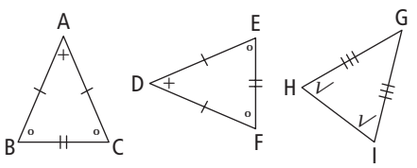
Get Ready

Name: _____ **Date:** _____

Congruent Figures

Congruent figures have the same shape and size. The equal sides and angles of congruent figures are called **corresponding** sides and angles.



The $\triangle ABC$ is congruent to $\triangle DEF$.

$\angle A = \angle D$

$\angle B$ and $\angle C = \angle E$ and $\angle F$

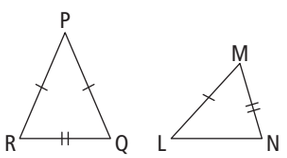
$\overline{AB}$ and $\overline{AC} = \overline{DE}$ and $\overline{DF}$

$\overline{BC} = \overline{EF}$

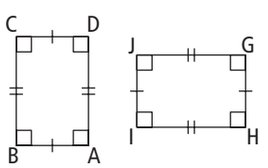
This could also be written as $\triangle ABC \cong \triangle DEF$.

1. Are the figures in each pair congruent? Explain your reasoning.

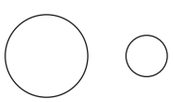
a)



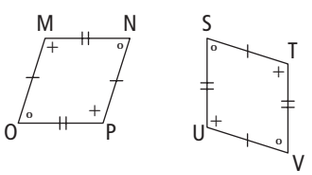
b)



c)

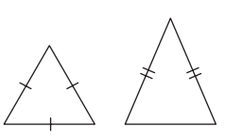


d)



Characteristics of Regular Polygons

A **regular polygon** has all sides equal and all angles equal. An equilateral triangle is an example of a regular polygon. An **irregular polygon** is one that does not have all sides and angles equal. An isosceles triangle is an example of an irregular polygon.

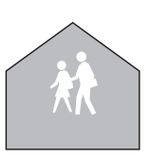


2. Decide if each polygon is regular or irregular. Give reasons for your decisions.

a)

b)

c)

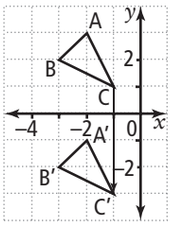


d)

Name: _____ Date: _____

Transformations and Transformation Images

A **transformation** moves one geometric figure onto another.



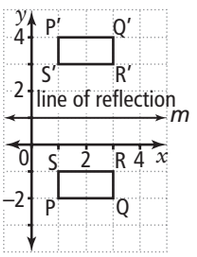
Transformations include translations, rotations, and reflections. The transformed figure is called an **image**.

- What translation is shown? What are the coordinates of the translation image?

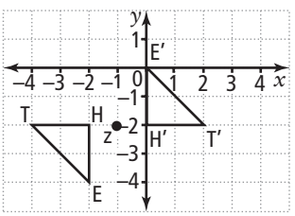
$\triangle ABC$ has been translated 4 units vertically. The translation image is $\triangle A'B'C'$. The coordinates are $(-2, -1)$, $(-3, -2)$, and $(-1, -3)$.

- Rectangle PQRS has been reflected in the line of reflection, m. What are the coordinates of PQRS and its reflection image?

The coordinates of PQRS are $(1, -2)$, $(3, -2)$, $(3, -1)$, and $(1, -1)$. The coordinates of P′Q′R′S′ are $(1, 4)$, $(3, 4)$, $(3, 3)$, and $(1, 3)$.



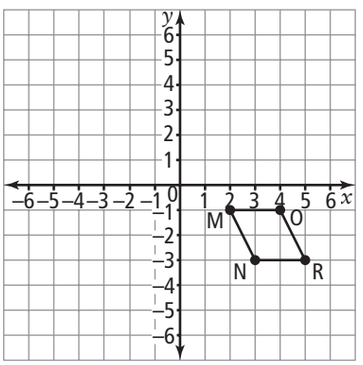
3. $\triangle THE$ is rotated around the centre of rotation, z.



a) What are the coordinates of $\triangle THE$ and $\triangle T'H'E'$?

b) What are the direction and angle of rotation?

4. Use the coordinate grid to complete the following questions.



a) Translate parallelogram MORN 3 units up and 4 units left.

b) Draw a line of reflection, t, parallel to the y-axis at –2.

c) Reflect M′O′R′N′ in line of reflection t.

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12.1 Exploring Tessellations With Regular and Irregular Polygons

***MathLinks 8,* pages 446–451**

Key Ideas Review

Select words from column B to complete the statements in column A.

A	B
1. _____ are patterns that cover a plane without overlapping or gaps.	**a)** irregular
2. _____ types of _____ polygons can tessellate the plane.	**b)** regular
3. Some _____ polygons can tessellate the plane.	**c)** tessellations
4. Polygons tessellate the plane when interior angle measurements total 360° at the point where the _____ meet.	**d)** three **e)** vertices

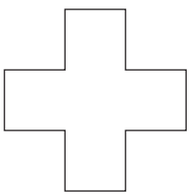
Practise and Apply

5. Can you use these regular polygons to tessellate the plane? Justify your answer.

a)

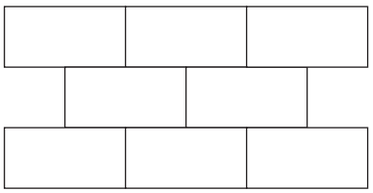
b)

6. Draw a design in the space below by tessellating this shape.



Name: _____ **Date:** _____

7. Create two different designs using a rectangular brick. Here is one example:



8. Find a tessellation either at home or at school and draw it below.

9. a) Describe how you know whether a shape can tessellate the plane.

b) Show two shapes by drawing examples, one that can tessellate the plane and one that cannot. Identify which one can tessellate the plane and which one cannot. Justify your response.

Name: _____ **Date:** _____

12.2 Constructing Tessellations Using Translations and Reflections

***MathLinks 8*, pages 452–456**

Key Ideas Review

For #1 to #4, unscramble the letters to form a word that correctly completes the statement.

1. _____ (LNSETSETLOIAS) can be made with two or more _____ (GNYOLPSO).

2. The _____ (TROINERI) angles that meet must equal 360°.

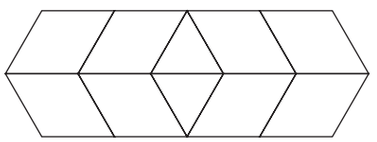
3. _____ (OSLNAASTNIRT) and _____ (RSNETFEOLIC) are common transformations.

4. The area of a _____ (LTEI) is the same after it is _____ (MEDASRFONRT).

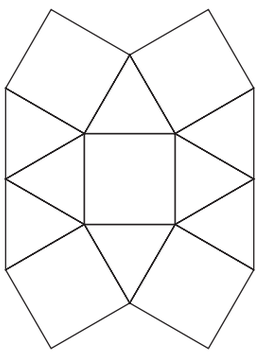
Practise and Apply

5. What two polygons are used to form each tessellation?

a)



b)



Name: _____ **Date:** _____

6. Use two or more polygons to create a tessellation.

7. Levi wanted to redo his patio. He decided to use the letter "L" to tessellate a pattern.

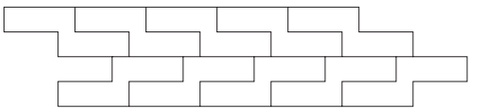
a) Show a design that Levi might use.

b) Name at least four other letters that can tessellate the plane.

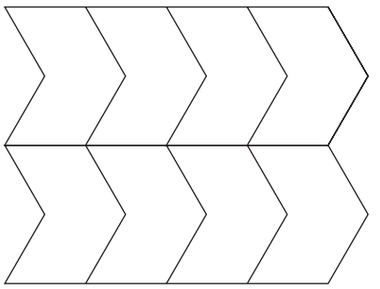
c) Draw a design using one of the letters you listed in b).

8. What transformations are used to create each design below?

a)



b)



9. Create a design by using both translations and reflections.

Name: _____ **Date:** _____

12.3 Constructing Tessellations Using Rotations

***MathLinks 8*, pages 457–460**

Key Ideas Review

1. Decide whether each of the following statements is true or false. Circle the word *True* or *False*. If the statement is false, rewrite it to make it true.

a) **True/False** Tessellations need more than two polygons to create a design.

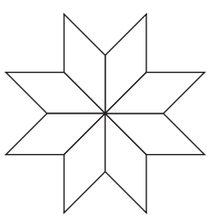
b) **True/False** Tessellations can be made if the interior angles of the polygons equal exactly 360° where the polygons meet.

c) **True/False** Rotations cannot be used to create tessellations.

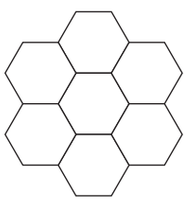
Practise and Apply

2. Name the polygons used in each design.

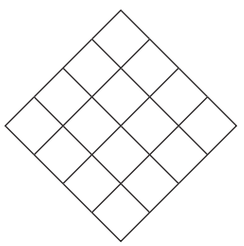
a)



b)



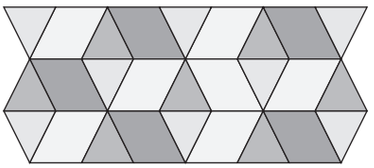
c)



Name: _____ **Date:** _____

3. What transformations are used in each design in #2?

4. Identify the shapes used in this design and their transformations.



5. Choose a polygon that you can rotate to form a tessellation. Draw the design below.

6. a) Choose two regular polygons that you can use to create a tessellation using rotations. Draw the design below.

b) Use those same two regular polygons to create a different design.

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12.4 Constructing Escher-Style Tessellations

***MathLinks 8*, pages 461–465**

Key Ideas Review

1. What steps should you take to create an Escher-style tessellation? Write the step number from column B that matches each description in column A.

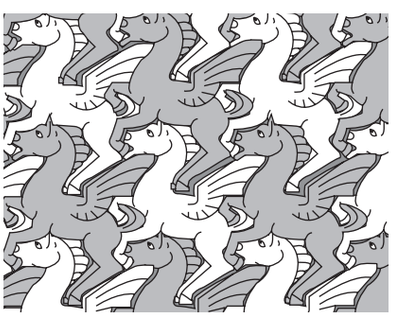
A	B
a) Make sure there are no overlaps or gaps in the pattern. _____	Step 1
b) Use transformations to tessellate the plane. _____	Step 2
c) Use a regular or irregular polygon. _____	Step 3
d) Make sure the interior angles at vertices total exactly 360°. _____	Step 4
e) The area of the tessellating tile must remain unchanged. Any part of the tile that is cut out must be re-attached. _____	Step 5

Practise and Apply

2. State the transformations used in each design.

a)

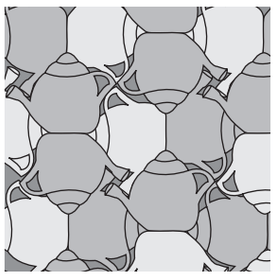
b)



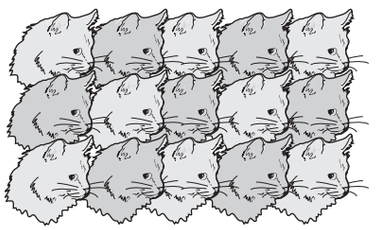
Name: _____ **Date:** _____

3. Draw the original shape and explain or show how the tessellation could have been made.

a)



b)



4. a) Create a tessellation using a square.

b) Use that square to create an Escher-style design below. Add details and colour to your design.

Name: _____ **Date:** _____

Link It Together

1. Your sister is having a birthday party this weekend and you are in charge of the craft area. She loves animals, so you decide to have your sister and her friends make an animal tessellation design.

a) Use a square or equilateral triangle to create a tessellation that resembles an animal. Show the tile below.

b) Make a list of the steps you will use to teach and carry out the activity at the party.

Step 1 _____

Step 2 _____

Step 3 _____

Step 4 _____

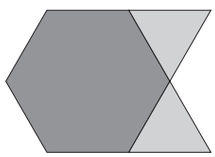
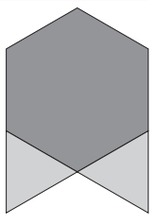
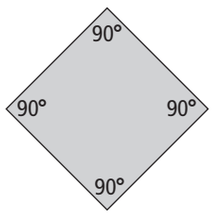
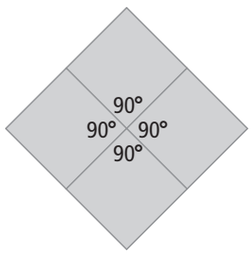
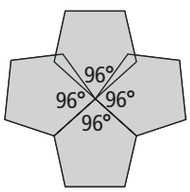
Step 5 _____

c) Use your tile from a) to make a sample to show your sister and her friends. Add details that will identify the animal.

Name: _____ **Date:** _____

Vocabulary Link

Unscramble the letters of each term. The terms are one to three words long. Use the clues to help you solve the puzzles.

A	B
1. This artist used tessellations to make unique pieces of art. _____	EHERCS
2. Here is a tile.   This visual shows a _____ of the tile.	FSNTNRTOOIAMRA
3. This is a two-dimensional flat surface that extends in all directions. _____	PENLA
4. Here is a shape.  In this visual, the shape is _____. 	ITIEHNNTLGAPLE
5. This visual is not a _____ because the shapes overlap. 	SELAENOTILST