9.1 Investigate Measurement Concepts

***Principles of Mathematics 9*, pages 478–483**

A

1. Explore the different rectangles that you can form with a perimeter of 22 units.

a) What are you to investigate?

b) Choose a strategy that you can carry out on grid paper. Record the areas of five different rectangles.

Rectangle	Width (units)	Length (units)	Perimeter (units)	Area (square units)
1			22	
2			22	
3			22	
4			22	
5			22	

2. Explore the different rectangles that you can form with an area of 18 square units.

a) What are you to investigate?

b) Choose a strategy that you can carry out using elastics on a geoboard. Record the perimeter of each rectangle.

Rectangle	Width (units)	Length (units)	Perimeter (units)	Area (square units)
1				18
2				18
3				18

3. You are designing a rectangular garage that is to have an area of 36 m^2. Using a geoboard, let the distance between the pegs represent 1 m.

a) With an elastic, construct different rectangles to represent the garage's perimeter. Record the dimensions of each rectangle you create in a table. Calculate the perimeter of each rectangle.

Rectangle	Width (m)	Length (m)	Perimeter (m)	Area (m^2)
1				36
2				36
3				36

b) Explain how the perimeter affects the cost of the garage.

c) Which shape would be the most economical for the garage? Why?

d) Is cost the only factor when choosing a shape for the garage.

B

4. You are designing a rectangular room in an office that is to have an area of 64 m^2. Using a geoboard, let the distance between the pegs represent 1 m.

a) With an elastic, construct different rectangles to represent the room's area. Record the dimensions of each rectangle you create in a table. Calculate the perimeter of each rectangle.

Rectangle	Width (m)	Length (m)	Perimeter (m)	Area (m^2)
1				64
2				64
3				64
4				64

b) Explain how the perimeter affects the cost of the garage.

c) Which shape would be the most economical for the garage? Why?

d) Is cost the only factor when choosing a shape for the garage.

5. **Use Technology** Reg is making a garden in his back yard. He was to put a fence around his garden. He has 25 m of fencing. Use *The Geometer's Sketchpad*® to investigate the dimensions of the rectangular garden with the greatest area than Reg can enclose with this fencing.

6. **Use Technology** Arin wants to put a fence around the swimming pool in her yard. He has 49 m of fencing. Use *The Geometer's Sketchpad*® to investigate the dimensions of the rectangular swimming pool with the greatest area than Arin can enclose with this fencing.

7. Meredith is enclosing a rectangular area for dogs with 48 m of fencing at a local park. Use a table or a spreadsheet to investigate the greatest area that Meredith can enclose.

Rectangle	Width (m)	Length (m)	Perimeter (m)	Area (m^2)
1	1	23	48	23
2	2	22	48	44
3			48	
4			48	

	A	B	C	D	E
1	Rec-tangle	Width (m)	Length (m)	Perim-eter (m)	Area (m)
2	1	1	=24-B2	48	=B2*C2
3	2	=B2+1	=24-B3	48	=B3*C3
4	3			48	
5	4			48	

C

8. Pyal is enclosing a rectangular area for his lawn with 72 m of fencing. Use a table or a spreadsheet to investigate the greatest area that Pyal can enclose.

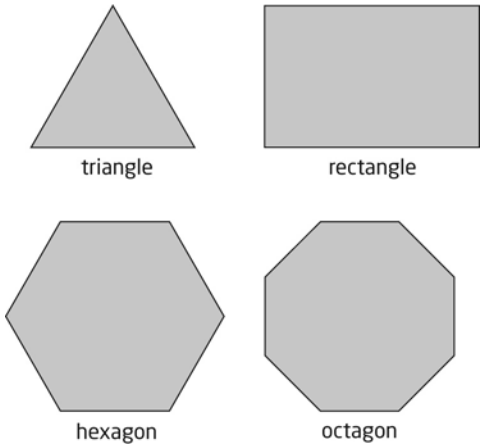
9. What happens to the area when you change the shape of an enclosure. Suppose each toothpick represents a 1-m length of fence.

a) Use 48 toothpicks to build enclosures with the greatest area, using the following shapes:

- triangle
- rectangle
- hexagon
- octagon
- circle

b) Find the area of each enclosure in part a). Round your answers to one decimal place, when necessary.

c) Does the shape of the enclosure affect its area? Write a brief report of your findings.



9.2 Perimeter and Area Relationships of a Rectangle

***Principles of Mathematics 9*, pages 484–490**

A

1. What dimensions will provide the maximum area for a rectangle with each perimeter?

a) 28 m

b) 40 m

c) 48 m

d) 65 m

2. A rectangular table is being constructed using oak wood. The perimeter of the table is to be 10.0 m.

a) Sketch three different tables that have a perimeter of 10.0 m.

b) What table dimensions will give the maximum area for the table?

3. A rectangular swimming area is to be enclosed using 78 m of rope.

a) What are the dimensions of the rectangle of maximum area?

b) Suppose 39 barriers, each 2 m long, are used instead. Can the same area be enclosed? Explain.

c) How much more area can be enclosed if the rope is used instead of the barriers?

B

4. A fence is to be built with prefabricated sections that are 2.6 m in length. What is the maximum rectangular area that you can enclose with

a) 28 pieces?

b) 52 pieces?

5. A fence is being built using the materials in question 4, but now there is an existing wall that will be used as one of the boundaries. Draw a diagram and label the dimensions of the maximum rectangular area that you can enclose with

a) 28 pieces

b) 52 pieces

For the fence materials in each of parts a) and b), how much additional area does using an existing border provide?

6. Fred is adding a rectangular fenced in area to the back of his house. The back of the house will form one side of the rectangle. Fred has 20 m of fencing to use. Conduct an investigation to determine the dimensions of the enclosure of maximum area. Use any tools: toothpicks, geoboards, grid paper, tables, or technology such as spreadsheets, *The Geometer's Sketchpad*®, or a graphing calculator.

7. A farmer is adding a rectangular corral to the side of his barn. The barn will form one side of the rectangle. The area of the corral is to be 50 m^2. One possible rectangle is given.

a) Investigate other possible rectangles with an area of 60 m^2. Copy and complete the table or use a spreadsheet like the one shown.

Rectangle	Width (m)	Length (m)	Area (m^2)	Length of Fence Used (m)
1	1	50	50	52
2	2		50	
3			50	
4			50	

	A	B	C	D	E
1	Rec-tangle	Width (m)	Length (m)	Area (m^2)	Length of Fence Used (m)
2	1	1	=50/B2	50	=C2+2*B2
3	2	=B2+1	=50/B3	50	=C3+2*B3
4	3			50	
5	4			50	

b) What dimensions use the minimum length of fence to enclose the corral?

c) What is the minimum length of fence that can be used to enclose the corral?

8. Sanjay has prepared a proposal for a client. In the proposal, he reports how 40 m of fencing can be used to fence an enclosure on

- four sides
- three sides, using a wall at the back of the property as the fourth side
- two sides, using the wall at the back and an existing hedge on an adjacent side

Draw diagrams for each of the three scenarios in Sanjay's proposal and calculate the maximum area that can be enclosed in each case.

9. Pose a problem involving the relationship between the perimeter and the area of a rectangular swimming pool. Solve the problem and then have a classmate solve it.

C

10. Describe a situation in which it is important to know

a) the maximum area of a rectangle for a given perimeter

b) the minimum perimeter of a rectangle for a given area

11. Conduct an investigation to determine the dimensions of the rectangular rug with area 42 m^2 and minimum perimeter. Round the dimensions to two decimal places.

12. A rectangular balcony with an area of 32 m^2 is to be enclosed on three sides. Minimizing the perimeter will minimize the cost of the material to be used for the balcony enclosure. Conduct an investigation to determine the shape of the balcony enclosure with the minimum perimeter.

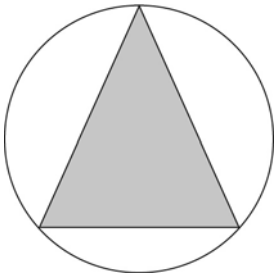
13. Conduct an investigation to find the dimensions of the triangle of maximum area that can be inscribed in a circle with

a) diameter 10 cm

b) diameter 16 cm

c) diameter 22 cm

Round you answers to two decimal places, when necessary.



9.3 Minimize the Surface Area of a Square-Based Prism

***Principles of Mathematics 9*, pages 491–497**

A

1. Determine the dimensions of the square-based prism box with each volume that requires the least material to make. Round the dimensions to the nearest tenth of a centimetre, when necessary.

a) 729 cm^3

b) 1331 cm^3

c) 800 cm^3

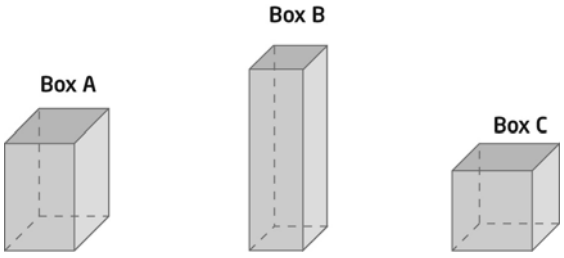
d) 1300 cm^3

e) 750 cm^3

f) 548 cm^3

2. Determine the surface area of each prism you found in question 2, to the nearest square centimetre.

3. These square-based prisms all have the same volume. Rank them in order from least to greatest surface area. Explain your reasoning.



B

4. Jacinth has been asked to design a square-based prism container to transport hot food. To keep heat loss to a minimum, the total surface area must be minimized.

a) Find the dimensions of the container with volume 150 000 cm^3 that has minimum heat loss. Round the dimensions to the nearest tenth of a centimetre.

b) What other factors might Jacinth consider?

5. Determine the dimensions of a square-based prism container with volume 4300 cm^3 and minimum heat loss. Round the dimensions to the nearest tenth of a centimetre.

6. Cereal is packaged in a square-based prism box.

a) The box contains 5564 cm^3 of cereal. What dimensions for the box require the least amount of cardboard? Round the dimensions to the nearest tenth of a centimetre.

b) Does cereal usual come in a box shaped like the one you found in part a)? Suggest reasons for this.

7. Martie is mailing a cell phone charger in a small cardboard squared-based prism box. The box must have a capacity of 1500 cm^3 and Martie wants to use the minimum amount of cardboard when she mails the box.

a) What should the dimensions of the box be, to the nearest hundredth of a centimetre?

b) What is the minimum amount of cardboard that Martie will need, to the nearest tenth of a square centimetre?

8. Create a problem that involves designing a square-based prism with a minimum surface area. Solve the problem. Exchange with a classmate.

9. A laundry soap manufacturer wants its large box of laundry detergent to be a square-based prism with a capacity of 5.5 L.

a) What should the dimensions of the box be to require the minimum amount of cardboard to construct the box? Round the dimensions to one decimal place.
Hint: 1 L = 1000 cm^3.

b) Determine the least amount of cardboard required to construct this box. Round to nearest square centimetre.

10. A storage container is a square-based prism with a capacity of 9.6 L. The storage container was designed to use the minimum amount of material when it was constructed.

a) Determine the dimensions of the storage container, to the nearest hundredth of a centimetre.

b) Determine the amount of material that was used in the construction of the storage container, to the nearest tenth of a centimetre.

11. Refer to question 10. The company has also designed a line of storage containers with a capacity of 9.6 L that do not have lids.

a) Carry out an investigation to determine the dimensions of a lidless box with minimum surface area and a capacity of 9.6 L. Round your answer to the nearest tenth of a centimetre.

b) Compare the results to those in question 10. Are the dimensions the same or different?

c) Does the lidless box require more, less, or the same amount of material to construct, compared to the box with a lid?

C

12. a) Determine the dimensions of a square-based prism box of orange juice that holds 175 mL of juice and requires the least amount of material. Round the dimensions to the nearest tenth of a centimetre.

b) Suggest reasons why boxes of orange juice are not usually manufactured with the dimensions you found in part a).

c) Write a letter to the manufacturer recommending a new design for its boxes of orange juice, keeping your results from parts a) and b) in mind.

13. a) Determine the dimensions of a box of microwave popcorn that has a capacity of 32.5 cm^3 and requires the least amount of material. Round the dimensions to the nearest tenth of a centimetre.

b) Suggest reasons why boxes of microwave popcorn are not usually manufactured with the dimensions you found in part a).

c) Write a letter to the manufacturer recommending a new design for its boxes of microwave popcorn, keeping your results from parts a) and b) in mind.

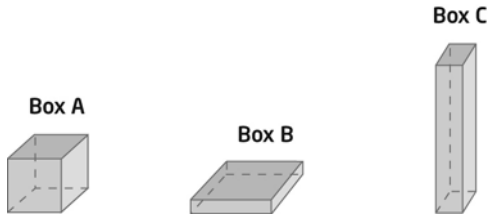
14. How would you arrange 48 interlocking cubes in a square-based prism with the smallest surface area possible?

9.4 Maximize the Volume of A Square-Based Prism

***Principles of Mathematics 9*, pages 498–503**

A

1. The three square-based prisms have the same surface area. Rank the prisms in order of volume from greatest to least.



2. Determine the dimensions of the square-based prism with maximum volume for each surface area. Round the dimensions to the nearest tenth of a unit when necessary.

a) 294 cm^2

b) 864 m^2

c) 600 cm^2

d) 1536 m^2

e) 1500 cm^2

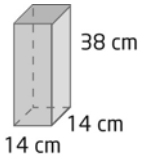
f) 1800 m^2

3. Determine the volume of each prism in question 2, to the nearest cubic unit, when necessary.

4. Use a table or a spreadsheet to conduct an investigation to find the dimensions of the square-based prism box with maximum volume that can be made with 850 cm^2 of cardboard. Round dimensions to the nearest tenth of a centimetre.

B

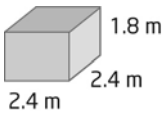
5. **a)** Determine the surface area and volume of the square-based prism box shown.



b) Determine the dimensions of a square-based prism box with the same surface area but with maximum volume. Round the dimensions to the nearest tenth of a centimetre.

c) Calculate the volume of the box in part b) to verify that it is greater than the volume of the box in part a). Round your answer to the nearest cubic centimetre.

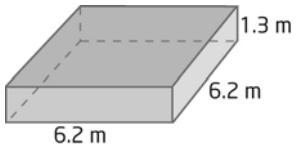
6. **a)** Determine the surface area and volume of the square-based prism box shown. Round your answers to the one decimal place when necessary.



b) Determine the dimensions of a square-based prism box with the same surface area but with maximum volume. Round the dimensions to the nearest tenth of a metre.

c) Calculate the volume of the box in part b) to verify that it is greater than the volume of the box in part a). Round your answer to the nearest cubic metre.

7. **a)** Determine the surface area and volume of the square-based prism box shown. Round your answers to the one decimal place when necessary.



b) Determine the dimensions of a square-based prism box with the same surface area but with maximum volume. Round the dimensions to the nearest tenth of a metre.

c) Calculate the volume of the box in part b) to verify that it is greater than the volume of the box in part a). Round your answer to the nearest metre.

8. Helen is building a square-based prism cedar chest with a lid to hold blankets. She has 16 m^2 of cedar wood available.

a) Determine the dimensions of the cedar chest with maximum volume, the nearest tenth of a metre.

b) Determine the volume of Helen's cedar chest to the nearest cubic metre.

9. Ranjit is building a square-based prism storage box with a lid to hold tools. He has 20 m^2 of plywood available.

a) Determine the dimensions of the storage box with maximum volume, the nearest tenth of a metre.

b) Determine the volume of Ranjit's storage box to the nearest cubic metre.

C

10. Jane is packaging a stereo system to be shipped to her cousin. She has 16 000 cm^2 of cardboard and will put shredded paper around the speakers to protect them during shipping.

a) What are the dimensions of the square-based prism box with maximum volume? Round the dimensions to the nearest tenth of a centimetre.

b) What is the volume of this box? Round to the nearest cubic centimetre.

c) If the stereo system measures 35 cm by 35 cm by 44 cm, how much empty space is left in the box?

d) What assumptions have you made in solving this problem?

11. Philip has a piece of plywood that measures 150 cm by 300 cm. He wants to construct a square-based prism box to hold his gardening equipment. Philip wants to maximize the volume of the box and to keep the waste of plywood to a minimum.

a) Determine the dimensions of the box with maximum volume that he can construct including a lid. Round to the nearest tenth of a centimetre.

b) Draw a scale diagram on grid paper to show how Dylan should cut the plywood.

c) Describe any assumptions you have made in solving this problem.

9.5 Maximize the Volume of a Cylinder

***Principles of Mathematics 9*, pages 504-509**

A

1. Determine the dimensions of the cylinder with the maximum volume for each surface area. Round the dimensions to the nearest hundredth of a unit.

a) 1400 cm^2

b) 20 m^2

c) 3000 mm^2

d) 400 cm^2

e) 80 m^2

f) 4500 mm^2

2. Determine the volume of each cylinder in question 1. Round to the nearest cubic unit.

3. A chemical company wants to make a cylindrical storage container of sheet metal. 80 m^2 of material is available.

a) Determine the dimensions of the container with maximum volume. Round the dimensions to the nearest tenth of a metre.

b) Determine how many litres of a chemical this container can hold. Hint: 1 m^3 = 1000 L.

c) Describe any assumptions you have made in solving this problem.

B

4. A fuel company wants to make a cylindrical fuel tank of sheet metal.

10 m^2 of material is available.

a) Determine the dimensions of the fuel tank with maximum volume. Round the dimensions to the nearest tenth of a metre.

b) Determine how many litres of a fuel this tank can hold.

c) Describe any assumptions you have made in solving this problem.

5. A fertilizer company wants to make a cylindrical storage container out of metal to store fertilizer in. There are 30 m^2 of material available to make the container.

a) Determine the dimensions of the storage container with maximum volume. Round the dimensions to the nearest tenth of a metre.

b) Determine how many cubic metres of fertilizer this tank can hold.

6. Martin ships DVDs to his customers in cylindrical plastic containers. The DVDs are 12.2 cm in diameter and 2 mm thick. Martin wants the cylinder to hold as many DVDs as possible.

a) What is the height of the optimal cylinder?

b) How many DVDs will this cylinder hold?

c) Describe any assumptions you have made.

7. A company is using plastic to create containers to store CDs in. They would like to use 1017 cm^2 of plastic to make each CD storage container.

a) Determine the dimensions of the plastic storage container with maximum volume. Round the dimensions to the nearest hundredth of a centimetre.

b) If CDs are each 2 mm in height, how many CDs will this container be able to hold?

C

8. You have a piece of sheet metal. Your task is to use this material to create a container with maximum volume to store water in.

a) Which shape would have the greatest volume: a square-based prism or a cylinder?

b) Justify your answer using a fixed surface area of 3500 cm^2.

9. An open-topped cylinder is to be made using 800 cm^2 of plastic.

a) Describe how you would determine the dimensions of the cylinder of maximum volume.

b) Determine the dimensions of the cylinder with the optimal volume. Round to the nearest tenth of a centimetre.

10. Suppose you have 3000 cm^2 of material to create a three-dimensional figure with the greatest volume. The material can be formed into a square-based prism, a cylinder, or a sphere.

a) Predict which shape will produce the greatest volume.

b) Determine the dimensions of each shape so that the volume is maximized. Round your answers to the nearest hundredth of a centimetre.

c) Determine the volume of each shape. Round your answers to the nearest tenth of a cubic centimetre.

d) Was your prediction correct? If not, which of the three shapes has the greatest volume for a given surface area? Will this always be true?

e) Summarize your findings.

11. Use Technology You have a piece of sheet metal that measures 2 m by 3 m. Use a spreadsheet to investigate the dimensions of the cylinder with the greatest volume if

a) the cylinder has a top and a bottom

b) the cylinder has no top

Round your answers to the nearest thousandth of a cubic metre.

9.6 Minimize the Surface Area of a Cylinder

***Principles of Mathematics 9*, pages 510–515**

A

1. Determine the dimensions of the cylinder with minimum surface area for each volume. Round the dimensions, to the nearest tenth of a unit.

a) 1400 cm^3

b) 5 m^3

c) 375 mm^3

d) 10 cm^3

e) 800 m^3

f) 25 mm^3

2. Determine the surface area of each cylinder in question 1 to the nearest square unit.

3. A cylindrical container for potato chips is to have a volume 900 cm^3. What should its dimensions be to minimize the amount of material used to make it? Round the dimensions to the nearest tenth of a centimetre.

4. A cylindrical can of soup is to have a volume of 450 cm^3. What should its dimensions be to minimize the amount of material used to make it? Round the dimensions to the nearest tenth of a centimetre.

5. A cylindrical tank is designed to hold 6 L of a chemical.

a) Determine the dimensions of the tank that requires the least material. Round the dimensions to the nearest tenth of a centimetre.
Hint: 1 L = 1000 cm^3

b) Describe any assumptions you made in solving this problem.

B

6. A cylindrical can is designed to hold 355 mL of a soft drink.

a) Determine the dimensions of the cylindrical soft drink can that requires the least material. Round the dimensions to the nearest tenth of a centimetre.
Hint: 1 mL = 1 cm^3

b) Describe any assumptions you made in solving this problem.

7. A company is designing a cylindrical can to contain a fruit drink. The medium size can is designed to hold 500 mL of the fruit drink.

a) Determine the dimensions of the medium size cylindrical fruit drink can that requires the least material. Round the dimensions to the nearest tenth of a centimetre.

b) If aluminum costs \$0.0015/cm^2, find the cost of the aluminum to make 24 medium sized cans.

8. Refer to question 7. The company is also designing a large size cylindrical can which is designed to hold 700 mL of the fruit drink.

a) Determine the dimensions of the large size cylindrical fruit drink can that requires the least material. Round the dimensions to the nearest tenth of a centimetre.

b) If aluminum costs \$0.0015/cm^2, find the cost of the aluminum to make 12 large sized cans.

9. Refer to question 7. The company is also designing a small size cylindrical can which is designed to hold 350 mL of the fruit drink.

a) Determine the dimensions of the small size cylindrical fruit drink can that requires the least material. Round the dimensions to the nearest tenth of a centimetre.

b) If aluminum costs \$0.0015/cm^2, find the cost of the aluminum to make 36 small sized cans.

10. A recycling company is designing a cylindrical recycling bin with a lid. They are planning to create a container with a volume of 500 000 cm^3 that is as cost efficient as possible.

a) Determine the dimensions of the recycling bin that requires the least material. Round the dimensions to the nearest tenth of a centimetre.

b) If aluminum costs \$0.001/cm^2, find the cost to make 10 recycling bins.

11. Gary is shipping computer cables to a customer. He needs a container with a volume of 300 cm^3 that is as cost efficient as possible. Should he use a square-based prism box or a cylinder for the cables? Justify your answer mathematically.

C

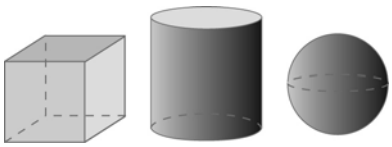
12. A movie theatre sells popcorn in an open cylindrical container. The medium size holds 1200 cm^3 of popcorn.

a) Determine the dimensions of the container that requires the least amount of cardboard, with or without technology. Round your answers to the nearest hundredth of a centimetre.

b) How much cardboard is required to make one container? Round your answer to the nearest square centimetre.

c) Describe any assumptions you have made in solving this problem.

13. a) For a given volume, predict which three-dimensional figure will have the minimum surface area: a cube, a cylinder with height equal to diameter, or a sphere.



b) Check your prediction using the formulas for volume and surface area and a fixed volume of 1300 cm^3. Round your answers to one decimal place.

Chapter 9 Review

***Principles of Mathematics 9*, pages 516–517**

1. Glen is building a rectangular frame for a flower box with 30 m of lumber. Use toothpicks to investigate the greatest area that Glen can enclose.

a) Let each toothpick represent 1 m of lumber. Construct different rectangles to represent the flower box's area. Record the dimension and the area in each case.

Rectangle	Width (units)	Length (units)	Perimeter (units)	Area (square units)
1			30	
2			30	

b) How many different rectangles are possible?

c) Which shape would you choose for the flower box? Give reasons for your choice.

2. A rectangular children's play area is to have an area of 36 m^2. The play area will be enclosed by edging bricks which will form the perimeter of the play area.

a) On grid paper, sketch all the rectangles with whole-number dimensions and an area of 36 m^2.

b) Record the dimensions and the perimeter in each case.

Rectangle	Width (units)	Length (units)	Perimeter (units)	Area (square units)
1				36
2				36

c) Which shape would be the most economical for the garden? Why?

3. A mirror is to have an area of 4 m^2. What should the dimensions of the mirror be to minimize the amount of framing required to go around the outside?

4. What is the maximum area of a rectangular horse paddock that can be enclosed with 160 m of fencing in each case?

a) The yard is enclosed on all four sides.

b) The yard is enclosed on three sides.

5. A rectangular parking lot is to have an area of 800 m^2. The parking lot is surrounded by a chain-link fence.

a) What are the dimensions of the parking lot that can be enclosed most economically? Round the dimensions to the nearest tenth of a metre.

b) Give reasons why the parking lot might not be designed in the most economical shape that you determined in part a).

6. Cookies are to be packaged in a square-based prism box with a capacity of 950 cm^3. Use a table like the one shown, or the spreadsheet you created in Section 9.3, to determine the dimensions of the box that requires the least amount of material. Round the dimensions to the nearest tenth of a metre.

Side Length of Square Base (cm)	Area of Square Base (cm^2)	Height (cm)	Volume (cm^3)	Surface Area (cm^2)
6			950	
7			950	

7. Sea salt is packaged in a plastic-coated square-based prism box with a capacity of 802.125 mL.

a) Determine the dimensions of the box that requires the minimum amount of material. Round the dimensions to the nearest tenth of a centimetre.

b) Explain why these dimensions might not be the ones the manufacturer chooses.

8. A 2-L box of instant mashed potatoes is a square-based prism and is to be made from the minimum amount of cardboard. Determine the minimum amount of cardboard required, to the nearest square centimetre.

9. Use a table like the one shown, or the spreadsheet you created in Section 9.4, to investigate the dimensions of the square-based prism box with maximum volume that can be made from 3 m^2 of cardboard. Round the dimensions to the nearest hundredth of a metre.

Side Length of Base (m)	Area of Base (m^2)	Surface Area (m^2)	Height (m)	Volume (m^3)
1		3		
2		3		

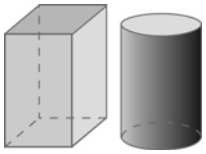
10. What are the dimensions of the square-based prism box with maximum volume that can be made from 3000 cm^2 of cardboard? Round the dimensions to the nearest tenth of a centimetre.

11. Suppose the cardboard in question 10 is a rectangular sheet that measures 30 cm by 100 cm. Explain why it may not be possible to make the shape you determined.

12. Use a table like the one shown, or the spreadsheet you created in Section 9.5 to investigate the dimensions of the cylinder with maximum volume that can be formed using 620 cm^2 of cardboard. Round your answer to the nearest hundredth.

Radius (cm)	Height (cm)	Volume (cm^3)	Surface Area (cm^2)
4			620
5			620

13. A manufacturer is trying to choose the best package for white rice. A square-based prism and a cylinder require the same amount of cardboard to make. Which shape should the manufacturer choose? Give reasons for your answer.



14. a) Use a table like the one shown, or the spreadsheet you created in Section 9.6, to determine the minimum amount of aluminum required to make a pop can with a capacity of 450 mL. Round your answers to the nearest hundredth.

Radius (cm)	Base Area (cm^2)	Volume (cm^3)	Height (cm)	Surface Area (cm^2)
1				
2				

b) What assumptions did you make in your solution?