

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Outcomes

KSCO: By the end of grade 3, students will be expected to

i) *explore and experiment with geometric shapes and relationships*

SCO: By the end of grade 3, students will be expected to

E1 continue their development of spatial sense with emphasis on perceptual constancy

Spatial understandings are necessary for interpreting, understanding, and appreciating our inherently geometric world. Insights and intuitions about two- and three-dimensional shapes and their characteristics, the interrelationships of shapes, and the effects of changes to shapes are important aspects of spatial sense. Students who develop a strong sense of spatial relationships and who master the concepts and language of geometry are better prepared to learn number and measurement ideas, as well as other advanced mathematical topics. (Curriculum and Evaluation Standards for School Mathematics, p. 48)

Suggestions for Teaching and Learning

E1 Perceptual constancy is the ability to recognize figures or objects in space regardless of size, position, or orientation. It involves the recognition of shape or size as stable even if it appears to be different to the observer. For example, a table top can appear to be a parallelogram or a trapezoid when viewed in certain ways, but our experience has taught us it is a rectangle. Similarly, if a shape is reduced or enlarged (as in photographs), the shape is maintained.

- Give students different shapes made from five or six centicubes. Have them make the same shapes, using larger multilink cubes. Have students make complex figures on geoboards and make copies on much smaller geopaper. Discuss what has changed and what has stayed the same.
- Show a pattern-block design that uses 10-12 blocks on an overhead projector. Have students replicate the design at their desks using pattern blocks. Discuss what aspects are constant between the overhead version and those created by students.
- Give the students three isometric drawings of shapes, two of which are different views of the same shape (see E1.4). Have them predict which are the two views of the same shape and then build the shape with cubes to check their prediction.
- Have the students draw what they see when they look at familiar objects from the top. Have the other students see if they can determine what the objects are, given only these top views. Some objects will be difficult to determine with only a top view.
- Put three different shapes made from five multilink cubes on display. In a bag, place a replica of one of these shapes made from centicubes. Have the students determine by feeling which one of the three it is.

Teachers should continue to provide experiences that focus on other spatial abilities. For example, using pattern blocks, a visual-discrimination activity could be to find the difference(s) between two designs made with 8-10 blocks; a visual-memory activity could be to have the children replicate, from memory, a design that they have been shown only briefly; a spatial-relations activity could be a pattern-block puzzle. As well, these abilities are inherent in the development of geometric concepts.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.


Suggestions for Assessment

Performance

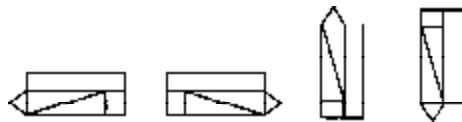
E1.1 Make a design on the overhead, using four or five tangram pieces. Have the students replicate this design, using their own pieces. Extend by showing the design for shorter periods of time before the students try to build it from memory.

E1.2 Place a variety of 3-D shapes in a bag. Have students feel the shapes in the bag, and describe them; have other students try to name them.

Paper and Pencil

E1.3 Ask: What 3-D shape has these faces? 

E1.4 Ask: Which of the following are pictures of the same figure? Have the students predict and use tracing paper to check.



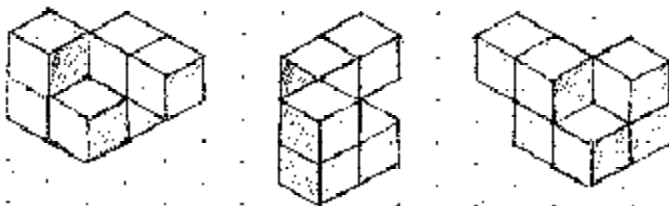
E1.5 Tell the student that these are top views of objects. Ask what objects they might be.



(Answer: While most students would see the second picture as the top view of an igloo, there could be a variety of suggestions for the first picture, including a gas pump, a toaster, or a camcorder.)

Interview

E1.6 Ask the student to predict which of the following are two views of the same shape made with six cubes? Have them build them to check.



Resources

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Outcomes

KSCO: By the end of grade 3, students will be expected to

- i) explore and experiment with geometric shapes and relationships (including the orientation and perspectives of objects)*

SCO: By the end of grade 3, students will be expected to

E2 recognize and represent angles that are less than/more than right angles

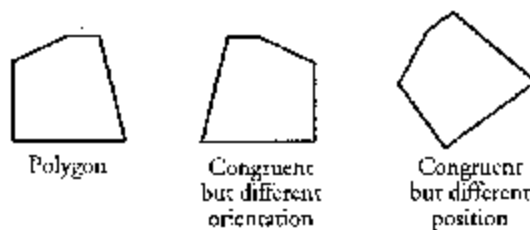
E3 recognize, name, describe, and represent congruent angles and congruent polygons

Suggestions for Teaching and Learning

E2 Students are not measuring angles in degrees at this stage; they are comparing angles by sight. The concept of right angle (corner) was introduced in grade two, and now other angles in shapes will be described as less or more than a right angle. Teachers should have a variety of convex polygons, including familiar triangles and quadrilaterals for students to examine.

- Provide the students with a small rectangular piece of paper or card. Discuss right angles in relation to the corners of this. Have pairs of students gather a set of six pattern blocks and, using the sheet of paper or card, find shapes that have right angles, angles less than right angles, and angles more than right angles.
- Examine the different members of the quadrilateral "family" (trapezoid, parallelogram, rectangle, rhombus, square, and kite) for these angles. Have students arrange toothpicks to make right angles and a variety of angles less/more than right angles. Find examples of angles in the classroom/school that would be right, less than right, and more than right. Students could use an index card or sheet of paper as a referent for the right angle to do comparisons.

E3 Through a variety of experiences, students should establish that congruent polygons are a perfect match (they would fit on top of one another exactly) regardless of their relative positions or orientations. Congruent angles in shapes occur when the corners match.



Have students match the corners (angles) of the pattern blocks to find ones that are congruent. Compare the angles in squares and rectangles. Compare the angles in the three different-sized triangles in the tangram set.

On a sheet with pictures of a variety of polygonal picture frames in different positions and orientations, ask students to find sets of congruent frames. They should try by sight and then check, either using tracing paper or cutting them out to match.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

Performance

E2.1 Have the students make shapes on a geoboard that meet different criteria. For example, make a shape that has two right angles; make a shape that has one angle that is more than a right angle; make a shape that has all angles less than a right angle.

E2.2 Give the students pictures of 12 different angles in different positions on the paper. Have them sort the angles into the three sets - right angles, more than right angles, and less than right angles.

E2.3 Have the students classify the angles on the faces of 3-D shapes.

E3.1 Ask a group of 10 students to make a rectangle anywhere on their geoboards. Have the students sort these rectangles into congruent groups.

E3.2 Prepare a set of cards with drawings of different polygons, some of them congruent but in different positions/orientations, and some similar (reductions, enlargements). Have the students match the congruent polygons. Discuss why they are/are not congruent.

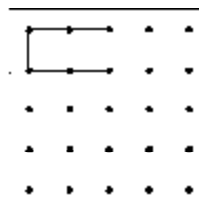
E3.3 Show the students a polygon on a geoboard. Have them make a slide, flipped, or rotated image of it on their own geoboard. Are they congruent? Compare by copying on geopaper and cutting them out.

Paper and Pencil

E3.4 Give the students a picture of a shape (for example, a parallelogram) and some tracing paper. Ask them to draw three parallelograms congruent to this one but in different positions/orientations. Have them draw one that is not congruent and describe how it is different from the others.

Presentation

E3.5 Have the students investigate how many rectangles congruent to this one can be made on a geoboard.



Resources

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Outcomes

KSCO: By the end of grade 3, students will be expected to

ii) *describe, model, draw, and classify 2-D figures and 3-D shapes*

SCO: By the end of grade 3, students will be expected to

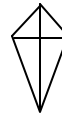
E4 recognize, name, describe, and represent kite, and some concave, convex, and regular polygons

Suggestions for Teaching and Learning

E4 Show the students a real traditional flying kite and read a story about kites to help the students make strong associations with the shape called kite.

Show them a variety of kite shapes, and some shapes that are not kites, asking the students why they think they are not kites.

Traditional kite



Other examples of kites:



These are not kites:



- Prepare two ropes of 1m and two ropes of 1.5m. Have four students choose ropes and, standing, hold them to make a kite. Which ropes are the same length? Have them make a rectangle using the same ropes. How were the positions of the ropes changed?

The students will have worked with some of the regular polygons (the triangle, square, and hexagon in the pattern blocks, for example); however, the name “regular” will be new. Familiarity with the term could be developed by displaying shapes that are regular and those that are not, asking the students to formulate the term’s meaning. All sides must be congruent, and all angles must be congruent for the polygon to be named “regular.” Make associations to things in the real world; for example, a STOP sign is a regular octagon.

- Have the students make all of the different polygons that can be formed with the four triangles made by cutting a square along both diagonals. These should be sorted into two groups (concave and convex polygons) that you name. Ask the students to try to describe concave and convex. At this stage, students would probably define them by their overall appearance. For example, concave polygons have an indentation or are “caved in.”

Note: A kite is a quadrilateral with two pairs of congruent adjacent sides. While a rhombus is a kite, at this level treat rhombus and kite as separate classes. Students should not be given formal definitions at this stage of their development.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

Performance

E4.1 Give students two long straws and two shorter straws. Have them arrange them on their desks to make a kite. Have them examine each other's to see how many different kites they can find. Ask: How are they the same and how are they different?

E4.2 Have the students use pattern blocks to make polygons that are concave and polygons that are convex.

E4.3 Give the students 15 toothpicks (all the same length). Have them arrange five of them to make a convex pentagon that is not regular, five to make a concave pentagon, and five to make a regular pentagon.

E4.4 Ask students to examine a collection of 3-D shapes to find ones that have faces that are regular polygons. Have them record the ones they find by tracing them on paper.

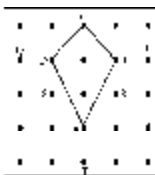
Interview

E4.5 Ask the student to compare a kite to a parallelogram and tell why they look different.

Presentation

E4.6 Have the students use a five-pin by five-pin geoboard to make as many different kites as they can. (Remind them that kites are not different if they are congruent to each other.) Record each kite found on geopaper.

E4.7 Have the student make kite $ABCD$ on a geoboard as shown. If the elastic is moved from peg A to peg T , will the shape be a kite? If B is moved to P , will the shape be a kite? (How could you move another peg to make it a kite?) If the elastic is then moved from peg P to peg R , would the shape be a kite? (Move the elastic from peg Q to make the shape a kite.)



Portfolio

E4.8 Ask the students to cut a square as shown:



Have them use the three pieces to make two examples of concave polygons and trace them; also make two examples of convex polygons and trace them as well.

Resources

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Outcomes

KSCO: By the end of grade 3, students will be expected to

ii) *describe, model, draw, and classify 2-D figures and 3-D shapes*

SCO: By the end of grade 3, students will be expected to

E5 recognize, name, describe, and represent different prisms and pyramids

E6 cut and assemble NET patterns for pentagonal and hexagonal prisms and pyramids

E7 build skeletons of various prisms and pyramids to focus on edges and vertices

Virtually every activity that is appropriate for K-8 geometry should involve some form of hands-on materials, models, or at least paper such as graph paper or dot paper that lends itself to easy spatial explorations. (Elementary School Mathematics, p. 324)

Suggestions for Teaching and Learning

E5 The following suggested activities will build on the students' previous experiences with prisms and pyramids. Prisms and pyramids should be presented together to have the students form impressions of these two "families" of shapes, both of which have "first names" based on the shape of their bases. These could include trapezoidal, pentagonal, hexagonal, and octagonal.

Commercial 3-D shapes usually have a variety of prisms and pyramids. While the pattern-block pieces are prisms, they have been treated as 2-D shapes; however, stacking a number of triangles, squares, or hexagons would provide examples of different prisms. Stacking the various polygons from the logic blocks would also provide examples of prisms. This stacking would help students visualize/conceptualize the uniform nature of prisms.

E6 Students should be given copies of NETS of these shapes to cut out and fold up. They should be encouraged to unfold them and examine the 2-D shapes that are connected to make each NET. Have them visualize the folding up and unfolding.

For example, a NET for a hexagonal pyramid would be



E7 Miniature marshmallows/baking gums and toothpicks are one source of material for students to build skeletons. Each marshmallow would serve as a vertex and each toothpick, an edge.

- Have students make skeletons of each prism and the corresponding pyramid. Discuss how they started off the same but then proceeded differently. Compare the number and shapes of faces, the number of vertices, and edges. Can they detect any patterns while they are building them? For example, they always used one more marshmallow as a vertex after the base of a pyramid was made.
- Give students face, edge, and vertex clues to have them name the 3-D shape. Have students feel a shape in a bag and describe it by its faces, edges, and vertices while others try to guess what the shape is.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

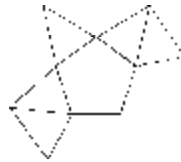
Performance

E5.1 Put a variety of prisms and pyramids in a bag. Have the students, using only their sense of touch, describe each shape and name it before bringing it out of the bag to check.

E5.2 Place a hexagonal prism and a hexagonal pyramid beside one another. Ask the students to name them. Ask them to tell you some things that are the same about them; some things that are different.

E6.1 Present the students with NETS of a prism and a pyramid that have the faces joined in a different way from the ones they have cut out before. Ask them to predict what shape it would fold up to make. Have them cut it out and fold to check their prediction.

Example:



E7.1 Ask the students to use toothpicks and marshmallows to build a prism and a pyramid, using the same number of marshmallow vertices for each.

E7.2 Play “Who am I?” by giving clues based on faces, edges, and vertices. (For example: I have five faces. I have six vertices. What prism or pyramid am I?)

Paper and Pencil

E7.3 Give the student two shapes and ask them to write a comparison between them on the basis of edges, faces, and vertices.

Interview

E7.4 Show the students a toothpick and marshmallow pentagon. Ask them to describe what they would need to make a pentagonal pyramid.

Resources

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Outcomes

KSCO: By the end of grade 3, students will be expected to

iii) investigate and predict the results of combining, subdividing, and transforming

SCO: By the end of grade 3, students will be expected to

E8 predict the results of combining triangles and/or quadrilaterals

Suggestions for Teaching and Learning

E8 Students should try to visualize what shape would be formed by combining triangles and quadrilaterals to make a variety of polygons and to make a variety of 3-D shapes. They might be able to do this for some combinations; however, many will require a trial-and-error approach. Teachers should encourage students to predict before physically combining shapes. Afterwards, the students should take the shapes apart and "in their minds" put them back together. The importance of predicting and reconstructing in the development of spatial visualization cannot be emphasized enough.

- Using pattern blocks, initially two at a time (for example, a trapezoid and a triangle), have students predict what polygons could be made if the blocks must share a common side. Check predictions and trace the blocks to record the new polygons. This should be extended to using three or four blocks; however, many students would have difficulty predicting when more than two blocks are used.
- Using the tangram pieces, have the students predict, and then check, the result(s) of combining
 - two small triangles
 - a small triangle and the square
 - a small triangle and the parallelogram
 - the parallelogram and the square
 - the square and two small triangles
- Make a set of cards, each card a face of a prism or pyramid, plus two each of squares, regular pentagons, and regular hexagons; four equilateral triangles; six rectangles; and six isosceles triangles. Put out a set of faces for one of the prisms or pyramids. Have the students predict the shape. Check by finding the shape and compare its faces to the cards. Cardboard 2-D shapes (like those mentioned for the cards above) could be used for the students to predict and experiment with in both 2- and 3-dimensions. There are commercial products that consist of a variety of 2-D shapes which can be manipulated to form 3-D shapes.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

Performance

E8.1 Provide the students with two triangles (formed by cutting a rectangle along one diagonal). Have them make and name all the shapes that can be made by combining these two triangles with equal sides matching.

E8.2 Show the students two congruent isosceles triangles (one in each hand). Ask them to predict what polygons could be made by combining them. Sketch their predicted shape. (Remind them to visualize them coming together.) Ask for suggestions and have them explain how they would join. Ask for a volunteer to make the polygons, using your two triangles.

E8.3 Provide the students with two congruent squares, one of them cut along a diagonal. Have them investigate the different shapes that can be made by using the three pieces with equal sides matched. Record all the shapes found by tracing around them.

E8.4 Have the students use six cardboard congruent squares to build a cube, taping some, but not all, of the edges. (Each face should be attached to another along one edge). Have them unwrap the cube and lay it out flat on the desk to make a 2-D shape with six squares. (This is a NET for the cube.) Ask: Is your shape the same or different from others in your class? Ask them to investigate different ways that the net for the cube could be made, and draw to record each one.

Paper and Pencil

E8.5 Ask the student to predict, check the predictions, and trace to record for each of the following. What shapes can be made by combining two congruent squares? Two congruent rectangles? Two congruent parallelograms? Two congruent rhombi?

Portfolio

E8.6 Provide the students with two of each of the six pattern blocks. Have them investigate how many new polygons can be made by using two of the same block (equal sides should be matched). Trace to record the different polygons. Which of the blocks could make only one polygon? Which could make the most different polygons? Observe that the students recognize the same shape in different positions or orientations.

Resources

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Outcomes

KSCO: By the end of grade 3, students will be expected to

iii) investigate and predict the results of combining, subdividing, and transforming

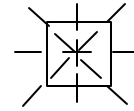
SCO: By the end of grade 3, students will be expected to

E9 find the lines of reflective symmetry of polygons

A very useful device for studying symmetry and transformations is the Mira, a piece of red Plexiglass, that stands perpendicular to the table surface. (Elementary School Mathematics, p. 350)

Suggestions for Teaching and Learning

E9 Students should begin to appreciate that reflective symmetry is a characteristic of some polygons and not others. These polygons can be described by stating how many lines of reflective symmetry they have. For example, after investigations, students should find that a square has 4 lines of reflective symmetry.



Experiences should provide students with the understanding that a symmetry line is where a polygon can be folded onto itself so that each half matches exactly, or where a mirror can be placed so that the reflection on one side matches the shape on the other.

- Provide students with a variety of polygons, some of which have reflective symmetry. Have the students cut them out and try to fold them onto themselves. When a perfect match is made, have the students crease on the fold line(s). Have them discuss the polygon and the number of lines of reflective symmetry.

A mira is a good instrument to have students find lines of symmetry in a variety of polygons.

Students should also examine some shapes that do not have lines of reflective symmetry; for example, the diagonal of a parallelogram is often mistaken for a line of symmetry.

Connect reflective symmetry to regular polygons (E4). Students might discover the pattern, that is, that the number of lines of reflective symmetry for regular polygons is the same as the number of sides it has. These lines either join vertices that are opposite each other, or midpoints of sides that are opposite each other, or from a vertex to the midpoint of the opposite side.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

Performance

E9.1 Have the students fold a piece of rectangular paper to show all of its lines of reflective symmetry. Ask: Why does folding it along a diagonal not make a line of symmetry?

E9.2 Have the students make three polygons on a geoboard that have only two lines of reflective symmetry. Ask them to record their polygons on geopaper. Suggest that not all three be the same type of shape.

E9.3 Have the students fold a piece of paper in half. Ask them to cut out (along the fold) a shape that, when unfolded, makes a polygon with only one line of symmetry.

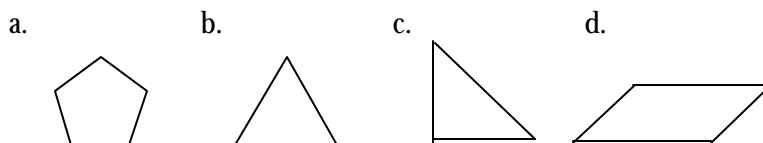
E9.4 Ask the student to examine the six shapes in the pattern blocks for lines of symmetry.

E9.5 Have the student combine various pieces in the tangram puzzle to make polygons with one line of symmetry.

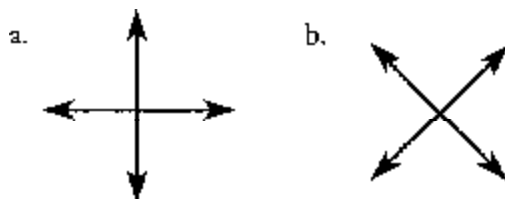
E9.6 Ask the student to sort by symmetry the shapes formed by the four triangles made by cutting a square along both diagonals (see Elaboration for E4).

Paper and Pencil

E9.7 Ask the students to use a mira to find the lines of reflective symmetry in the figures below (if there are any):



E9.8 Ask the student to draw a shape, given its two lines of reflective symmetry, as shown.



Resources

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Outcomes

KSCO: By the end of grade 3, students will be expected to

KSCO: By the end of grade 3, students will be expected to

iii) investigate and predict the results of combining, subdividing and transforming

SCO: By the end of grade 3, students will be expected to

E10 recognize, name, describe, and represent half and quarter turns of 2-D figures

Suggestions for Teaching and Learning

E10 Initial experiences with these turns should be with students' own bodies, turning on the spot, one quarter at a time until a complete revolution is made. Teachers could connect quarter/half turns to the rotation of the minute hand of a clock from 12 to 3 and 12 to 6. They should connect a quarter turn to a right angle as well.

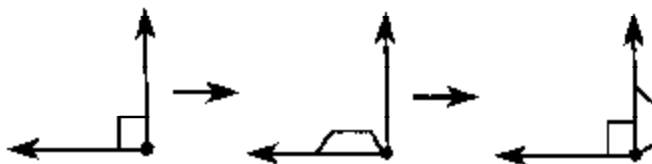
Rotations are the most perceptually challenging of the transformations. Students will need many experiences actually rotating (turning) a shape through quarter and half turns before they are able to recognize and describe such turns. It is suggested that, at this level, experiences start with cut-out 2-D shapes with right angles (for example, squares and rectangles), and turning points be one of the vertices of the shape. These turns can be clockwise or counter-clockwise. Using squared paper makes quarter and half turns easier to do.

Examples:



Experiences could then involve other shapes and pictures of shapes, using tracing paper to find the rotated images, still keeping the vertices as the centres of rotation. Students should make slide and reflected images of the same shapes and be encouraged to compare them to the turned (rotated) images.

To make a quarter turn of a pattern block on plain paper, draw a right angle; place one side of the block along one arm of the angle and rotate the block until the same side of the block lies along the other arm of the angle. (The block could be traced in both positions.)



GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

Performance

E10.1 Have the students draw the half turn clockwise and counter-clockwise images of the trapezoid in the pattern blocks. Ask: What do you notice?

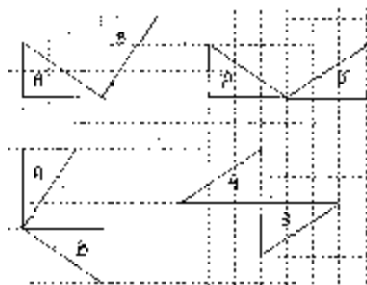
E10.2 Have the students make an acute triangle on a geoboard and draw it on geopaper. Ask them to follow these instructions: Rotate the geoboard a quarter turn clockwise and draw the image on geopaper. Rotate the geoboard another quarter turn and draw this image on geopaper. Choose one angle in the original triangle on geopaper and colour it red; find its corresponding angles in the two image triangles and colour them red as well. Compare the locations of the red angles.

Paper and Pencil

E10.3 Have students draw pictures of a square, rectangle, and a parallelogram on squared paper. Have them use tracing paper to make half-turn images of each, using one of their vertices as a turning point. (Hold a pencil point firmly on the chosen vertex as you turn the tracing paper the half turn. Using a sharp pencil, press through the tracing paper to locate the vertices of the turned shape.) Could these images have been the result of a slide? A reflection? Explain.

E10.4 Using a rectangle from the logic blocks, have the students trace it on paper. Using one vertex as a turn centre, rotate the rectangle a quarter turn counter-clockwise and trace it; using the same vertex, move the rectangle another quarter turn and trace it; continue. What happened the fourth time? What would happen if you were to continue?

E10.5 For each pair below, describe what motion (slide, reflection, rotation) of triangle A would result in triangle B.



Resources

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Outcomes

KSCO: By the end of grade 3, students will be expected to

iv) relate geometric ideas to number and measurement ideas and recognize and apply geometric principles in real-world situations

SCO: By the end of grade 3, students will be expected to

E11 recognize and identify different polygons, prisms, and pyramids in real-world contexts

E12 make the connection between arrays of squares forming rectangles and describing their dimensions


Geometry is an important component of the K-4 mathematics curriculum because geometric knowledge, relationships, and insights are useful in everyday situations and are connected to other mathematical topics and school subjects. (Curriculum and Evaluation Standards, p. 48)

Suggestions for Teaching and Learning

E11 In the development of geometric concepts, initial experiences should include their real-world uses to help students make associations and form visual images. For example, regular polygons are used in many logos and designs students should be encouraged to find examples in magazines, newspapers, cars, stores, fabric, artworks, wallpaper, etc. Native handicrafts and quilt patterns are other good sources of geometric shapes in use. A class collection of boxes and containers can provide examples of various prisms and pyramids.

Teachers should collect an assortment of pictures (for example, streetscapes, formal gardens, buildings, oriental carpets). Students could find examples of 2-D and 3-D shapes in the pictures.

Students should be encouraged to use geometry in design and art projects. For example, they could design a quilt, using construction paper shapes in different colours; they could design a logo; they could make 3-D ornaments/mobiles, using pyramids/prisms with decorated faces.

E12 One of the concrete/pictorial representations of multiplication is arrays. For example,  is one way to show 2 x 3. This essentially geometric way of representing multiplication, by combining 6 squares to form this rectangle, is also the way we often describe a rectangle, by giving its dimensions (2 by 3 rectangle in this example). Have the students use 12 square tiles to build all possible rectangles. Record them on grid paper and label with the appropriate multiplication.

The connection of arrays to area of squares and rectangles should also be made.

GCO E: Students will demonstrate spatial sense and apply geometric concepts, properties, and relationships.

Suggestions for Assessment

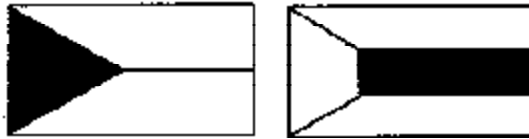
Performance

E11.1 Tell the student many unsharpened pencils are shaped like prisms. Ask him/her to find one and name the prism.

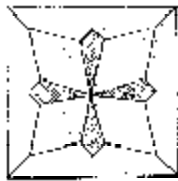
E11.2 Show the students a collection of boxes of various shapes. Have them identify and name the shape of the boxes, using geometric vocabulary.

Paper and Pencil

E11.3 Tell the students that the following flags of different countries were designed by using polygons. Ask them to find, draw, name, or describe the different polygons used in each flag.



E11.4 Tell the student that this is one square of a quilt pattern. Ask him/her to identify, draw, and name some of the different shapes that are used.



Presentation

E11.5 Have the students work in groups to explore the different rectangles that can be made, using from 1 to 36 squares. Ask them to record their results by giving the possible dimensions in a chart.

Number of Squares	Dimensions of Rectangles
1	1x1
2	1x2, 2x1
3	1x3, 3x1
4	1x4, 4x1, 2x2

Discuss which number of squares had the most possible number of rectangles; which had the least possible number of rectangles; which had rectangles with 1 as one of its dimensions.

Resources