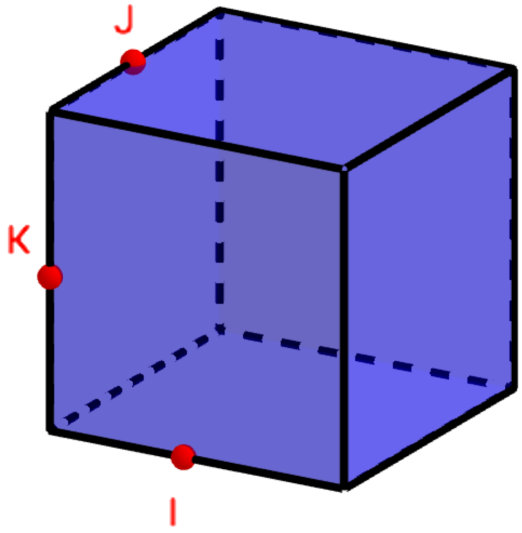
Cube Cross Sections

Performance Task:
In the image below, there are three points (J, K, and I) located on different edges of a cube.



Since the 3 points are not collinear, there is a single plane which passes through all three points I, K, and J. This plane would create a cross section through the cube.

1. What is the shape of the cross section formed by slicing the cube above with the single plane through all three points J, K, and I?

2. If you were able to move points I, K, and J anywhere along the edges of the cube, being sure the 3 points are not collinear, what are the different cross section shapes which can be formed?

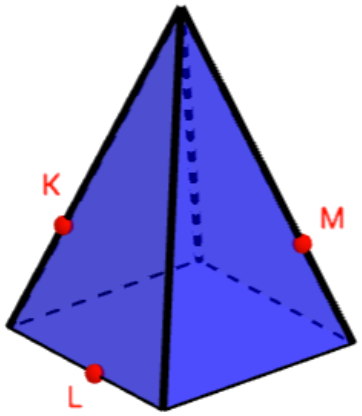
3. What is the least number of sides a cube cross section shape can have?

4. What is the greatest number of sides a cube cross section shape can have?

5. Could you slice cross sections to form shapes with each of the numbers of sides in between the least and greatest number of sides? (Draw images demonstrating each of the different cross sections you could find.)

Pyramid Cross Sections

Performance Task: In the image below, there are three points (K, M, and L) located on different edges of a pyramid.



Since the 3 points are not collinear, there is a single plane which passes through all three points J, K, and L. This plane would create a cross section through the rectangular pyramid.

1. What is the shape of the cross section formed by slicing the rectangular pyramid above with the single plane through all three points J, K, and L?

2. If you were able to move points J, K, and L anywhere along the edges of the rectangular pyramid, being sure the 3 points are not collinear, what are the different cross section shapes which can be formed? (What if you could also change the base?)

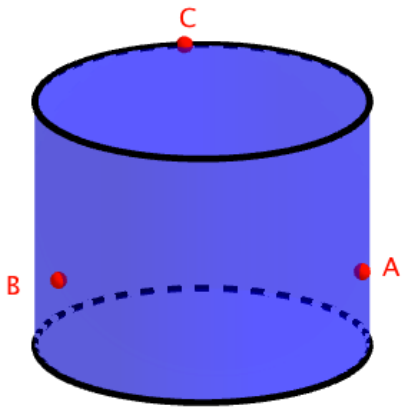
3. What is the least number of sides a rectangular pyramid cross section shape can have?

4. What is the greatest number of sides a rectangular pyramid cross section shape can have?

5. Could you slice cross sections to form shapes with each of the numbers of sides in between the least and greatest number of sides? (Draw images demonstrating each of the different cross sections you could find.)

Cylinder Cross Sections

Performance Task: In the image below, there are three points (A, B, and B) located on the surface of a cylinder.



Since the 3 points are not collinear, there is a single plane which passes through all three points A, B, and C. This plane would create a cross section through the cylinder.

1. What is the shape of the cross section formed by slicing the cylinder above with the single plane through all three points A, B, and C?

2. If you were able to move points A, B, and C, what cross section shapes can be formed by moving points A, B, and C anywhere along the surface of the cylinder, being sure the 3 points are not collinear?

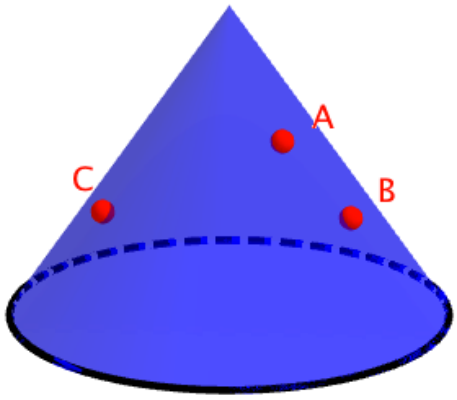
3. Which of the following polygons can be created by slicing a plane through a cylinder? (Justify your answer.)

    a. Pentagon
    b. Heptagon
    c. Quadrilateral
    d. Triangle

4. Would changing the height or radius of the cylinder affect your answers above? (Justify your answer.)
    a. No
    b. Yes

Cone Cross Sections

Performance Task: In the image below, there are three points (A, B, and B) located on the surface of a cone.



Since the 3 points are not collinear, there is a single plane which passes through all three points A, B, and C. This plane would create a cross section through the cone.

1. What is the shape of the cross section formed by slicing the cone above with the single plane through all three points A, B, and C?

2. If you were able to move points A, B, and C, what cross section shapes can be formed by moving points A, B, and C anywhere along the surface of the cone, being sure the 3 points are not collinear?

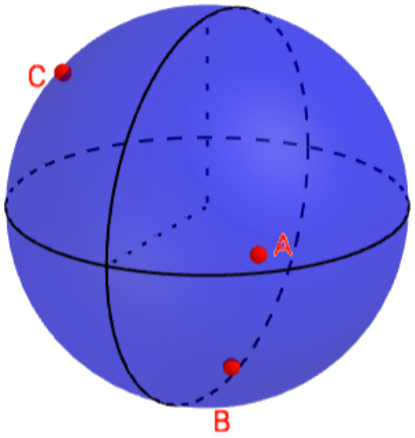
3. Which of the following polygons can be created by slicing a plane through a cone? (Justify your answer.)

    a. Pentagon
    b. Heptagon
    c. Quadrilateral
    d. Triangle

4. Would changing the height or radius of the cone affect your answers above? (Justify your answer.)
    a. No
    b. Yes

Sphere Cross Sections

Performance Task: In the image below, there are three points (A, B, and B) located on the surface of a sphere.



Since the 3 points are not collinear, there is a single plane which passes through all three points A, B, and C. This would create a cross section through the sphere.

1. What is the shape of the cross section formed by slicing the sphere above with the single plane through all three points A, B, and C?

2. What cross section shapes can be formed by moving points A, B, and C anywhere along the surface of the sphere, being sure the 3 points are not collinear?

3. Which of the following statements is TRUE about the cross sections of a sphere?
    a. The radius of the cross section can only be less than the radius of the sphere.
    b. The radius of the cross section can be less than, or equal to the radius of the sphere.
    c. The radius of the cross section can only be equal to the radius of the sphere.
    d. The radius of the cross section can be greater than, less than, or equal to the radius of the sphere.

4. Would changing the height or radius of the sphere affect your answers above? (Justify your answer.)
    a. No
    b. Yes