

# MathLinks

## GRADE 6 TASKS Algebra, Geometry, Statistics

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# MY MENU

## Algebra / expressions and equations

This problem allows you to use your creativity to demonstrate your knowledge of algebraic concepts and notation.

Use a menu from a local take-out restaurant or create a menu with your own favorite foods.

- Identify the costs of some food items on the menu with variables. Be sure to use different letters to represent the costs of different items.
- Write in words at least two different orders.
- Write an algebraic expression to represent the cost of each of the orders.
- Evaluate each expression to find the cost of each order.
- Write two equations (using the same variables you identified) that show that the cost of the items is equal to the total cost (in dollars) for each order.
- Write an expression for the cost of both orders together.
- Evaluate the new expression to find the total cost.
- Write an equation (using the same variables you identified) that shows that the cost of the items is equal to the total cost (in dollars) for the combined orders.

**\*\*Make a poster that creatively displays your menu and all your work.\*\***

# BUILDING A HOUSE

geometry, measurement, scale, percent

Part 1:

Sarah has a plot of land that measures 20 yards by 30 yards. She wants to build a new, one-story rectangular home that covers 1,800 square feet of land.

Local regulations in Sarah's neighborhood state that every house must be at least 12 feet from the edge of the plot of land.

On a sheet of graph paper, create a diagram that represents her rectangular plot of land. Make sure you label your scale.

Then draw an outline that could represent the location and size of her house based on the information above.

Show your calculations clearly.

Part 2:

Sarah later learns that there is another local regulation that states that a house cannot cover more than 40% of the area of the plot.

Does Sarah's 1,800 square foot house meet this regulation? Explain.

Part 3:

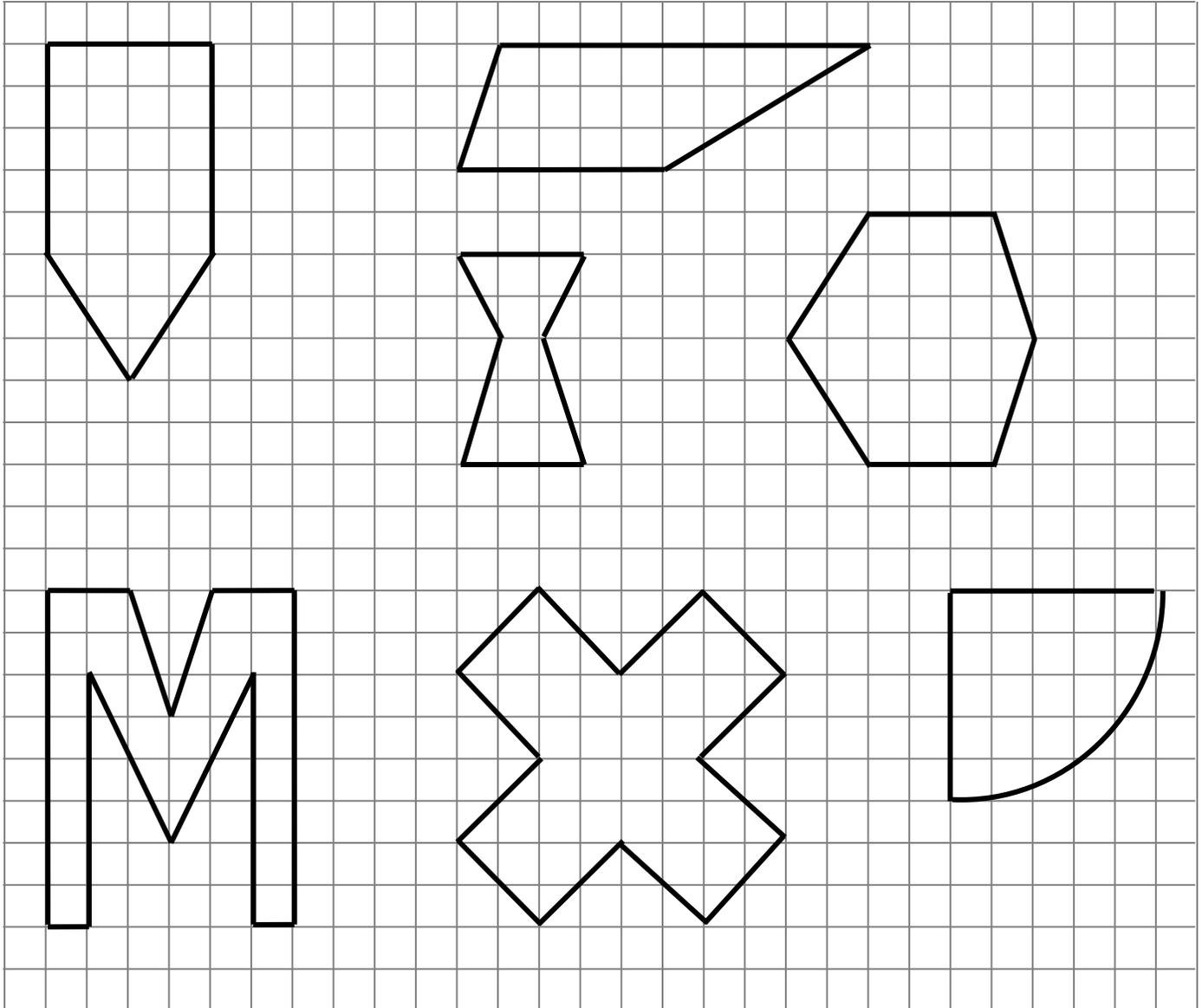
What is the area of the largest one-story rectangular home that Sarah could build on her plot and still meet both regulations?

What could be the dimensions of this house? List three possibilities.

# AREA CHALLENGES

geometry / area

Find the area of each figure and justify your answer as directed by your teacher.



# PACKING BASEBALLS

geometry / surface area

A large sporting goods store wants to purchase 24,000 baseballs from a manufacturer. The diameter of a baseball is about  $2\frac{7}{8}$  in. They come in cubic cardboard boxes that are 3 inches per side. (How many feet are equal to 3 inches?)

Janet in the manufacturer's shipping department has to decide how she wants to pack the cubes. Help Janet by giving her at least two ways to pack boxes with the dimensions in the given form:

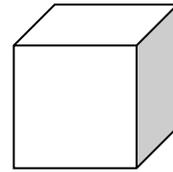
\_\_\_\_\_ ft. × \_\_\_\_\_ ft. × \_\_\_\_\_ ft.

Explain why you think your packing suggestion is reasonable.

# MAKING NETS OF CUBES

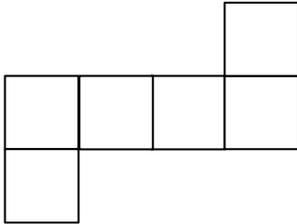
geometry / surface area

This problem is a geometry challenge about making 2-dimensional nets of a 3-dimensional figure.



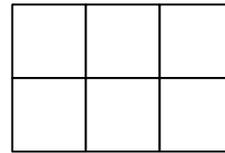
A cube has six faces.

One way to link the six square faces, edge to edge, is:



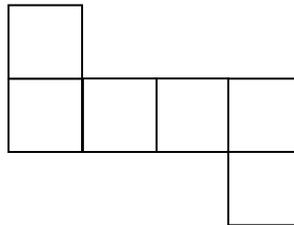
This arrangement will result in a net that can be cut and folded to make a cube.

Another way to link the six square faces, edge to edge, is:



This arrangement cannot be cut and folded to make a cube.

Find all the ways that six squares may be linked (edge to edge). Then shade the arrangements that could be cut out to form a net for a cube. Use graph paper or dot paper to show your work. Note that nets created from flips or turns are considered the same net. In other words, the net below is the same as the one above.



# GREG'S SAVINGS PLAN

tables, equations, graphs, ratios

Greg wants to purchase a camera for \$240 and a printer for \$140. He has already saved \$100 in the bank, and he is going to save \$20 each month.

1. Greg puts money in the bank on the first day of the month. If he saves for the camera first, and then the printer, when will he be able to purchase the camera? When will he be able to purchase the printer?
  - Use a table (or two), a graph (or two), an equation (or two) in two variables, and words to explain your solution.
  - Determine if ordered pairs in your table(s) represent equivalent ratios.
  - Identify the independent and dependent variables.
2. Suppose Greg wants to save for the printer first, and then the camera. When will he be able to purchase the printer? When will he be able to purchase the camera?
  - Predict if you think this situation will have the same result as above or not.
  - Use a table (or two), a graph (or two), an equation (or two) in two variables, and words to explain your solution.
  - Was your prediction correct? Explain why the result changed / stayed the same.

# PAINTING MARCO'S AND ROCKY'S ROOMS

geometry; measurement; area; rates; percent

Marco and Rocky each want to paint their rooms some shade of green. Create three good math questions for each set of facts below, and then answer your questions. You may add facts to the story. Be creative.

## Facts about their rooms

Both rooms are 12 feet by 14 feet. The walls are 10 feet high. Each room has a window that is 4.5 feet by 3 feet and a door that is 36 inches by 80 inches. Marco wants to use two coats of paint. Rocky wants to use one coat of paint.

## Facts about mixing paint

In the garage, they find 3 gallons of blue paint, 3 gallons of yellow paint, and all the painting supplies they need except for paint roller covers, paint brushes, and painter's tape. Marco wants his room to be bluer than Rocky's.

## Facts about their trip to the paint store

The paint store (Paints-R-Us ) is 4 miles away. Marco usually rides his bike at a rate of 10 miles per hour. It takes Rocky 5 minutes to go half a mile on his skateboard.

At Paints-R-Us, they can purchase supplies. Here are some prices. Tax is 8.5%.

7-Piece Painting Set (2 rollers, 2 covers, 2 brushes, and painting tray	\$15.99
Painter's Tape (60 yards)	\$5.93
Painter's Tape (180 feet)	\$4.99
Paint Roller Cover ( 1 roller)	\$4.58
Paint Roller Covers (package of 3)	\$8.99
Paint Brush Set (3 brushes in different sizes)	\$7.97
Paint Brush (1 brush)	\$2.99
Yellow paint (1 quart)	\$25.99
Yellow paint (1 gallon)	\$8.99

## Facts about painting

They must tape the windows and doors. Taping takes about 90 minutes. They can paint about 100 square feet in  $\frac{1}{3}$  hour.

Be creative in writing and answering questions that showcase all the mathematics you know. If you are unsure about what kinds of questions to ask and answer, try to get some ideas from discussing with a friend or relative.

# CONDUCT A SURVEY

## statistics

This problem provides an opportunity to explore data collection, analysis, and presentation by conducting a survey of your choice.

Plan a survey and then conduct it. Then, write a report of your findings. Your report should include the following information.

### Survey plan

- What is a statistical question that you will answer by conducting a survey?
- What will you measure to answer your question?
- What units of measurement will you use?
- How will you collect your data?

### Data collection

- Collect your data and record it in a table.
- How many observations ( $n$ ) did you make?

### Statistics

- Calculate measures of center for your data (mean, median, mode).
- Calculate the five-number summary for your data.
- Calculate measures of spread for your data (range, interquartile range).

### Displays of data

- Construct a dot plot of your data.
- Construct a histogram of your data.
- Construct a box-and-whisker plot of your data.
- Be sure to label the scale or intervals and to give titles to your displays.

### Analysis of statistics and displays

- What do the measures of center and spread tell you?
- Do there appear to be any potential outliers in your data set? Explain.
- Is your data symmetrical or is it skewed to the left or right? Explain.

### Conclusions

- According to the data you collected, what is the answer to your statistical question?
- What evidence (statistics or displays) did you use to answer your question?