Name: _____ Date: _____

Sharing a Cake

BROAD AREAS OF LEARNING: Citizenship and Community Life, Health and Well-Being

CROSS-CURRICULAR COMPETENCIES:

- Uses information
- Solves problems
- Exercises critical judgment

Application Question

- **To develop Competency 2:** Uses mathematical reasoning
- **To develop Competency 3:** Communicates by using mathematical language

Circular Sharing

You are at a birthday party with 11 other people. There is a circular cake that is to be shared equally by all 12 people at the party.

? What is the area of the top of each person's piece of cake if everyone gets a fair share?

- The birthday cake is circular and has a diameter of 30 cm.
- Everyone will receive the same size piece of cake.
- Each piece will be formed by cutting from the centre of the cake to the edge.
- You need to know the area of the top of each person's piece of cake and also need to describe all the measurements (lengths and angles) for the pieces of cake.
- You hear one guest at the party say that each person would receive twice as much cake if the diameter of the cake had been doubled. Another guest states that the central angle of each piece would be double if the diameter were doubled.

Are any of the guests right? If so, prove their statements. If not, disprove the claim.

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A. Draw the cake accurately and show how it will be shared equally for 12 people. Label all measurements for one of the pieces of cake. Show your work and explain how to determine each of the measurements.

B. Prove or disprove the guest's claim that the area of the top of a piece of cake is doubled if the diameter is doubled. Does the height of the cake make a difference to your answer? Explain your thinking.

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Prove or disprove the guest's claim that the central angle for one piece of cake is doubled if the diameter is doubled.

C. Explain how to determine an algebraic expression for the area of the top of each person's piece of cake if the circular cake has a diameter of d centimetres and the cake is to be divided evenly among n people. What is the expression for the area of the top of each person's piece of cake, in terms of the diameter? Does your expression produce the same results as your calculations for the original cake being shared equally by 12 people?

Evaluation Criteria Checklist

- ☐ You drew the cake and showed how it will be divided, including labels for all measurements for one of the pieces of cake.
- ☐ You proved or disproved each of the guests' claims about how doubling the diameter would affect pieces of the cake.
- ☐ You determined an algebraic expression for the area of the top of a piece of cake when the number of guests and the diameter are unknown.
- ☐ You used correct mathematical language in your explanations.