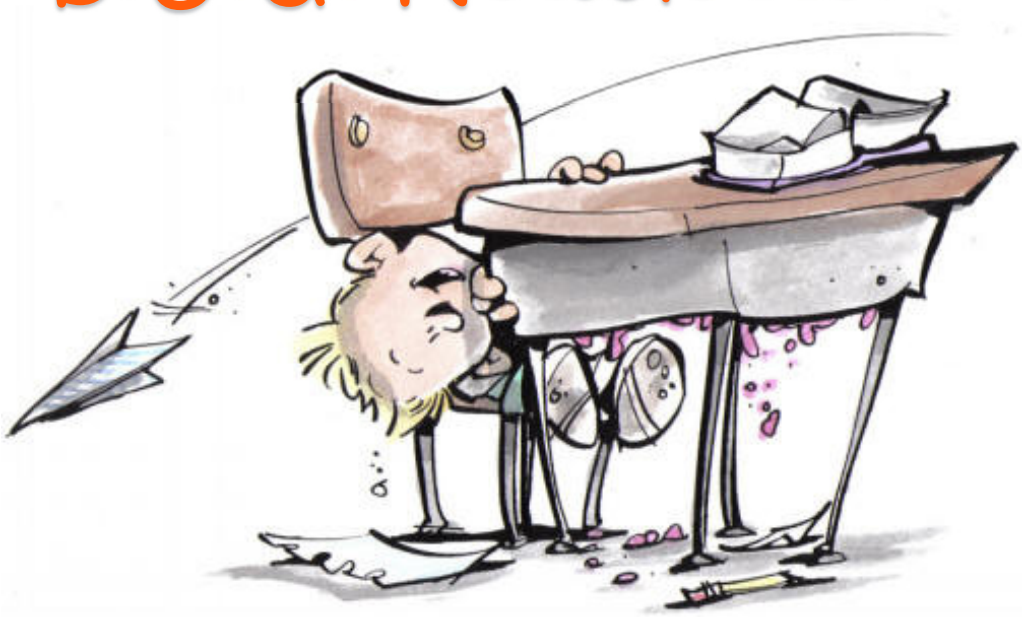
B.U.G. Newsletter



October 2014

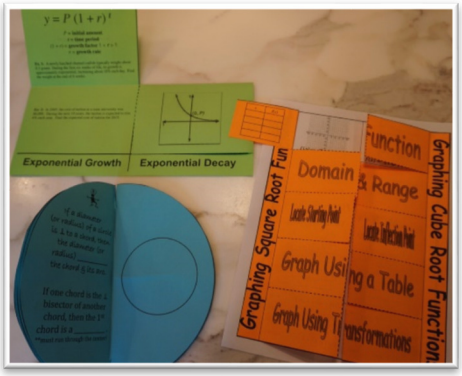
THIS NEWSLETTER IS A SERVICE THAT WAS FUNDED BY "NO CHILD LEFT BEHIND" TITLE II PART A HIGHER EDUCATION IMPROVING TEACHER QUALITY HIGHER EDUCATION GRANT ADMINISTERED THROUGH THE UNIVERSITY OF GEORGIA.

IN THIS ISSUE

We have reached halfway!

by Jennifer L. Brown

Can you believe it? We have reached the nine-week mark! Hopefully, your school has a fall break so you can recharge your batteries – at least for one day. You are on the downhill slide. When I was in the classroom, October and November flew by, and, before I knew it, it was December and final exam time. The theme for this month's activities is "Fun with Foldables". For this month, Unit 3 in Coordinate Algebra focuses on linear and exponential functions. The activity is a simple two-tab horizontal foldable for exponential growth and decay models. Inside the foldable (pictured in green) are the formulas and four example word problems. This topic is a great one to incorporate a variety of hands-on activities, whether it is with dice, M&Ms, or simulated technology via computer, internet, or graphing calculator. My students loved the "Survivor" activity where they were on a deserted island and exposed to a rare and deadly disease. By rolling the dice, students found out whether they contract the disease and die or survive to the next round. For Analytic Geometry, Unit 3 covers circles and volume. One of the most difficult parts of Geometry is all of those theorems. When I took Geometry in high school myself, they overwhelmed me. I used the various theorems that relate to circles and made this "circle book" foldable (pictured in blue). There is space for the students to fill-in the blank for the theorem, and a space is provided for the students to construct an example. The book can be difficult to make so I included step-by-step directions. In Advanced Algebra, Unit 3 tackles rational and radial relationships. When I taught the old QCC Algebra 2 course, these two concepts were quite difficult for the students because they were so abstract to them. Students that I have worked with at the college level who were taking College Algebra struggled with them, too. I created a foldable for graphing square root and cube root functions. The foldable (pictured in orange) incorporates the parent functions, domain and range, locating starting or inflection points, graphing with a table, and graphing with transformations. If you need hard copy examples of these foldables, please send me an email. I would be glad to send them to you via mail. Remember, if you need to modify the existing foldables, you can download the PowerPoint from my website.



Dr. Brown ☺

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Prior Knowledge

Unit 3 in Coordinate Algebra

- Know how to solve equations, using the distributive property, combining like terms, and equations with variables on both sides.
- Know how to solve systems of linear equations.
- Able to explain what a function is.
- Determine if a table, graph, or set of ordered pairs is a function.
- Distinguish between linear and non-linear functions.
- Write linear equations and use them to model real-world situations.

Unit 3 in Analytic Geometry

- The concepts of Area, Surface Area, and Volume of triangles, special quadrilaterals, and right rectangular prisms were introduced in the 6th Grade Unit 5.
- This knowledge was built on in the 7th Grade Unit 5 and expanded to include the slicing of right rectangular pyramids.
- The Volumes of Cones, Cylinders, and Spheres were previously covered in the 8th Grade Unit 3.

Unit 3 in Advanced Algebra

- Computation with fractions.
- Factoring polynomials.
- Solving linear and quadratic equations.

FOR MORE IDEAS AND ACTIVITIES

Bell's Useful Guide for Teachers

www.bugforteachers.com/crmc.html

Common Student Misconceptions

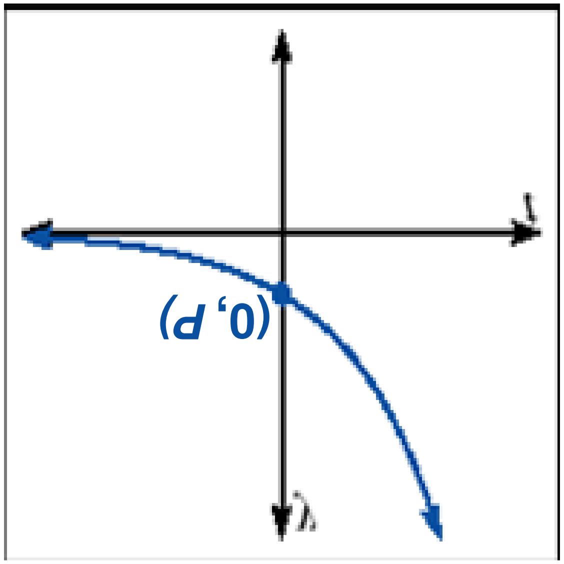
BY Jennifer L. Brown

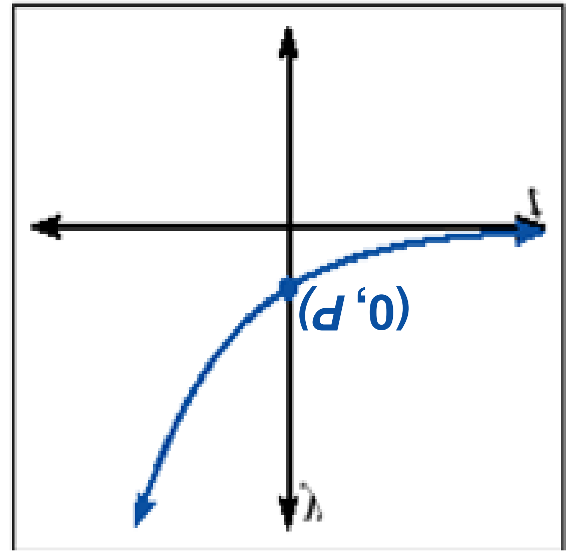
Geometry. When I taught the old QCC Geometry and the GPS Math II courses, I found that the students struggled with distinguishing between an inscribed angle and a central angle. Reviewing simple vocabulary is key to overcoming this obstacle. The students can make a foldable with notebook paper to write the term, define it, and draw a visual. Constructions with patty paper to illustrate angle measures will show the students there is a difference between the two types of angles. As a side note, here is a cute little song to the tune of "If You're Happy and You Know It" to remember the formulas for angle and arc measure relationships. In this unit, the students will have to learn about radians and how they relate to degree measures. This concept is quite difficult for students to understand beyond rote memorization. I am attaching "The Unit Circle Workout" to make the Unit Circle more concrete and kinesthetic for the students. You can vary the radian measures to repeat the "workout" across multiple days. In addition, you should try to switch back and forth between degree and radian measures once the students get the radian measures down pat.

> If the vertex is **ON** the circle, half the arc.
>
> If the vertex is **IN** the circle, half the sum.
>
> But if the vertex is **OUTSIDE**, then you're in for a ride
>
> Cause it's half of the difference anyway.

Algebra. From my experience, most, if not all, students struggle with graphing. They absolutely hate it! Along with graphing comes all of the characteristics, which are abstract for them. I spent a lot of time teaching and reviewing the characteristic vocabulary to help my students. I also used analogies like rollercoasters for increasing and decreasing. One misconception for the students is they do not realize that those characteristics apply to all functions. They seem to think they have to learning new characteristics with each function. When I was teaching in the high school setting, I tried to show my students that math concepts are universal in a variety of situations. If you use a "trick", make sure it works for all situations. As you move through the course content, show them how that "trick" works with each concept (e.g., factoring).

Above is my "foldable" organizer from my high school classroom. As we created the foldables, I posted them on the wall so I could reference them during later lessons.





Exponential Growth

$$y = P(1 + r)^t$$

P = initial amount
t = time period
$(1 + r)$ = growth factor $1 + r > 1$
r = growth rate

Ex. 1: A newly hatched channel catfish typically weighs about 0.3 grams. During the first six weeks of life, its growth is approximately exponential, increasing about 10% each day. Find the weight at the end of 6 weeks.

Ex: 2: In 2005, the cost of tuition at a state university was $6,000. During the next 10 years, the tuition is expected to rise 4% each year. Find the expected cost of tuition for 2015.

Exponential Decay

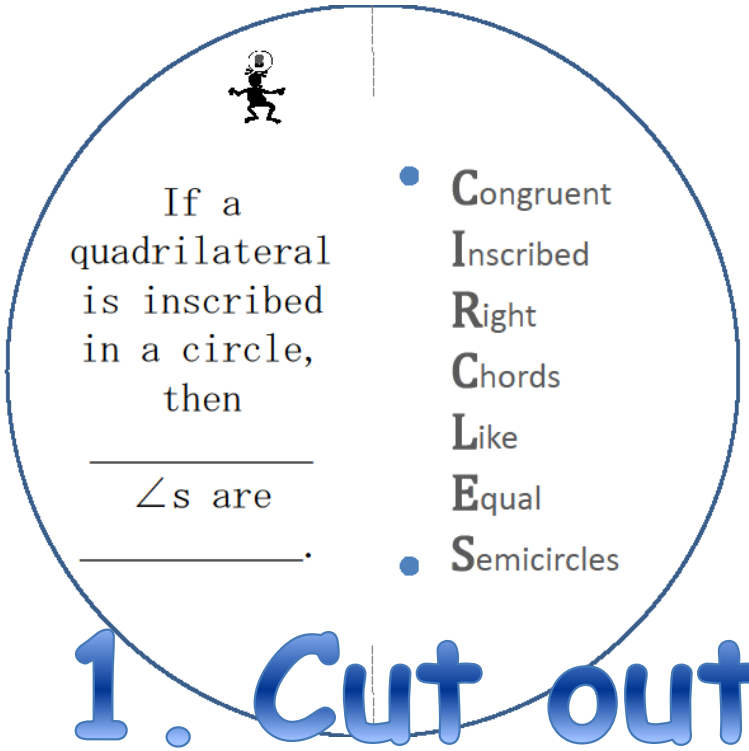
$$y = P(1 - r)^t$$

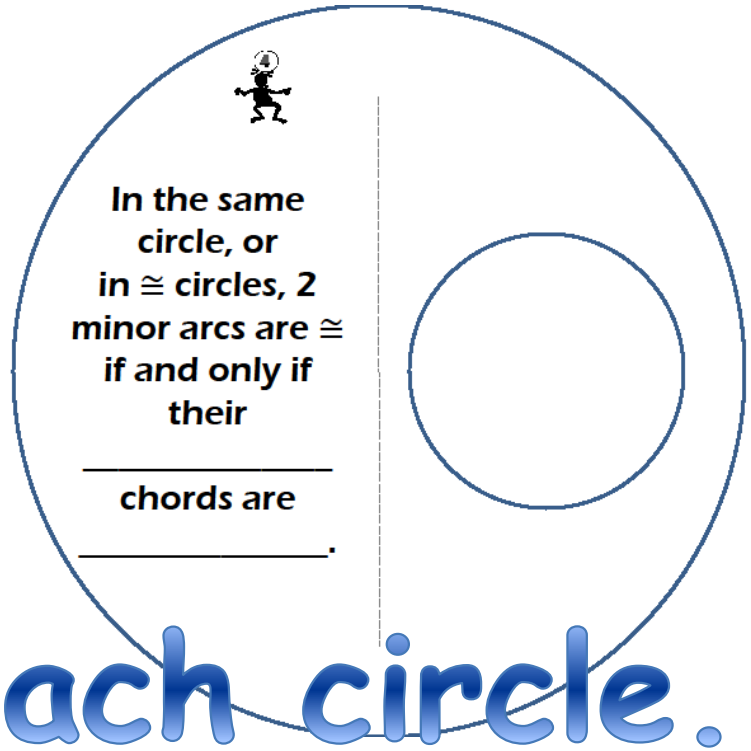
P = initial amount
t = time period
$(1 - r)$ = decay factor $0 < 1 - r < 1$
r = decay rate

Ex. 1: A certain car depreciates at a rate of 11% per year. It was purchased new in 2006 for $32,000. How much is the car worth today?

Ex. 2: A certain prescription drug is eliminated from the body at a rate of about 10% per hour. Predict the amount of a 250-milligram dose remaining in the body after 2 hours.

Circle Book





1. Cut out each circle.
2. Cut along the dotted lines ONLY!

(MCC9-12.G.C.2; MCC9-12.G.C.3; MCC9-12.G.C.4)

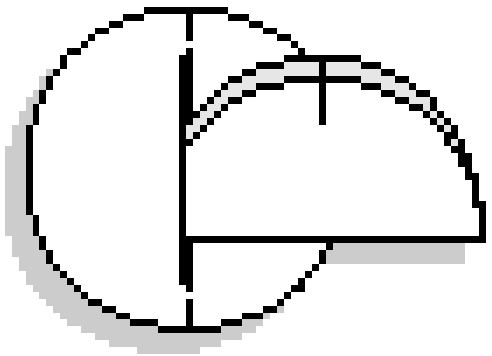
3. Group circles by dotted line pattern.

4. Order the pages:

3, 2, 1 5,4

5. Slide the 3 circles with slits on the ends through the large slit of the other 2 circles.

6. Write your name on it.



(MCC9-12.G.C.2; MCC9-12.G.C.3; MCC9-12.G.C.4)

If a quadrilateral is inscribed in a circle, then

_____

∠s are

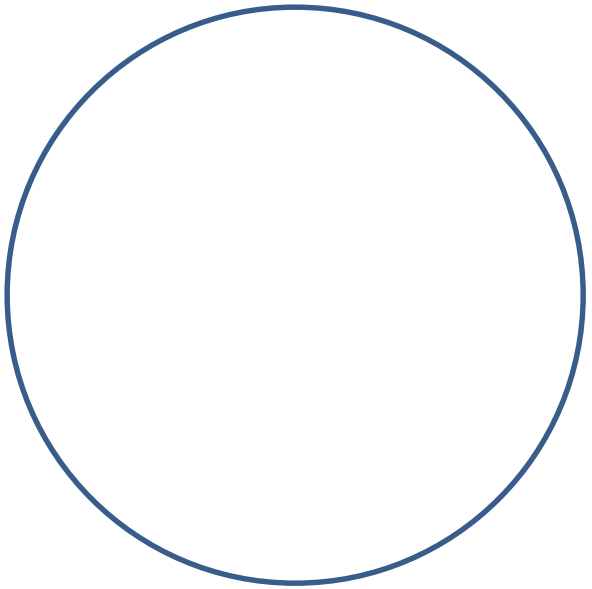
_____.

- **C**ongruent
- **I**nscribed
- **R**ight
- **C**hords
- **L**ike
- **E**qual
- **S**emicircles

If a line is tangent to a circle, then the line is

_____

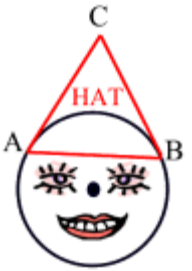
to the radius drawn at the point of tangency.

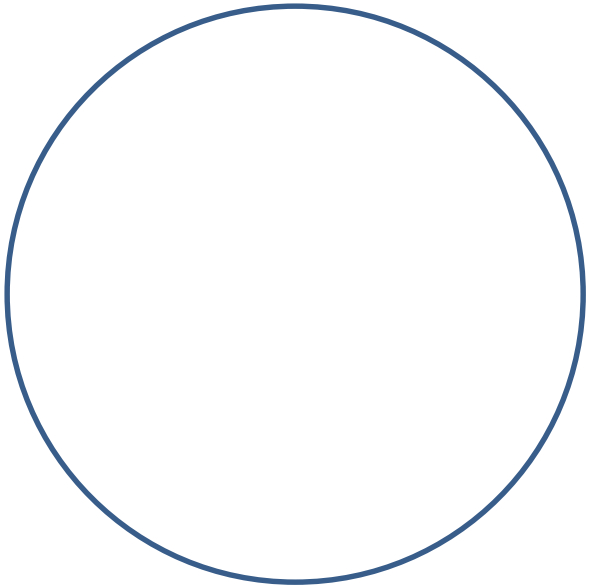


If 2 segments from the same exterior point are tangent to a circle, then they are

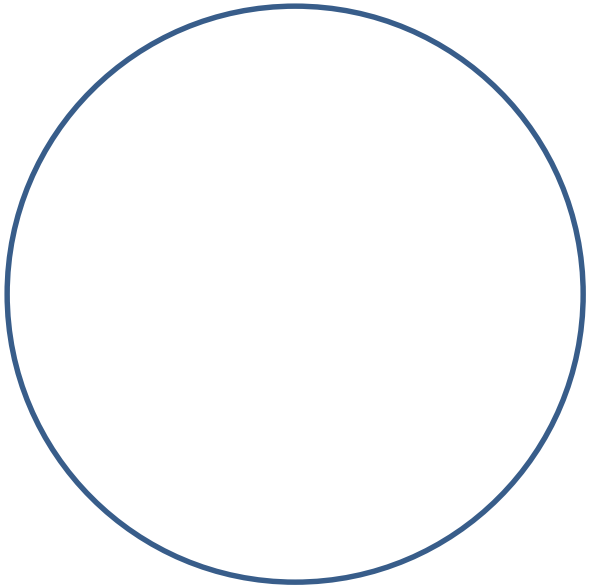
_____.

**Hat rule!





An ∠ inscribed in a semicircle is a _____.

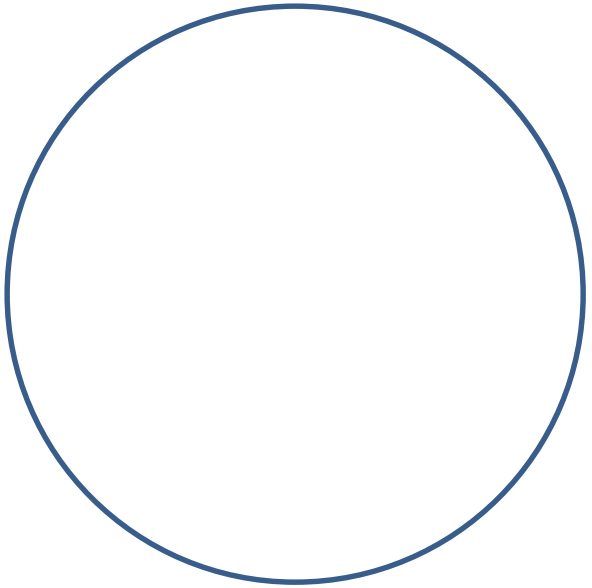


If a diameter (or radius) of a circle is ⊥ to a chord, then the diameter (or radius) _____ the chord & its arc.

If one chord is the ⊥ bisector of another chord, then the 1st chord is a _____ .

**must run through the center!

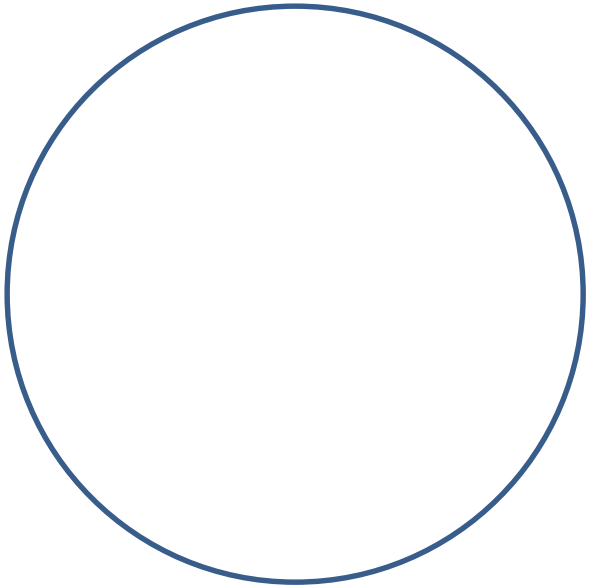
If 2 inscribed ∠s intercept the same arc, then they are _____.



In the same circle, or in ≅ circles, 2 chords are ≅ if and only if they are

_____

from the center.



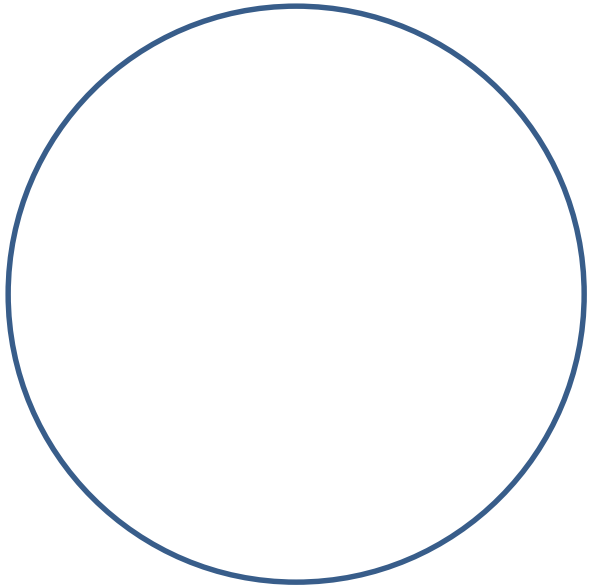
***Other tidbits*:**

* If 2 chords in a circle are ≅, then their 2 central ∠s are

_____.

*Parallel lines intercept

_____arcs on a circle.

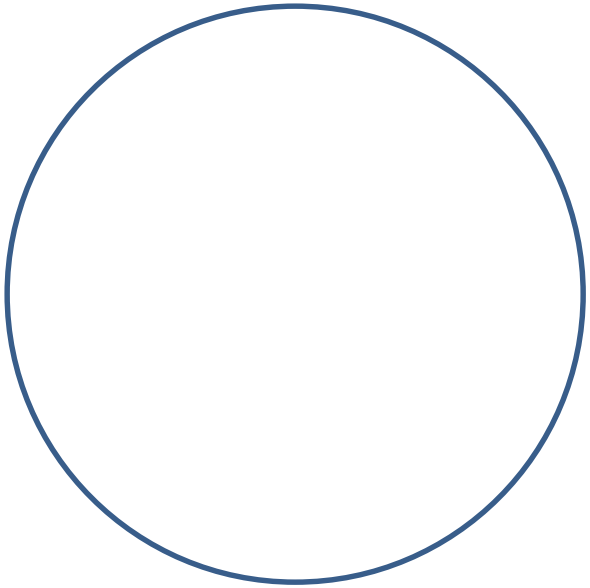


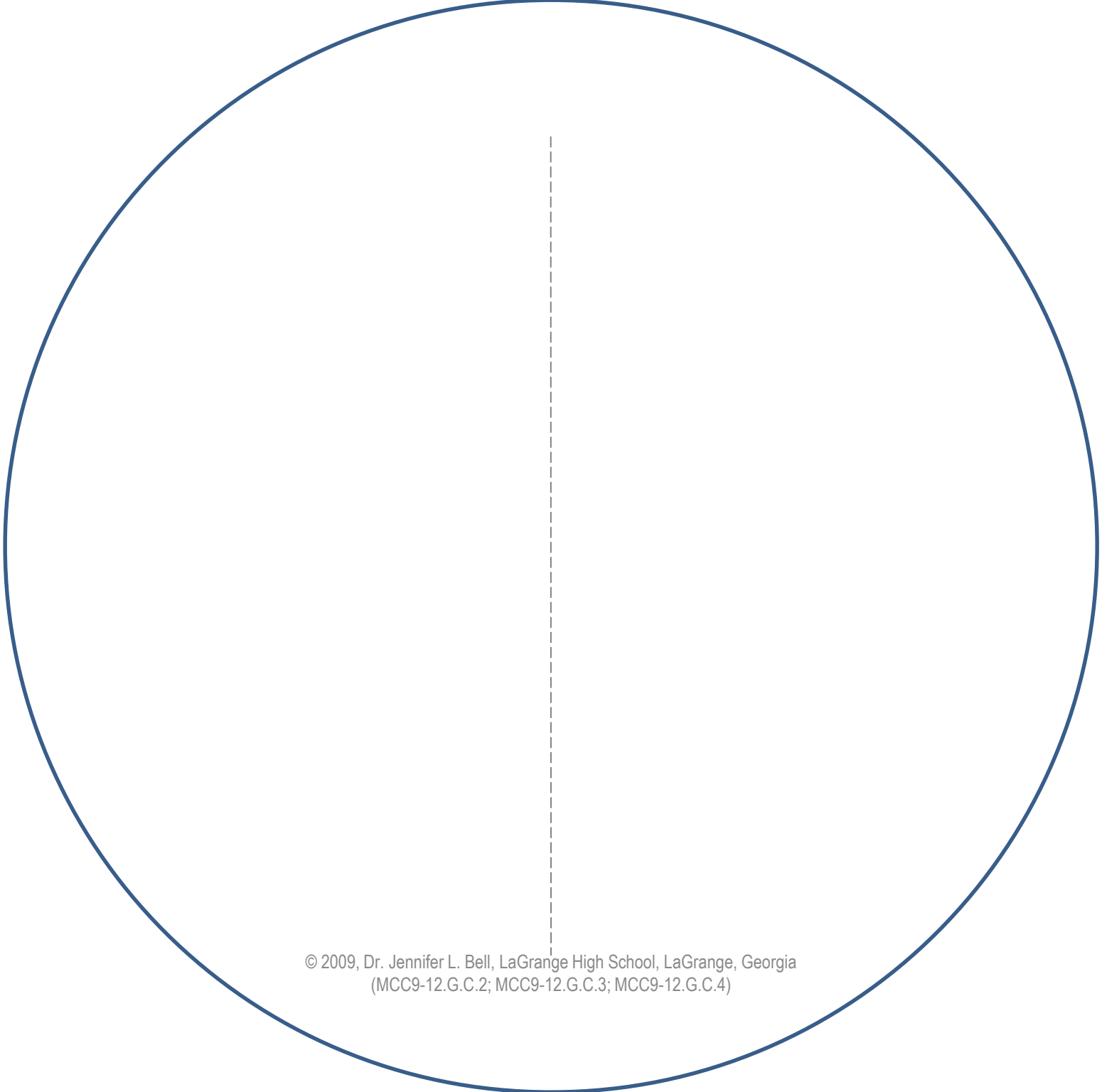
In the same circle, or in ≅ circles, 2 minor arcs are ≅ if and only if their

_____

chords are

_____.





(MCC9-12.G.C.2; MCC9-12.G.C.3; MCC9-12.G.C.4)

Graphing Square Root Functions

Parent Function

Domain & Range

Locate Starting Point

Locate Inflection Point

Graph Using a Table

Graph Using Transformations

Graphing Cube Root Functions

Place glue here.

x	$f(x)$

Place glue here.

x	$f(x)$

Place glue here.

Place glue here.

Place glue here.

$f(x) = \sqrt[3]{x-h}+k$

The inflection point is (____, ____).

Place glue here.

$f(x) = \sqrt{x-h}+k$

The starting point is (____, ____).

Place glue here.

Place glue here.

x	$f(x)$

Place glue here.

x	$f(x)$

Place glue here.

Place glue here.

$f(x) = \sqrt[3]{x}+k$ moves _____ k units

$f(x) = \sqrt[3]{x}-k$ moves _____ k units

$f(x) = \sqrt[3]{x-h}$ moves _____ h units

$f(x) = \sqrt[3]{x+h}$ moves _____ h units

Place glue here.

$f(x) = \sqrt{x}+k$ moves _____ k units

$f(x) = \sqrt{x}-k$ moves _____ k units

$f(x) = \sqrt{x-h}$ moves _____ h units

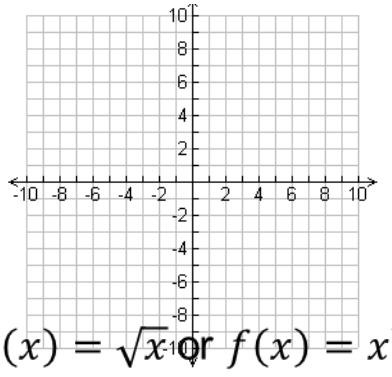
$f(x) = \sqrt{x+h}$ moves _____ h units

Place glue here.

Place square root tab here.

Place square root tab here.

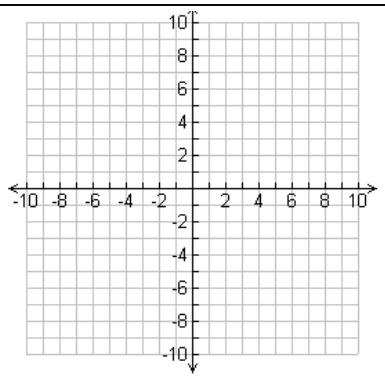
Place square root tab here.

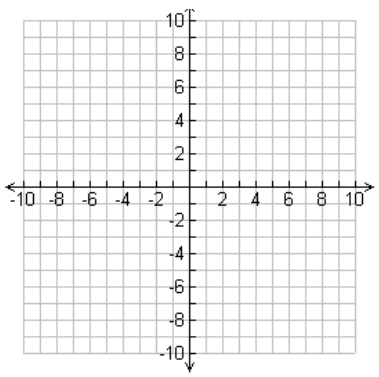


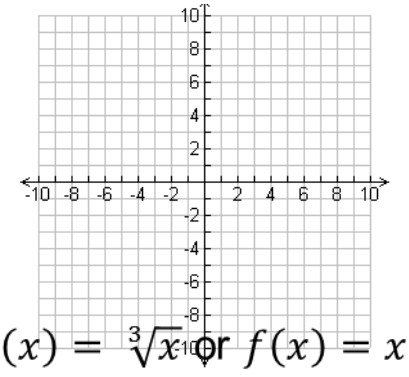
$f(x) = \sqrt{x}$ or $f(x) = x^{\frac{1}{2}}$

What is the domain?

What is the range?



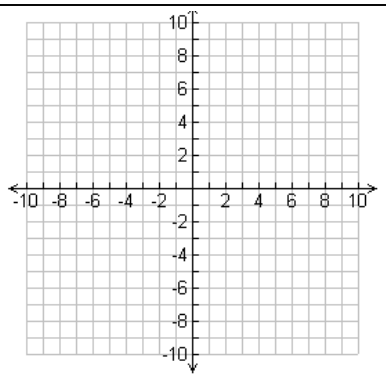


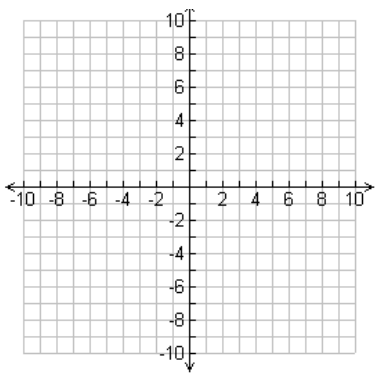


$f(x) = \sqrt[3]{x}$ or $f(x) = x^{\frac{1}{3}}$

What is the domain?

What is the range?



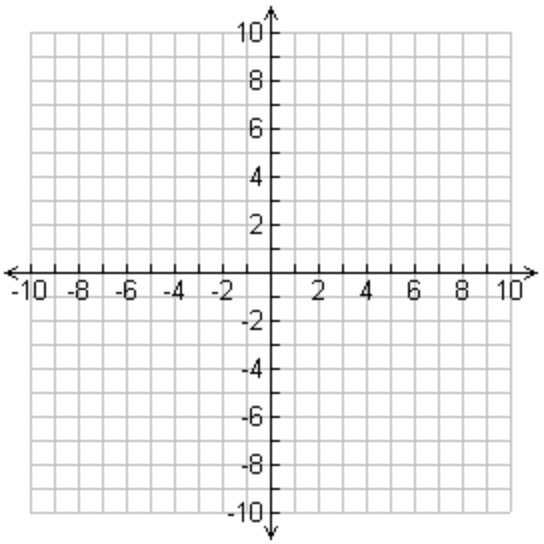


Place cube root tab here.

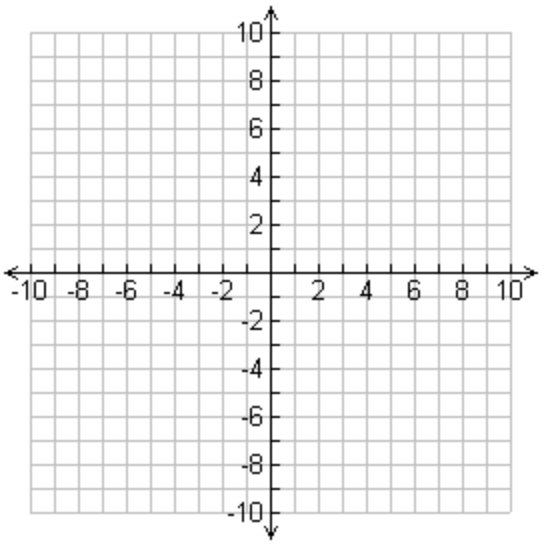
Place cube root tab here.

Place cube root tab here

x	$f(x)$



x	$f(x)$



(MCC9-12.F.IF.4; MCC9-12.F.IF.5; MCC9-12.F.IF.7b)

The Unit Circle Workout

Susan Cantey © 2008

Put your hands in the air; now move them to the right,
That's the positive x-axis; we're gonna move counter clockwise.
Are you ready for the Unit Circle Workout?

Zero, pi over six, pi over four, pi over three,
Pi over two, two pi over three, three pi over four, five pi over six,
Pi, seven pi over six, five pi over four, four pi over three,
Three pi over two, five pi over three, seven pi over four, eleven pi over six,
Two pi, two pi, two pi….

Put your hands back in the air, put 'em back to the right,
Still going counter clockwise, doing sine this time.

Zero, one half, root two over two, root three over two,
One, root three over two, root two over two one half,
Zero, negative one half, negative root two over two, negative root three over two,
Negative one, negative root three over two, negative root two over two, negative one half,
Zero, zero, zero.

One, root three over two, root two over two, one half,
Zero, negative one half, negative root two over two, negative root three over two,
Negative one, negative root three over two, negative root two over two, negative one half,
Zero, one half, root two over two, root three over two, one, one, one, we're done.

This is the last one; we're gonna do it double time,
Arms out to the side; gonna shoot to the sky,
Tangent…double time!

Zero, one over root three, one, root three,
Undefined, negative root three, negative one, negative one over root three,
Zero, one over root three, one, root three,
Undefined, negative root three, negative one, negative one over root three,
Zero, zero, zero, zero, now we're done