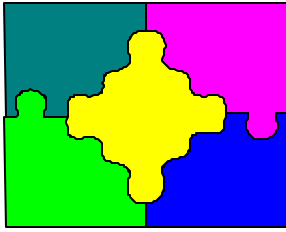
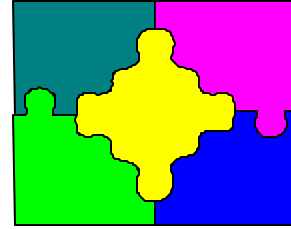


Problem of the Month

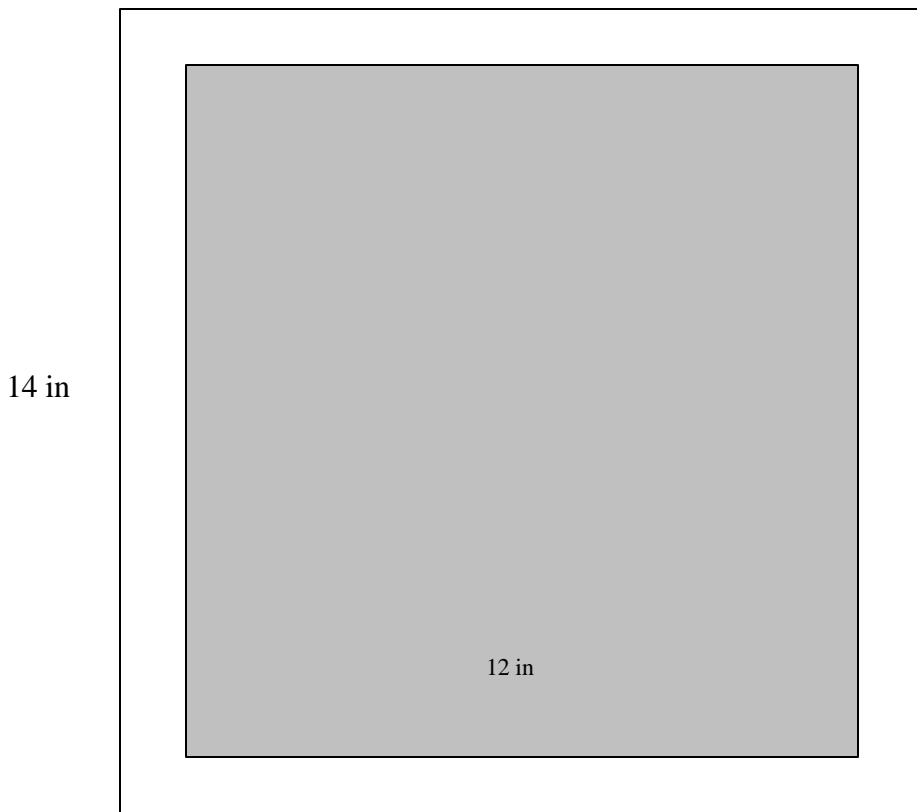


Miles of Tiles

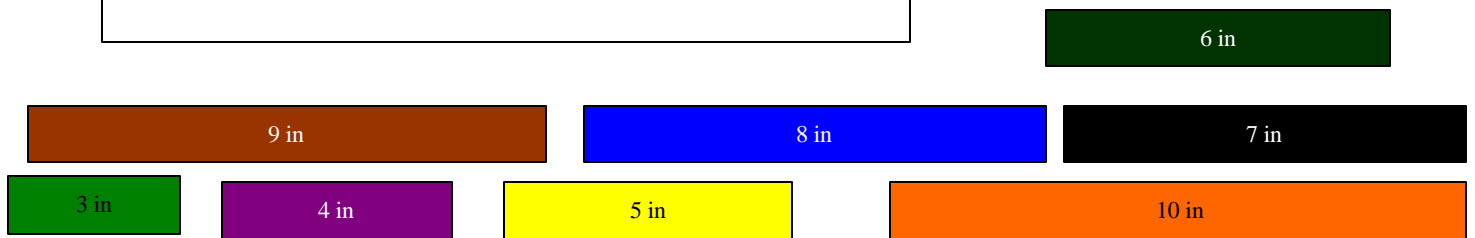


Level A:

You have a picture frame. You would like to decorate the frame by gluing tiles on it. The frame is a square shape.



The frame is 1 inch wide all around. The inside of the frame is a 12 by 12 inches square. The outside of the frame is 14 by 14 inches square. There are 8 tiles, each a different length (3, 4, 5, 6, 7, 8, 9 and 10 inches).

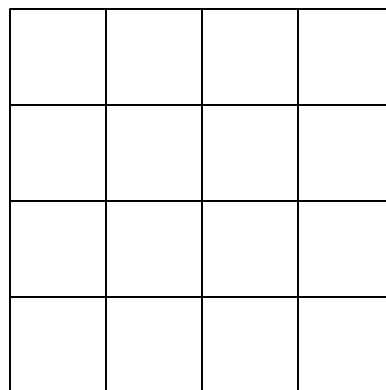
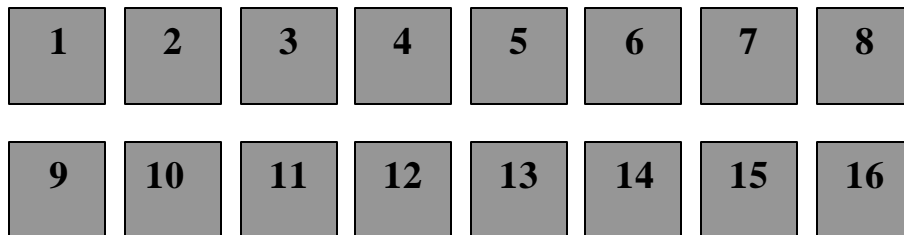


Determine how the tiles should be placed in order to cover the frame with tiles. How many different arrangements can you make? Explain how you found your answers.

Level B:

You work for a puzzle company and your job is to write the solutions to the puzzles that have been designed.

You have been assigned to determine the solution to the puzzle called *Totaling Tiles*. The puzzle provides 16 tiles, each with a different number written on the tile (1 - 16). It also provides a board with sixteen squares. The task is to arrange the tiles in the table so that each row, column and diagonal adds to the same amount.

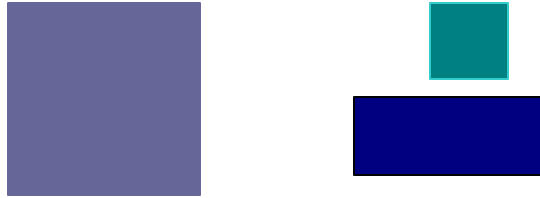


Determine an arrangement of the tiles so that each row, column and diagonal sums to the same total. Explain how you found your solution.

Is there more than one possible arrangement that fits the conditions? If so, find others; if not, explain why you believe there is only one solution.

Level D:

You work for a tile manufacturing company. The company has overstocked a certain set of tiles. There are three different tiles in this particular set. One is a large square tile, the second is a small square tile and the third is a rectangle. The length of the rectangle is the same length as one side of the large square. The width of the rectangle is the same size as one side of the small square.



This happens to work out to be good news. A set of these tiles can be arranged into rectangular configurations to create nice tile patterns.

Find all the rectangular configurations that can be made using 6 large squares and 4 small squares along with a certain number of rectangles.

How many rectangles are needed to make a rectangular configuration? Explain how you know.

Illustrate all the different configurations that can be created.

Explain how you know that you have found all possible rectangular configurations.

Level E:

Your boss is proud of how you handled the over-stocked tile problem. Your boss wants to know your secret. So the boss has asked you to address these questions.

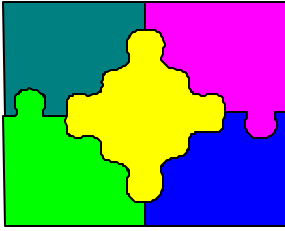
First, determine whether or not you can make rectangular configurations given any number of large and small squares. In these configurations you can use as many rectangles as needed. If so, how would you proceed; if not, how would you know for sure and what else might you do?

Secondly, determine if you were given a specific number of large squares, small squares and rectangles could you always make a rectangular configuration from those tiles? If so, how would you proceed; if not, how would you know for sure?

Write a memo to the boss that would address the questions listed above.

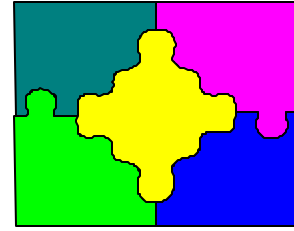
Remember your tiling career hangs in the balance, so you need to use mathematics to explain your reasoning.

Problem of the Month



Miles of Tiles

Primary Version Level A



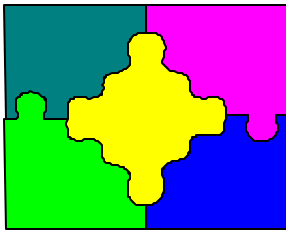
Materials: Set of Cusinere Rods per group, paper frame and paper tiles.

Discussion on the rug: (Teacher holds up the picture of the blank picture frame) "We want to make this frame colorful." "How might we make the frame colorful?" (Teacher solicits answers from students) "Those are good answers, but I was thinking we could use color tiles." (Teacher hold ups some tiles) "How could we use these tiles to color the frame?" (Students demonstrate). "What do we need to be careful about in placing these tiles?" (Teacher questions students to find out they must not overlap, gap and be put together to fit in the space provided).

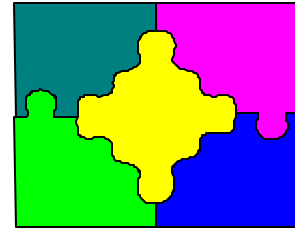
In small groups: (Each group has a blank picture frame and a set of tiles. The teacher states the following.) "We want to make the frame colorful. Try to put the different tiles around the frame. Can you make them fit? We don't want white area showing (gaps). We need to be careful not to cover other tiles (overlap)."

Students use rods to guess and check. Once they have found a solution they may glue the paper tiles down on the paper frame. Once the class has completed their frames, process the activity by looking at student work and asking, "How are the frames alike? Different? How do we know whether the tiles fit? How many different frames do we have? What parts of the frames are alike? Why? Explain how to design your frame."

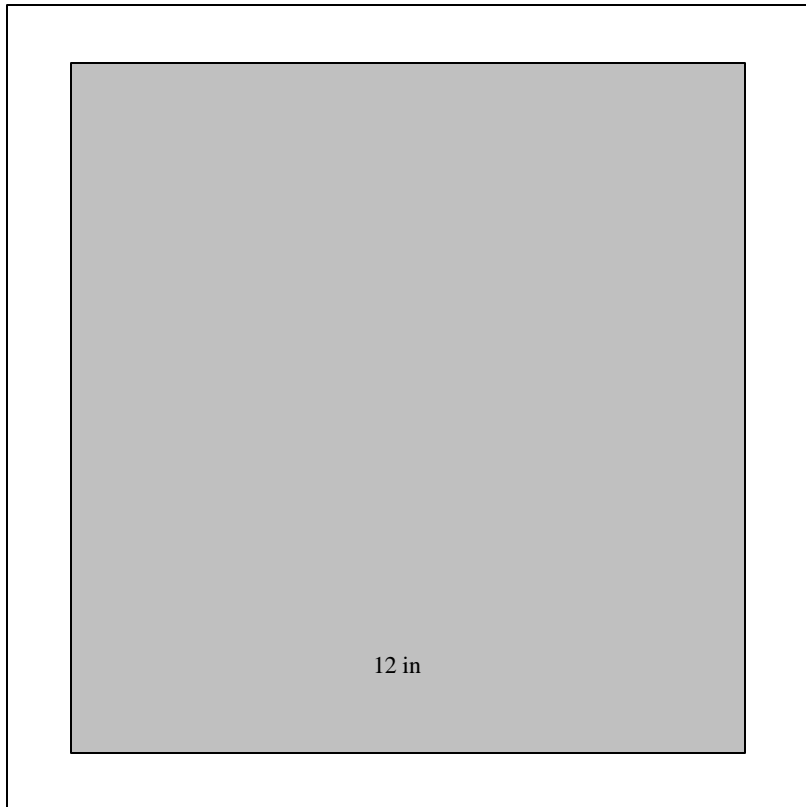
(At the end of the investigation have students either discuss or dictate a response to this summary question.)



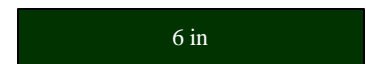
Miles of Tiles



14 in



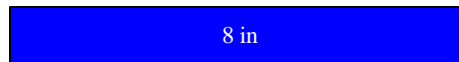
12 in



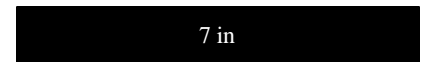
6 in



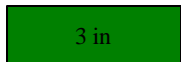
9 in



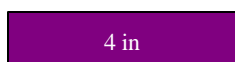
8 in



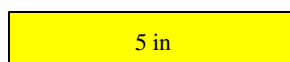
7 in



3 in



4 in



5 in



10 in