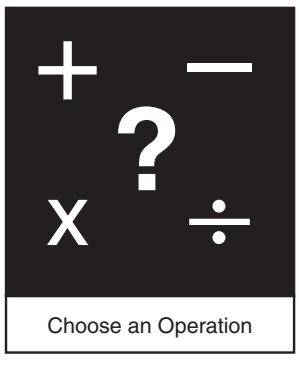
Appendix A

Sample Strategy Problems

While students at primary levels can begin to explore and develop strategies (e.g., find a pattern, make a list, draw a picture) to solve problems, those same strategies can be applied to increasingly difficult problems. The problems that follow illustrate various levels of complexity while focusing on the same strategy. The levels are not intended to be grade-level specific but to provide you with a view of the strategies as they increase in complexity. The goal is to help struggling students acquire the foundational skills they need to become effective problem solvers, as well as to continue to challenge students with ever-more complex problems. The ultimate goal is to help all students develop critical thinking skills. (NOTE: Answers to computations are provided. Student responses to open-ended questions will vary.)



Sample Problems: Choose an Operation

Level 1

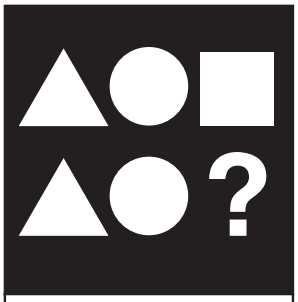
Rita wanted some candy. Joe gave her 3 pieces and Kevin gave her 2 pieces. How much candy did Rita have? Draw a picture to show your answer. (5 pieces)

Level 2

Colleen loves playing basketball. Her team has played 4 games so far this year. She scored 11 points in the first game, 14 points in the second game, 16 points in the third game, and 12 points in the fourth game. How many points has she scored so far this season? How did you solve the problem? (53 points)

Level 3
Darnell and Lia each had lunch at Burger Shack. Darnell's lunch cost $7.25 and he paid with a $10 bill. Lia's lunch cost $3.15 and she paid with a $5 bill. Who received more change? Use math data to justify your answer. (Darnell)

Level 4
Brad receives an allowance of $5.25 each week. He pays his sister one-third of his allowance for doing his chores each week. His neighbor pays him $2.75 each week to walk her dogs. He owes his Mom for a vase he broke, so he has to give her $1.25 each week for the next 6 weeks. At the end of each week, after he collects his allowance and dog-walking money and then pays his sister and his mother, he puts half of the money he has left in the bank and spends the rest. How much money will he have in the bank after 6 weeks? Explain how you got your answer. ($15.00)



Sample Problems: Find a Pattern

Level 1
Megan had a bag of jellybeans. The jellybeans were 3 different colors. She lined them up in a row like this: red, green, yellow, red, green, yellow, red. . . . Which color jellybean did she put next in the row? Why? (green)

Level 2
Melissa was learning to ice skate. On the first day, she skated around the pond 1 time. On the second day, she skated around the pond 3 times. On the third day, she skated around the pond 5 times. On the fourth day, she skated around the pond 7 times. How many times did she skate around the pond on the fifth day? How do you know? (9 times)

Level 3
Sara swam in the swim meet. She had to swim 5 laps for her race. The first lap took her 25 seconds, the second lap took 30 seconds, the third lap took her 35 seconds, and the fourth lap took her 40 seconds. Use the pattern to help you figure out how long it took her to swim the entire race. How did knowing the pattern help you figure out the answer? (2 minutes, 55 seconds)

Level 4
There are 3 teams in the basketball league. Each team wants to play every other team. How many games will have to be played? (3 games)

What if there were 4 teams? (6 games) 5 teams? (10 games)

Find a pattern to help you decide how many games will need to be played if there are 7 teams in the league. Explain how the pattern helped you solve the problem. (21 games)

Sample Problems: Make a Table

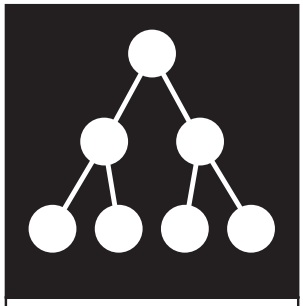
Level 1
If 1 balloon costs 10 cents, what is the cost of 3 balloons? (30 cents)

Level 2
If 2 gallons of grape juice costs $5.00, how much will 8 gallons cost? Explain how you solved the problem. ($20.00)

Level 3
Miss Finnerty is buying pizzas for a class party. Each pizza costs $12.00. She has $68.00. How many pizzas can she buy? Justify your answer. (5 pizzas)

Level 4

For one triangle, the perimeter is 3 units. For a row of two connected triangles, the perimeter is 4 units. What is the perimeter for a row of three connected triangles? (5 units). What is the perimeter for a row of 20 triangles? (22 units) What is the perimeter for a row of n triangles? ($n + 2$) Explain how you solved for n.



Draw a Picture or Diagram

Sample Problems: Draw a Picture or Diagram

Level 1

There were 3 cats. How many legs were there? (12)

Level 2

Andrew folded his shirts and stacked them on his dresser. His red shirt was beneath the green one. The yellow shirt was above the green one. The blue shirt was beneath the red. Which shirt was on the top? (yellow)

Level 3

Susie is decorating a birthday cake for her sister. She decorated the top of the circular cake with a ring of 8 roses. In between each rose, she put 2 candles. How old is Susie's sister? What strategy helped you solve the problem? (16 years old)

Level 4

You are cutting a rectangular cake into 2" × 4" pieces. You are able to get 16 pieces. What are the possible dimensions of the cake? Explain how you solved the problem (some possibilities are 8" × 16", 16" × 8", 4" × 32", 32" × 4").

Guess, Check, and Revise

Sample Problems: Guess and Check

Level 1

Kim picked 8 flowers. She put them in 2 vases. One vase had 2 more flowers than the other. How many flowers were in each vase? Explain how you solved this problem. (5, 3)

Level 2

Patty was buying candy. She could choose a bag of 7 lollipops, a bag of 8 lemon drops, a bag of 9 peppermints, or a bag of 10 gumdrops. She bought 3 bags of candy (all different kinds) and had 26 pieces of candy. Which bags did she buy? Explain how you found the answer. (lollipops, peppermints, gumdrops)

Level 3

Michael read 3 consecutive pages of his book. The sum of the page numbers is 96. Which pages did Michael read? Explain how you solved this problem. (31, 32, 33)

Level 4

The class is on a field trip. The cost for each adult is $7.00 and the cost for each student is $3.00. The total cost of the trip was $91.00. If there were 25 people on the trip, how many of them were adults and how many were children? Use math data to justify your answer. (4 adults, 21 children)

Sample Problems: Make an Organized List

Level 1
For the school picnic, students can order a hot dog, a hamburger, or a cheeseburger. They can have milk or lemonade. What are the possible lunch combinations? Explain how you got your answer. (hot dog and milk, hot dog and lemonade, hamburger and milk, hamburger and lemonade, cheeseburger and milk, cheeseburger and lemonade)

Level 2
A sundae can be made with chocolate, vanilla, or mint ice cream. It can have caramel, fudge, strawberry, or marshmallow topping. How many different kinds of sundaes are possible? Explain how you got your answer. (12 kinds)

Level 3
A sandwich can be made on wheat, rye, or white bread. It can be made with ham, turkey, tuna, or roast beef. It can have Swiss, provolone, American, or no cheese. How many different kinds of sandwiches are possible? Are you sure you got all of the possibilities? Why? (48 possibilities)

Level 4
Jenny bought a candy bar for 25 cents. Find all of the possible coin combinations she could have used to pay for the candy with exact change. Are you sure you got all of the possibilities? Why? (1Q; 2D, 1N; 2D, 5 P; 1D, 3N; 1D, 2N, 5P; 1D, 1N, 10P; 1D, 15P; 5N; 4N, 5P; 3N, 10P; 2N, 15P; 1N, 20P; 25P)

Sample Problems: Use Logical Reasoning

Level 1
My number is less than 8. My number is greater than 5. My number is an even number. What is my number? How did you figure this out? (6)

Level 2
Use the following clues to figure out how many students were in Brendan's class.

- It is a two-digit number.
- It is an odd number.
- There is a 2 in the tens place.
- The 2 digits add up to 7.
- How many are in his class?

What did you do to make this problem simpler to solve? (25 students)

Level 3
Kevin, Joe, Colleen, and Megan all play a different sport. They play soccer, football, basketball, and baseball. Colleen loves to kick the ball. Megan and Joe hate football. Megan's sport never gets rained out. Joe scored a homerun in his last game. Kevin is his team's quarterback. Which child plays which sport? What did you do to make this problem easier to solve? (Kevin, football; Joe, baseball; Colleen, soccer; Megan, basketball)

Level 4
This number is a 3-digit number. It is less than 280. It is greater than 190. It is a palindrome. The sum of its digits is 7. What number is it? Justify your answer. (232)

Sample Problems: Work Backward

Level 1

Ty had some money in his pocket. He gave Josh 25 cents. He had 12 cents left. How much money did he have before he gave Josh money? How did you figure this out? (37 cents)

Level 2

Ryan had a bag of colored candy. He had 2 times as many green as yellow. He had 3 more yellow than red. He had the same number of red as blue. He had 2 blue candies. How many of each color did he have? Explain how you solved the problem. (2 blue, 2 red, 5 yellow, 10 green)

Level 3

Megan went to the store to buy some presents for her family. First she spent half of her money on a gift for her mother. Then she spent $5.30 on a gift for her father. Next, she spent $4.50 on a gift for her sister. When she got home, she had $10.00 left. How much money did she have when she started her shopping trip? Explain the strategy you used to solve this problem. ($39.60)

Level 4

Allison waited in line for rides. She got on the log flume ride in two-thirds the time that it took to wait in line for the roller coaster. The rapids ride wait was three-fifths of the time it took to wait for the log flume. Allison waited in line three-quarters of an hour for the roller coaster. How long was the wait for each ride? Justify your answer. (roller coaster, 45 minutes; log flume, 30 minutes; rapids, 18 minutes)