

3.5

Solve Problems Using Guessing and Testing

YOU WILL NEED

- a calculator

GOAL

Use guess and test to solve measurement problems.

LEARN ABOUT *the Math*

The students in Liam's class have drawn some pictures. The teacher puts the pictures in three groups. Group A pictures are 20.3 cm wide, group B pictures are 15.6 cm wide, and group C pictures are 8.4 cm wide. Liam is asked to pin up some of the pictures along the bottom of a bulletin board, from one end to the other, with no space between them.



The bulletin board is 185.6 cm wide. Liam has to use about the same number of pictures from each group.



How many pictures from each group should Liam use?

1 Understand the Problem

Liam knows that the bulletin board is 185.6 cm wide. He needs to use pictures from all three groups.

2 Make a Plan

Liam decides to try different combinations and see which is the right width.



3 Carry Out the Plan

Liam organizes the combinations he tries in a table.

A	B	C	Total width (cm)	Right width?
1	1	1	$20.3 + 15.6 + 8.4 = 44.3$	no, too short; try more
2	2	2	$44.3 \times 2 = 88.6$	no, too short; try more
3	3	3	$44.3 \times 3 = 132.9$	no, too short; try more
4	4	4	$44.3 \times 4 = 177.2$	no, too short; try more
5	5	5	$44.3 \times 5 = 221.5$	no, too long; try fewer
5	4	5	$101.5 + 62.4 + 42.0 = 205.9$	no, too long; try fewer
5	4	4	$101.5 + 62.4 + 33.6 = 197.5$	no, too long; try fewer
4	4	5	$81.2 + 62.4 + 42.0 = 185.6$	just right!

Liam can cover the width of the bulletin board with 4 pictures from group A, 4 from group B, and 5 from group C. Since he is using more pictures from group C, he decides to start with C and end with C. His pattern is C, A, B, C, A, B, C, A, B, C, A, B, C.

4 Look Back

Liam looks at his pattern and thinks it is correct since there are about the same number of drawings from each group. As well, his pattern fits the width of the bulletin board exactly. Liam estimates to check: 4×20.3 is about 80, 4×15.6 is about 60, and 5×8.4 is about 40. $80 + 60 + 40 = 180$, which is close to the width of the bulletin board.

Reflecting

- A. How did the guess and test strategy help Liam solve the problem?
- B. What other strategy could Liam have used to solve the problem?

WORK WITH the Math



Example

Solving a problem using guess and test

A rectangle has an area of 1.44 m^2 . Neither the length nor the width is 1.00 m . What might the length and the width of the rectangle be?

Julie's Solution

1 Understand the Problem

Julie knows that the area is 1.44 m^2 . She also knows that the formula for the area of a rectangle is length multiplied by width. She knows that there is more than one possible answer, but she needs to determine only one answer.

2 Make a Plan

Julie tries different combinations of the length and width to see which product gives the right area. She keeps track of her guesses in a table.

3 Carry Out the Plan

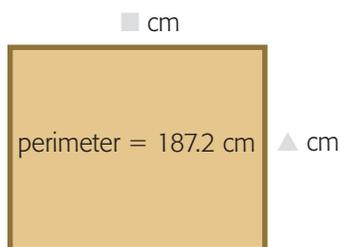
Length (m)	Width (m)	Area (m^2)	Right area?
1.20	1.10	$1.20 \times 1.10 = 1.32$	too small, try longer width
1.20	1.30	$1.20 \times 1.30 = 1.56$	too big, try shorter width
1.20	1.20	$1.20 \times 1.20 = 1.44$	just right

4 Look Back

Julie checks her calculations. She notices that $12 \times 12 = 144$, so it makes sense that $1.2 \times 1.2 = 1.44$. She thinks she is correct.

A Checking

1. Liam had pictures that were 20.3 cm wide, 15.6 cm wide, and 8.4 cm wide. He posted all the pictures along one wall of the class. The pictures made a line that was 318.5 cm long. How many pictures of each width did Liam have?



B Practising

2. Winnie is using the diagram at the left to make a wooden picture frame.
 - a) List two different sets of dimensions (length and width) for the picture frame.
 - b) Which set results in a greater area?
3. An Egyptian mummy is in a case that is 3 m high and has a volume of 24 m^3 . The case is half as wide as it is long. What are the length and the width of the case?
4. Poul has 124.8 m of fencing to build a rectangular pen. He wants the pen to have the largest possible area. Calculate the length and width of the pen to one decimal place.
5. A small rectangular box has a width of 18 cm and a volume of 720 cm^3 .
 - a) Determine the height and the length of the box.
 - b) Is there more than one answer? Explain.
6. The Leclair family is choosing between two swimming pools for their backyard. Model A is almost square. Model B is about twice as long as it is wide. Both pools are 2.0 m deep and hold about 117.6 m^3 of water. Determine a possible length and width for each pool. Express your answers to the nearest tenth.
7. Jessica is helping her grandmother make a quilt with crocheted squares. The area of the material they have is 1.936 m^2 . Her grandmother asked her to determine the number of squares they will need to crochet, and the length and width of each square in centimetres. What are two possible choices that Jessica can give her grandmother?