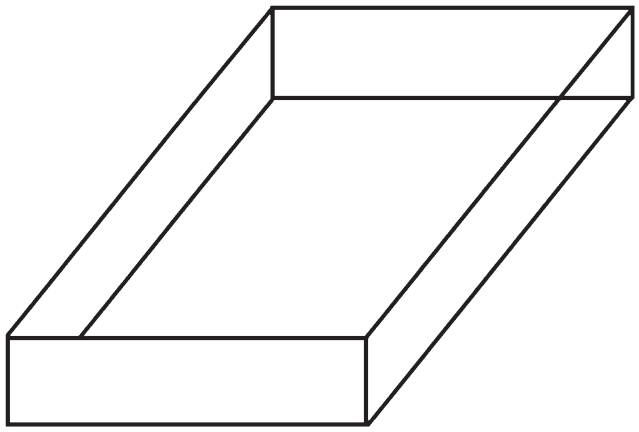
Prisms

Jill and Bob are looking at a rectangular prism. Jill says the rectangular prism has one plane shape on it. Bob said there are two plane shapes on it. Who is correct and why? Show and explain all of your math thinking.



Prisms

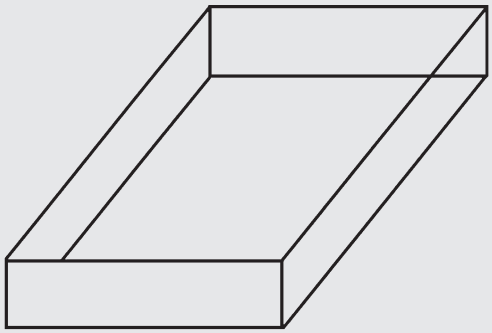
Suggested Grade Span
Pre–K – 2

Grade(s) in Which Task Was Piloted
Grade 2

Task
Jill and Bob are looking at a rectangular prism. Jill says the rectangular prism has one plane shape on it. Bob said there are two plane shapes on it. Who is correct and why? Show and explain all of your math thinking.

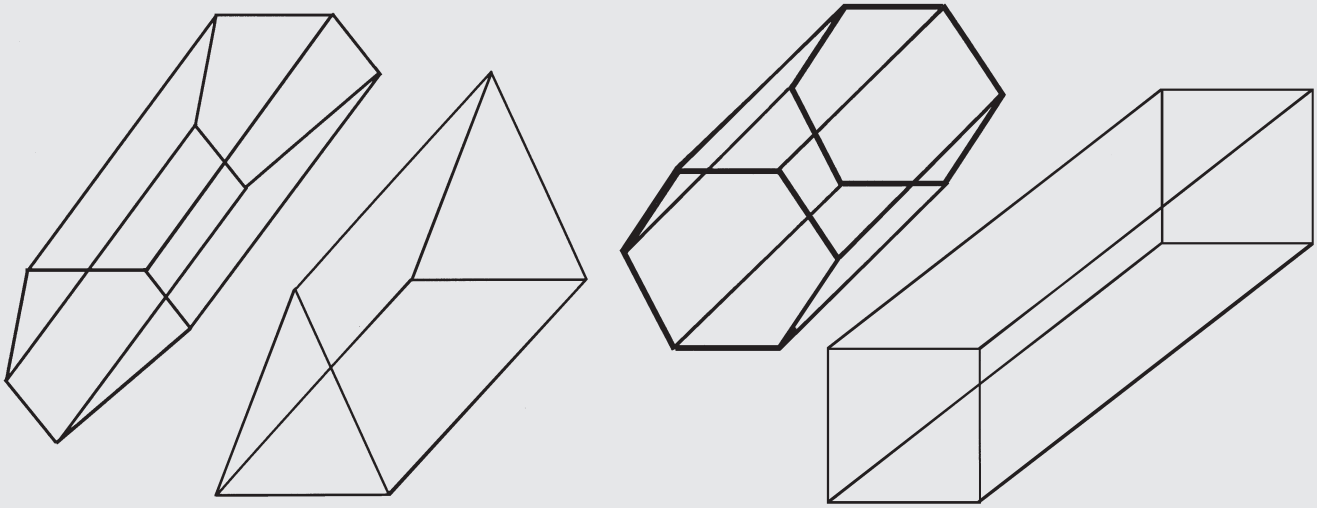
Alternative Versions of Task

More Accessible Version:
Jill and Bob are looking at the shape below.



Jill says the diagram is made of one plane shape. Bob says it is made of two plane shapes. Who is correct and why? Show and explain all of your math thinking.

More Challenging Version:
Below are 4 different types of three–dimensional shapes called prisms. What characteristics do they have in common that make them prisms? What characteristics make them different? Show and explain all of your math thinking.



NCTM Content Standards and Evidence

Geometry Standard for Grades Pre–K – 2

Instructional programs from Pre–Kindergarten through grade 12 should enable students to...

- Analyze characteristics and properties of two– and three–dimensional shapes and develop mathematical arguments about geometric relationships.

  - *NCTM Evidence A:* Recognize, name, build, draw, and sort two– and three–dimensional shapes.

  - *Exemplars Task Specific Evidence A:* This task requires students to identify a rectangular prism, either by recognizing one in their environment, or by drawing one.

  - *NCTM Evidence B:* Describe attributes and parts of two– and three–dimensional shapes.

  - *Exemplars Task Specific Evidence B:* This task requires students to describe the attributes of a prism when explaining whether Jill or Bob is correct.

Time/Context/Qualifiers/Tip(s) From Piloting Teacher

This task can be a short or medium length task, depending on prior knowledge students bring to the task.

The teacher may want to have models of prisms, pyramids, and other polyhedra available in the classroom as a resource to students, along with math dictionaries and posters from which students can identify and visualize rectangular prisms.

Links

Students were given this task after reading the *I Spy* book.
This task could link to a science unit on prisms and/or the color spectrum.

Common Strategies Used to Solve This Task

Most students will begin by drawing a prism and then analyzing its components.

Possible Solutions

Original Version:

Jill and Bob could both be correct. A prism has one shape as its two parallel bases, and rectangles as its faces. In the case of a rectangular prism, both the bases and faces are rectangles. The rectangles on the faces and bases can be similar, congruent, or neither. The student would need to communicate the reasoning behind his/her solution to ensure a correct answer.

More Accessible Version:

The solution is the same. The modification is that a diagram of the shape is provided.

More Challenging Version:

This version allows students to construct their own knowledge of prisms. Students should notice that a prism has one shape as its two parallel bases, and rectangles as its faces. The number of rectangles is determined by the number of sides of the base.

Task Specific Assessment Notes

General Notes: Most students will need to draw a diagram to solve the task and to communicate problem solving. There is a great opportunity for the student to use language of geometry to communicate solutions such as "face" and "base."

Novice: The novice will have no understanding of the three dimensionality of the shape.

Apprentice: The apprentice will be unable to correctly visualize a prism but will be engaged in the task and show understanding of the term "rectangular."

Practitioner: The practitioner will have a correct solution with an adequate, mathematically–based argument. Diagrams will clarify the solution, and formal math language will be used to communicate.

Expert: The expert will justify and support arguments using geometric properties.

Author

This task was written by **Deb Armitage**, K – 8 Mathematics Assessment Consultant at the Vermont Department of Education. The task was piloted by teachers and students in Vermont.

Novice

The student demonstrates no knowledge of 3–dimensionality.

Communication is minimal.

Apprentice

Jill said it is correct.

I see 4 retangles.

Prism of glass are pretty.
I have 2 of them.

The student is unable to correctly visualize the prism.

Diagrams are used to communicate the student's solution.

Some formal math language is used.

There is some engagement with the "rectangular" part of the task.

There is an awareness of audience in the student's response.

Some justification is present through use of a diagram, although an incorrect answer is achieved.

Practitioner

The student achieves a correct solution.

S/he constructs an adequate argument with supporting diagrams.

Diagrams clarify the solution.

Presentation is methodical.

1.

Bob is correct!

2.

3.

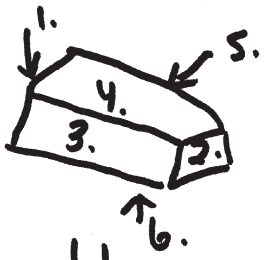
4.

5.

6.

1 and 2 = base

3 - b = Faces

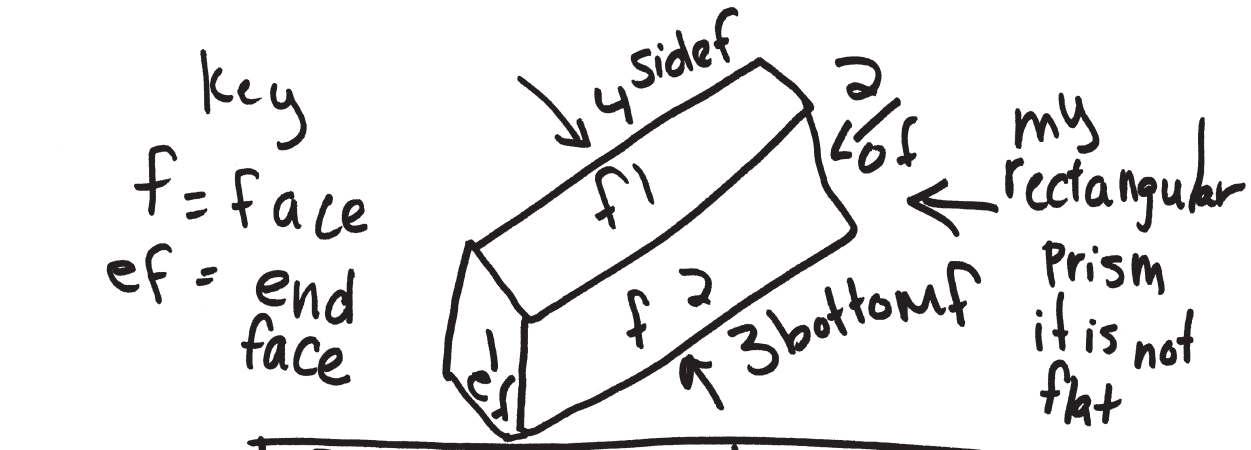


all rectangles

Formal language is used to communicate.

Expert

I got to see Who is right



I no Squares Can be rectangles

Squares	rectangles
1 end face	1 face
1 end face	1 face
	1 face
	1 face

Bob was rite if ef is square

Jill was rite if ef is rectangle

A correct answer is achieved.

Decisions are justified.

The student makes a connection to his/her prior knowledge.

Arguments are supported by mathematical properties.

A sense of purpose and audience is demonstrated through explanation of reasoning.