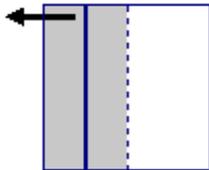


Activity 5: Mirrors and Shapes (Geometry for MS Teachers PSU Unit 1)

Illustrating Reflected Shapes—Example

(a) Thick line indicates mirror, (b) Dashed line(s) indicate reflections, (c) Arrow indicates which way the mirror is facing and (d) Shading shows final shape.

A Non-Square Rectangle Explanation

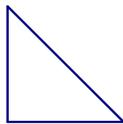


The mirror is perpendicular to one edge of the square; therefore original and reflected angles are right angles and top and bottom edges are parallel as are right and left edges. The mirror is less than halfway along edge, so reflected top and bottom edges are shorter than and not congruent to right and left edges.

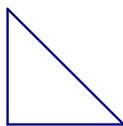
Isosceles Right Triangle Reflections

1. Consider the isosceles right triangles below. How can you position a mirror upright on the right triangles so as to see the following shapes? Illustrate and explain each shape. Give any additional observations you have.

a. A square



b. A non-square rhombus

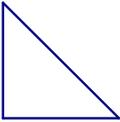
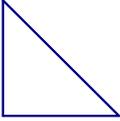
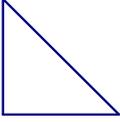
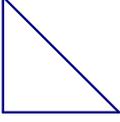
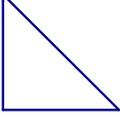
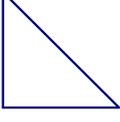
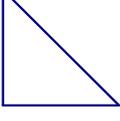
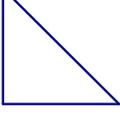
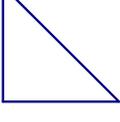


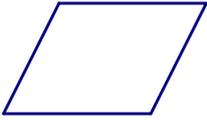
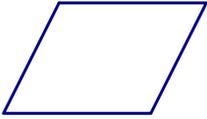
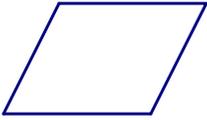
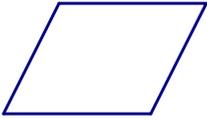
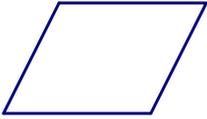
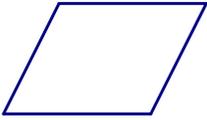
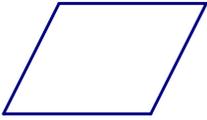
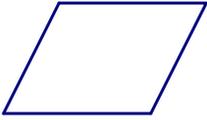
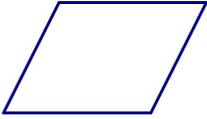
On the following pages, investigate possibilities for locating a mirror upright on

2. An **isosceles right triangle** in such a way as to “see” the shape listed in Column A.

3. A **parallelogram** in such a way as to “see” the shape listed in Column A.

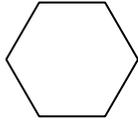
For each shape that you are able to create in this way, illustrate and explain the shape. If there are shapes in Column A that you think cannot be created in this way, then offer an argument that supports your conjecture in the “Explanation” section.

Reflections of Isosceles Right Triangles		
Column A	Column B	Explanation
Dart		
Kite (not a dart and not a rhombus)		
Parallelogram (not a rhombus)		
Scalene Triangle		
Isosceles Triangle		
Equilateral Triangle		
Trapezoid		
Pentagon		
Hexagon		

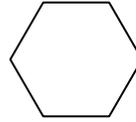
Reflections of Parallelograms		
Column A	Column B	Explanation
Square		
Rhombus (not a square)		
Dart		
Kite (not a rhombus and not a dart)		
Parallelogram (not a rhombus)		
Isosceles Triangle		
Scalene Triangle		
Trapezoid		
Hexagon		

4. Imagine placing a mirror upright on a **regular hexagon**. For each shape listed below, determine whether it is possible to position the mirror so as to see the shape. Explain your reasoning. Try to do this *without actually using a mirror*. We will use a mirror to check our answers at the end as a class discussion.

a. Square



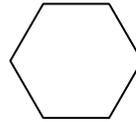
b. Rhombus (not a square)



c. Dart



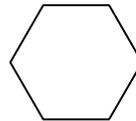
d. Kite (not a rhombus or dart)



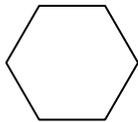
e. Parallelogram (not a rhombus)



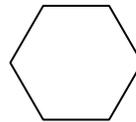
f. Scalene Triangle



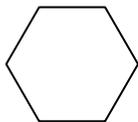
g. Isosceles Triangle



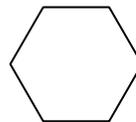
h. Pentagon



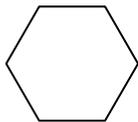
i. Hexagon



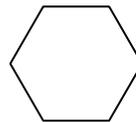
j. Heptagon



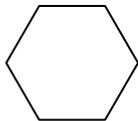
k. Octagon



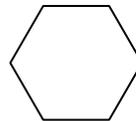
l. Nonagon



m. Decagon



n. Dodecagon



Sue's Message

5. A boy named Sue has written the following message that he claims contains instructions for seeing a square.

Step 1: Make a right triangle

Step 2: Bisect the right angle of the right triangle

Step 3: Place the mirror perpendicular to the bisector in Step 2 (with the reflecting side facing the vertex of the right angle).

Step 4: Be sure that the mirror cuts off equal lengths on the sides of the right angle.

Are the directions adequate (i.e., if they are followed, will one see a square)?

Do the directions contain any unnecessary steps? If so, which one(s)? {Could any of the instructions be omitted and still permit one to see a square by following those that are left?}

A Rhombus Message

6. Compose a minimal message for seeing a rhombus that is not a square. We will discuss these as a class to make sure that your message is adequate and minimal.