Math Mobile – Balancing Equations

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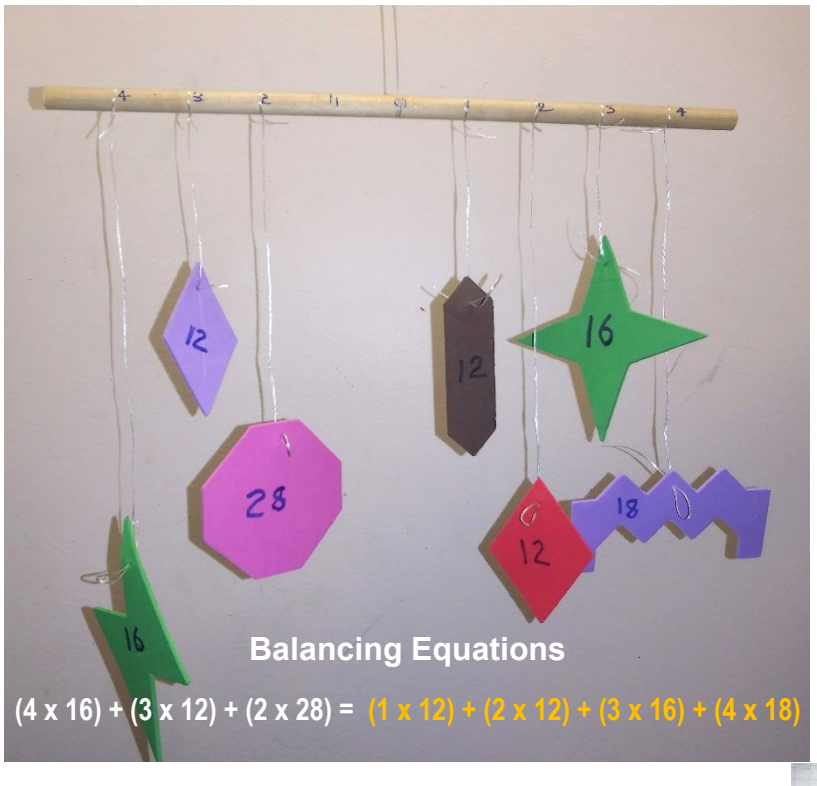
Specialized tools and materials used:	**Experience level required:**
Vinyl cutter, cardstock 2D modeling software such as Vectr	beginner

Grade Level (of this example): 7th grade (and up)

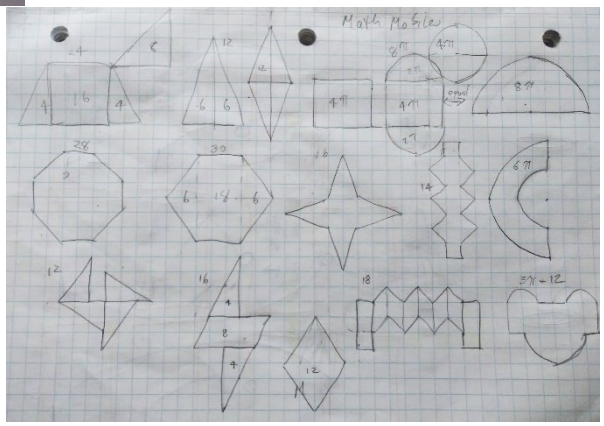
Subject (for this example): Math – geometry, number sense, intro to algebra

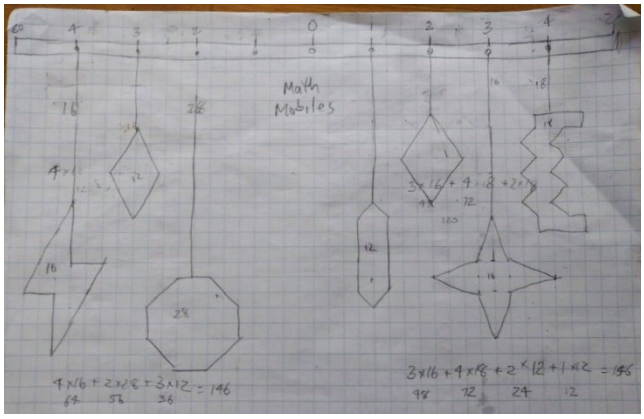


Students create mobiles to practice math skills associated with geometry (polygons, calculating area), number sense (operations), and even an intro to algebra (solving for an unknown, variable names).

They create a "balanced equation" by hanging shapes of specific weights at specific distances from the mobile mounting point. This activity is designed for students to get comfortable with geometry; it also uses the physics principles of torque and levers, but without focusing on them. The project can be done individually or in small groups of 2 or 3.

To start this activity students can use grid paper to come up with shapes and calculate the total area of a shape in units of "boxes". To calculate area, the shapes with straight lines are broken up into squares and triangles, and the shapes with circular features are left as multiple of pi. Shapes can be combined to create identifiable icons, like lightning bolts, flower pots, baseball caps, etc. For a challenge, shapes may have to reach a target size.

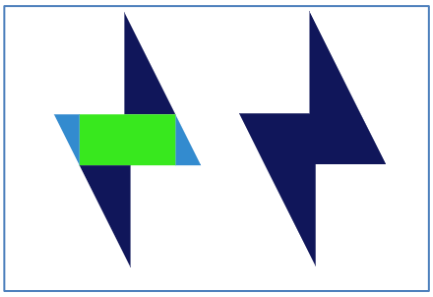




Students choose shapes, make balanced equations, and draw how it will look on a simple mobile.

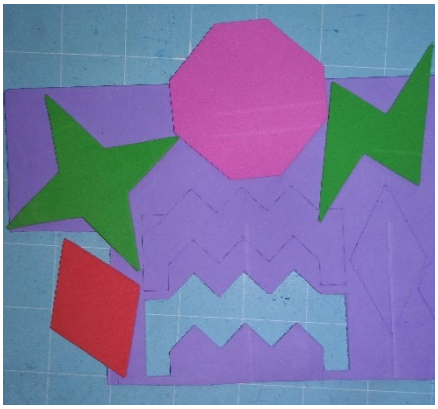
Make sure to have some small pieces that can be used to make the equation balance.

To create the physical pieces for the mobile, shapes can be redrawn on cardstock (photocopy a grid on cardstock) and cut out by hand, or modelled on 2D software and cut out on a vinyl/craft cutter or laser cutter. The browser-based modelling program Vectr.com is easy and well suited to making these shapes with intuitive logic and alignment tools.



A vinyl cutter can cut the shapes out of foam sheets, card stock, even sheets of balsa wood.

With a laser cutter you can cut shapes out of plywood or acrylic.



We use a wood dowel for the top bar, marked it in the center and every inch out, then made notches in the wood where the shapes would hang. Suspend the shapes with unwaxed dental floss or light string – with foam shapes you can make a hole with a pushpin and push the floss through, then pick a length so they don't interfere with each other.

Mobiles can hang in a public space such as the library or a lobby.

Suggested resources

https://www.mathsisfun.com/area.html

Challenge project:

Balance the pizza dough with all the toppings! All the shapes were simple, but a spreadsheet was used to get the final balanced equation.