Prisms: Areas and Volume

Volume and Surface Area of a Rectangular Prism

Directions: Each group has an 8.4 in. x 11 in. piece of paper. Create a box without a lid from the sheet of paper by cutting a square of the designated size from each corner of the paper and then folding the paper to make the box. Complete the row in the table below for the size square that you are assigned to cut out from the corner of the paper.

Side of square	Length (in.)	Width (in.)	Height (in.)	Surface area (sq. in)	Volume (cu. in.)
0.5 in.					
4.0 in.					
1.5 in.					
3.0 in.					
2.5 in.					
5.0 in.					
3.5 in.					
4.0 in					

1. Why can't you cut a 4.5 inch square from each corner of the paper?

2. Should all the boxes have the same volume? Use mathematics to justify your answer.

3. Should all the boxes (with the addition of the lid) have the same surface area? Use mathematics to justify your answer.

Prisms: Areas and Volume

Answers:

Side of square	Length (in.)	Width (in.)	Height (in.)	Surface area (sq. in)	Volume (cu. in.)
0.5 in.	10 in	7.5 in.	0.5 in.	167.5	37.5
1.0 in	9 in.	6.5 in	1.0 in	148	58.5
1.5 in	8 in	5.5 in.	1.5 in	128.5	66
2.0 in.	7 in	4.5 in.	2.0 in.	109	63
2.5 in.	6 in	3.5 in.	2.5 in.	89.5	52.5
2.0 in.	5 in.	2.5 in.	3.0 in.	70	37.5
3.5 in.	4 in.	1.5 in.	3.5 in.	50.5	21
4.0 in	3 in	0.5 in	4.0 in	31	6

1. If you tried to cut a 4.5 in. square from each side, you would be cutting 2 x 4.5 = 9 in. from the paper. The paper is only 8.5 in. wide.
2. Answers will vary before the class sees the results of the other groups. After they have shared information they will see that the 8 x 5.5 x 1.5 box has the greatest volume.
3. Answers will vary before the class sees the results of the other groups. After they have shared information they will see that the 10 x 7.5 x 0.5 box has the greatest surface area. This makes sense since it has the least amount of paper cut from the corners.