings, infant formulas, or perhaps cleaning solutions. This worksheet will give the student practice making up different types and strengths of solutions.

Prepare a 100 mL of a $\frac{1}{3}$ strength solution of hydrogen peroxide (solute) using NS (solvent). This means one part hydrogen peroxide (solute) to three parts of NS (solvent).

EXAMPLE:

Know *Want to Know*

$1 : 3 = x : 100$

$3x = 1 \times 100 = 100$

$3x = 33.33$ mL of the solute hydrogen peroxide needed

Proof: $1 \times 100 = 100$

$3 \times 33.33 = 99.9$

100 mL solution wanted

-33.33 mL hydrogen peroxide

66.67 mL of NS

66.67 mL of NS added to the 33.33 mL of hydrogen peroxide yields 100 mL of a $\frac{1}{3}$ strength hydrogen peroxide solution for irrigation.

31. Prepare a 70% Betadine solution for traction pin care. Cleanse area twice daily with 10 mL of a 70% Betadine solution with NS.
a. How many mL of total solution will you prepare?
b. How many mL of Betadine will be needed?
c. How many mL of NS will you add?

ANS:
a. 10×2 times per day = 20 mL of 70% Betadine solution should be prepared.

b.
Know *Want to Know*

$0.70 : 1 = x : 20$ mL

$x = 0.70 \times 20 = 14.00$

$x = 14$ mL of Betadine needed

Proof : $0.70 \times 20 = 14.00$

$1 \times 14 = 14$

c.
20 mL needed

-14 mL Betadine

6mL NS added to make 20 mL of a 70% Betadine solution

32. Prepare 100 mL of a 10% strength solution of bleach for cleaning.
a. How many mL of bleach will be needed?
b. How many mL of water will be needed?

ANS:

a.
Know *Want to Know*

$1 : 10 = x : 100$

$10x = 100$

$x = 10$ mL of bleach needed

Proof: $1 \times 100 = 100$

$10 \times 10 = 100$

b.
100 mL total needed

−10 mL bleach needed

90 mL of water added to make 100 mL of bleach solution

33. Make a $\frac{1}{4}$ strength solution of hydrogen peroxide. Irrigate the wound with 100 mL of solution 4 times a day.
a. How many total mL will be needed?
b. How many mL of hydrogen peroxide will be needed?
c. How many mL of sterile NS will be needed?

ANS:
a. 100 mL $\times$ 4 times per day = 400 mL of solution needed

b.
Know *Want to Know*

$1 : 4 = x : 400$

$4x = 400$

$x = 100$ mL of hydrogen per oxide needed

Proof: $1 \times 400 = 400$

$4 \times 100 = 400$

c.
400 mL total needed

−100 mL hydrogen peroxide

300 mL of sterile NS added to make 400 mL of $\frac{1}{4}$ strength solution

34. Make 4 cups of a 20% vinegar solution for household cleaning.
a. How many total mL will you prepare?
b. How many mL of vinegar will be needed?
c. How many mL of water will be needed?

ANS:

a.

Know *Want to Know*

1 cup : 240 mL = 4 cups : x mL

$x = 240 \times 4 = 960$

x = 960 mL total solution needed

Proof : $240 \times 4 = 960$

$1 \times 960 = 960$

b.

Know *Want to Know*

$20 : 100 = x : 960$

$5x = 960$

x = 192 mL of vinegar needed

Proof : $5 \times 192 = 960$

$1 \times 960 = 960$

c.

960 mL total solution needed

−192 mL vinegar needed

768 mL of water added to make a 20% solution

35. Make a 60% strength baking soda solution to clean your stainless steel sink. The directions read: 200 mL of a 60% solution will clean five stainless steel appliances.
a. How many mL of baking soda will you need?
b. How many mL of water will you need?

ANS:

a.

Know *Want to Know*

$0.60 : 1 = x : 200$

$x = 0.60 \times 200 = 120$

x = 120 mL of baking soda needed

Proof : $0.60 \times 200 = 120$

$120 \times 1 = 120$

b.

200 mL total solution needed

−120 mL baking soda

80mL of water needed to make a 60% solution

36. Make a $\frac{1}{3}$ strength drink of Ensure from a 12 oz. can.
a. How many mL are in 12 oz?
b. How many mL of Ensure will be needed?
c. How many mL of water will be needed?

ANS:
a.
Know *Want to Know*

1 oz : 30 mL = 12 oz : x mL

$x = 30 \times 12 = 360$ mL in 12 oz.

Proof : $30 \times 12 = 360$

$1 \times 360 = 360$

b.
Know *Want to Know*

$1 : 3 = x : 360$

$3x = 360$

$x = 120$ mL of Ensure needed

Proof : $1 \times 360 = 360$

$3 \times 120 = 360$

c.
360 mL total needed

−120 mL Ensure

240 mL water needed to make a $\frac{1}{3}$ strength drink

37. Make a $\frac{3}{4}$ strength drink of Sustacal from a 10 oz can.
a. How many mL are in 10 oz?
b. How many mL of Sustacal will be needed?
c. How many mL of water will be needed?

ANS:
a.

Know *Want to Know*

$10\text{ oz} : 30\text{ mL} = 10\text{ oz} : x\text{ mL}$

$x = 30 \times 10 = 300$

$x = 300$ mL in 10 ounces

Proof: $30 \times 10 = 300$

$1 \times 300 = 300$

b.

Know *Want to Know*

$3 : 4 = x : 300$

$4x = 3 \times 300 = 900$

$x = 225$ mL of Sustacal needed

Proof: $3 \times 300 = 900$

$4 \times 225 = 900$

c.

300 mL total needed

-225 mL Sustacal

75 mL water added to make a $\frac{3}{4}$ strength drink

38. Make a $\frac{1}{2}$ strength drink of 360 mL of Isomil.
a. How many mL of Isomil will be needed?
b. How many mL of water will be added?

ANS:

a.

Know *Want to Know*

$1 : 2 = x : 360$

$2x = 360$

$x = 180$ mL of Isomil needed

Proof: $1 \times 360 = 360$

$2 \times 180 = 360$

b.

360 mL total needed

−180 mL of Isomil

180 mL of water added to Isomil to make a $\frac{1}{2}$ strength drink

39. Make a $\frac{2}{3}$ strength drink from a 12 oz. can of Ensure.
    a. How many total mL of Ensure is 12 oz?
    b. How many mL of Ensure will be needed?
    c. How many mL of water will be added?

    ANS:
    a.
    Know *Want to Know*

    1 oz : 30 mL = 12 oz : x mL

    $x = 30 \times 12 = 360$ mL

    x = 360 mL in 12 ounces

    Proof : $30 \times 12 = 360$

    $1 \times 360 = 360$

    b.
    Know *Want to Know*

    $2 : 3 = x : 360$

    $3x = 2 \times 360 = 720$

    x = 240 mL of Ensure needed

    Proof : $2 \times 360 = 720$

    $3 \times 240 = 720$

    c.
    360 mL total needed

    −240 mL of Ensure

    120 mL of water added to make a $\frac{2}{3}$ strength drink

40. Prepare 400 mL of a $\frac{3}{4}$ strength drink of Sustacal for each nasogastric feeding 3 times daily.
    a. How many total mL will be needed?
    b. How many total mL of Sustacal will be needed for the 3 feedings?
    c. How many mL of water will be needed?

    ANS:

a. 400 mL × 3 times daily = 1200 mL

b.

Know *Want to Know*

$3 : 4 = x : 1200$

$4x = 3 \times 1200 = 3600$

x = 900 mL of Sustacal needed

Proof : $3 \times 1200 = 3600$

$4 \times 900 = 3600$

c.

1200 mL total need for 3 feedings

−900 mL of Sustacal needed

300 mL of water added to make a $\frac{3}{4}$ strength drink

Directions: Change the following fractions to ratios in lowest terms.

41. $\frac{3}{4}$

ANS:
3 : 4

42. $\frac{1}{2}$

ANS:
1 : 2

43. $\frac{2}{3}$

ANS:
2 : 3

44. $\frac{5}{20}$

ANS:
1 : 4

45. $\frac{3}{6}$

ANS:
1 : 2

Directions: Change the following ratios to fractions and reduce to the lowest terms.

46. 5 : 25

ANS:
$\frac{1}{5}$

47. 5 : 100

ANS:
$\frac{1}{20}$

48. 3 : 9

ANS:
$\frac{1}{3}$

49. 4 : 12

ANS:
$\frac{1}{3}$

50. 50 : 200

ANS:
$\frac{1}{4}$

Directions: Change the following percentages to fractions and reduce to the lowest terms.

51. 5%

ANS:
$\frac{5}{100} = \frac{1}{20}$

52. 10%

ANS:
$\frac{10}{100} = \frac{1}{10}$

53. 4.5%

ANS:

$$\frac{45}{1000} = \frac{9}{200}$$

54. 7.6%

ANS:
$$\frac{76}{1000} = \frac{19}{250}$$

55. 20%

ANS:
$$\frac{20}{100} = \frac{1}{5}$$

Directions: Change the following percentages to ratios and reduce to lowest terms.

56. 8%

ANS:
$8 : 100 = 2{:}25$

57. 10%

ANS:
$10 : 100 = 1 : 10$

58. 0.9%

ANS:
$9 : 1000$

59. 0.45%

ANS:
$45 : 10,000 = 9 : 2000$

60. 50%

ANS:
$50 : 100 = 1 : 2$

Directions: Change the following ratios to lowest term fractions and cross multiply.

61. $1 : 4 = 16 : x$

ANS:
$$\frac{1}{4} \times \frac{16}{x} = 1x = 64$$

62. $1 : 3 = 80 : x$

ANS:

$$\frac{1}{3} \times \frac{80}{x} = 1x = 240$$

63. $1 : 3 = 60 : x$

ANS:

$$\frac{1}{3} \times \frac{60}{x} = 1x = 180$$

64. $25 : 75 = 10 : x$

ANS:

$$\frac{1}{3} \times \frac{10}{x} = 1x = 30$$

65. $80 : 20 = 120 : x$

ANS:

$$\frac{4}{1} \times \frac{120}{x} = 4x = 120x = 30$$