Mixture Problems – Day 3
Unit 5: Real World Applications

Solve each question. Round your answer to the nearest hundredth when needed.

1. 4 kg of Jill's special coffee blend was made by combining 3 kg of brand X coffee which costs \$7/kg with 1 kg of brand Y coffee which costs \$15/kg. Find the cost per kg of the mixture. \$9/kg
2. 2 m^3 of soil containing 40% clay was mixed into 1 m^3 of soil containing 10% clay. What is the clay content of the mixture? 30%
3. A metal alloy weighing 12 mg and containing 10% gold is melted and mixed with 3 mg of a different alloy which contains 20% gold. What percent of the resulting alloy is gold? 12%
4. For her birthday party Lea mixed together 2 gal. of Brand A punch and 6 gal. of Brand B. Brand A contains 6% fruit juice and Brand B contains 18% fruit juice. What percent of the mixture is fruit juice? 15%
5. How much of Brand A fruit punch (30% fruit juice) must be mixed with 3 gal. of Brand B fruit juice (40% fruit juice) to create a mixture containing 36% fruit juice? 2 gal
6. How much of Brand A fruit punch (15% fruit juice) must be mixed with 4 gal. of Brand B fruit punch (50% fruit juice) to create a mixture containing 25% fruit juice? 10 gal
7. How many L of a 45% sugar solution must be mixed with 9 L of a 15% sugar solution to make an 18% solution? 1 L
8. How many lbs. of a metal containing 24% platinum must be combined with 2 lbs. of pure platinum to form an alloy containing 43% platinum? 6 lbs
9. Chelsea and her brother mixed together two types of soil to make 10 m^3 of soil with a 46% silt content. They used 2 m^3 of a soil with 50% slit content and 8 m^3 of another type of soil. What was the silt content of the second type of soil? 45%

10. Matt created a metal containing 64% copper by combining 5 mg of pure copper with 4 mg of another metal. What percent of the other metal was copper?

19%

11. Amy created a metal containing 78% silver by combining two other metals. One of these metals weighed 8 oz. and contained 90% silver. If the other weighed 12 oz., then what percent of it was silver?

70%

12. Bill and his brother mixed together two types of soil to make 12 m^3 of soil with a 30% clay content. They used 8 m^3 of a soil with 20% clay content and 4 m^3 of another type of soil. What was the clay content of the second type of soil?

50%

13. Aliyah wants to make 10 gal. of a 68% alcohol solution by mixing together a 35% alcohol solution and a 90% alcohol solution. How much of each solution must she use?

4 gal of 35% solution
6 gal of 90% solution

14. To build the garden of your dreams you need 12 yd^3 of soil containing 40% sand. You have two types of soil you can combine to achieve this: soil with 50% sand and soil with 10% sand. How much of each soil should you use?

9 yd^3 with 50% sand
3 yd^3 with 10% sand

15. To build the garden of your dreams you need 13 ft^3 of soil containing 55% silt. You have two types of soil you can combine to achieve this: soil with 35% silt and pure silt. How much of each soil should you use?

9 ft^3 with 35% silt
4 ft^3 of silt

16. Mixed nuts which cost \$4/oz. are made by combining walnuts which cost \$6/oz. with peanuts which cost \$3/oz. Find the number of oz. of walnuts and peanuts required to make 6 oz. of mixed nuts.

2 oz. of walnuts
4 oz of peanuts

17. Kim asked you to make 10 L of fruit punch that contains 26% fruit juice by mixing together some amount of Brand A fruit punch and some amount of Brand B fruit punch. Brand A contains 20% fruit juice and Brand B contains 40% fruit juice. How much of each do you need?

7 L of Brand A
3 L of Brand B

18. A metallurgist needs to make 15 lbs. of an alloy containing 66% nickel. She is going to melt and combine one metal that is 30% nickel with another metal that is 75% nickel. How much of each should she use?

3 lbs of 30% nickel
12 lbs of 75% nickel

① $3(\$7) + 1(\$15) = (3+1)(x)$

$\$21 + \$15 = 4x$

$\frac{\$36}{4} = \frac{4x}{4}$

$\boxed{\$9/kg = x}$

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② $2(0.40) + 1(0.10) = (2+1)(x)$

$0.80 + 0.10 = 3x$

$\frac{0.90}{3} = \frac{3x}{3}$

$0.30 = x$

Move decimal 2 places to the right. $\boxed{30\%}$

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③ $12(0.10) + 3(0.20) = (12+3)(x)$

$1.2 + 0.60 = 15x$

$\frac{1.8}{15} = \frac{15x}{15}$

$0.12 = x$

Move decimal 2 places to the right. $\boxed{12\%}$

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④ $2(0.06) + 6(0.18) = (2+6)(x)$

$0.12 + 1.08 = 8x$

$\frac{1.2}{8} = \frac{8x}{8}$

$0.15 = x$

Move decimal 2 places to the right $\boxed{15\%}$

⑤ $x(0.30) + 3(0.40) = (x+3)(0.36)$

$0.30x + 1.20 = 0.36x + 1.08$

$-0.30x \quad -1.08 \quad -0.30x \quad -1.08$

$0.12 = 0.06x$

$0.06 \quad 0.06$

2 gallons = x

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⑥ $x(0.15) + 4(0.50) = (x+4)(0.25)$

$0.15x + 2 = 0.25x + 1$

$-0.15x \quad -1 \quad -0.15x \quad -1$

$1 = 0.10x$

$0.10 \quad 0.10$

10 gallons = x

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⑦ $x(0.45) + 9(0.15) = (x+9)(0.18)$

$0.45x + 1.35 = 0.18x + 1.62$

$-0.18x \quad -1.35 \quad -0.18x \quad -1.35$

$0.27x = 0.27$

$0.27 \quad 0.27$

X = 1 L

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⑧ $x(0.24) + 2(1.00) = (x+2)(0.43)$

$0.24x + 2 = 0.43x + 0.86$

$-0.24x \quad -0.86 \quad -0.24x \quad -0.86$

$1.14 = 0.19x$

$0.19 \quad 0.19$

6 lbs = x

(9) $2(0.50) + 8(x) = (2+8)(0.46)$

$1 + 8x = 10(0.46)$

$1 + 8x = 4.6$

$-1 \qquad -1$

$8x = 3.6$

$\frac{8x}{8} = \frac{3.6}{8}$

$x = 0.45$

move decimal 2 places to the right. **45%**

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(10) $5(1.00) + 4(x) = (5+4)(0.64)$

$5 + 4x = 9(0.64)$

$5 + 4x = 5.76$

$-5 \qquad -5$

$4x = 0.76$

$\frac{4x}{4} = \frac{0.76}{4}$

$x = 0.19$

Move decimal 2 places to the right **19%**

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(11) $8(0.90) + 12(x) = (8+12)(0.78)$

$7.2 + 12x = 20(0.78)$

$7.2 + 12x = 15.6$

$-7.2 \qquad -7.2$

$12x = 8.4$

$\frac{12x}{12} = \frac{8.4}{12}$

$x = 0.70$

Move decimal 2 places to the right. **70%**

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(12) $8(0.20) + 4(x) = 12(0.30)$

$1.6 + 4x = 3.6$

$-1.6 \qquad -1.6$

$4x = 2$

$\frac{4x}{4} = \frac{2}{4}$

$x = 0.50$

Move decimal 2 places to the right **50%**

(13) Let x = amount of 35% alcohol solution
Let y = amount of 90% alcohol solution

Total Equation

$x + y = 10$

multiply by -0.35

$-0.35x - 0.35y = -3.5$

Mixture Equation

$0.35x + 0.90y = 10(0.68)$

$0.35x + 0.90y = 6.8$

$0.35x + 0.90y = 6.8$
$-0.35x - 0.35y = -3.5$

$\frac{0.55y}{0.55} = \frac{3.3}{0.55}$

$y = 6$ gal

$x + y = 10$
$x + 6 = 10$
$-6 \quad -6$

$x = 4$ gal

4 gal of 35% solution; 6 gal of 90% solution

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(14) Let x = amount of 50% sand
Let y = amount of 10% sand

Total Equation

$x + y = 12$

multiply by -0.10

$-0.10x - 0.10y = -1.2$

Mixture Equation

$0.50x + 0.10y = 12(0.40)$

$0.50x + 0.10y = 4.8$

$0.50x + 0.10y = 4.8$
$-0.10x - 0.10y = -1.2$

$\frac{0.40x}{0.40} = \frac{3.6}{0.40}$

$x = 9$ yd^3

$x + y = 12$
$9 + y = 12$
$-9 \quad -9$

$y = 3$ yd^3

9 yd^3 of 50% sand; 3 yd^3 of 10% sand

(15) Let x = amount of 35% silt
Let y = amount of silt

Total Equation

$x + y = 13$

multiply by -1

$-x - y = -13$

Mixture Equation

$0.35x + 1.00y = 13(0.55)$

$0.35x + y = 7.15$

$$\begin{array}{r} 0.35x + y = 7.15 \\ -x - y = -13 \\ \hline -0.65x = -5.85 \end{array}$$

$$\frac{-0.65x}{-0.65} = \frac{-5.85}{-0.65}$$

$x = 9\ ft^3$

$$\begin{array}{r} x + y = 13 \\ 9 + y = 13 \\ -9 \quad -9 \\ \hline y = 4\ ft^3 \end{array}$$

$9\ ft^3$ of 35% silt; $4\ ft^3$ of silt

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(16) Let x = amount of walnuts
Let y = amount of peanuts

Total Equation

$x + y = 6$

multiply by -3

$-3x - 3y = -18$

Mixture Equation

$\$6x + \$3y = 6(\$4)$

$\$6x + \$3y = \$24$

$$\begin{array}{r} \$6x + \$3y = \$24 \\ -3x - 3y = -18 \\ \hline 3x = 6 \end{array}$$

$$\frac{3x}{3} = \frac{6}{3}$$

$x = 2\ oz$

$$\begin{array}{r} x + y = 6 \\ 2 + y = 6 \\ -2 \quad -2 \\ \hline y = 4\ oz \end{array}$$

2 oz of walnuts; 4 oz of peanuts

(17) Let x = amount of Brand A

Let y = amount of Brand B

Total Equation

$x + y = 10$

multiply by -0.20

$-0.20x - 0.20y = -2$

Mixture Equation

$0.20x + 0.40y = 10(0.26)$

$0.20x + 0.40y = 2.6$

$0.20x + 0.40y = 2.6$

$-0.20x - 0.2y = -2$

$\frac{0.20y}{0.20} = \frac{0.60}{0.20}$

$y = 3L$

$x + y = 10$

$x + 3 = 10$

$-3 \quad -3$

$x = 7L$

7 L of Brand A; 3L of Brand B

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(18) Let x = amount of 30% nickel

Let y = amount of 75% nickel

Total Equation

$x + y = 15$

multiply by -0.30

$-0.30x - 0.30y = -4.5$

Mixture Equation

$0.30x + 0.75y = 15(0.66)$

$0.30x + 0.75y = 9.9$

$0.30x + 0.75y = 9.9$

$-0.30x - 0.30y = -4.5$

$\frac{0.45y}{0.45} = \frac{5.4}{0.45}$

$y = 12$ lbs

$x + y = 15$

$x + 12 = 15$

$-12 \quad -12$

$x = 3$ lbs

3 lbs of 30% nickel; 12 lbs of 75% nickel