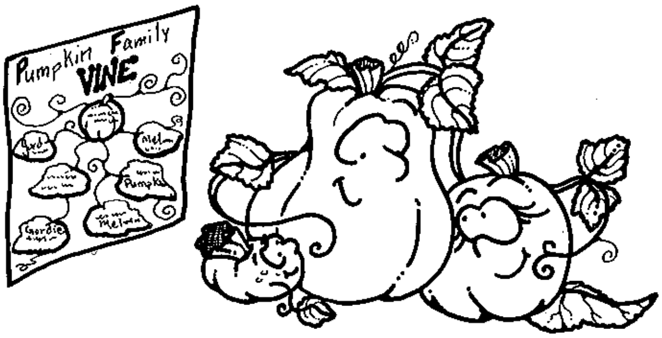
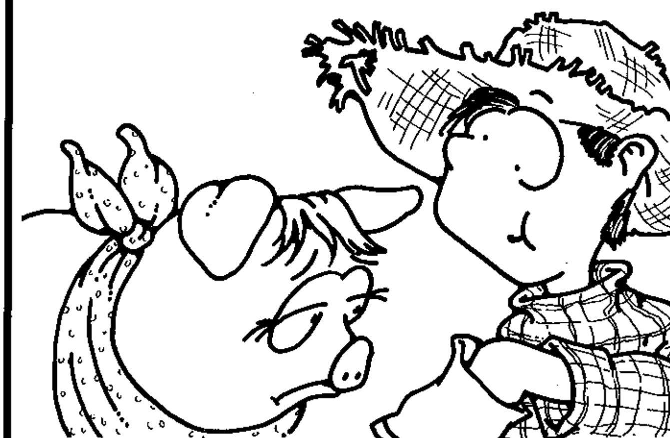
Isn't It Interesting...

Points on Pumpkins

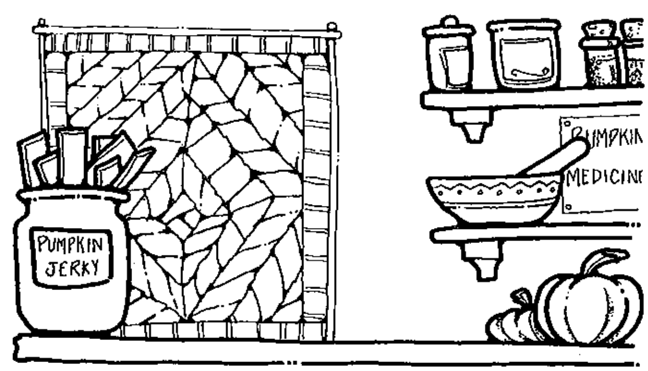


It's thought that pumpkins originated in Central America. Seeds that are related to pumpkins have been found in Mexico that date back to 7000-5500 BC.

Pumpkin seeds serve as people snacks, but farmers also use them as feed for livestock.



Orange-fleshed pumpkin is rich in beta-carotene which is converted by the body into Vitamin A. Among other things, Vitamin A helps prevent certain types of blindness.



Native Americans used the pumpkin for many purposes. They dried pumpkin strips and wove them into mats. They used the seeds not only for food but also for medicine. They roasted long strips of pumpkin to eat.

PRIMARILY PROBLEM SOLVING

PUMPKIN PATCHES

by Michelle Pauls

This month's *Primarily Problem Solving* indirectly explores perimeter and area in a problem-solving setting. Students are given chains of paper clips (fences) with which they are to enclose patches of pumpkins. They are challenged to discover the different numbers of pumpkins that can be enclosed with a fence of a given length, and to describe the shape of each enclosure. They are then challenged to predict how many pumpkins they will be able to enclose with a larger fence, and test their predictions.

Each student will need a total of 16 small paper clips and a copy of the pumpkin patch page. If appropriate, the individual recording and prediction pages can also be used. If your students are not yet ready to record their responses individually, complete the recording and predicting as a class. Make an overhead transparency of the pumpkin patch page to use on the overhead for demonstration.

Have students take 12 of their paper clips and link them together to form a closed loop. (Be sure that none of the paper clips are linked through the smaller interior hook.) Inform students that this loop is a fence with which they are going to enclose pumpkins in their pumpkin patches. Use the overhead projector to model the proper way to enclose a patch of pumpkins. Each paper clip must follow the edge of a square surrounding a pumpkin. Paper clips must be in line with or at right angles to each other; no circles, triangles, or other shapes that would cause partial pumpkins to be enclosed are allowed.

Have students find and record all the different-sized patches they can enclose with a 12-link fence. (They should be able to enclose five, eight, and nine pumpkins, depending on the shape of the fence.) Once all solutions have been recorded, tell students that they are going to be adding two more links (paper clips) to their fences. Ask them to predict how many pumpkins they will be able to enclose with these longer fences and record their predictions. Repeat this process once more with a 16-link fence.

Once students have completed the exploration and recording time, conduct a time of class discussion where students can generalize some of their findings. Students should be able to generalize that the longer the fence, the more pumpkins can be enclosed, and that as the shape of the pen gets closer to a square, more pumpkins can be enclosed. Students should also share their predictions and why they were able/unable to accurately predict the sizes of the smallest and largest patches. As a class, predict the smallest and largest patch for an 18-link fence and then check the accuracy of your predictions.

This activity lends itself to many extensions, depending on the ages and abilities of your students. The perimeter and area concepts that are studied indirectly can be directly addressed by having students calculate and record the perimeter (number of paper clips) and relate that to the area (number of pumpkins enclosed). This can lead to the generalization that for a constant perimeter, the area approaches a maximum as the shape approaches a square. (This generalization applies to rectangular shapes—the largest area that can be enclosed by a given perimeter is a circle.)

Another topic that can be studied as an extension to this activity is the perimeter of square areas. Students can be challenged to identify the number of paper clips in fences that enclosed a square, and discover the next number of paper clips that will enclose a square area. These numbers can be studied for patterns that can then be generalized. (Paper clip fences that are multiples of four can enclose square areas.)

I hope you and your students find this activity valuable. As always, I welcome any feedback you have on this, or any other *Primarily Problem Solving* activity. Stay tuned for the next installment in your December magazine.

Pumpkin Patches

12-Link Fence

Number of Pumpkins	Shape of Patch

For a 14-link fence I predict:

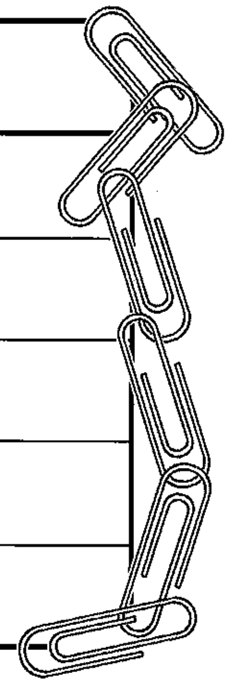
The smallest patch will have ________ pumpkins.

The largest patch will have ________ pumpkins.

Pumpkin Patches

14-Link Fence

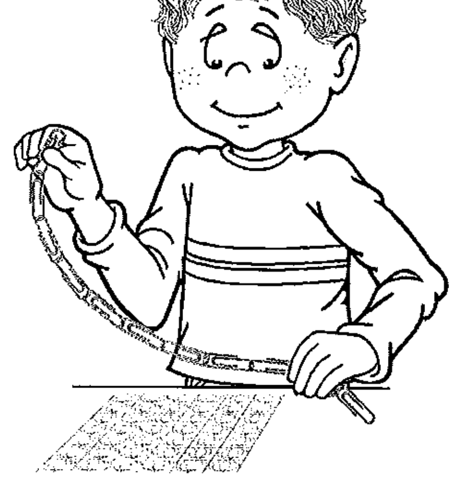
Number of Pumpkins	Shape of Patch



For a 16-link fence I predict:

The smallest patch will have ________ pumpkins.

The largest patch will have ________ pumpkins.



Pumpkin Patches

16-Link Fence

Number of Pumpkins	Shape of Patch

My predictions for a 14-link fence were right/wrong because:

My predictions for a 16-link fence were right/wrong because:

Pumpkin Patches