

DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES

Geometry – Shape and Space

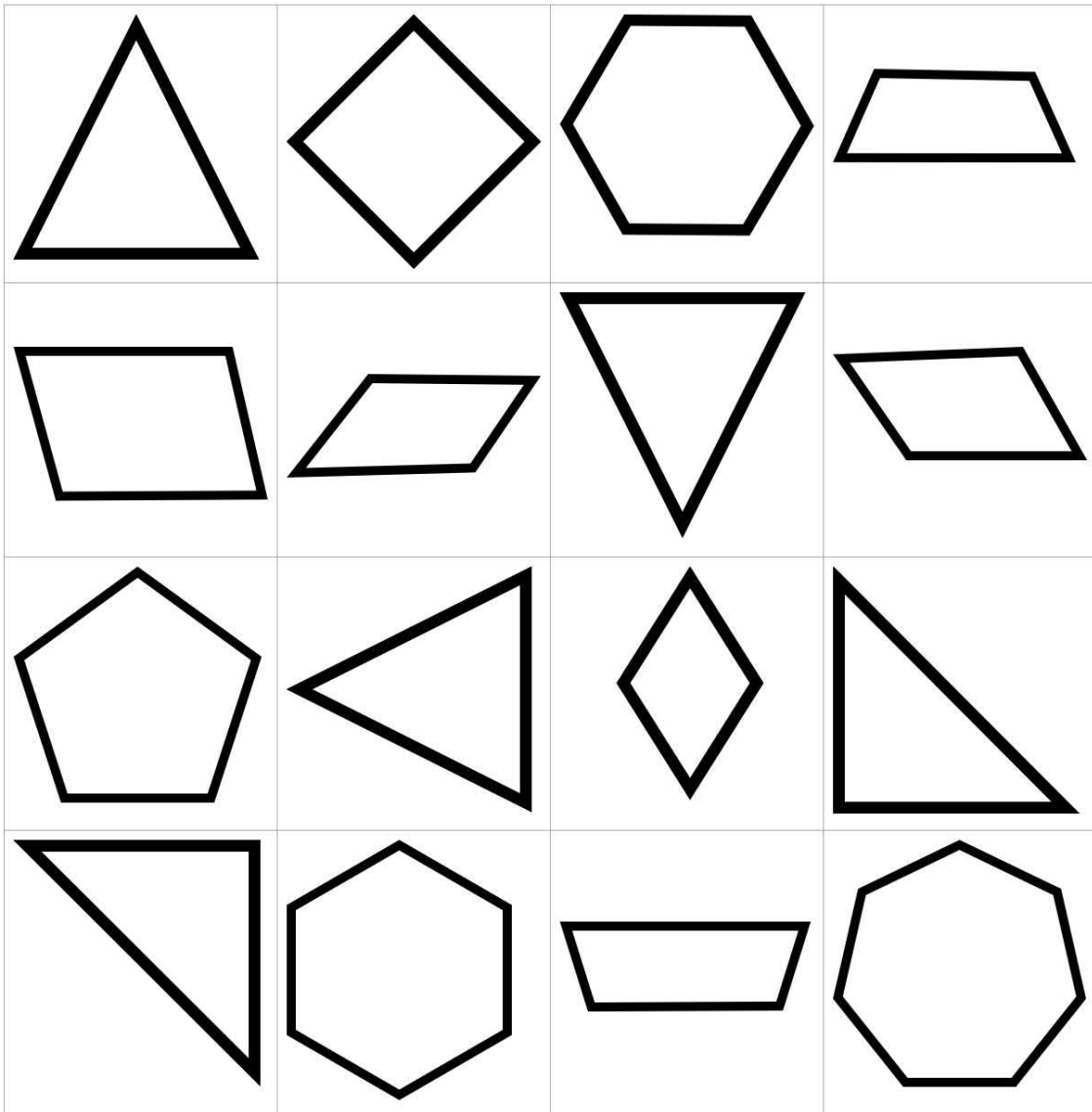
Level 3 (Year 5/6)

Copy Masters

Task 1

1. Can you sort these shapes into different groups? As you sort them, talk with your group about what you notice about them. What properties do they have that are the same? Different?
2. Randomly place a shape in the middle. Take turns to find other shapes which have properties the same as the first shape.

The rule is that you have to name the properties of each new shape as it is added, and the properties that match the first shape. Do this again, starting with a different shape.

Task 1 Resource

Task 1 (independent)

Use the shapes to do a ‘secret sort’.

Create a collection of about five shapes using a ‘secret’ rule (that only you know).

Now challenge others to find more shapes with the same properties to add to the set and guess what your ‘secret’ rule was.

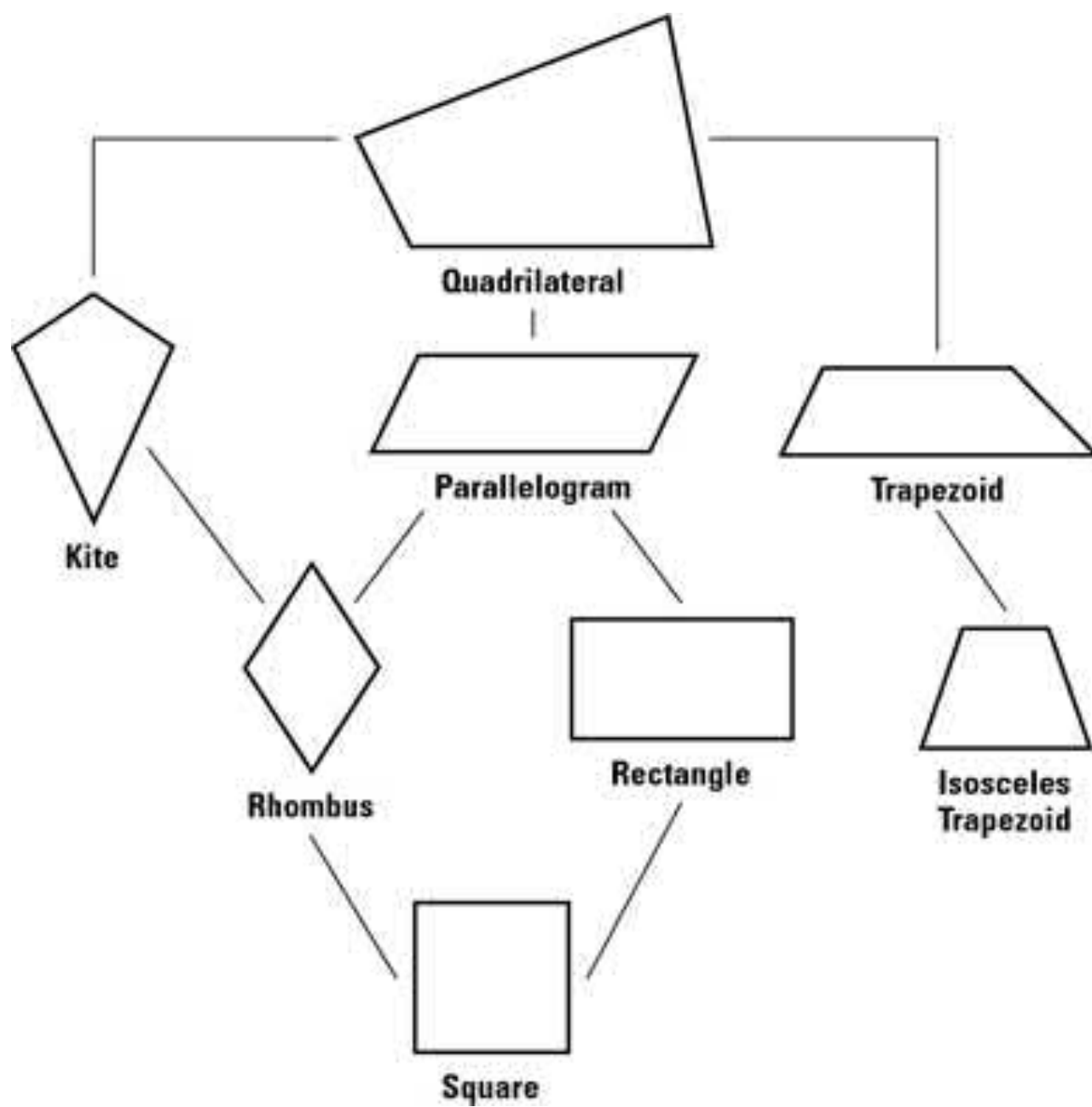
Task 2

Junior is playing a game with his sister. He says “I drew a shape with 4 sides. You draw what my shape might look like.”

Each person in your group draw the shape you think his sister drew, and compare it with other children in your group. What properties do you notice are the same in all the shapes you drew and what are different?

As a group draw other shapes with 4 sides which she might have also drawn.

Your challenge is to make sure that as a group you have drawn 7 different 4-sided shapes and can explain and justify the properties that are the same and the properties that are different.

Quadrilaterals Chart

Task 2 (independent)

1. Make 2 squares with your sticks. How many sticks did you need?
2. Make a rectangle with the sticks which is made up of 2 squares joined together.
3. Make 4 squares with your sticks. How many sticks did you need?
4. Make a 2 by 2 large square with the sticks which is made of 4 squares joined together to make one large square. How many sticks did you need this time? Why do you need less?
5. On your paper draw without looking at the picture a rectangle made of 2 squares.
6. On your paper draw without looking at the picture a 2 by 2 large square made up of the 4 smaller squares.

Task 3

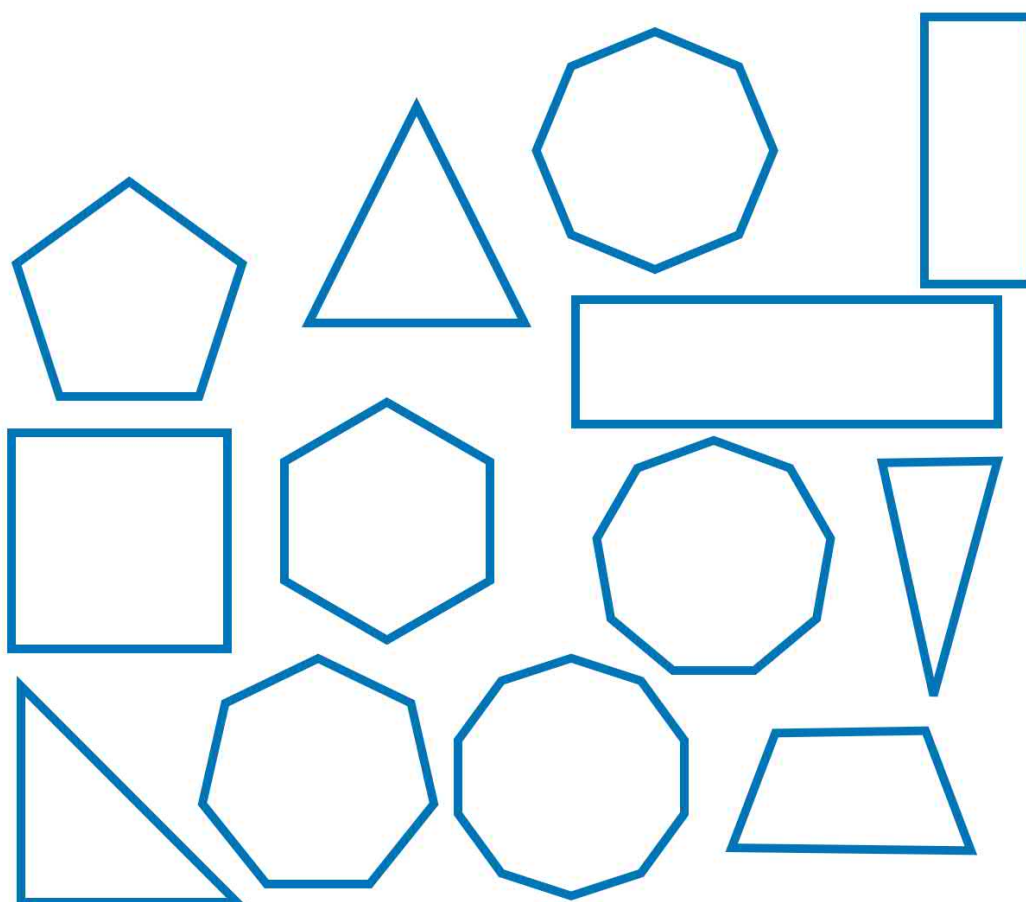
Ready to be a shape sorter? You will need to be because the word polygon is from Greek and poly means many!

Here you have a set of polygons all mixed up. With your group can you sort these polygons into different groups by their properties.

What do you notice about their properties? Can you come up with a list of attributes you have decided are shared by all the polygons each set?

As a shape sorter be ready to explain and justify your list of attributes shared by the polygons in each set.

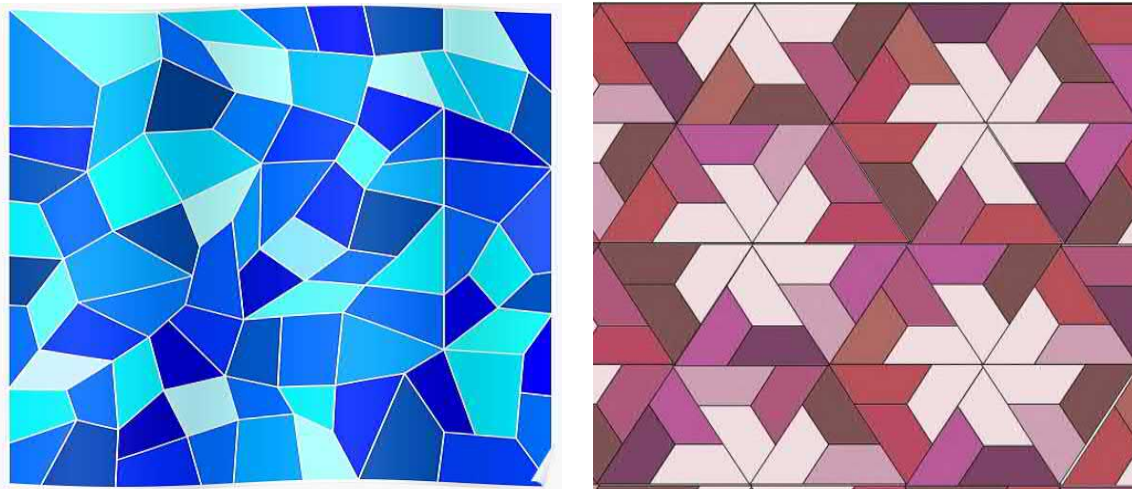
What about across the whole set of polygons?

Task 3 – Polygons

Level 3 Year 5/6: Geometry – Space and Shape

Task 3 (independent)

Look at the geometric patterns on some wrapping paper.



What do you notice about all the shapes on the wrapping paper that are the same? That are different?

Mason says that he can see lots of different shapes and they all have different names, but they are also all called quadrilaterals. Can you explain why Mason said that?

Can you find the different sorts of quadrilaterals in the design? How are they the same? How are they different from other quadrilaterals?

Level 3 Year 5/6: Geometry – Space and Shape

Task 4

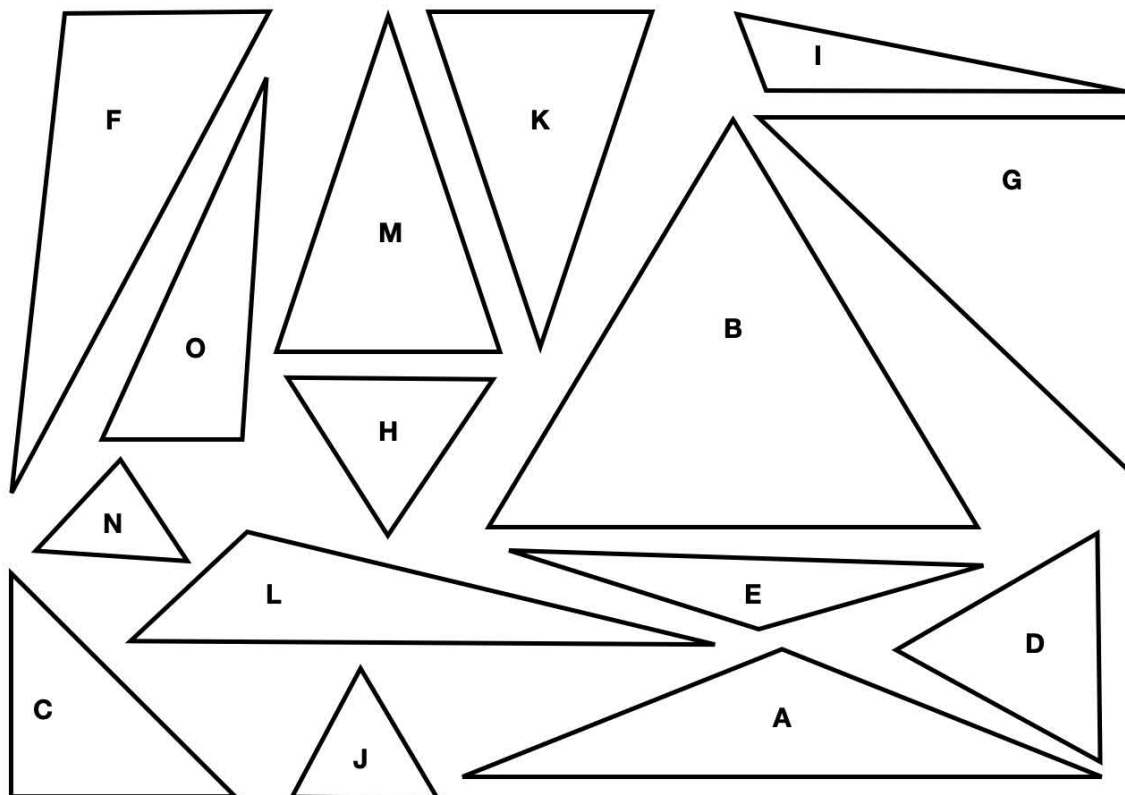
Today as a shape sorter you are going to sort a special sort of polygons.

Your challenge is to sort the whole set into three groups. But wait! There is an important rule you need to follow as you do this. No triangle is allowed to belong to two groups.

When you have sorted them into three groups record the properties of each group.

Now start again. Re-sort the set into another three groups which are different from your first set. Record the properties of this new group.

Task 4 Triangle Resource



Level 3 Year 5/6: Geometry – Space and Shape

Task 4 Connect



Task 4 (independent)

Regular polyhedrons are shapes that have all sides equal in length and all inside angles are equal.

Irregular polyhedrons are 2-D shapes that have straight sides that are not equal to each other and angles that are not equal to each other.

Fill in the missing details. Draw examples of what the following might look like.

*Level 3 Year 5/6: Geometry – Space and Shape***Task 4 (independent continued)**

Number of sides & angles	Name	Draw an example of regular polygon	Draw an example of irregular polygon
3	Triangle		
3	Triangle		
	Kite		
4	Quadrilateral		
5	Pentagon		
	Hexagon		
	Square		
7			
	Octagon		
	Nonagon		
10			

Level 3 Year 5/6: Geometry – Space and Shape

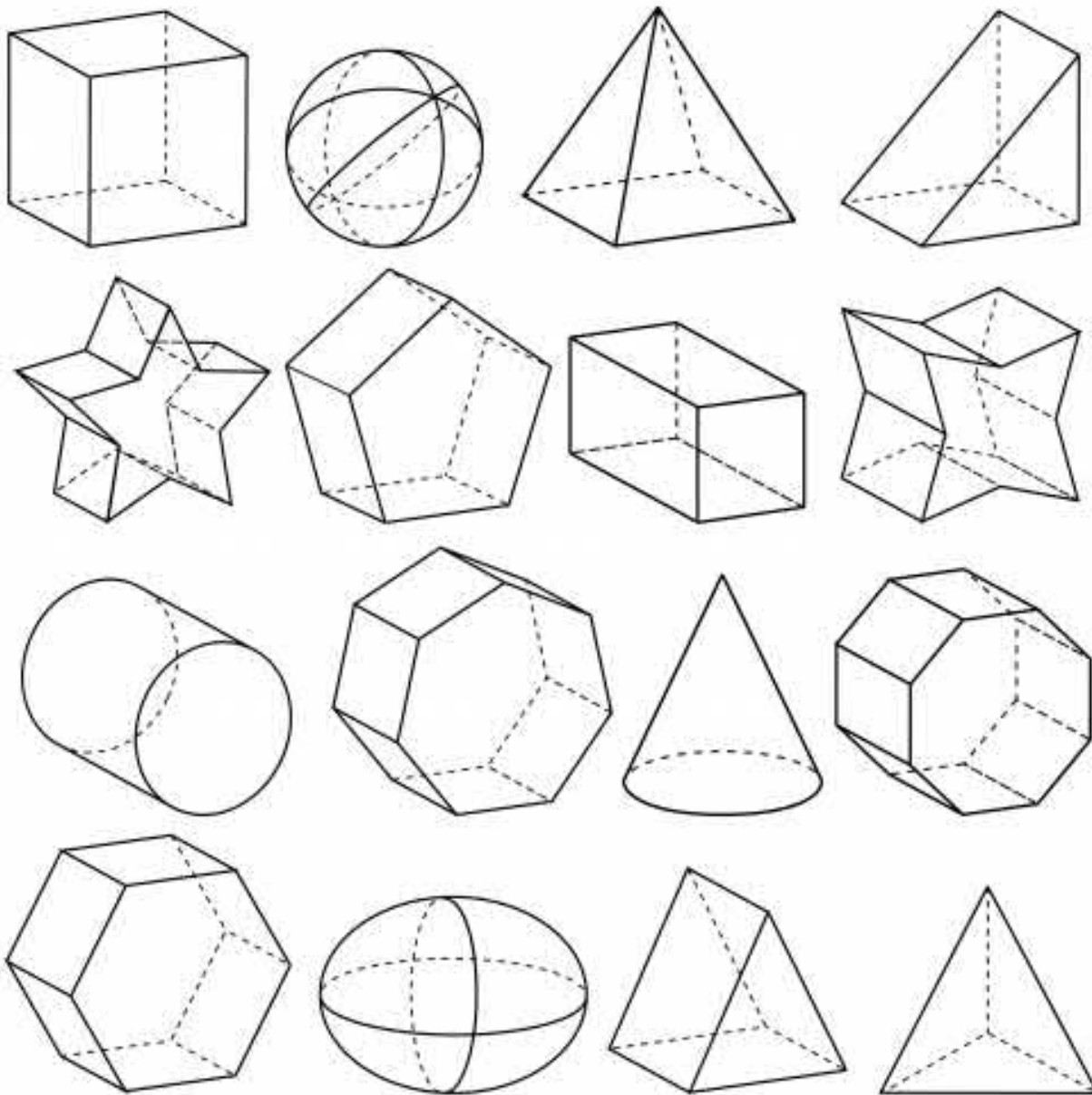
Task 5

Talk with your buddy about what you notice about the shape of these different things.

Can you sort them into groups which you think are the same?

Can you sort them into groups which you think are different?

Be ready to explain and justify why you sorted them into the different groups.

*Level 3 Year 5/6: Geometry – Space and Shape***Task 5 3D Shapes**

Task 5 (independent)

What do you notice about the three-sided shapes on the ngatu?

Are all the three-sided shapes on this piece of ngatu triangles?

Why or why not?

Explain and justify your reasoning for all the three-sided figures on this piece of ngatu.

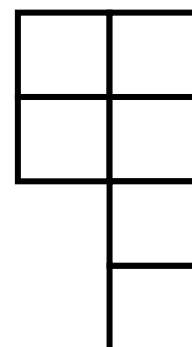
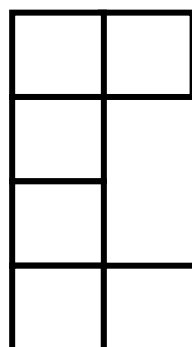
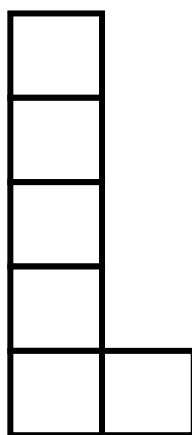
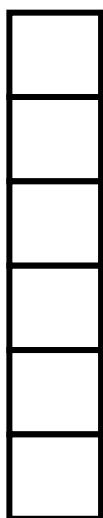
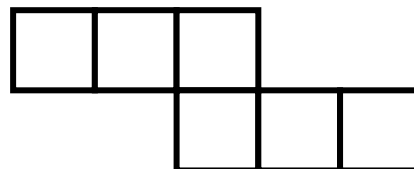
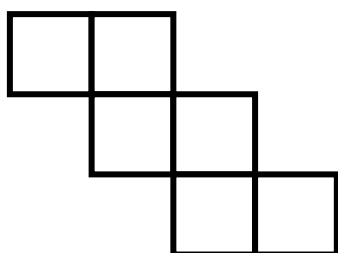
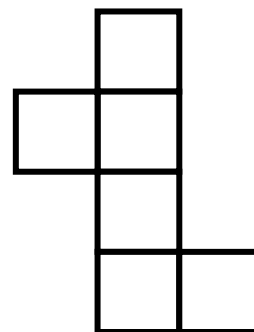
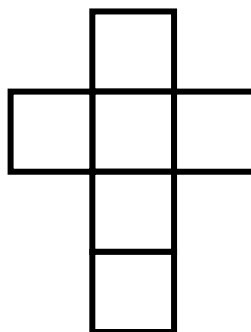
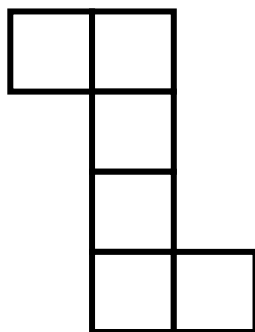
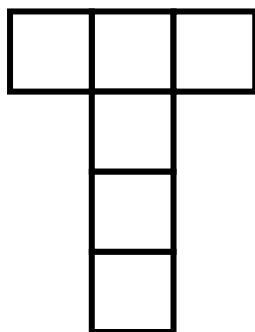
Represent a description that covers all the properties of triangles.

Task 6

When the box makers were designing these cuboids, they drew a 2D representation of their net. What 2D shapes did they draw?

Look carefully at one of the cuboids and imagine what it would look like flattened out as a net. Talk to your buddy about how many faces it will have and how many will be congruent.

Draw what you think it will look like as a net. Remember that when you fold the net up it needs to make a 3D cuboid and so you need to draw all the faces.

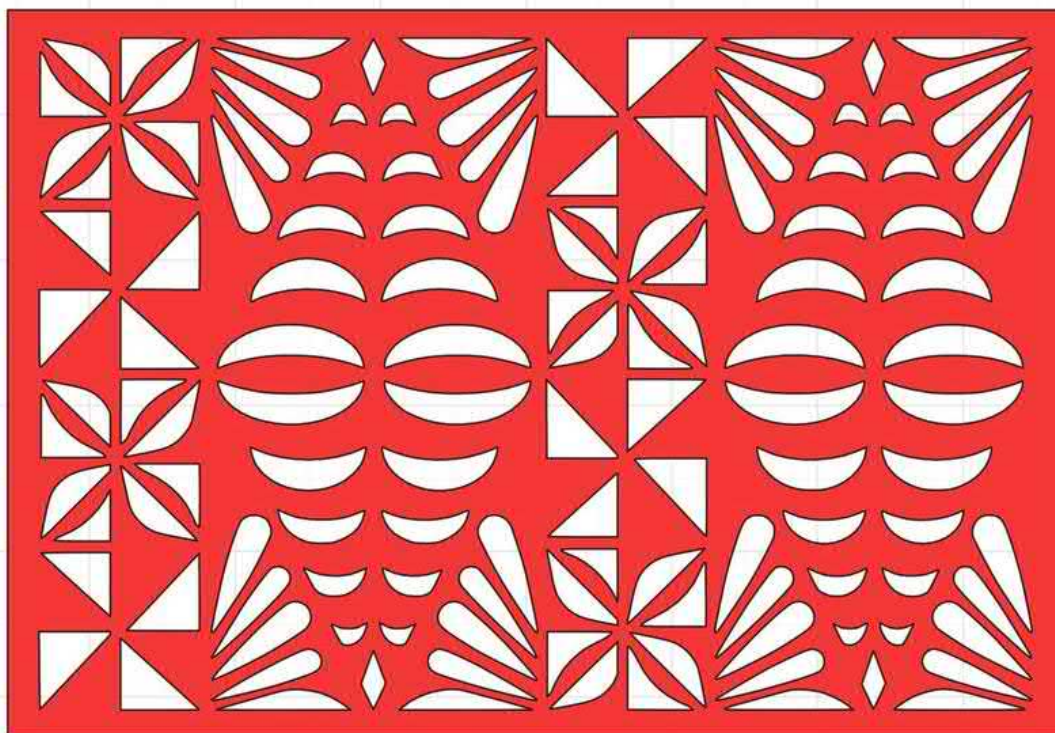
Task 6 Net Resource

Task 6 (independent)

What do you notice about the pattern on this Polynesian material?

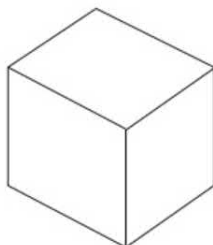
Are all the three-sided shapes triangle? Why or why not?

What are the attributes or properties of a triangle? What attributes are the same? What attributes are different? Have some triangles only got one attribute the same? Have some triangles only more than one attribute the same?

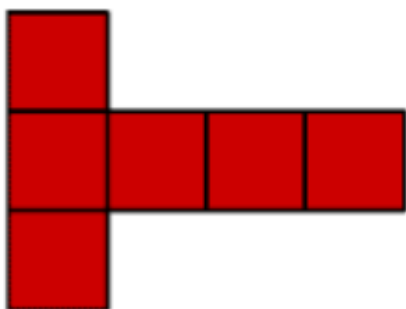


*Level 3 Year 5/6: Geometry – Space and Shape***Task 7**

Your class has an opportunity to sell lucky dip prizes at the local Night Market for a fundraiser. The prizes will be put in a box that looks like this and children will lift the flap and choose a parcel:



In your group discuss and justify whether the net drawing below would make the box.



Can you draw at least 3 different nets which will also make the box.
Be ready to prove that they all work.

Task 7 (independent)

Look closely at the box you have chosen. Draw what you think it will look like as a net. Do not draw the flaps just the faces. Remember that when you fold the net up it needs to make a 3D cuboid and so you need to draw all the faces.

When you have finished drawing the net undo your box and compare its net with the net you drew. Keep redrawing the net until you have got it correct.

Level 3 Year 5/6: Geometry – Space and Shape

Task 8

Whittaker's chocolate company have a competition currently running for schools around New Zealand. Schools are competing to see who can design the best packaging for a new series of chocolate that they have created.

Work in your group to design at least two different nets for each chocolate bar below.

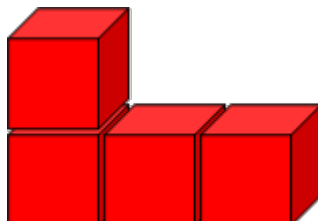


Make sure that you can all explain and justify why the nets you designed would be suitable for each different chocolate bar.

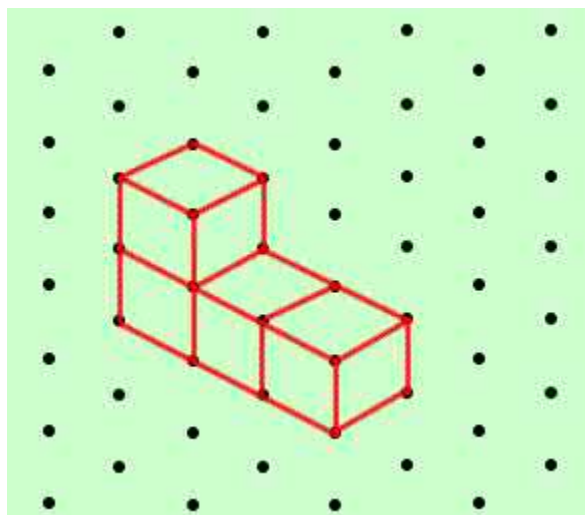
Task 8 Connect Resource

Task 8 (independent)

Here are four cubes joined together.



Here is what they look like drawn on dotty paper



How many other ways can you arrange the cubes? When you complete the arrangement draw what they look like on dotty paper.

Task 9

Ready to be a constructor?

Your challenge is to build a shape with nine cubes. It has to be at least two cubes wide and at least two cubes tall. It also has to be symmetrical.

Can you build another one with the same requirements which is a different shape?

Are there anymore you could build with the same requirements?

If you have run out of ideas, you can develop another challenge for other constructors. You can change the number of cubes and the other requirements, but the shape must still be symmetrical.

Explore and build first and then write the instructions.

Level 3 Year 5/6: Geometry – Space and Shape

Task 9 Connect Resource



Image 1: <https://www.tepapa.govt.nz/about/our-building> (accessed 19 August 2022)

Image 2: <https://haydnrollett.co.nz/projects/samoan-consulate> (accessed 19 August 2022)

Image 3: <http://www.TeAra.govt.nz/en/photograph/39547/te-manukanuka-o-hoturoa-marae-auckland-airport> (accessed 19 August 2022)

Level 3 Year 5/6: Geometry – Space and Shape

Task 9 (independent)

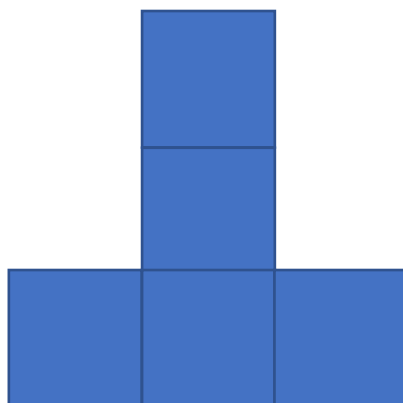
Look at this siapo. Make a table and describe all the attributes of the different geometric shapes you see.



Task 10

Constructors ready for another challenge?

Here is a shape made with linking cubes. When you look at it from one side, it looks like this.



What do you think the whole structure looks like?

Before you explore and experiment with your cubes can you visualise what you think it looks like. Make a drawing of what you think it might look like and then build it with the cubes.

Task 10 Connect Resource

Draw two pictures of this box that look different.



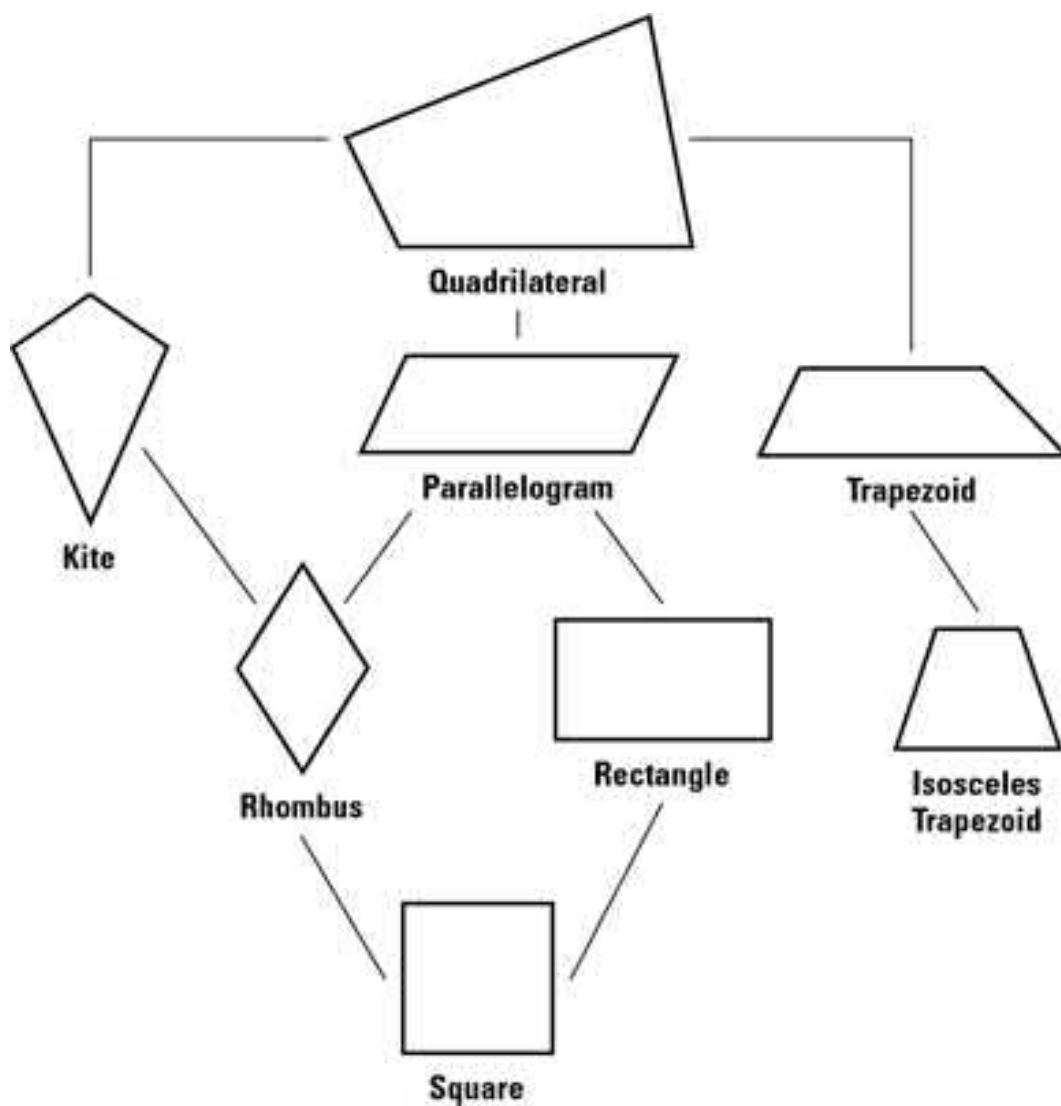
Be ready to describe each view using the language of geometry.

Task 10 (independent)

What do you notice about the shapes below?

Write down everything you notice about their sides and angles.

List all of the places you could find these shapes. Describe how they are used.



Task 11 (Optional)

Young children love unwrapping presents, don't they?

But with global warming we need to save paper. So, your challenge is to draw the net of the wrapping paper you need to wrap the box. But you are not allowed to have one piece of paper overlapping any other piece of paper.

First build the box you want to wrap. Use 27 multilink cubes to make a 3 by 3 by 3 cube and use this as your box to wrap. How many different designs could you use?

Ready for the next level of challenge? Use more multilink cubes to extend one end of the cube so that you now have a cuboid. How many different designs could you use?

Too easy? Okay, what about extending the cube in two different directions? How many different designs could you use?

As a group be ready to explain using the language of geometry what changed in your nets as you changed the shape of the boxes.

Level 3 Year 5/6: Geometry – Space and Shape

Task 11 (Optional Independent Task)

Draw two pictures of this box that look different.



Label everything you can.

Describe each view using the language of geometry.

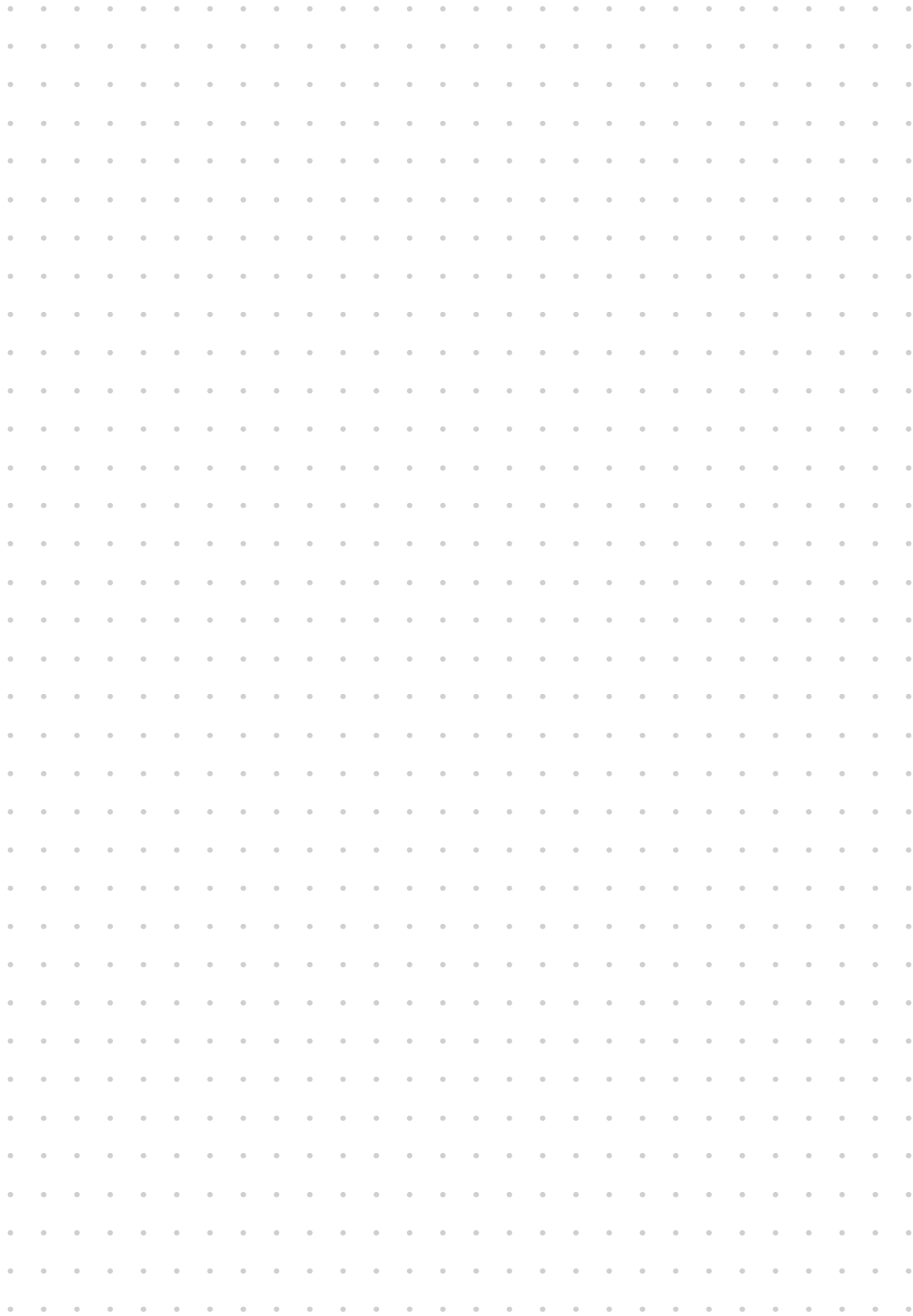
Task 12 (Optional)

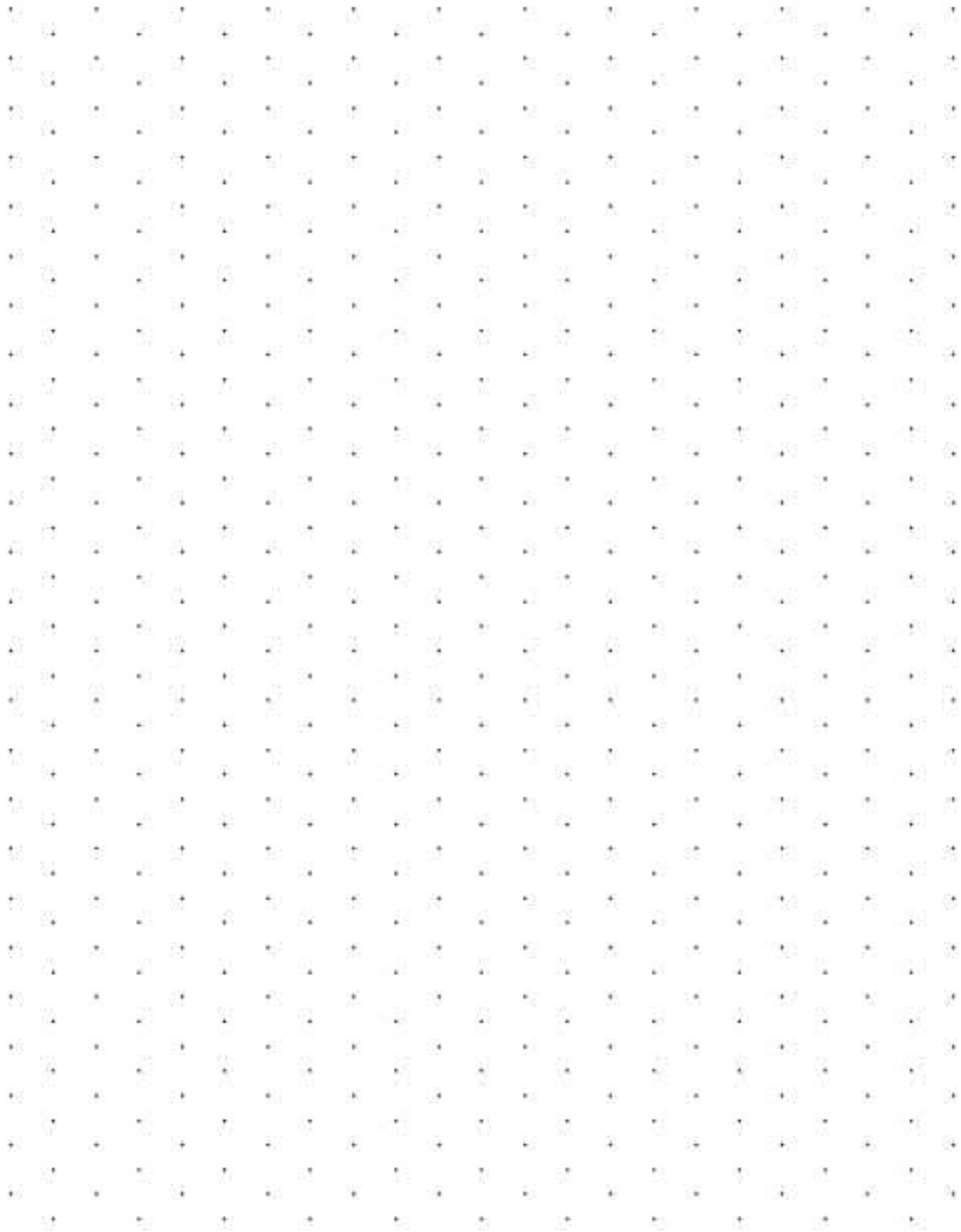
You have all shown yourselves as fantastic geometry puzzle solvers. So, first you have some puzzles to solve and then it is your turn to write puzzles for others.

1. None of the pattern blocks in the row touch each other, and none of the shapes are congruent to any other in the row. Make the row of pattern blocks.
2. The pieces at the end of the row are not quadrilaterals, but there are two rhombuses (rhombi) in the middle of the row. Make the row of pattern blocks.
3. The piece on the left has the largest number of acute angles of any piece. The piece on the right has more obtuse angles than any other. Make the row of six pattern blocks.
4. The two pieces on the left end of the row are both regular—they have equal angles in every corner. Make the row of six pattern blocks.
5. The trapezoid is next to the piece that has the smallest angles. Make the row of pattern blocks.

Your turn now to make different pattern rows and then write them as a puzzle for others to solve.

Dotty Paper



Isometric Dotty Paper

Squared Paper