7 How to • • • • • • • Use Problem-Solving Strategies in Word Problems

Facts to Know

Some problems can't be solved just by following a plan or looking for code words. The way these unconventional problems are written requires you to try different strategies until you hit on a reasonable solution. Sometimes you may have to try two or three different strategies before you hit on the correct approach.

In these problems follow these steps:

1. Read the problem carefully, twice.
2. State the problem to be solved in your own words.
3. Try each strategy until you get one that works.

Problem-Solving Strategies

Guess and Check

Your coach bought 7 balls. The baseballs cost $3.98 and the basketballs cost $19.98. The total cost was $75.86. How many baseballs and how many basketballs did he buy?

You know:

- the cost of each type of ball
- the total cost
- the number of balls purchased

You guess:

- 1 baseball ($3.98) plus 6 basketballs ($119.88) equals $123.86—too high
- 3 baseballs ($11.94) plus 4 basketballs ($79.92) equals $91.86—too high but closer
- 4 baseballs ($15.92) plus 3 basketballs ($59.94) equals $75.86—exactly right

Working Backwards

When Peter started selling greeting cards, he spent half of his money to buy the cards. Then he spent half of what he had left on advertising. He only has $50.00 now. How much money did he start with?

You know:

- how much money he now has
- the fractional amount he spent each time

Check:

$200.00 divided by half is $100.00

$100.00 divided by half is $50.00

Work Backwards:

- He has $50.00 now.
- He had twice $50.00 ($100.00) before he spent half on advertising.
- He had twice $100.00 ($200.00) before he spent half on cards.

Make a Visual (chart, diagram, graph, list, or table)

There are four baseball teams in a league. How many games must be played so that each team plays every other team once and only once? There are six games altogether. Make a chart (or diagram):

- Team 1 plays Team 2
- Team 1 plays Team 3
- Team 1 plays Team 4
- Team 2 plays Team 3
- Team 2 plays Team 4
- Team 3 plays Team 4

7 Practice • • • • • • • • • • • • Using Guess and Check

Things to remember when using guess and check.

1. Read the problem carefully, twice.
2. State the problem to be solved in your own words.
3. Guess at an answer and check how close you are.
4. If possible, start with a number in the middle of a range of possible guesses.

Directions: Use the information on page 29 and the reminders above to help you solve these problems.

1. Danielle bought several tops for $9.50 each and some skorts (skirt/shorts) for $18.00 each. She spent $129.00 for 10 pieces. How many tops did she buy? How many skorts did she buy?

   Guess #1: tops _____ skorts _____

   Guess #2: tops _____ skorts _____

   Guess #3: tops _____ skorts _____

   Answer: tops _____ skorts _____

2. Liz has $0.93 in a total of nine coins. She does not have a half dollar. How many of each coin does she have?

   pennies _____ nickels _____ dimes _____ quarters _____

3. Albert found $1.41 in a total of nine coins in the sofa. What two combinations of coins could he have?

   A. pennies _____ nickels _____ dimes _____ quarters _____ half dollars _____

   B. pennies _____ nickels _____ dimes _____ quarters _____ half dollars _____

4. You did 60 math problems in five days. On each day you did 3 more problems than the day before. How many math problems did you do each day?

   Day 1 ____ Day 2 ____ Day 3 ____ Day 4 ____ Day 5 _____

5. On a five-day vacation trip by car, you traveled 50 miles farther each day than the day before. You traveled 2,000 miles. How many miles did you travel each day?

   Day 1 ____ Day 2 ____ Day 3 ____ Day 4 ____ Day 5 _____

6. A bag of sporting equipment has 14 balls. There are 2 times as many tennis balls as baseballs. There is 1 less basketball than there are baseballs. There are 3 footballs. How many balls of each type are in the bag?

   footballs_____ tennis balls_____ baseballs_____ basketballs _____

7. Jack's dad is 40 years old. Jack is 14 years old. How old will each of them be when his dad is twice as old as Jack?

   Jack _____ Dad _____

8. Marie is 13 years old and her mother is 35 years old. How old will each of them be when Marie is half of her mother's age?

   Marie _____ Mother _____

7 Practice • • • • • • • • • • • • • • • Working Backwards to Solve Problems

Things to remember when working backwards to solve problems.

1. Read the problem carefully, twice.
2. State the problem to be solved in your own words.
3. Work backwards from the end of the problem using the facts given.
4. Always check your answer by working forwards.

Directions: Use the information on page 29 and the reminders above to help you solve these problems.

1. Sandy went to the coolest clothing store in the mall, Frederica's Funky Fashions. She spent half of her money on a dance outfit she just had to have. She spent $100.00 of her remaining money on a pair of running shoes. Then she spent half of the money she had left on an outfit with the logo of her favorite singer. She had $40.00 remaining. How much money did she have to start?

   Work Backwards: $40.00 x 2

   Answer: _____

   Check: _____

2. Loretta uses beads to make wristbands for her friends. She lost $\frac{1}{2}$ of her beads when they fell on the grass on her way to school. She used 300 of the remaining beads to make a wristband for her sister and 250 beads to make a headband for a friend. She now has 800 beads left. With how many beads did she start?

   Work Backwards: _____

   Answer: _____

   Check: _____

3. Frederica's Funky Fashions had a pile of clothes on a sales table. There were twice as many shorts as jeans. There were 4 times as many blouses as there were jeans. There were half as many skirts as there were jeans. Half of the skirts were blue. There were 8 blue skirts. How many jeans, shorts, blouses, and skirts were in the pile and what was the total number of clothes on the table?

   Work Backwards: _____

   Answer: _____

   Check: _____

4. Melissa spent twice as much money as Doreen in Frederica's. Alyse spent half as much money as Doreen did. Christina spent half as much money as Alyse did. Elaine spent $12.00, which was half as much as what Christina spent. How much did each girl spend? How much did they spend altogether?

   Work Backwards: _____

   Answer: _____

   Check: _____

5. John is $1\frac{1}{2}$ years older than Brett. Robert is 5 years older than John. Raymond is $1\frac{1}{2}$ years younger than Brett. James is 2 years old. He is 1 year younger than Raymond. How old is each boy?

   Work Backwards: _____

   Answer: _____

   Check: _____

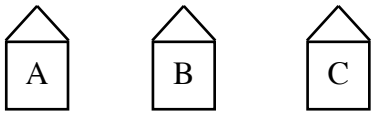
7 Practice • • • • • • Using Visuals to Solve Problems

A visual can be a . . .

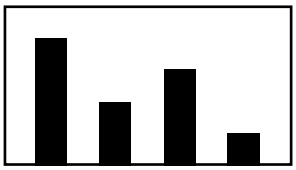
Chart

Hits	*Innings*
3	1
4	2

Diagram



Graph



List

Runs Scored
4
3

Table

Runs	1
Hits	4
Errors	0

Directions: On another sheet of paper, use a visual to help you solve each of these problems.

1. A marathon runner ran one mile in 5 minutes, walked one mile in 8 minutes, and rested for one minute before repeating the pattern. At this rate, how long would it take the runner to cover 26 miles?

   Type of Visual: _____

   Answer: _____

2. There are 32 basketball teams in a middle school sudden death elimination tournament. The winning team in each contest goes on. How many games must be played to find the winning team?

   Type of Visual: _____

   Answer: _____

3. A baseball player got on base 9 times in every 17 at bats. How many times did he get on base in 153 at bats?

   Type of Visual: _____

   Answer: _____

4. The team mascot at Skunkfield Middle School was a striped skunk. The principal agreed to let the students name the mascot using any two of the following six names: Polecat, Stinker, Putrid, Fragrant, Sweety, and Scented. A name such as Polecat Sweety is different than Sweety Polecat. How many different name possibilities are there?

   Type of Visual: _____

   Answer: _____

5. A player on a middle school basketball team made 3 points in her first game. She made 2 more points than her first game in her second game and 3 more points than her second game in her third game. She continued to add 2 points and then 3 points in all of her succeeding games. In which game did she score 20 points? In which game did she score 35 points?

   Type of Visual: _____

   Answer: _____

6. In a middle school basketball tournament, six out of every 16 students are 12 years old, five are 13 years old, three are 11 years old, and two are 14 years old. There are 112 players in the tournament. How many players are 13 years old?

   Type of Visual: _____

   Answer: _____

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

Page 23

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.

Page 24

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

Page 34

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.