Optimizing Volume and Surface Area

Part I – Optimizing the Volume of a Square-Based Prism

Open **4C 5.6.1**.

In this investigation, you will be manipulating square-based prims with fixed surface areas.

1. Move the point labeled "Change Surface Area" to a number you like.
2. Record your surface area in the table below.
3. Move the point labeled "Change Base Dimensions" up and down to the extremes.
4. Make a prediction about when the volume will be maximized.

5. Continue to move the "Change Base Dimensions" point, watching the volume. Get the volume as large as you can and then stop.
6. Record the width / length, base and volume in the table below.
7. Complete your table by getting values from 3 other groups.

Group	Surface Area	Width / Length	Height	Maximum Volume
Your Group				

8. Describe how to optimize the volume of a square-based prism.

9. Determine the formula for the volume of an optimized square-based prism.

Part II – Optimizing the Surface Area of a Square-Based Prism

Open **4C 5.6.2**.

In this investigation, you will be manipulating square-based prims with fixed volumes.

1. Move the point labeled “Change Volume” to a number you like.
2. Record your volume in the table below.
3. Move the point labeled “Change Base Dimensions” up and down to the extremes.
4. Make a prediction about when the surface area will be minimized.

5. Continue to move the “Change Base Dimensions” point, watching the surface area. Get the surface area as small as you can and then stop.
6. Record the width, length, base and surface area in the table below.
7. Complete your table by getting values from 3 other groups.

Group	Volume	Width / Length	Height	Minimum Surface Area
Your Group				

8. Describe how to optimize the surface area of a square-based prism.

9. Determine the formula for the surface area of an optimized square-based prism.

Part III – Optimizing the Volume of a Cylinder

Open **4C 5.6.3**.

In this investigation, you will be manipulating cylinders with fixed surface areas.

1. Move the point labeled "Change Surface Area" to a number you like.
2. Record your surface area in the table below.
3. Move the point labeled "Change Radius" up and down to the extremes.
4. Make a prediction about when the volume will be maximized.

5. Continue to move the "Change Radius" point, watching the surface area. Get the volume as large as you can and then stop.
6. Record the radius, height and volume in the table below.
7. Complete your table by getting values from 3 other groups.

Group	Surface Area	Radius	Height	Maximum Volume
Your Group				

8. Describe how to optimize the volume of a cylinder.

9. Determine the formula for the volume of an optimized cylinder.

Part IV – Optimizing the Surface Area of a Cylinder

Open **4C 5.6.4**.

In this investigation, you will be manipulating cylinders with fixed volumes.

1. Move the point labeled "Change Volume" to a number you like.
2. Record your volume in the table below.
3. Move the point labeled "Change Radius" up and down to the extremes.
4. Make a prediction about when the surface area will be minimized.

5. Continue to move the "Change Radius" point, watching the surface area. Get the surface area as small as you can and then stop.
6. Record the radius, height and surface area in the table below.
7. Complete your table by getting values from 3 other groups.

Group	Volume	Radius	Height	Minimum Surface Area
Your Group				

8. Describe how to optimize the surface area of a cylinder.

9. Determine the formula for the surface area of an optimized cylinder.