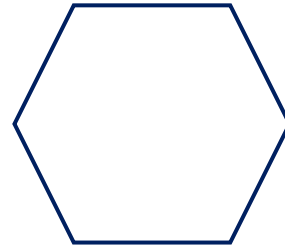
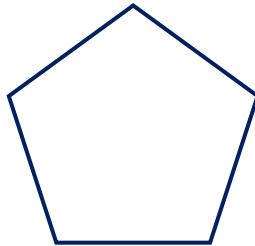


## Lesson Worksheet

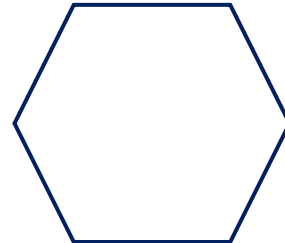
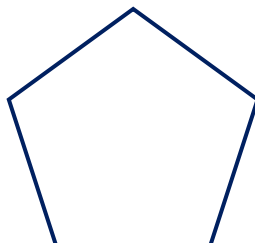
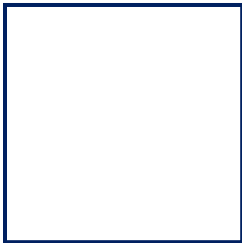
Let's think like civil engineers and apply our knowledge of geometric shapes to the design of trusses.

### Two-Dimensional Modeling

1. What polygons are shown below?



2. Now imagine these polygons are standing upright with weight on them, as shown by the **force arrows** below.



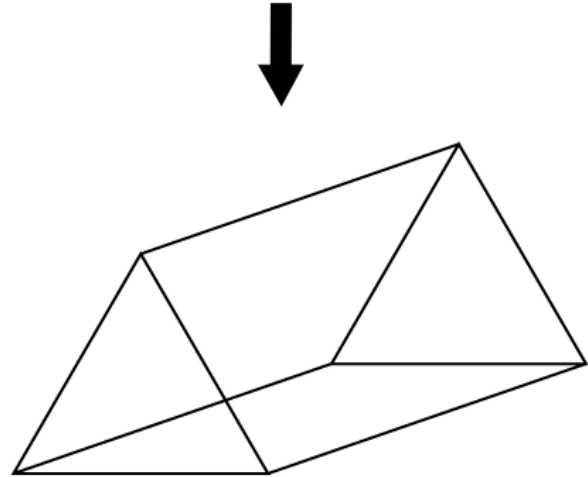
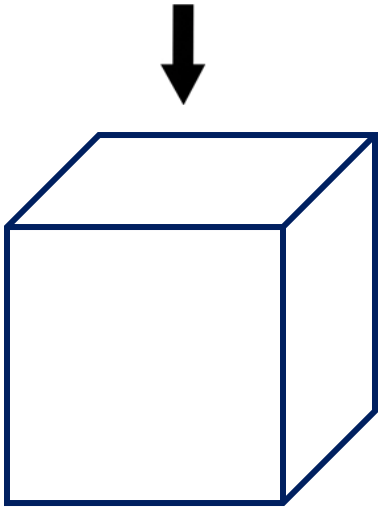
3. Under this load, where would the shapes collapse?  
Place **stars** where the polygons are likely to undergo failure (collapse).  
Draw **dashed lines** to represent the deformed members. Explain your reasoning.

4. If you were going to add support members to these shapes to keep them from collapsing, where would you put those? Draw them as **dotted lines** on the shapes above.

### Three-Dimensional Modeling

Now let's test how two prisms would change under a compressive load in a three-dimensional space instead of a two-dimensional space. You are given a cube and a triangular prism, below, to test.

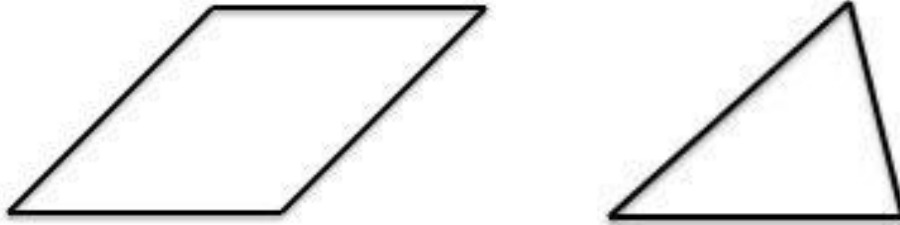
1. How would these square and triangular prisms deform under loads?  
Draw **dashed lines** to represent the deformed shapes.



2. If you were to add structural members to strengthen the shapes, where would you add them?  
Draw them as **dotted lines** on your shapes above.
  
3. Use a ruler to draw a square and an equilateral triangle. Measure all the angles in both shapes.  
Find the sum of the interior angles in the square and triangle. Write your answers below the shapes.

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4. Consider the front shapes of the deformed square and triangle (below). Measure all their interior angles.



5. How did each of the angles change in the deformed square and triangle?  
What is the sum of the interior angles in the deformed square and triangle?
6. Now draw the square in a way that will keep it from collapsing. You may add up to six members.
7. Draw another polygon and add members in such a way that will keep it from collapsing.
8. Why would engineers choose to design trusses from triangles rather than squares?