6 How to • Solve Two-Step and Multi-Step Problems

Facts to Know

- Two-step problems involve two operations.
- Multi-step problems involve more than two operations.

Five-Step Plan

1. Read the problem carefully. Make sure you understand what the situation is. Know who and what is involved.
2. State the problem to be solved. In your own words, briefly write or restate the problem.
3. Determine the operations to be used. Decide which of the four operations you need to do first and which numbers to use. Decide which of the four operations you need to do next and which numbers to use. If a third or fourth step is involved, determine which operation and the numbers to use.
4. Do the operations in order. Carefully recheck your calculations.
5. Check the final answer to see if it is reasonable.

Use the Five-Step Plan to solve these problems.

Sample

Jennifer bought a mountain bike priced at $299.00. She received a 20% discount because the dealer was overstocked. She had to pay an 8% sales tax on the amount she actually paid for the bike. What was the total cost of the bike, including tax?

Step 1: *Read the problem carefully*. Note that she gets a discount, but she has to pay sales tax.

Step 2: *State the problem*. The problem breaks down into four main sections:

A. How much money does the discount amount to? _____

B. How much does the bike cost after the discount? _____

C. How much tax must she pay? _____

D. What is the total cost of the bike, including tax? _____

Steps 3 and 4: *Determine the operations to be used. Do the operations.*

A. **Multiply** $299.00 by .20 (20%) to determine the amount of the discount.

$$\begin{array}{r} \$299.00 \\ \times \quad .20 \\ \hline \$59.8000\ (\$59.80) \end{array}$$

B. **Subtract** the discount ($59.80) from $299.00 to determine the discounted cost of the bike.

$$\begin{array}{r} \$299.00 \\ - \quad \$59.80 \\ \hline \$239.20 \end{array}$$

C. **Multiply** the discounted cost of the bike $239.20 by .08 (8%) to determine the amount of tax.

$$\begin{array}{r} \$239.20 \\ \times \quad .08 \\ \hline \$19.1360\ (\$19.14) \end{array}$$

D. **Add** the amount of the tax ($19.14) to the discounted cost of the bike to get the final answer, which is $258.34.

$$\begin{array}{r} \$239.20 \\ + \quad \$19.14 \\ \hline \$258.34 \end{array}$$

Step 5: Check the final answer to see if it is reasonable.

Frederica's Funky Fashions

Frederica's Funky Fashions is the newest clothing store in the mall with the trendiest clothes. They are having a spectacular sale with huge discounts on school styles and sports clothes for teenagers.

Directions: Use the information on page 25 to help you solve these problems.

1. Marlena bought 3 pairs of jeans, which usually sell for $19.00 each. They were on sale at 20% off the regular price. How much did Marlena spend? _____
2. James bought 7 T-shirts, which usually cost $6.50 each, on sale for 25% off the regular price. How much did he spend? _____
3. Elena bought 3 tops at $9.75 each and 4 pairs of shorts at $18.85 each. How much was her bill? _____
4. Ricky bought 7 colored T-shirts at $4.95 each and 2 pairs of jeans at $13.75 each. He got a 30% discount on everything. How much money did he spend on clothes? _____
5. Roxanne spent $13.68. Joanne spent $27.98. Alyssa spent $33.87. Marie spent $22.34. Patricia spent $66.88. What was the average amount spent by the 5 girls? _____
6. Jimmy bought a jacket listed at $42.50 for $\frac{1}{2}$ off the price. He bought a pair of shorts listed at $12.00 for $\frac{1}{3}$ off the price. How much did he spend? _____
7. Melissa bought an outfit, which was supposed to cost $56.88 at a 40% discount. She had to pay 8% sales tax. How much did she spend for the outfit? _____

Directions: Use the information below to answer questions 8–11.

Frederica's Receipt Totals for One Week

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
$22,567.89	$21,798.96	$28,455.02	$27,886.09	$38,997.66	$44,529.51	$29,654.32

8. What were the average daily earnings for this week at Frederica's? _____
9. Which two days of receipts approximately equaled one other day's sales? _____
10. These receipts included a sales tax of 8%. How much of the total weekly receipts were for taxes? _____
11. How much more money did Frederica's make on the three days of the weekend (Friday, Saturday, Sunday) than on Monday through Thursday? _____

6 Practice • • • • • Solving More Multi-Step Problems

Boom Box City

Boom Box City offers the absolute latest in home entertainment appliances from big screen televisions to the largest boom box on the market.

Directions: Use the information on page 25 to help you solve these problems.

1. The Blast'em Boom Box with four speakers is listed at $144.95. You can get a 30% discount if you pay cash. How much will the boom box cost with the discount? _____

2. You can buy a standard VCR for $99.75 plus 8% tax. How much change would you receive from $120.00? _____

3. You could buy a DVD player for $179.67 or a DVD/CD player for $189.41. There is an 8% sales tax on each item. You have only $200 to spend. Which player can you afford to buy? _____ How much change would you have left? _____

4. A widescreen television is listed at $970.56. You can get a 25% discount if you buy it today. There is an 8% sales tax. How much will the television cost if you buy it today? _____

5. You could buy a cordless phone answering machine for $129.88 or a traditional phone answering machine for $87.75 and a second phone for $30.89. Which system is cheaper and by how much? _____

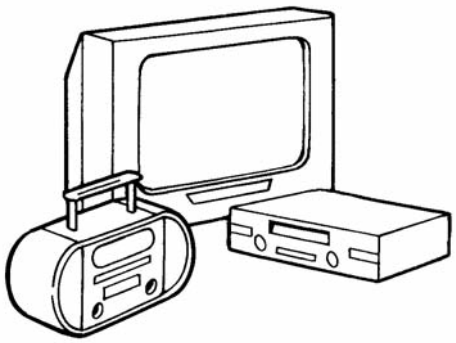
6. A small runner's headphone and cassette player costs $10.79. A CD player with headphones is listed at $49.99 but is offered at a 40% discount for today only. How much more than the cassette player would you pay for the CD unit if you bought it today? _____

7. You can purchase a home computer for $699.89. A separate monitor and printer will cost you $189.77 and $159.99, respectively. A complete system including all of these pieces is available for the purchase price of $999.89. How much would you save by purchasing the complete system? _____

8. A digital camcorder costs $299.99 plus an 8% sales tax at Boom Box City. The same machine can be purchased on the Internet for $349.45 with no sales tax. Which costs less money and by how much?_____

9. A complete sound system with a CD recorder costs $499.99. A home theater system costs $389.49. If you purchase both systems, you get a 40% discount and a $50.00 rebate from a manufacturer. How much less than the price of the sound system will it cost to buy both systems? _____

10. The original price of a television was $200. The sale price was $150. The discount was what percentage of the original price? _____



6 Practice • • • • • • • • • • • • • • • • • Solving Even More Multi-Step Problems

Vacation Time

Vacation time often involves lots of travel time and an opportunity to spend a great deal of money. Compute the answers to these vacation problems.

Directions: Use the information on page 25 to help you solve these problems. Use a calculator to check your computations, if your teacher approves.

1. You and your friends went on a bike hike through some very hilly terrain. You rode 22.5 miles on the first day, 34.7 miles on the second day, 16.25 miles on the third day, and 18 miles on the final day. What was your average number of miles per day?_____

2. During a camping trip, you were able to hike through the mountains at a speed of 100 feet every 5 minutes. How many hours and minutes would it take to hike 1 mile? (A mile is 5,280 feet.)___

3. You have to read a novel during vacation for your literature class. The book has an average of 10 words per line and 30 lines per page. There are 230 pages in the book. You read an average of 345 words per minute. How many hours and minutes will it take you to read the book? _____

4. You drove 380 miles from Los Angeles to San Francisco. Your trip started at 8:00 A.M. and ended at 5:30 P.M. How many miles did you average per hour?_____

5. The odometer on your family car read 35 when you started a trip from Seattle and 215 when you reached Portland 3 hours later. On average, how many miles did you travel each minute? (There are 60 minutes in 1 hour.)_____

6. It costs $44.75 to buy an entrance ticket to your favorite amusement park, the Screaming Meemies Roller Coaster Park. How much change would you receive from $200 to buy tickets for a family of 4? _____

7. An entrance ticket to Screaming Meemies Roller Coaster Park costs $44.75. If you arrived at the park at 10:00 A.M. and left at 12:00 midnight, what was the average hourly cost of your day at the park?_____

8. You spent $4.50 for a hamburger, $2.79 for fries, and $1.89 on a drink for lunch. How much change did you get from a $10.00 bill?_____

9. Your family dinner bill at a restaurant in the park came to $48.90. You added a 15% tip for the waitress. You had a $9.50 discount coupon. How much did you pay for dinner?_____

C. $698.00 or $700.00
2. A. 185 sq. ft.
B. 5 rolls
C. $125
3. A. 244 3/8 sq. ft.
230 sq. ft.;
244 3/8 sq. ft.;
230 sq. ft.;
425 sq. ft.
B. 1,373 3/4 sq. ft. or 1,374 sq. ft.
C. 4 gallons
D. $71.96

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1. A. 2,356 sq. ft.
B. $23.56
2. A. 200 ft.
B. $6.00
3. A. 1,116 sq. ft.
B. $11.16
4. A. 34.54 ft.
B. $1.04
C. 94.99 sq. ft.
D. $0.95
5. A. 643.75 sq. ft.
B. $96.56
6. A. 221 sq. ft.
B. $39.78
7. A. 37.68 ft.
B. 113.04 sq. ft.

Extension: Answers will vary.

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1. 240 cartons
2. 4,070 cu. ft.
3. 25,688.34 cu. in.
4. 1,417.95 cu. cm
5. 370 cu. ft.
6. 14,820 cu. ft.
7. 162,887.5 cu. ft.
8. 10,160,922 lb.
9. 1,218,398.5 gallons
10. 471 cu. in.
11. 84,780 cu.ft.

Page 26

1. $45.60
2. $34.13
3. $104.65
4. $43.51
5. $32.95
6. $29.25
7. $36.86
8. $30,555.64
9. Monday and Tuesday = Saturday
10. $17,111.16
11. $12,473.53

Page 27

1. $101.47
2. $12.27
3. You could buy the DVD player;
$179.67
$5.96 change
4. $786.15
5. The traditional machine/phone is $11.24 cheaper.
6. $19.20
7. $49.76
8. Boom Box City $25.46 less
9. $16.30
10. 25%

Page 28

1. 22.86 miles per day
2. 4 hr. 24 min.
3. 3 hr. 20 min.
4. 40 m.p.h.
5. 1 mile per minute
6. $21.00
7. $3.20
8. $0.82
9. $46.74

Page 30

1. 6 tops/4 skorts
2. 3 pennies, 3 nickels, 0 dimes, 3 quarters,
3. A. 1 penny, 0 nickels,
4 dimes,
4 quarters,
0 half dollars
B. 1 penny, 4 nickels,
2 dimes,
0 quarters,
2 half dollars
4. 6, 9, 12, 15, 18
5. 300, 350, 400, 450, 500
6. 3 footballs, 6 tennis balls, 3 baseballs, 2 basketballs
7. Jack is 26 years old; Dad is 52 years old
8. Marie is 22 years old; Mother is 44 years old

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1. $360.00
2. 2,700 beads
3. 240 total
16 skirts
32 jeans
64 shorts
128 blouses
4. $372.00 total
Elaine $12.00
Christina $24.00
Alyse $48.00
Doreen $96.00
Melissa $192.00
5. James 2 years old
Raymond 3 years old
Brett 4 1/2 years old
John 6 years old
Robert 11 years old

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1. 3 hr. 2 min.
2. 31 games
3. 81 times
4. 30 names
5. 20 points on 8th game; 35 points on 14th game
6. 35 players are 13 years old

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1. $n = 36–23$
$n = 13$
13 years old
2. $n = (4 \times 15) + 2$
$n = 62$
62 CDs
3. $n = 216–122$
$n = 94$
94 lb.
4. $n = 25 \times .60$
$n = 15$
15 shots
5. $n = 22 – 7$
$n = 15$
15 minutes
6. $n = 1{,}145 – 316$
$n = 829$
829 words
7. $n = 88 \times 3/4$
$n = 66$
66 minutes

Extension: Answers will vary.

Page 35

1. $n + (n + 28) = 50$
$2n + 28 = 50$
$n = 11$
Mother is 39 years old.
Sarah is 11 years old.
2. $n + (n + 140) = 336$
$2n + 140 = 336$
$n = 98$
Joe weighs 98 lbs.
Dad weighs 238 lbs.
3. $n + 4n + 22 = 122$
$n = 25$
Melissa has $25.00.
Christina has $97.00.
4. $n + 2n = 669$
$3n = 669$
$n = 223$
John read 223 words.
Joseph read 446 words.
5. $n + 4n = 15$
$5n = 15$
$n = 3$
Nicholas is 3 years old.
Norman is 12 years old.