

Inquiry Question

You are throwing a pizza party with some friends and see that one 18-inch pizza costs the same amount as two 12-inch pizzas. You want as much pizza as possible, and your friends don't like crust, so which order should you get?

Name: _____

Date: _____



General Instructions

It's Friday night, and you and your friends want to order pizza and watch the new Avengers movie. None of you really have that much money, but you all want as much pizza as possible. A couple of your friends really dislike crust and usually throw it out, but you think that's a waste of pizza! There are two order's that you can get: one 18-inch pizza or two 12-inch pizzas. Your friends start to argue about which order has more pizza, and about which one has the least amount of crust. Luckily, you know the math, and can tell them which order the better order is!

You will be exploring the circumference and area of a circle to determine which pizza order

you should get. You will do two activities that will help you estimate the circumference and area of a circle, and then you will find the exact value using math!

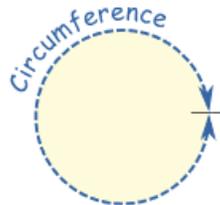
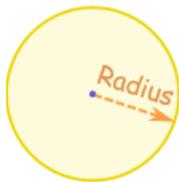
Materials you'll need:

- Scissors
- Glue
- String or pipe cleaners (no more than 100 cm is needed)
- Pencil
- Ruler or measuring device

Project submission:

Submit the completed pages of this project, including the filled in circle-graph.

To help you make the best decision about which pizza order to get, we need to know a little bit about circles.



What is a circle? How would you describe the shape to someone who has never seen it before? Someone who is blind? Fill out your thoughts below.

What is a circle?

A circle is a collection of points that are all the same distance from a fixed point. The circumference is the distance around the circle, the diameter is the distance from one edge to the other that goes through the middle of the circle, and the radius is the distance from the middle of the circle to the outer boundary.

LET'S TALK ABOUT AREA

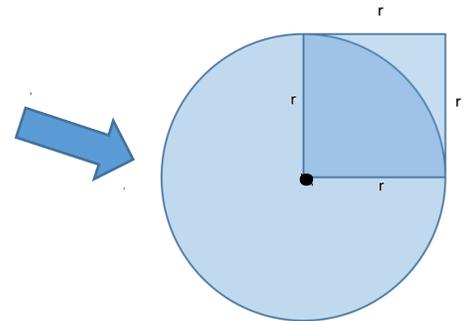


What about area? The area of a circle is the amount of surface space inside the shape. There is a way to calculate the area of a circle using a formula, but we are going to discover that formula on our own by using scissors and glue!

On the next page are four small coloured squares, and a large circle inside a grid. Cut out the four small coloured squares and measure the length of the sides, then determine the area.

Length of side of square: _____ *cm* **Area of the square:** _____ cm^2

If you place the corner of the square in the middle of the circle like this, we can now call the length of the sides of the square the radius, *r*!



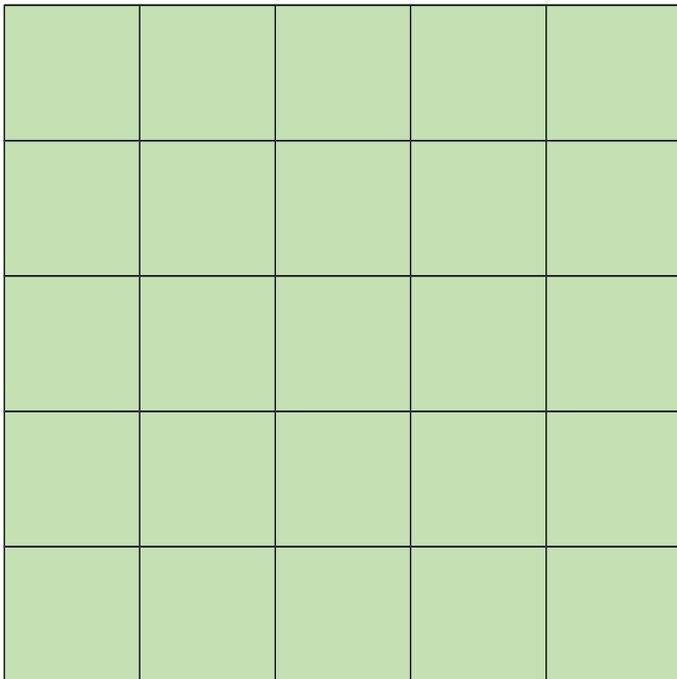
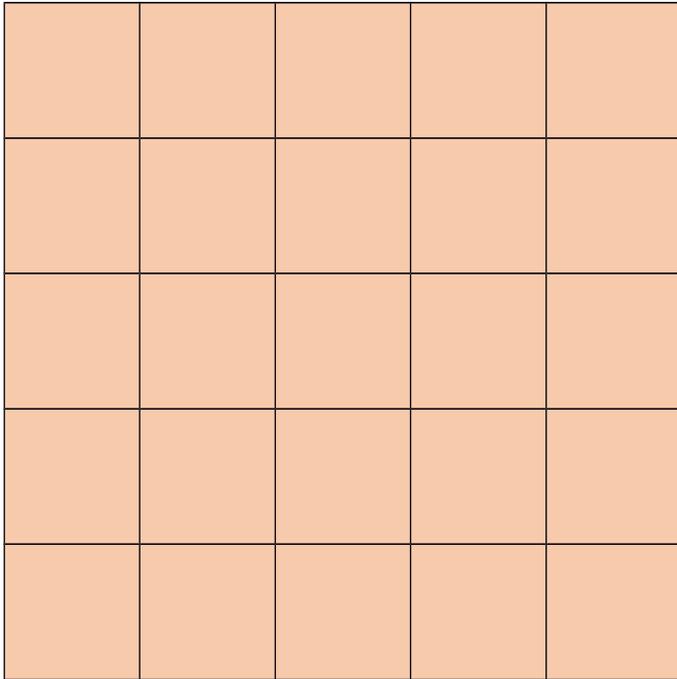
Now what is the area of the square, using *r* as the length of a side instead of the centimeters?
Hint: area of a square is length multiplied by width.

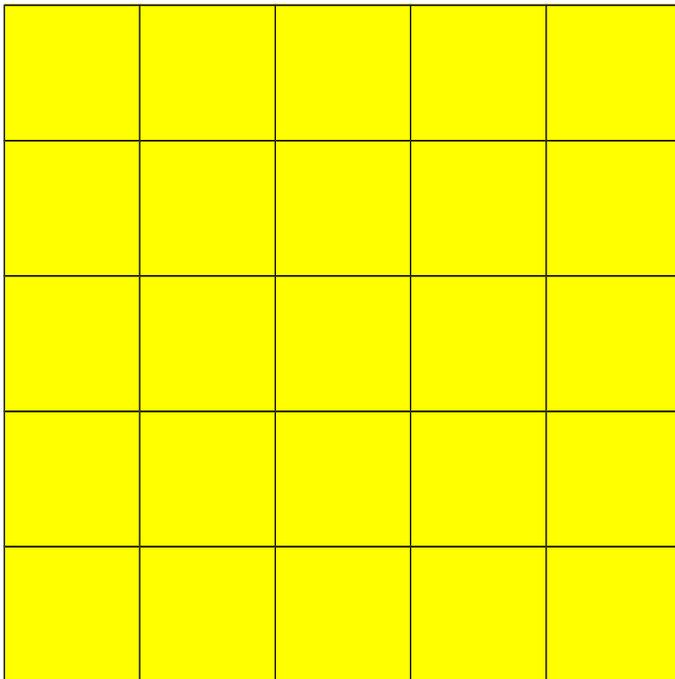
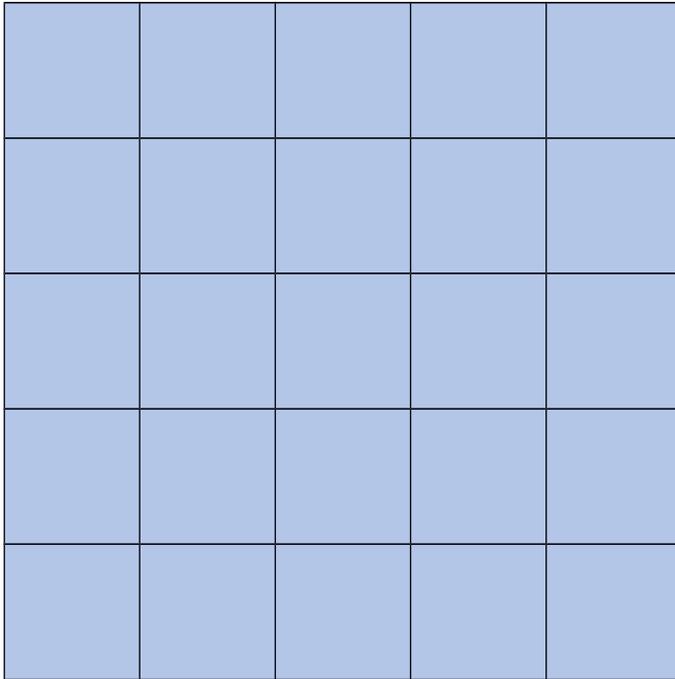
Area of the square: _____

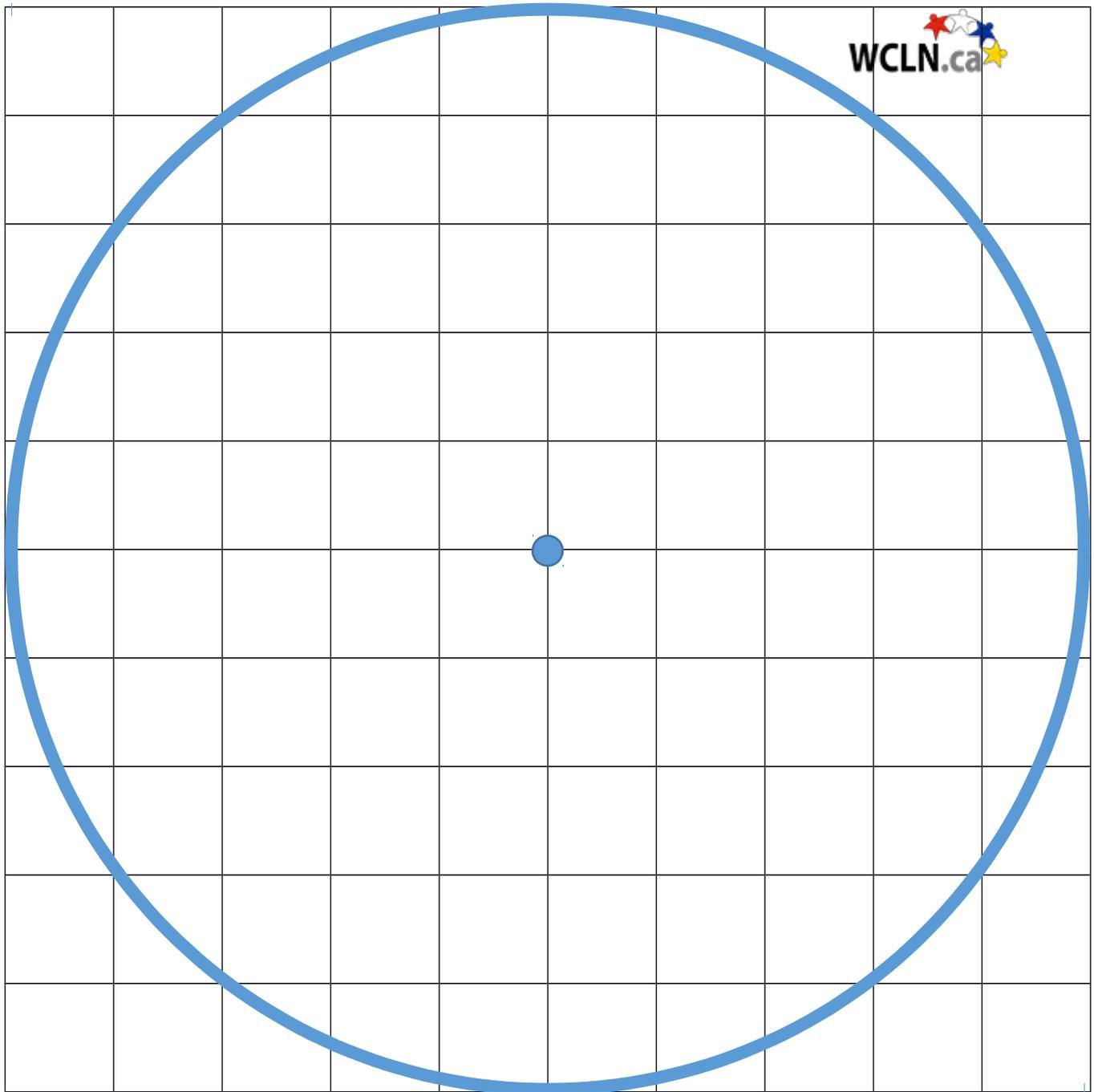
ACTIVITY TIME

Now that we've discovered the area of our squares is $A = r * r = r^2$, let's try to find the area of a circle!

How many of the coloured squares can you fit inside the circle?! Using the four cut out coloured squares, and using them one at a time, how many squares can fit inside the circle? You can cut them up as much as you want but fill up as much of the space inside the circle as you can!







How many coloured squares can you fit inside the circle? Estimate. _____

Do you recognize this number? It's a little bit more than 3. It's supposed to be 3.14159..... it's π !



Since we now know that we can fit $3.14159 = \pi$ of the coloured squares into our circle, what is the area of the circle?

HINT: how many coloured squares, which have the area $r^2 = r * r$, fit into the circle? If the area of the squares is r^2 , and it took π coloured squares to fill it, how much space is inside the circle?

Area of the circle: _____ this works for ANY circle

Once you have the formula for the area of a circle, double check that it is right!

PIZZA CALCULATION #1

Now that you have the equation for finding the area of a circle, by finding the area of the 18-inch pizza and comparing it to the area of two 12-inch pizza's, which pizza has a larger area? In other words, which order has **more** pizza??

***When a pizza is called an 18-inch pizza, it means that the pizza has a **diameter** of 18 inches, not radius!

Calculate the area of 18-inch pizza:

Calculate the area of two 12-inch pizza's:

The pizza with the larger area: _____



LET'S TALK ABOUT CIRCUMFERENCE

We now know which pizza we should order! But wait, what about the crust on the outside of the pizza? Your friends don't like crust and want as little of it as possible. We need to determine which pizza has the least amount of crust.

On the large circle graph, using pipe cleaners or string, measure the circumference of the circle as accurately as you can.

What is the measured circumference of the circle? _____ *cm*

The formula for the circumference of a circle is

$$C = \pi * D ,$$

where D is the diameter.

Given that formula, what is the *actual* circumference of the circle?

Calculated circumference of the circle: _____ *cm*

How close was your measurement to the calculated value?

Challenge: Try testing the formula for the circumference of a circle. Cut string/pipe cleaner into 3 diameter-length pieces and cut another piece that is approximately 0.14 the length of the diameter of the circle. Using these four pieces of string, test to see if they add up to the circumference by wrapping them around the circle!

$$\text{Circumference} = D + D + D + (0.14) D = (3.14) * D$$



PIZZA CALCULATION #2

It's time to find out which pizza has more crust!

Calculate the circumference of an 18-inch pizza:

Calculate the circumference of two 12-inch pizza's:

The pizza with the smaller circumference: _____

ORDERING THE PIZZA

Based off your calculations for the area and circumference of the pizza's, and knowing that you want the **most** pizza but the **least** crust, which pizza order are you getting and **why**?

Which pizza order are you getting?



PIZZA HUT

Let's take one last look at real pizza sizes. Pizza Hut sells a 9-inch pizza for \$13.79 and a 12-inch pizza for \$17.99. If you want to order pizza for a party, should you order **three** 9-inch pizza's or **two** 12-inch pizza's? Consider the area (amount of pizza), circumference (amount of crust), and price.

Circumference of 9-inch:

Circumference of 12-inch:

Area of 9-inch:

Area of 12-inch:

Price of three 9-inch:

Price of two 12-inch

Which order gets you more pizza, less crust, and is the cheapest? In other words, which is the better deal?
