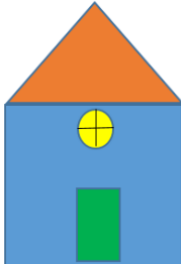


## BEAUTY IN SHAPES AND MEASUREMENTS


### Ages 4 to 7 (Level 1)

<b>Description:</b>	Learners use a Math lens to look into their house and their body, and use what they have learned to create geometric patterns.
<b>Leading question:</b>	Can we find any beauty in shapes and measurements?
<b>Age group:</b>	4 to 7 years old
<b>Subjects:</b>	Mathematics: Shapes, measurements and patterns Art: Math based art using shapes and patterns
<b>Total time required:</b>	~90 minutes a day for 3 days (total of ~5 hours)
<b>Self-guided / Supervised activity:</b>	Supervised by parents / guardians
<b>Resources required:</b>	Paper and pencil, (optional: removable stickers like sticky notes).

Day	Time	Activity and Description
1	10-15 mins	Introduction about the main 2-dimensional shapes: triangle, square, rectangle, and circle. <ul style="list-style-type: none"> <li>• Triangle is made of 3 sides, and it has 3 angles or corners.</li> <li>• A circle is a perfect shape of a set of points that are all exactly the same distance from one point which we call the center.</li> <li>• A square has 4 equal sides and 4 right (90 degree) angles.</li> <li>• A rectangle has 4 right angles, but its sides are not all equal.</li> </ul>
	10 mins	Find at least 3 objects at home that are squares. Draw one of them.
	10 mins	Find at least 3 rectangles at home. Draw these rectangles on your notebook.
	10 mins	Go and find 10 circles around the house. Can you draw a perfect circle without tracing?
	15 mins	Go and find 10 triangles hidden around the house. Put a sticker on every triangle you find, and draw it in your notebook.
	30 mins	The parent and learner go around the house to see all the triangles that the learner found out, and identify ones he/she may have missed and put stickers on.  From the triangles, identify which ones are: <ul style="list-style-type: none"> <li>• Equilateral (have 3 equal sides, and angles)</li> </ul>

		<ul style="list-style-type: none"> <li>• Isosceles (having 2 equal sides and one other side that is longer or shorter)</li> <li>• Right (having a 90 degree angle which looks like a <b>L</b> letter)</li> </ul> <p><b>*Optional-</b> Obtuse (having one 'wide' angle)  <b>*Note:</b> if some types of triangles were not found at home, the parent is to draw them and explain the difference with the ones that they found.</p>
	15 mins	<p>Draw at least 3 objects that have a combination of 2 or more shapes from the list of shapes in this lesson, i.e: square, rectangle, triangle and circle. For practice, you may draw a house like this that contains all the four shapes:</p>  <p>TIP: if learners find this difficult , you may recommend some objects like: a car, a phone, radio, ...etc.</p>

Day 2	10-15 mins	<p>Units of length and body parts          Introduce the fact that long time ago, people used their body parts for measurements. See the <a href="#">Day 2 worksheet</a>.          (Alternatively, if internet were available, here is a good presentation on this: <a href="https://prezi.com/r-6odwf4fy5k/usage-of-body-parts-to-measure-objects/">https://prezi.com/r-6odwf4fy5k/usage-of-body-parts-to-measure-objects/</a>)</p>								
	15 mins	<p>How tall are you in your own span? The span is the measure using your own hand from the tip of the thumb to the tip of your little (pinky) finger. Stand against a wall and place a sticky note on the wall at the top of your head. Measure how many spans is that?</p> <table border="1" data-bbox="462 1480 1421 1711"> <tr> <td>How tall am I, measured with my own span?</td> <td></td> </tr> <tr> <td>How tall is dad, measured with his own span?</td> <td></td> </tr> <tr> <td>How tall is mom, measured with her own span?</td> <td></td> </tr> <tr> <td>How tall is my sister or brother, measured with her/his own span?</td> <td></td> </tr> </table> <p>Try it with other family members, and ask them to measure their height with their own span length. Can you make a conclusion on this? 😲</p>	How tall am I, measured with my own span?		How tall is dad, measured with his own span?		How tall is mom, measured with her own span?		How tall is my sister or brother, measured with her/his own span?	
How tall am I, measured with my own span?										
How tall is dad, measured with his own span?										
How tall is mom, measured with her own span?										
How tall is my sister or brother, measured with her/his own span?										

		*Hint: do all family members have a similar count of spans when measuring their height? Do you want to see if this also applies to friends and their families?
	20 mins	Which is longer: your height, or your Fathom (the distance between your hands when your arms are stretched sideways)? Sleep on the ground, and let your brother/sister place a mark/sticky note where the bottom of your feet touches the floor, and one at the tip of your head. Open your arms and lay facing down horizontally between the 2 marks. Which distance is longer? Try the same with other family members, what do you think?
	10 mins	How many spans is a cubit? (A cubit is the length from your elbow to the tip of your longest finger) Try the same with other family members, what do you think?
	10-15 mins	Parents challenge the learners to form the following shapes using their bodies:  In how many ways you can form a square using your body? (hint: using your chest and arms, or a small square using your fingers, ....)  In how many ways you can form a rectangle using your body ?  In how many ways you can form a circle using your body? (using your arms, or using your fingers)
	15 mins	Triangles: Using your body parts against a wall or the ground, form the following triangles: <ul style="list-style-type: none"> <li>- Right (one leg vertical, and the other stretched sideways)</li> <li>- Isosceles (stand straight, and slightly open your legs)</li> <li>- Equilateral (use your cubits, and the side of a table)</li> <li>- (*Optional) Obtuse ( having an angle that is larger than 90 degrees)</li> </ul> 

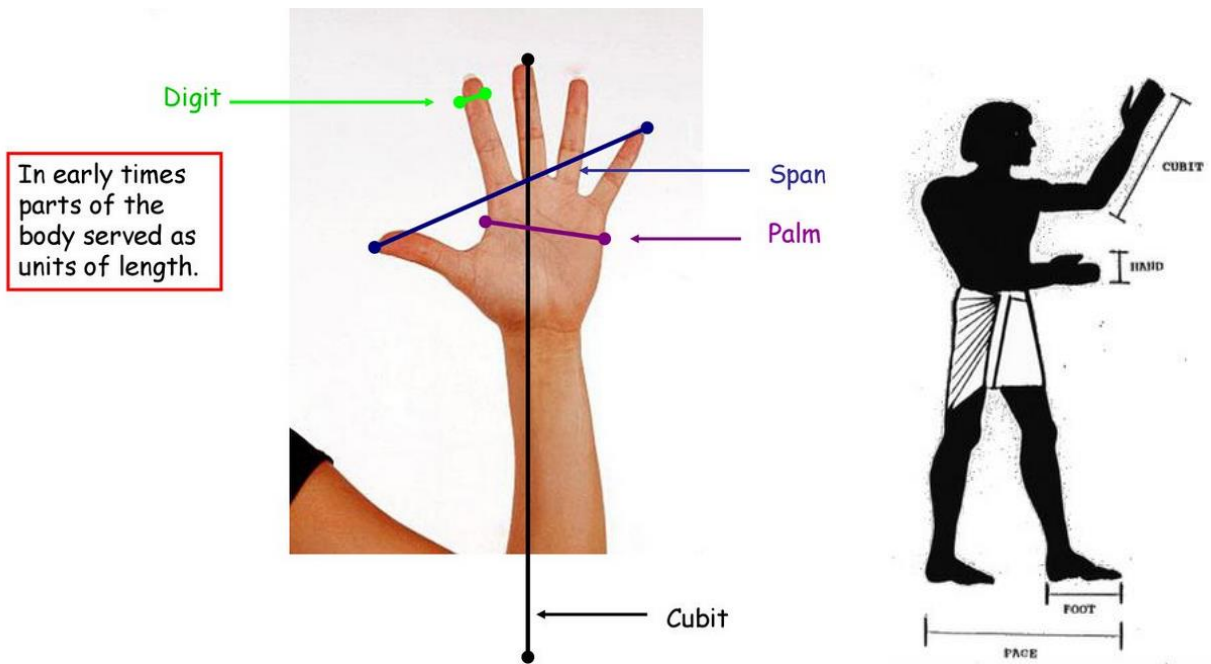
	15 mins	<p>What is the height of the room in Fathoms? You can estimate that in the toilet or kitchen where you have tiles on the wall. Measure your height in tiles, then count how many tiles are there from floor to ceiling. Hence, conclude, how many of your heights can fit on top of each other from floor to ceiling? (as you recall, your fathom is almost equal to your height)</p>
	15 mins	<p>Reflection: Use your foot to measure the room length. Repeat by asking your father to measure the same room length using his foot. How different are the 2 measurements? Why do you think people came up with standard units of measurement?</p>
	5 mins	<p>Conclusion: the parent must reinforce that the need for standard units is important because people of different heights would have different measurements of the same object!</p>
Day 3	10 mins	<p><b>Math based Art</b> Introduction: Let me show you a drawing (<a href="#">day 3 worksheet</a>): a cartoon adaptation of the Vitruvian Man, by Leonardo Da Vinci. It actually shows a man inside a square and a circle. What do we learn from this drawing? (Discussion, to confirm one of their earlier observations that one's own fathom is equal to the person's height).</p>
	60 mins	<p>Look at the <a href="#">day 3 worksheet</a> and work on challenges number 1 to 5. *Optional: can you recreate the pattern in number 6?</p>
	15 mins	<p>Reflection: How did Math help you in creating geometric patterns? Do you think patterns are beautiful? Why? Where have you noticed patterns before? Probe: buildings? Would you try to create patterns? What for, and where would you place them?</p>
	Bonus challenge	<p>Learners are challenged to create a new pattern, other than the ones on the worksheet, on a whole sheet of paper (A4) that they can work on during their free time.</p>

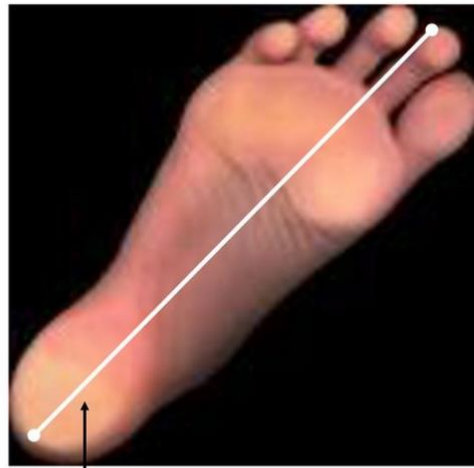
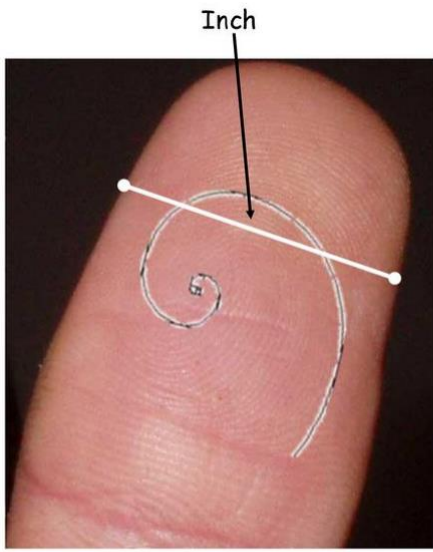
**Assessments:**

- Observation checklists while learners are working on activities
- Learners answers about their conclusions and reflections
- Learners creativity in the day 3 activities and closing challenge

Learning outcomes:	<ul style="list-style-type: none"> <li>- Learning about the characteristics of 2-d shapes</li> <li>- Some proportions of the human body</li> <li>- Using the body for spatial measurements and estimations</li> </ul>
Required previous learning:	<ul style="list-style-type: none"> <li>- Counting, basic names of shapes</li> </ul>
Inspiration:	This presentation: <a href="https://prezi.com/r-6odwf4fy5k/usage-of-body-parts-to-measure-objects/">https://prezi.com/r-6odwf4fy5k/usage-of-body-parts-to-measure-objects/</a>
Additional enrichment activities:	Learners are challenged to create a new pattern, other than the ones on the worksheet, on a whole sheet of paper (A4) that they can work on during their free time. (Parents may choose to hang this in the house for decoration!)

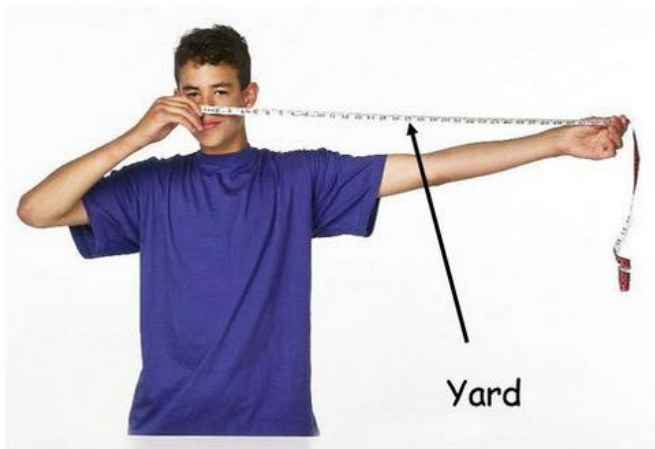
## Day 2 Worksheet- Body dimensions



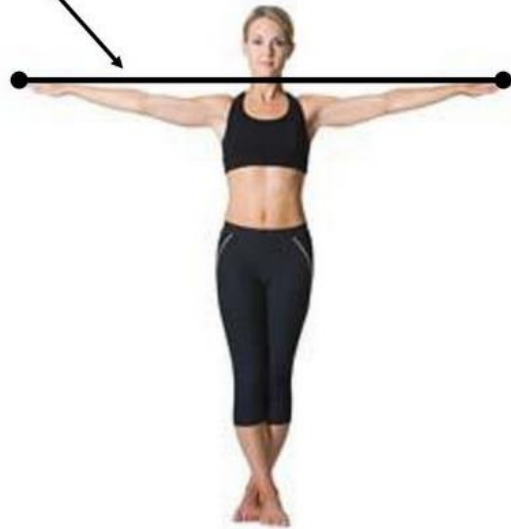


Foot

Fathom



Yard



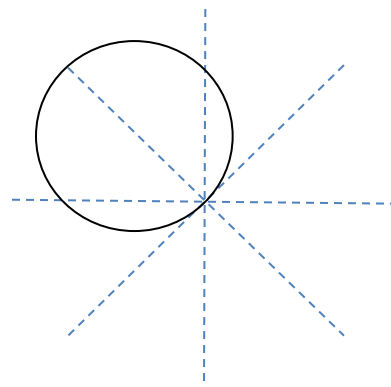
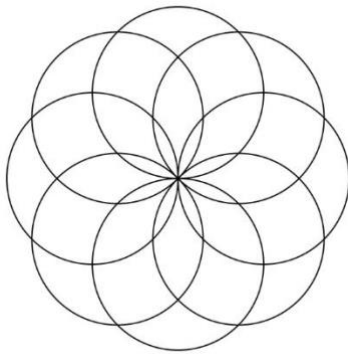
Source: <https://slideplayer.com/slide/14948703/>

### Day 3 worksheet

Cartoon hero based on the Vitruvian man drawing by Leonardo Da Vinci. What does the square tell you? (Hint: fathom versus height?)

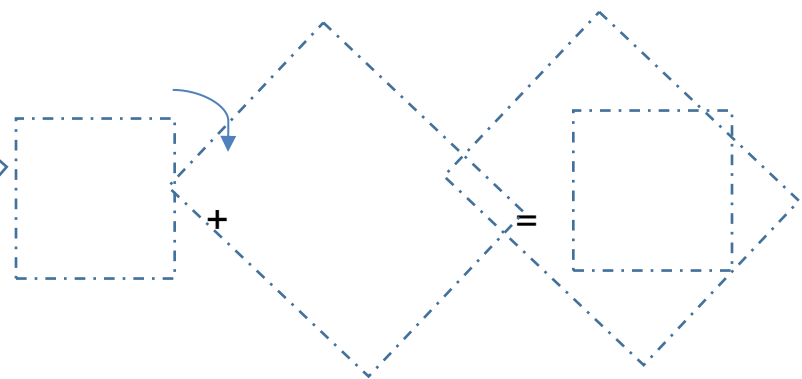
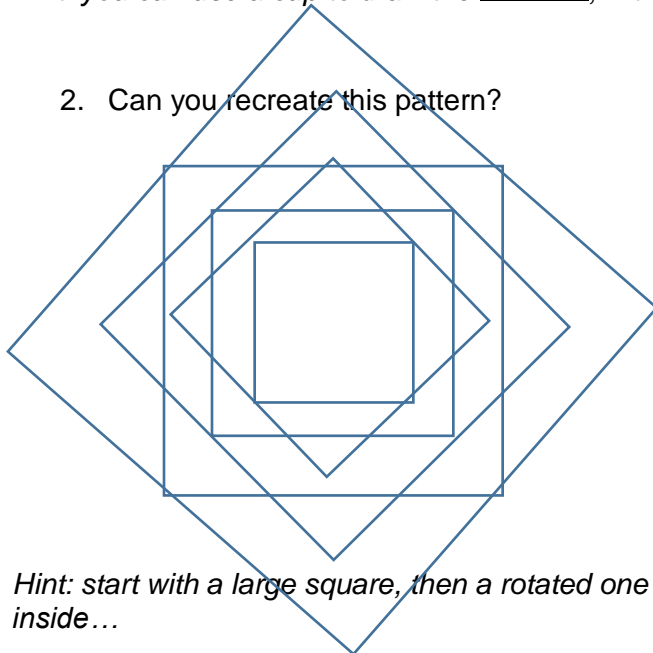


1. Can you draw the following Mandala?



*Hint: you can use a cup to draw the 8 circles, with the help of 4 intersecting segments.*

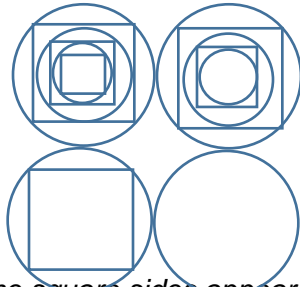
2. Can you recreate this pattern?



*Hint: start with a large square, then a rotated one on top of it, and then repeat with smaller ones inside...*

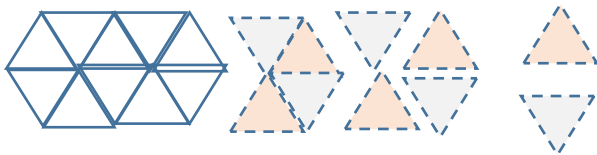


3. Can you create a pattern using two different shapes with repetition to create a larger image? See the below incomplete shape made of circles and squares.

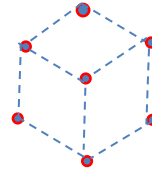
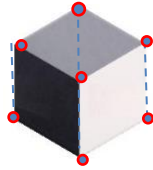


(Do the square sides appear bent or not?)

4. Here is another example of a pattern using one equilateral triangle repeatedly. Recreate this pattern on a small sheet of paper (A5 size).



5. 3D illusions: Do you know how to draw a cubic box?  
To draw the below cube, you first need to draw the shape, and then to add colors (3 different levels of intensity) to make the effect of light and shadows.



6. (\*Optional) Can you draw a pattern by putting those shapes next to one another? Then another layer below? *Then fill a whole page of your notebook with this pattern?*

