Ch 7.4 Applications

EXAMPLE Real-World Problem Solving

Metallurgy A metalworker has some ingots of metal alloy that are 20% copper and others that are 60% copper. How many kilograms of each type of ingot should the metalworker combine to create 80 kg of a 52% copper alloy?

Define Let g = the mass of the 20% alloy.
Let h = the mass of the 60% alloy.

Relate mass of alloys   mass of copper

Write $g + h = 80$ $0.2g + 0.6h = 0.52(80)$

Real-World Connection
The melting point of copper is 1083°C.

To make 80 kg of 52% copper alloy, you need 16 kg of 20% copper alloy and 64 kg of 60% copper alloy.

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❶ Suppose you combine ingots of 25% copper alloy and 50% copper alloy to create 40 kg of 45% copper alloy. How many kilograms of each do you need?

x = 25% copper alloy
y = 50% copper alloy

percents of substance   mass of substance
$.25x + .50y = .45(40)$ $x + y = 40$
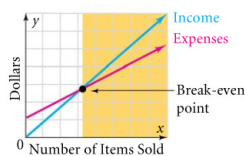
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When starting a business, people want to know the *break-even point*, the point at which their income equals their expenses. The graph at the right shows the break-even point for one business.

☐ Lose money   ☐ Make money

Notice that the values of y on the red line represent dollars spent on expenses, and the values of y on the blue line represent dollars received as income. So y is used to represent both expenses and income.

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2 EXAMPLE Finding a Break-Even Point

Publishing Suppose a model airplane club publishes a newsletter. Expenses are $.90 for printing and mailing each copy, plus $600 total for research and writing. The price of the newsletter is $1.50 per copy. How many copies of the newsletter must the club sell to break even?

Define Let x = the number of copies.
Let y = the amount of dollars of expenses or income.

Relate Expenses are printing costs   Income is price
plus research and writing.   times copies sold.

Write $y = 0.9x + 600$ $y = 1.5x$

• To break even, the model airplane club must sell 1000 copies.

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❷ Suppose an antique car club publishes a newsletter. Expenses are $.35 for printing and mailing each copy, plus $770 total for research and writing. The price of the newsletter is $.55 per copy. How many copies of the newsletter must the club sell to break even?

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Ex3) Rebecca has 45 coins, all nickels and dimes. The total value of the coins is $3.60. How many of each type of coins does Rebecca have?

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Ex3b) Sally has $21.40 in dimes and quarters, for a total of 100 coins. How many of each kind of coin does Sally have?

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