Regular Polygons and Polygon Clusters

Tessellations and Transformations

MATHOMAT V2
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Linear Radian Scale 1 Radian = 1.5cm

Octagon

Hexagon

Pentagon

Octagon

Triangle

Triangle

Pentagon

Hexagon

Square

Square 25mm

Polygon Cluster

Dodecagon

Australian Patent Appl.
No. 2018900281 and
Design Appl.
No. 201810792

100 Divisions (Percentage Points)

Clock Face 40mm

50mm

Circle Cluster

5mm

7mm

10mm

15mm

20mm

18.54 x 30mm

Isometric Lines

Ellipse Cluster

20 x 40mm

NZQR

NNW N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW

26mm

10 x 40mm

90°

Bearing

Degrees

Radius to Tenths

Circle Centre Finder

Parallel Lines

Scalene

Isosceles

Golden Rectangle
18.54 x 30mm

Rhombus 30°

Rhombus 60°

Square 15 x 15mm

Quadrilateral Cluster

Kite

Rhombus 45°

Problem solving steps:
1 - analyse,
2 - think,
3 - do,
4 - check

0.5mm Pencil Allowance

Triangle Cluster

Equilateral

Isosceles

$(1, 2, \sqrt{3})$

$(1, 1, \sqrt{2})$

8 x 26mm

$y = 2x^2$

$y = x^2$

Rectangle 25 x 15mm

Parallelogram 45°

Normal Frequency Curve

Trapezium

Trapezium

$y = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$

Concave Quadrilateral

Arrow Head

5 x 15mm

Scale 1 : 2
(Mapping)

Scale 1 : 20.00

$y = \sin x$

Name:

$\pi/6$ $\pi/3$ $\pi/2$ $2\pi/3$ $5\pi/6$ π $7\pi/6$ $4\pi/3$ $3\pi/2$ $5\pi/3$ $11\pi/6$ 2π

$\pi/4$ $3\pi/4$ $5\pi/4$ $7\pi/4$

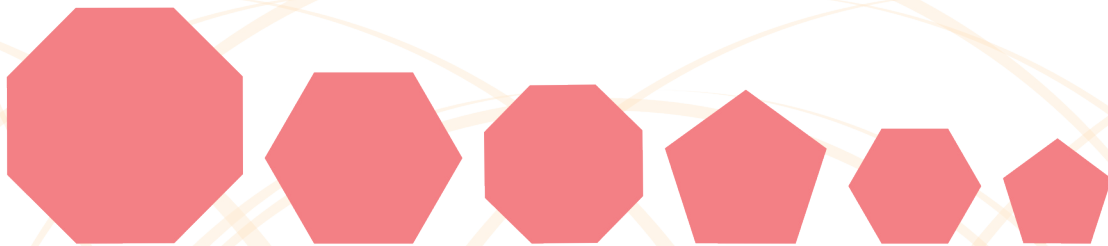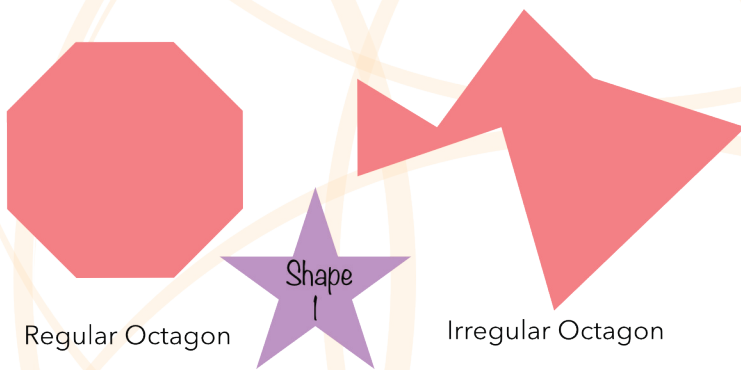Number Line · cm divisions

Parallel Lines

Isosceles

Regular Polygon Cluster Examples

Exploring Regular Shape Properties and Algebraic Equations

Regular polygons are a great start for exploring symmetry. Enlarge these shapes and have students measure the angles and sides. Have students write down the properties for each one as they go along.

Have students each pick a regular polygon. Allow for them to make a certain number of changes to convert it into an irregular polygon of the same number of sides as the original one.
How many properties changed?
How many properties stayed the same?

Regular Octagon

Shape 1

Irregular Octagon

This critical thinking exercise shows an equation
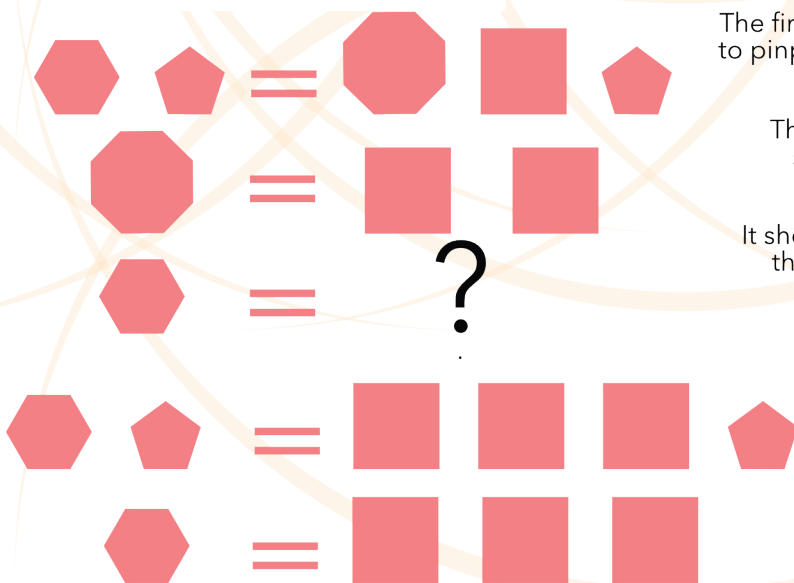
The first line presents a fact, the second line helps us to pinpoint that two squares will be the equivalent of one octagon.

The student should re-write the first line and substitute the octagon with two squares.

It should now be easier for the student to deduct that one Hexagon is equal to three Squares.

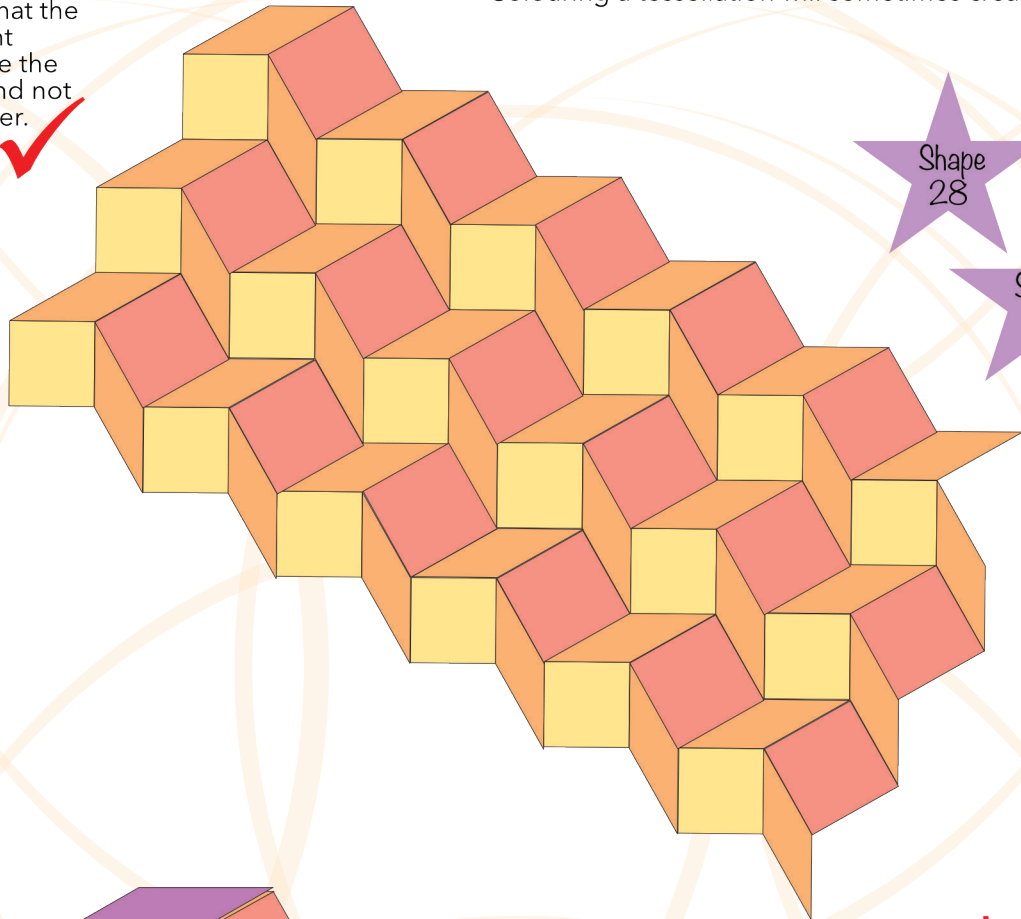Introduce values for each shape and progress to a point where only numbers are used.

Polygon Clusters

Tessellations

Make sure that the student manipulate the template and not the paper. ✓

Colouring a tessellation will sometimes create a 3D-effect.

Shape 28

Shape 27

Discuss the transformations of the shapes:

Purple Rhombus to Yellow Rhombus - Translation and Rotation: anti - clockwise.

Blue Square to Green Square - Translation: Up and Left.
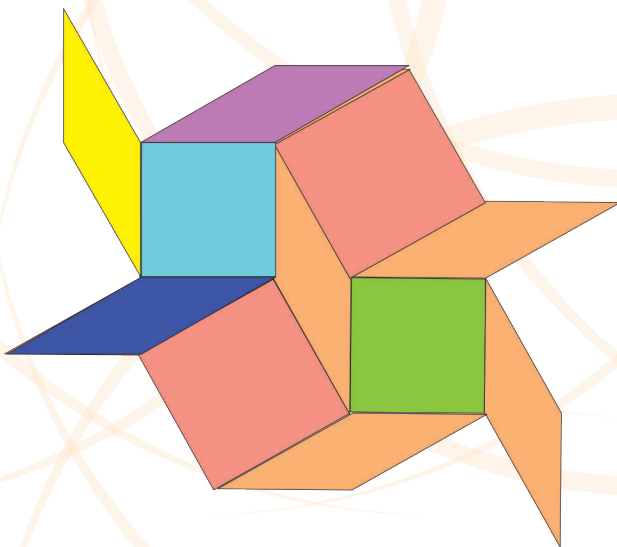
Look at the two reflections of the two shapes from the tessellation.

Experiment with the rotation of these shapes as well. Some transformations seem to have no 'effect' unless we add some features. ✓
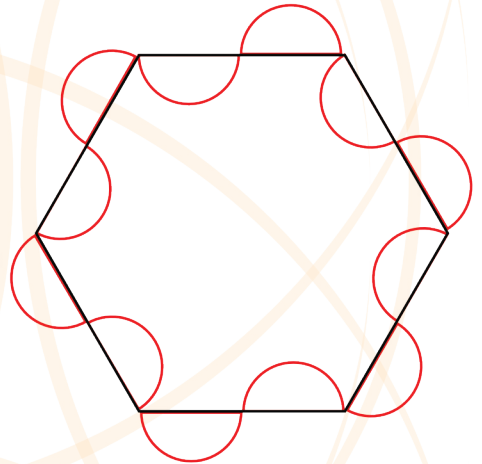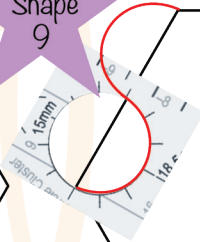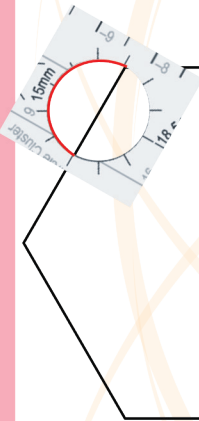
Tessellation puzzle

Create a Tessellation Puzzle with Regular Polygons and Circles
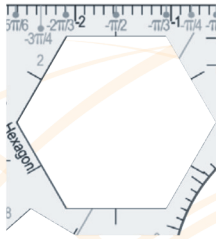
Use the template to measure the midpoint of the sides if formal measurement has not yet been done.
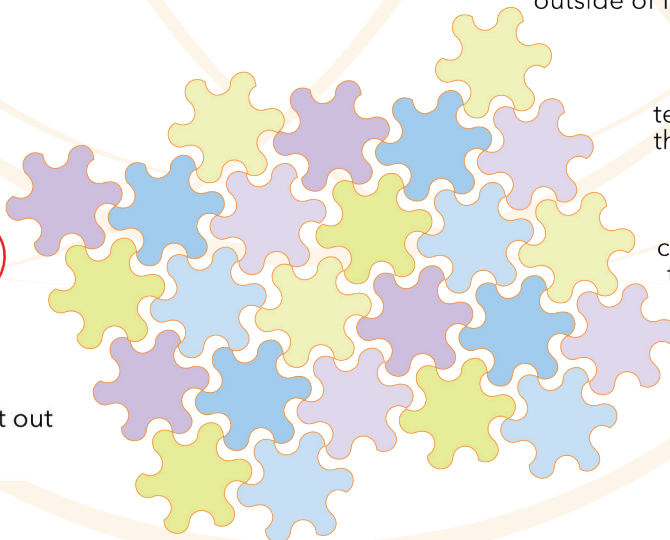
Enlarge the Hexagon by a factor of two.
Measure the side and mark a point halfway on each of the sides. Draw the hexagon lightly in pencil.

Shape 2

Shape 9

Use Circle no 9 as shown to create two semi-circles on each side of the **enlarged** Hexagon no 2. One semi-circle should be inside the Hexagon and the other on the outside of it.

Compare this tessellation to the one in the MATHOMAT Primary Unwrap.
Let the students see if they can find a correlation between the tessellations. Can they explain what it is and why it formed?

Erase the pencil marks and cut out the semi-circle pattern.

Golden Rectangle
18.54 x 30mm

Rhombus 30°

Rhombus 60°

Quadrilateral

Square 45 x 45mm

29

28

27

Prol
1 - 8