Take out Thursday's Packet

6.4 Leap Year
A Practice Understanding Task

Carlos and Clarita are discussing their latest business venture with their friend Juanita. They have created a daily planner that is both educational and entertaining. The planner consists of a pad of 365 pages bound together, one page for each day of the year. The planner is entertaining since images along the bottom of the pages form a flip-book animation when thumbed through rapidly. The planner is educational since each page contains some interesting facts. Each month has a different theme, and the facts for the month have been written to fit the theme. For example, the theme for January is astronomy, the theme for February is mathematics, and the theme for March is ancient civilizations. Carlos and Clarita have learned a lot from researching the facts they have included, and they have enjoyed creating the flip-book animation.

The twins are excited to share the prototype of their planner with Juanita before sending it to printing. Juanita, however, has a major concern. "Next year is leap year," she explains, "you need 366 pages."

So now Carlos and Clarita have the dilemma of having to create an extra page to insert between February 28 and March 1. Here are the planner pages they have already designed.

Part 1

Since the theme for the facts for February is mathematics, Clarita suggests that they write formal definitions of the three rigid-motion transformations they have been using to create the images for the flip-book animation.

How would you complete each of the following definitions?

1. A translation of a set of points in a plane . . . It is a transformation that moves / slides every pt of a pre-image the same distance to preserve size & shape
* All segments connecting the corresponding pts are ||.

2. A rotation of a set of points in a plane . . . It is a transformation in which a preimage is turned about a fixed pt called the center of rotation.
* The corresponding pts of the image & preimage are equidistant from the center of rotation.

3. A reflection of a set of points in a plane . . . It is a transformation that used a line of reflection to create a mirror image of the pre-image.

* The line of reflection will be the $\perp$ bisector of the segments connecting corresponding pts.

4. Translations, rotations and reflections are rigid motion transformations because . . .

They preserve distance & angle measures.

- What convinces you that the February 29 image is a reflection of the February 28 image about the given line of reflection?

- mirror images

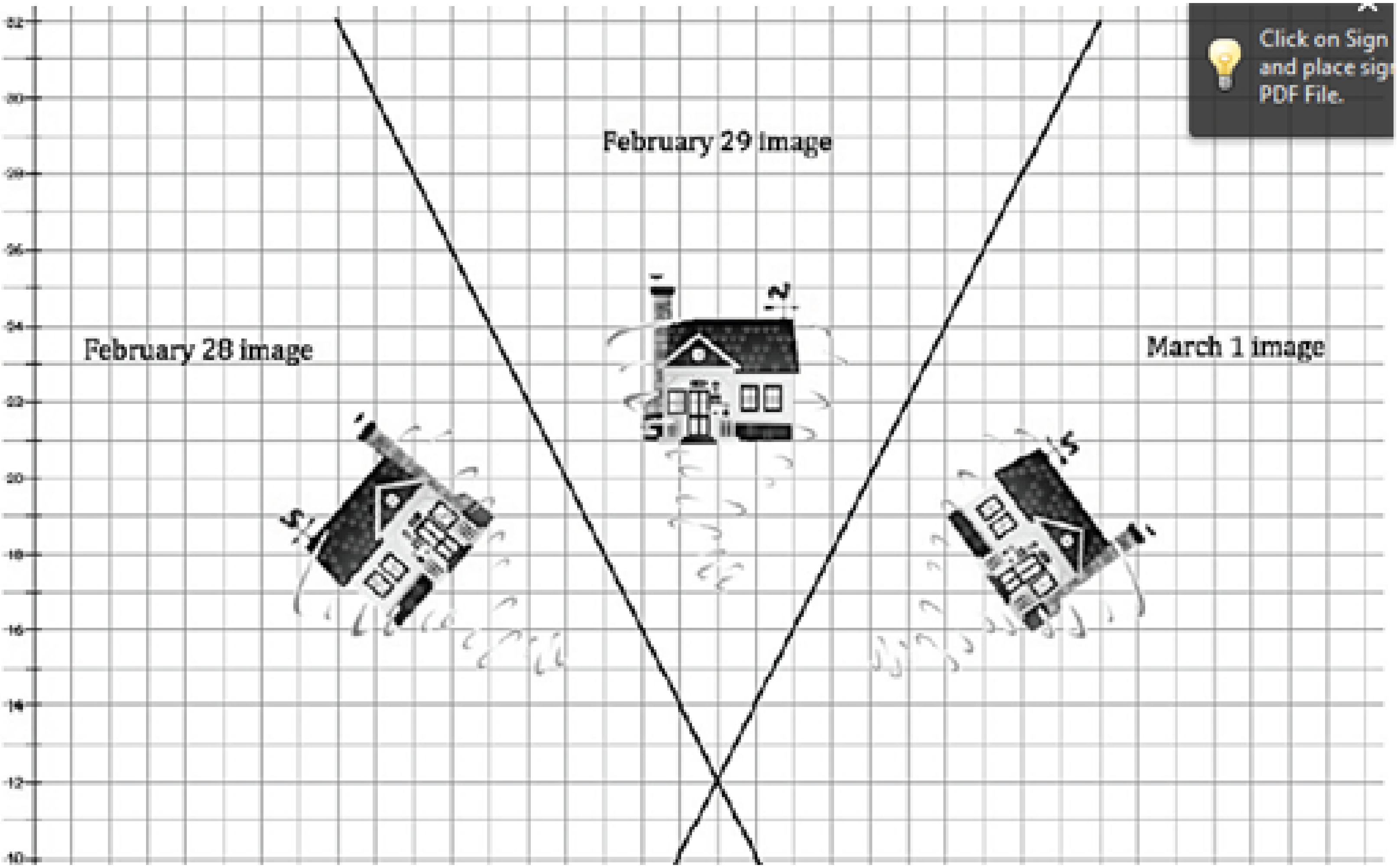
- same distance from line of reflection

March 1 Feb. 29

- What convinces you that the ~~February 29~~ image is a reflection of the ~~February 28~~ image about the given line of reflection?

- What convinces you that the two reflections together complete a rotation between the February 28 and March 1 images?

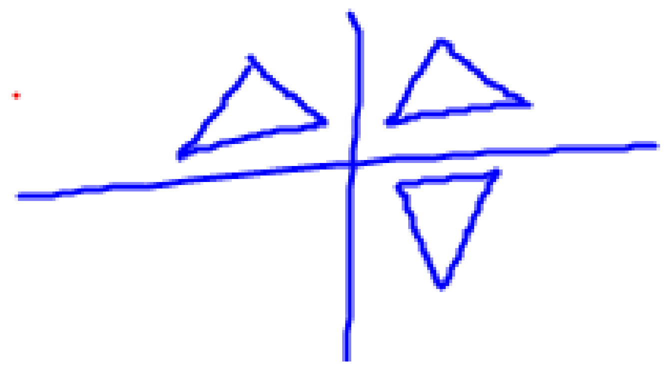
- same distance from the center of rotation



February 29 image
February 28 image
March 1 image
Click on Sign
and place sig
PDF File.

① 2 reflections over parallel lines is a translation.

② 2 reflections over intersecting lines is a rotation.

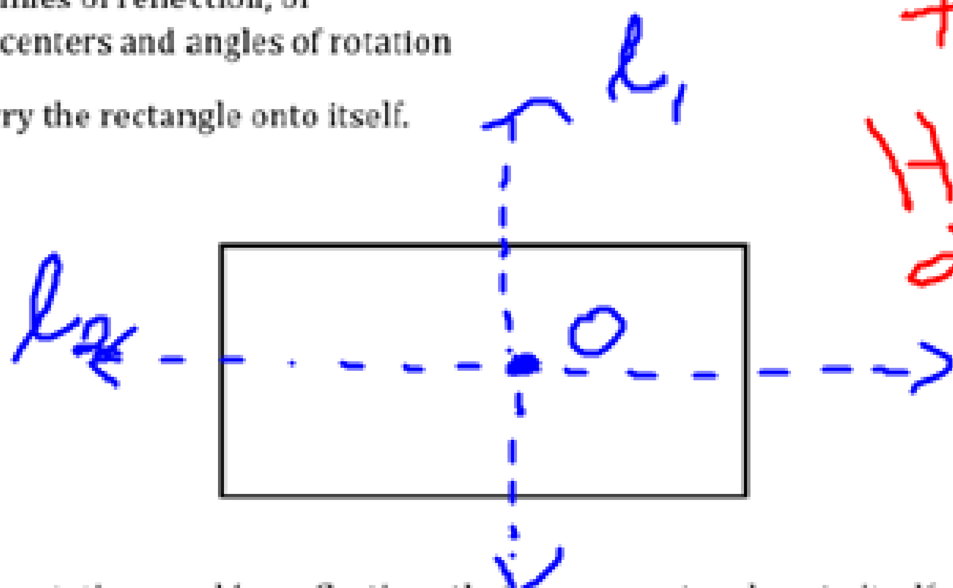


1. A **rectangle** is a quadrilateral that contains four right angles. Is it possible to reflect or rotate a rectangle onto itself?

For the rectangle shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the rectangle onto itself.



Describe the rotations and/or reflections that carry a rectangle onto itself. (Be as specific as possible in your descriptions.)

<u>lines of symmetry</u>

Vertical line down the center = l_1

Horizontal line down the center = l_2.

<u>Rotations</u>

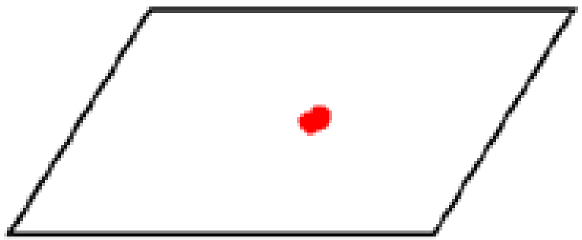
Rotate at cent[er] pt, where reflection lines meet, 180°

2. A **parallelogram** is a quadrilateral in which opposite sides are parallel. Is it possible to reflect or rotate a parallelogram onto itself?

For the parallelogram shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the parallelogram onto itself.



Describe the rotations and/or reflections that carry a parallelogram onto itself. (Be as specific as possible in your descriptions.) No line of symmetry.

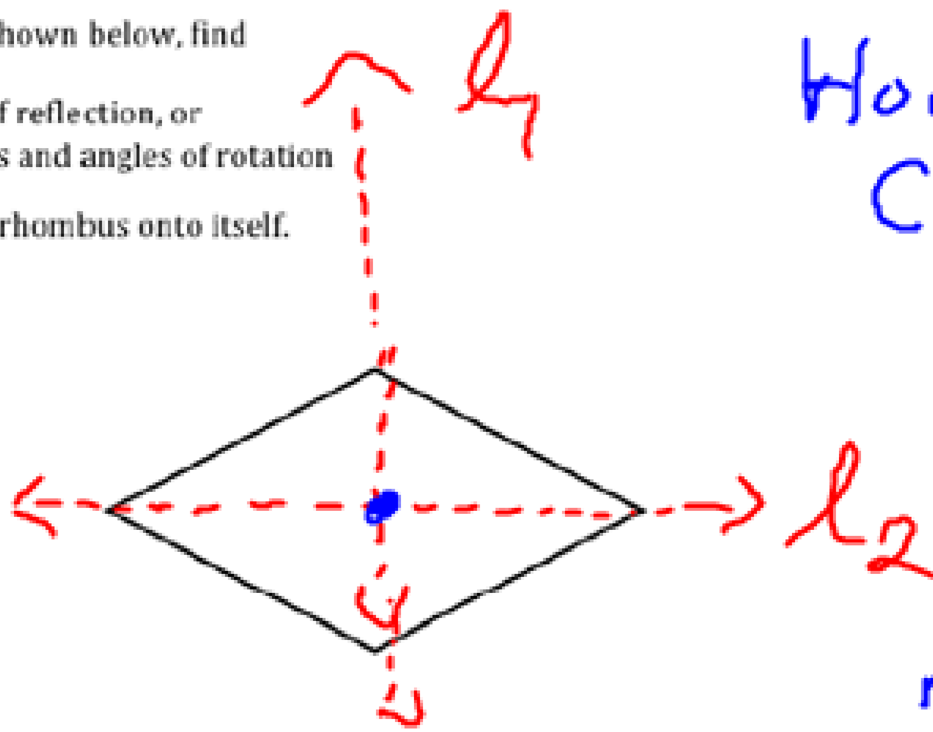
Rotate around center 180°

3. A **rhombus** is a quadrilateral in which all sides are congruent. Is it possible to reflect or rotate a rhombus onto itself?

For the rhombus shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the rhombus onto itself.



<u>Lines of symmetry</u>

Hor/Vert. line down Center → ℓ_1 & ℓ_2

<u>Rotation</u>

Center pt where lines of reflection meet, rotate 180°.

Describe the rotations and/or reflections that carry a rhombus onto itself. (Be as specific as possible in your descriptions.)

4. A **square** is both a rectangle and a rhombus. Is it possible to reflect or rotate a square onto itself?

For the square shown below, find

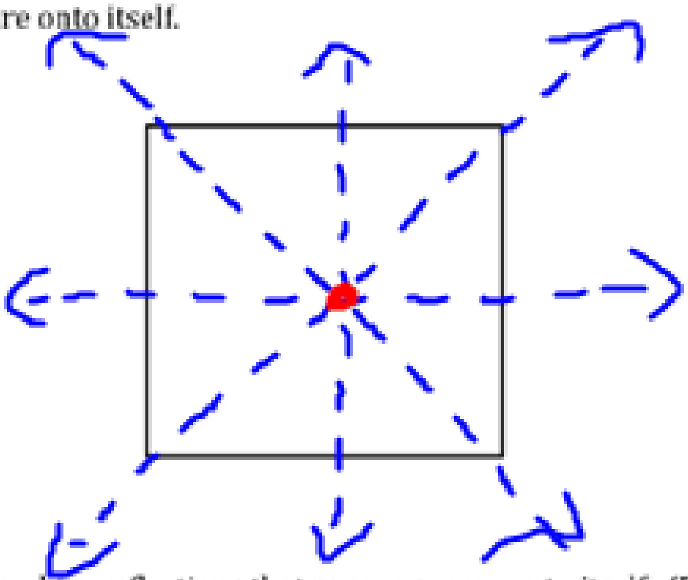
- any lines of reflection, or
- any centers and angles of rotation

that will carry the square onto itself.

line of symmetry

Hor/Ver lines through center.

Diagonal lines connecting opp. corners.



Rotations

Rotate 90° about center pt (where reflection lines meet)

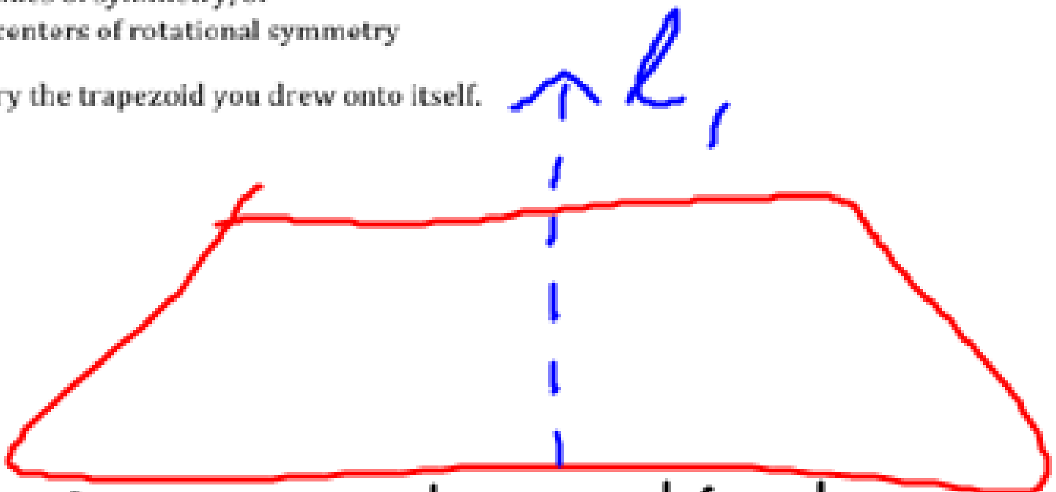
Describe the rotations and/or reflections that carry a square onto itself. (Be as specific as possible in your descriptions.)

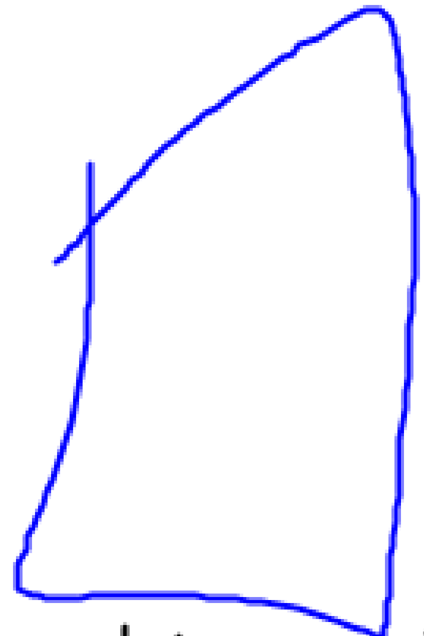
5. A **trapezoid** is a quadrilateral with one pair of opposite sides parallel. Is it possible to reflect or rotate a trapezoid onto itself?

Draw a trapezoid based on this definition. Then see if you can find

- any lines of symmetry, or
- any centers of rotational symmetry

that will carry the trapezoid you drew onto itself.





line of symmetry → Vertical

lines of symmetry. None.

If you were unable to find a line of symmetry or a center of rotational symmetry for your trapezoid, see if you can sketch a different trapezoid that might possess some type of symmetry.

line dow the center. Through || lines.