Algebra Word Problems

Lesson 7

Worksheet 7

Algebra Word Problems

Involving

Mixture

Algebra Word Problems – Lesson 7 - Worksheet 7 - Algebra Word Problems Involving Mixture

Problem 1) How many gallons, to the nearest tenth, of cream that is 15% fat must be mixed with milk that is 4% fat to produce 20 gallons of cream that is 5% fat?

Problem 2) Jake needs 50 ounces of 20% salt solution. He has a 35% salt solution and a 10% salt solution. How many ounces, to the nearest tenth, of each must he mix to have what he needs?

Problem 3) How many kg of a 90% nickel alloy must be mixed with a 70% nickel alloy to make 40 kg of 80% nickel alloy?

Problem 4) A tank has a capacity of 10 gallons. When it is full, it contains 12% alcohol. How many gallons must be replaced by a 36% alcohol solution to give 10 gallons of 15% alcohol solution?

Problem 5) How many pounds, to the nearest tenth, of chocolate worth $\$4.20$ a pound must be mixed with 10 pounds of chocolate worth $\$1.20$ a pound to produce a mixture worth $\$2.40$ a pound?

Problem 6) A scientist has one solution that is 30% acid and another solution that is 18% acid. How much of each should he use to get $300\ L$ of a solution that is 21% acid?

Problem 7) How many liters of 20% alcohol solution should be added to 40 liters of 50% alcohol solution to make a 30% alcohol solution?

Problem 8) You mix some tea that costs $\$2.75$ per pound with some cheaper tea that costs $\$0.75$ per pound. You obtain 5 pounds of tea that costs $\$1.50$ per pound. How many pounds of each type of tea did you use?

Problem 9) John wants to make 100 ml of 5% bromine solution by mixing 2% bromine solution with 7% bromine solution. How much of each, in milliliters of the two solutions (2% and 7%), will he use?

Problem 10) How many pounds, to the nearest tenth, of mixed nuts that cost $\$4.85$ per pound must be mixed with peanuts that cost $\$2.15$ per pound to yield 10 pounds of mixed nuts with peanuts that cost $\$3.75$ per pound?

Problem 11) How many gallons of cream that is 22% fat must be mixed with milk that is 6% fat to produce 30 gallons of cream that is 8% fat?

Problem 12) Jaime needs 180 ounces of 15% salt solution. She has a 35% salt solution and a 5% salt solution. How many ounces of each must she mix to have what she needs?

Problem 13) How many kg of an 80% nickel alloy must be mixed with a 20% nickel alloy to make 150 kg of 60% nickel alloy?

Problem 14) A tank has a capacity of 20 gallons. When it is full, it contains 8% alcohol. How many gallons must be replaced by a 36% alcohol solution to give 20 gallons of 15% alcohol solution?

Problem 15) How many pounds, to the nearest tenth, of chocolate worth $\$7.30$ a pound must be mixed with 20 pounds of chocolate worth $\$1.10$ a pound to produce a mixture worth $\$3.40$ a pound?

Problem 16) A scientist has one solution that is 36% acid and another solution that is 18% acid. How much of each should he use to get $400\ L$ of a solution that is 24% acid?

Problem 17) How many liters of 5% alcohol solution should be added to 70 liters of 10% alcohol solution to make a 8% alcohol solution?

Problem 18) You mix some tea that costs $\$5.75$ per pound with some cheaper tea that costs $\$1.05$ per pound. You obtain 15 pounds of tea that costs $\$1.50$ per pound. How many pounds, to the nearest tenth, of each type of tea did you use?

Problem 19) Jose wants to make a 25 ml of 6% bromine solution by mixing 2% bromine solution with 8% bromine solution. How much of each, in milliliters to the nearest tenth, of the two solutions (2% and 8%) will he use?

Problem 20) How many pounds, to the nearest tenth, of mixed nuts that cost $\$9.25$ per pound must be mixed with peanuts that cost $\$1.15$ per pound to yield 10 pounds of mixed nuts with peanuts that cost $\$3.75$ per pound?

Answers - Algebra Word Problems – Lesson 7 - Worksheet 7 - Algebra Word Problems Involving Mixture

Problem 1) How many gallons, to the nearest tenth, of cream that is 15% fat must be mixed with milk that is 4% fat to produce 20 gallons of cream that is 5% fat?

Solution:

Let x represent the number of gallons of cream and $20 - x$ represent the number of gallons of milk. Write and solve the following equation:

$$(15\%)x + (4\%)(20 - x) = (5\%)(20)$$

$$(0.15)x + (0.04)(20 - x) = (0.05)(20)$$

Distribute and combine like terms:

$$0.15x + 0.80 - 0.04x = 1.0$$

$$0.11x + 0.80 = 1.0$$

$$0.11x = 0.20$$

$$x = 1.8181 \sim 1.8$$

Answer: 1.8 gallons

Problem 2) Jake needs 50 ounces of 20% salt solution. He has a 35% salt solution and a 10% salt solution. How many ounces of each must he mix to have what he needs?

Solution:

Let x represent the number of ounces of 35% salt solution and $50 - x$ represent the number of ounces of 10% salt solution. Write and solve the following equation:

$$(35\%)x + (10\%)(50 - x) = (20\%)(50)$$

$$(0.35)x + (0.10)(50 - x) = (0.20)(50)$$

Distribute and combine like terms:

$$0.35x + 5 - 0.10x = 10$$

$$0.25x + 5 = 10$$

$$0.25x = 5$$

$$x = 20$$

If $x = 20$, then $50 - x = 50 - 20 = 30$

Answer: 20 ounces of 35% solution and 30 ounces of 10% solution

Problem 3) How many kg of a 90% nickel alloy must be mixed with a 70% nickel alloy to make 40 kg of 80% nickel alloy?

Solution:

Let x represent the amount of 90% nickel alloy and $40 - x$ represent the amount of 70% nickel alloy. Write and solve the following equation:

$$(90\%)x + (70\%)(40 - x) = (80\%)(40)$$

$$(0.90)x + (0.70)(40 - x) = (0.80)(40)$$

Distribute and combine like terms:

$$0.90x + 28 - 0.70x = 32$$

$$0.20x + 28 = 32$$

$$0.20x = 4$$

$$x = 20$$

Answer: 20 kg

Problem 4) A tank has a capacity of 10 gallons. When it is full, it contains 12% alcohol. How many gallons, to the nearest tenth, must be replaced by a 36% alcohol solution to give 10 gallons of 15% alcohol solution?

Solution:

Let x represent the number of gallons of 12% alcohol solution and $10 - x$ represent the number of gallons of 36% alcohol solution. Write and solve the following equation:

$$(12\%)x + (36\%)(10 - x) = (15\%)(10)$$

$$(0.12)x + (0.36)(10 - x) = (0.15)(10)$$

Distribute and combine like terms:

$$0.12x + 3.6 - 0.36x = 1.5$$

$$0.36x - 0.12x = 3.6 - 1.5$$

$$0.24x = 2.1$$

$$x = \frac{2.1}{0.24} = 8.75$$

The final mixture requires 8.75 gallons of 12% solution, so 1.25 gallons must be replaced by the 36% solution.

Answer: 1.25 gallons

Problem 5) How many pounds, to the nearest tenth, of chocolate worth $\$4.20$ a pound must be mixed with 10 pounds of chocolate worth $\$1.20$ a pound to produce a mixture worth $\$2.40$ a pound?

Solution:

Let x represent the number of pounds of $\$4.20$ chocolate and $10 + x$ represent the number of pounds of $\$2.40$ chocolate. Write and solve the following equation:

$$\$4.20x + \$1.20(10) = \$2.40(x + 10)$$

$$4.2x + 1.2(10) = 2.4(x + 10)$$

Distribute and combine like terms:

$$4.2x + 12 = 2.4x + 24$$

$$1.8x + 12 = 24$$

$$1.8x = 12$$

$$x = \frac{12}{1.8} = \frac{20}{3} = 6.\bar{6} \sim 6.7$$

Answer: 6.7 pounds

Problem 6) A scientist has one solution that is 30% acid and another solution that is 18% acid. How much of each should he use to get $300\ L$ of a solution that is 21% acid?

Solution:

Let x represent the amount of 30% acid and $300 - x$ represent the amount of 18% acid. Write and solve the following equation:

$$(30\%)x + (18\%)(300 - x) = (21\%)(300)$$

$$(0.30)x + (0.18)(300 - x) = (0.21)(300)$$

Distribute and combine like terms:

$$0.30x + 54 - 0.18x = 63$$

$$0.12x + 54 = 63$$

$$0.12x = 9$$

$$x = 75$$

If $x = 75$, then $300 - x = 300 - 75 = 225$

Answer: 75 liters of 30% acid and 225 liters of 18% acid

Problem 7) How many liters of 20% alcohol solution should be added to 40 liters of 50% alcohol solution to make a 30% alcohol solution?

Solution:

Let x represent the amount of 20% alcohol solution and $x + 40$ represent the amount of 30% alcohol solution. Write and solve the following equation:

$$(20\%)x + (50\%)(40) = (30\%)(40 + x)$$

$$(0.20)x + (0.50)(40) = (0.30)(40 + x)$$

Distribute and combine like terms:

$$0.20x + 20 = 12 + 0.30x$$

$$20 = 12 + 0.10x$$

$$8 = 0.10x$$

$$x = 80$$

Answer: 80 liters

Problem 8) You mix some tea that costs $\$2.75$ per pound with some cheaper tea that costs $\$0.75$ per pound. You obtain 5 pounds of tea that costs $\$1.50$ per pound. Exactly how many pounds of each type of tea did you use?

Solution:

Let x represent the amount of $\$2.75$ tea and $5 - x$ represent the amount of $\$0.75$ tea. Write and solve the following equation:

$$\$2.75x + \$0.75(5 - x) = \$1.50(5)$$

$$2.75x + 0.75(5 - x) = 1.50(5)$$

Distribute and combine like terms:

$$2.75x + 3.75 - 0.75x = 7.5$$

$$2x + 3.75 = 7.5$$

$$2x = 3.75$$

$$x = 1.875$$

If $x = 1.875$, then $5 - x = 5 - 1.875 = 3.125$

Answer: 1.875 pounds of $\$2.75$ tea, 3.125 pounds of $\$0.75$ tea

Problem 9) John wants to make a 100 ml of 5% bromine solution by mixing 2% bromine solution with 7% bromine solution. How much of each, in milliliters, of the two solutions (2% and 7%) will he use?

Solution:

Let x represent the amount of 2% bromine solution and $100 - x$ represent the amount of 7% bromine solution. Write and solve the following equation:

$$(2\%)x + (7\%)(100 - x) = (5\%)(100)$$

$$(0.02)x + (0.07)(100 - x) = (0.05)(100)$$

Distribute and combine like terms:

$$0.02x + 7 - 0.07x = 5$$

$$0.07x - 0.02x = 7 - 5$$

$$0.05x = 2$$

$$x = 40$$

If $x = 40$, then $100 - x = 100 - 40 = 60$

Answer: 40 ml of 2% solution, 60 ml of 7% solution

Problem 10) How many pounds, to the nearest tenth, of mixed nuts that cost $\$4.85$ per pound must be mixed with peanuts that cost $\$2.15$ per pound will it take to yield 10 pounds of mixed nuts with peanuts that cost $\$3.75$ per pound?

Solution:

Let x represent the amount of $\$4.85$ mixed nuts and $10 - x$ represent the amount of $\$2.15$ peanuts. Write and solve the following equation:

$$\$4.85x + \$2.15(10 - x) = \$3.75(10)$$

$$4.85x + 2.15(10 - x) = 3.75(10)$$

Distribute and combine like terms:

$$4.85x + 21.5 - 2.15x = 37.5$$

$$2.7x + 21.5 = 37.5$$

$$2.7x = 16$$

$$x = 5.92592 \sim 5.9$$

Answer: 5.9 lbs

Problem 11) How many gallons, to the nearest hundredth, of cream that is 22% fat must be mixed with milk that is 6% fat to produce 30 gallons of cream that is 8% fat?

Solution:

Let x represent the gallons of cream and $30 - x$ represent the gallons of milk. Write and solve the following equation:

$$(22\%)x + (6\%)(30 - x) = (8\%)(30)$$

$$(0.22)x + (0.06)(30 - x) = (0.08)(30)$$

Distribute and combine like terms:

$$0.22x + 1.8 - 0.06x = 2.4$$

$$0.16x + 1.8 = 2.4$$

$$0.16x = 0.6$$

$$x = 3.75$$

Answer: 3.75 gallons

Problem 12) Jaime needs 180 ounces of 15% salt solution. She has a 35% salt solution and a 5% salt solution. How many ounces of each must she mix to have what she needs?

Solution:

Let x represent the number of ounces of 35% salt solution and $180 - x$ represent the number of ounces of 5% salt solution. Write and solve the following equation:

$$(35\%)x + (5\%)(180 - x) = (15\%)(180)$$

$$(0.35)x + (0.05)(180 - x) = (0.15)(180)$$

Distribute and combine like terms:

$$0.35x + 9 - 0.05x = 27$$

$$0.30x + 9 = 27$$

$$0.3x = 18$$

$$x = 60$$

If $x = 60$, then $180 - x = 180 - 60 = 120$

Answer: 60 ounces of 35% solution and 120 ounces of 5% solution

Problem 13) How many kg of an 80% nickel alloy must be mixed with a 20% nickel alloy to make 150 kg of 60% nickel alloy?

Solution:

Let x represent the amount of 80% nickel alloy and $150 - x$ represent the amount of 20% nickel alloy. Write and solve the following equation:

$$(80\%)x + (20\%)(150 - x) = (60\%)(150)$$

$$(0.80)x + (0.20)(150 - x) = (0.60)(150)$$

Distribute and combine like terms:

$$0.80x + 30 - 0.20x = 90$$

$$0.60x + 30 = 90$$

$$0.60x = 60$$

$$x = 100$$

Answer: 100 kg

Problem 14) A tank has a capacity of 20 gallons. When it is full, it contains 8% alcohol. How many gallons must be replaced by a 36% alcohol solution to give 20 gallons of 15% alcohol solution?

Solution:

Let x represent the number of gallons of 36% alcohol solution and $20 - x$ represent the number of gallons of 8% alcohol solution. Write and solve the following equation:

$$(36\%)x + (8\%)(20 - x) = (15\%)(20)$$

$$(0.36)x + (0.08)(20 - x) = (0.15)(20)$$

Distribute and combine like terms:

$$0.36x + 1.6 - 0.08x = 3$$

$$0.28x + 1.6 = 3$$

$$0.28x = 1.4$$

$$x = 5$$

The final mixture requires 5 gallons of 36% solution.

Answer: 5 gallons

Problem 15) How many pounds, to the nearest tenth, of chocolate worth $\$7.30$ a pound must be mixed with 20 pounds of chocolate worth $\$1.10$ a pound to produce a mixture worth $\$3.40$ a pound?

Solution:

Let x represent the pounds of $\$7.30$ chocolate and $20 + x$ represent the number of pounds of $\$3.40$ chocolate. Write and solve the following equation:

$$\$7.30x + \$1.10(20) = \$3.40(x + 20)$$

$$7.3x + 1.1(20) = 3.4(x + 20)$$

Distribute and combine like terms:

$$7.3x + 22 = 3.4x + 68$$

$$3.9x + 22 = 68$$

$$3.9x = 46$$

$$x = 11.794872 \sim 11.8$$

Answer: 11.8 pounds

Problem 16) A scientist has one solution that is 36% acid and another solution that is 18% acid. How many liters, to the nearest tenth, of each should he use to get $400\ L$ of a solution that is 24% acid?

Solution:

Let x represent the amount of 36% acid and $400 - x$ represent the amount of 18% acid. Write and solve the following equation:

$$(36\%)x + (18\%)(400 - x) = (24\%)(400)$$

$$(0.36)x + (0.18)(400 - x) = (0.24)(400)$$

Distribute and combine like terms:

$$0.36x + 72 - 0.18x = 96$$

$$0.18x + 72 = 96$$

$$0.18x = 24$$

$$x = 133\,.\overline{3} \sim 133.3$$

If $x = 133.3$, then $400 - x = 400 - 133.3 = 266.7$

Answer: 133.3 liters of 36% acid and 266.7 liters of 18% acid

Problem 17) How many liters, to the nearest tenth, of 5% alcohol solution should be added to 70 liters of 10% alcohol solution to make an 8% alcohol solution?

Solution:

Let x represent the amount of 5% alcohol solution and $x + 70$ represent the amount of 8% solution. Write and solve the following equation:

$$(5\%)x + (10\%)(70) = (8\%)(70 + x)$$

$$(0.05)x + (0.10)(70) = (0.08)(70 + x)$$

Distribute and combine like terms:

$$0.05x + 7 = 5.6 + 0.08x$$

$$7 = 5.6 + 0.03x$$

$$1.4 = 0.03x$$

$$x = 46.\bar{6} \sim 46.7$$

Answer: 46.7 liters

Problem 18) You mix some tea that costs $\$5.75$ per pound with some cheaper tea that costs $\$1.05$ per pound. You obtain 15 pounds of tea that costs $\$1.50$ per pound. How many pounds, to the nearest tenth, of each type of tea did you use?

Solution:

Let x represent the amount of $\$5.75$ tea and $15 - x$ represent the amount of $\$1.05$ tea. Write and solve the following equation:

$$\$5.75x + \$1.05(15 - x) = \$1.50(15)$$

$$5.75x + 1.05(15 - x) = 1.50(15)$$

Distribute and combine like terms:

$$5.75x + 15.75 - 1.05x = 22.50$$

$$4.7x + 15.75 = 22.5$$

$$4.7x = 6.75$$

$$x = 1.436170 \sim 1.4$$

If $x = 1.4$, then $15 - x = 15 - 1.4 = 13.6$

Answer: 1.4 pounds of $\$5.75$ tea, 13.6 pounds of $\$1.05$ tea

Problem 19) Jose wants to make 25 ml of 6% bromine solution by mixing 2% bromine solution with 8% bromine solution. How much of each, in milliliters to the nearest tenth, of the two solutions (2% and 8%) will he use?

Solution:

Let x represent the amount of 2% bromine solution and $25 - x$ represent the amount of 8% bromine solution. Write and solve the following equation:

$$(2\%)x + (8\%)(25 - x) = (6\%)(25)$$

$$(0.02)x + (0.08)(25 - x) = (0.06)(25)$$

Distribute and combine like terms:

$$0.02x + 2 - 0.08x = 1.5$$

$$0.06x = 2 - 1.5$$

$$0.06x = 0.5$$

$$x = 8.\overline{3} \sim 8.3$$

If $x = 8.3$, then $25 - x = 25 - 8.3 = 16.7$

Answer: 8.3 ml of 2% solution, 16.7 ml of 8% solution

Problem 20) How many pounds, to the nearest tenth, of mixed nuts that cost $\$9.25$ per pound must be mixed with peanuts that cost $\$1.15$ per pound to yield 10 pounds of mixed nuts with peanuts that cost $\$3.75$ per pound?

Solution:

Let x represent the amount of $\$9.25$ mixed nuts and $10 - x$ represent the amount of $\$1.15$ peanuts. Write and solve the following equation:

$$\$9.25x + \$1.15(10 - x) = \$3.75(10)$$

$$9.25x + 1.15(10 - x) = 3.75(10)$$

Distribute and combine like terms:

$$9.25x + 11.5 - 1.15x = 37.5$$

$$8.1x + 11.5 = 37.5$$

$$8.1x = 26$$

$$x = 3.209877 \sim 3.2$$

Answer: 3.2 lbs