

77. Verbal Model: $\boxed{\text{Interest}} = \boxed{\text{Principal}} \cdot \boxed{\text{Rate}} \cdot \boxed{\text{Time}}$

Labels: Interest = I
Principal = 5000
Rate = 9.5%
Time = 6

Equation: $I = (5000)(0.095)(6)$
 $I = \$2850$

79. Verbal Model: $\boxed{\text{Interest}} = \boxed{\text{Principal}} \cdot \boxed{\text{Rate}} \cdot \boxed{\text{Time}}$

Labels: Interest = 500
Principal = P
Rate = 7%
Time = 2

Equation: $500 = (P)(0.07)(2)$
 $500 = P(0.14)$
 $\frac{500}{0.14} = P$
 $\$3571.43 \approx P$

81. Verbal Model: $\boxed{\text{Interest}} = \boxed{\text{Principal}} \cdot \boxed{\text{Rate}} \cdot \boxed{\text{Time}}$

Labels: Interest = 3500
Principal at 10% = x
Principal at 8% = $40,000 - x$
Time = 1

Equation: $3500 = 0.10x + 0.08(40,000 - x)$
 $3500 = 0.10x + 3200 - 0.08x$
 $300 = 0.02x$
 $\frac{300}{0.02} = x$
 $\$15,000 = x$

83. (a) $y = 9.24 + 0.307t$, $0 \leq t \leq 7$

From the graph, 1993 was the year when the average hourly wage was \$10.15.

$$10.15 = 9.24 + 0.307t$$

$$0.91 = 0.307t$$

$$2.9641 \approx t$$

$$3 \approx t$$

Yes, the result would be the same, 1993.

(b) The average annual hourly raise for bus drivers during this 8-year period is \$0.307. Determine the average hourly wage for each year using the model. The difference between each two consecutive years is \$0.307.

85. The bus drivers' average salaries were increasing at a greater annual rate at \$0.307 compared to \$0.209 for the cafeteria workers.

87. Markup is the difference between the cost a retailer pays for a product and the price at which the retailer sells the product. Markup rate is the percent increase of the markup.

89. If it takes you t hours to complete a task, you can complete $1/t$ of the task in 1 hour.

91. No, it quadruples. The area of a square of side s is s^2 . If the length of the sides is $2s$, the area is $(2s)^2 = 4s^2$.

Mid-Chapter Quiz for Chapter 1

1. $4x + 3 = 11$

$$4x + 3 - 3 = 11 - 3$$

$$4x = 8$$

$$\frac{4x}{4} = \frac{8}{4}$$

$$x = 2$$

Check:

$$4(2) + 3 \stackrel{?}{=} 11$$

$$8 + 3 \stackrel{?}{=} 11$$

$$11 = 11$$

2. $-3(z - 2) = 0$

$$\frac{-3(z - 2)}{-3} = \frac{0}{-3}$$

$$z - 2 = 0$$

$$z - 2 + 2 = 0 + 2$$

$$z = 2$$

Check:

$$-3(2 - 2) \stackrel{?}{=} 0$$

$$-3(0) \stackrel{?}{=} 0$$

$$0 = 0$$

3. $2(y + 3) = 18 - 4y$

$2y + 6 = 18 - 4y$

$2y + 4y + 6 = 18 - 4y + 4y$

$6y + 6 - 6 = 18 - 6$

$6y = 12$

$\frac{6y}{6} = \frac{12}{6}$

$y = 2$

Check:

$2(2 + 3) \stackrel{?}{=} 18 - 4(2)$

$2(5) \stackrel{?}{=} 18 - 8$

$10 = 10$

4. $5t + 7 = 7(t + 1) - 2t$

$5t + 7 = 7t + 7 - 2t$

$5t + 7 = 5t + 7$

Identity

5. $\frac{1}{4}x + 6 = \frac{3}{2}x - 1$

$4\left(\frac{1}{4}x + 6\right) = 4\left(\frac{3}{2}x - 1\right)$

$x + 24 = 6x - 4$

$x - x + 24 = 6x - 4 - x$

$24 = 5x - 4$

$24 + 4 = 5x - 4 + 4$

$28 = 5x$

$\frac{28}{5} = \frac{5x}{5}$

$\frac{28}{5} = x$

Check:

$\frac{1}{4}\left(\frac{28}{5}\right) + 6 \stackrel{?}{=} \frac{3}{2}\left(\frac{28}{5}\right) - 1$

$\frac{7}{5} + \frac{30}{5} \stackrel{?}{=} \frac{42}{5} - \frac{5}{5}$

$\frac{37}{5} = \frac{37}{5}$

6. $\frac{u}{4} + \frac{u}{3} = 1$

$12\left(\frac{u}{4} + \frac{u}{3}\right) = 12(1)$

$3u + 4u = 12$

$7u = 12$

$\frac{7u}{7} = \frac{12}{7}$

$u = \frac{12}{7}$

Check:

$\frac{12}{7} + \frac{12}{7} \stackrel{?}{=} 1$

$\frac{3}{7} + \frac{4}{7} \stackrel{?}{=} 1$

$\frac{7}{7} \stackrel{?}{=} 1$

$1 = 1$

7. $\frac{4 - x}{5} + 5 = \frac{5}{2}$

$10\left(\frac{4 - x}{5} + 5\right) = 10\left(\frac{5}{2}\right)$

$2(4 - x) + 50 = 25$

$8 - 2x + 50 = 25$

$-2x + 58 = 25$

$-2x + 58 - 58 = 25 - 58$

$-2x = -33$

$\frac{-2x}{-2} = \frac{-33}{-2}$

$x = \frac{33}{2}$

Check:

$\frac{4 - \frac{33}{2}}{5} + 5 \stackrel{?}{=} \frac{5}{2}$

$\frac{\frac{8}{2} - \frac{33}{2}}{5} + 5 \stackrel{?}{=} \frac{5}{2}$

$-\frac{25}{2} + \frac{1}{5} + 5 \stackrel{?}{=} \frac{5}{2}$

$-\frac{5}{2} + \frac{10}{2} \stackrel{?}{=} \frac{5}{2}$

$\frac{5}{2} = \frac{5}{2}$

8. $0.2x + 0.3 = 1.5$

$10(0.2x + 0.3) = 10(1.5)$

$2x + 3 = 15$

$2x + 3 - 3 = 15 - 3$

$2x = 12$

$\frac{2x}{2} = \frac{12}{2}$

$x = 6$

Check:

$0.2(6) + 0.3 \stackrel{?}{=} 1.5$

$1.2 + 0.3 \stackrel{?}{=} 1.5$

$1.5 = 1.5$

$$9. \quad 3x + \frac{11}{12} = \frac{5}{16}$$

$$3x + \frac{11}{12} - \frac{11}{12} = \frac{5}{16} - \frac{11}{12}$$

$$3x = \frac{15}{48} - \frac{44}{48}$$

$$3x = -\frac{29}{48}$$

$$\frac{3x}{3} = -\frac{29}{48} \div 3$$

$$x = -\frac{29}{48} \cdot \frac{1}{3}$$

$$x = -\frac{29}{144} \approx -0.20$$

$$10. \quad 0.42x + 6 = 5.25x - 0.80$$

$$0.42x + 6 - 5.25x = 5.25x - 0.80 - 5.25x$$

$$-4.83x + 6 = -0.80$$

$$-4.83x + 6 - 6 = -0.80 - 6$$

$$-4.83x = -6.80$$

$$\frac{-4.83x}{-4.83} = \frac{-6.80}{-4.83}$$

$$x \approx 1.41$$

11. 0.45 is 45 hundredths so $0.45 = \frac{45}{100}$ which reduces to $\frac{9}{20}$ and since percent means hundredths, $0.45 = 45\%$.

12. Verbal Model:

Compared number

 =

Percent

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Base number

Labels: Compared number = a

Percent = p

Base number = b

Equation: $a = p \cdot b$

$$500 = (2.50)(b)$$

$$\frac{500}{2.50} = b$$

$$200 = b$$

13. $\frac{\text{Total price}}{\text{Total units}} = \frac{2.35}{12} = \frac{235}{1200} \approx \0.1958 per ounce

14. Verbal Model:

Defective units
Total units

 =

Defective units
Total units

Proportion: $\frac{x}{600,000} = \frac{1}{300}$

$$x = 600,000 \cdot \frac{1}{300}$$

$$x = 2000 \text{ defective units}$$

15. Store computer:

Verbal Model:

Discount

 =

Discount rate

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List price

Labels: Discount = x

Discount rate = 0.25

List price = 1750

Equation: $x = (0.25)(1750)$

$$x = \$437.50$$

Verbal Model:

Selling price

 =

List price

 -

Discount

Labels: Selling price = x

List price = 1750

Discount = 437.50

Equation: $x = 1750 - 437.50$

$$x = \$1312.50$$

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15. —CONTINUED—

Mail-order catalog computer

$$\text{Verbal Model: } \boxed{\text{Selling price}} = \boxed{\text{List price}} + \boxed{\text{Shipping}}$$

$$\text{Labels: } \text{Selling price} = x$$

$$\text{List price} = 1250$$

$$\text{Shipping} = 24.95$$

$$\text{Equation: } x = 1250 + 24.95$$

$$x = \$1274.95$$

The mail-order catalog computer is the better buy.

$$16. \text{ Verbal Model: } \boxed{\text{Total wages}} = \boxed{\text{Regular wages}} + \boxed{\text{Overtime wages}}$$

$$\text{Labels: } \text{Total wages} = 616$$

$$\text{Regular wages} = 40(12.25)$$

$$\text{Overtime wages} = x(18)$$

$$\text{Number of hours} = x$$

$$\text{Equation: } 616 = 40(12.25) + x(18)$$

$$616 = 490 + 18x$$

$$126 = 18x$$

$$7 \text{ hours} = x$$

$$17. \text{ Verbal Model: } \boxed{\text{Amount of solution 1}} + \boxed{\text{Amount of solution 2}} = \boxed{\text{Amount of final solution}}$$

$$\text{Labels: } \text{Percent of solution 1} = 25\%$$

$$\text{Gallons of solution 1} = x$$

$$\text{Percent of solution 2} = 50\%$$

$$\text{Gallons of solution 2} = 50 - x$$

$$\text{Percent of final solution} = 30\%$$

$$\text{Gallons of final solution} = 50$$

$$\text{Equation: } 0.25x + 0.50(50 - x) = 0.30(50)$$

$$0.25x + 25 - 0.50x = 15$$

$$25 - 0.25x = 15$$

$$-0.25x = -10$$

$$x = 40 \text{ gallons at } 25\%$$

$$50 - x = 10 \text{ gallons at } 50\%$$

$$18. \text{ Verbal Model: } \boxed{\text{Distance}} = \boxed{\text{Rate}} \cdot \boxed{\text{Time}}$$

$$\text{Labels: } \text{Distance} = 300$$

$$\text{Rate of first part} = 62$$

$$\text{Time for first part} = x$$

$$\text{Rate of second part} = 46$$

$$\text{Time for second part} = 6 - x$$

$$\text{Equation: } 300 = 62x + 46(6 - x)$$

$$300 = 62x + 276 - 46x$$

$$24 = 16x$$

$$1.5 \text{ hours} = x \text{ (first part of trip at } 62 \text{ mph)}$$

$$4.5 \text{ hours} = 6 - x \text{ (second part of trip at } 46 \text{ mph)}$$