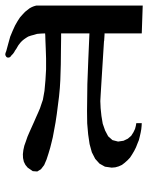# Discovering

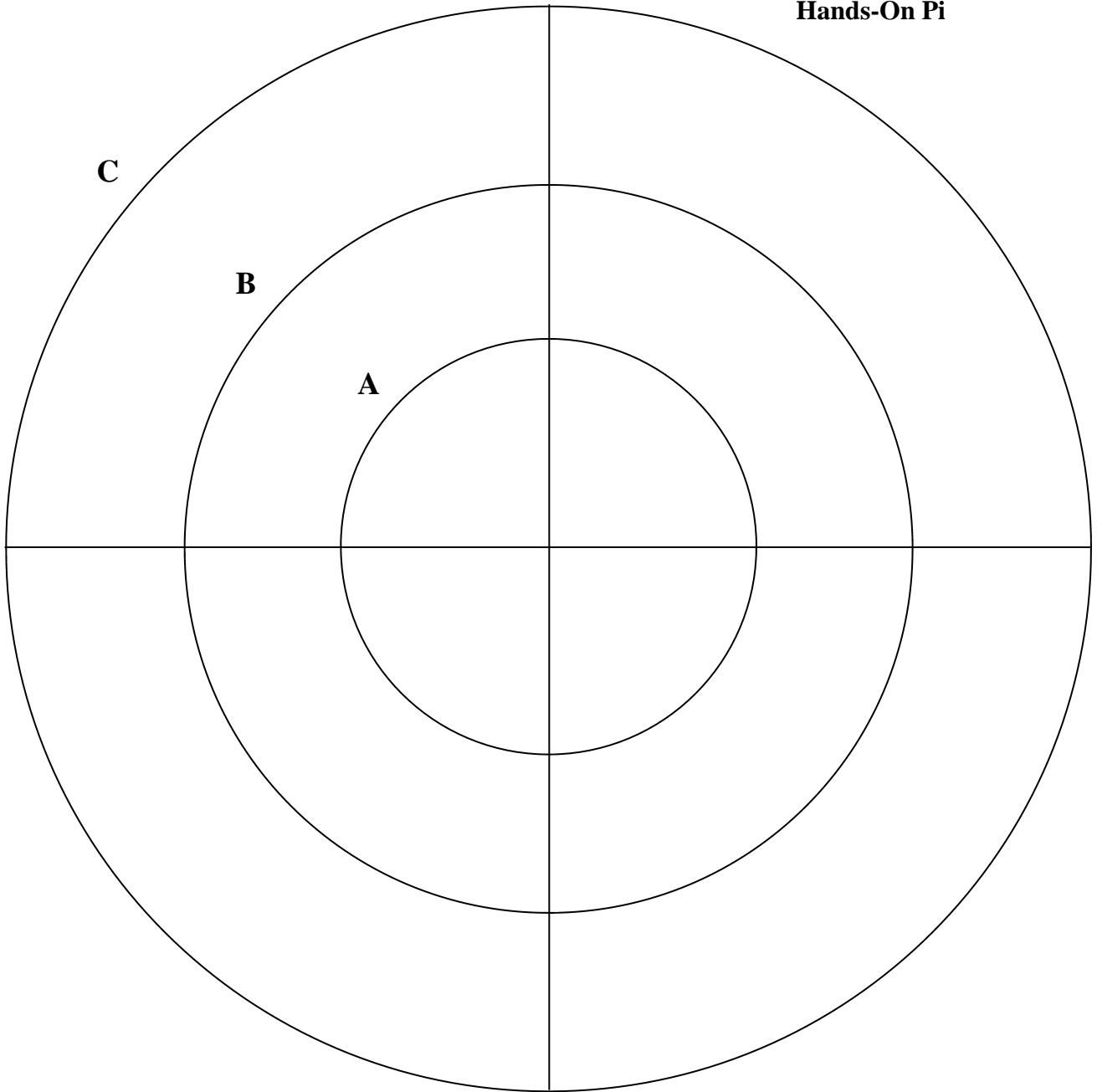# Pi Day

π Discovering Pi

C

B

A

Use **string** and a **ruler** to measure in millimeters. Round the division answer to the **hundredths** place.

Circle A: Circumference: _____   Diameter: _____   Circumference ÷ Diameter = _____

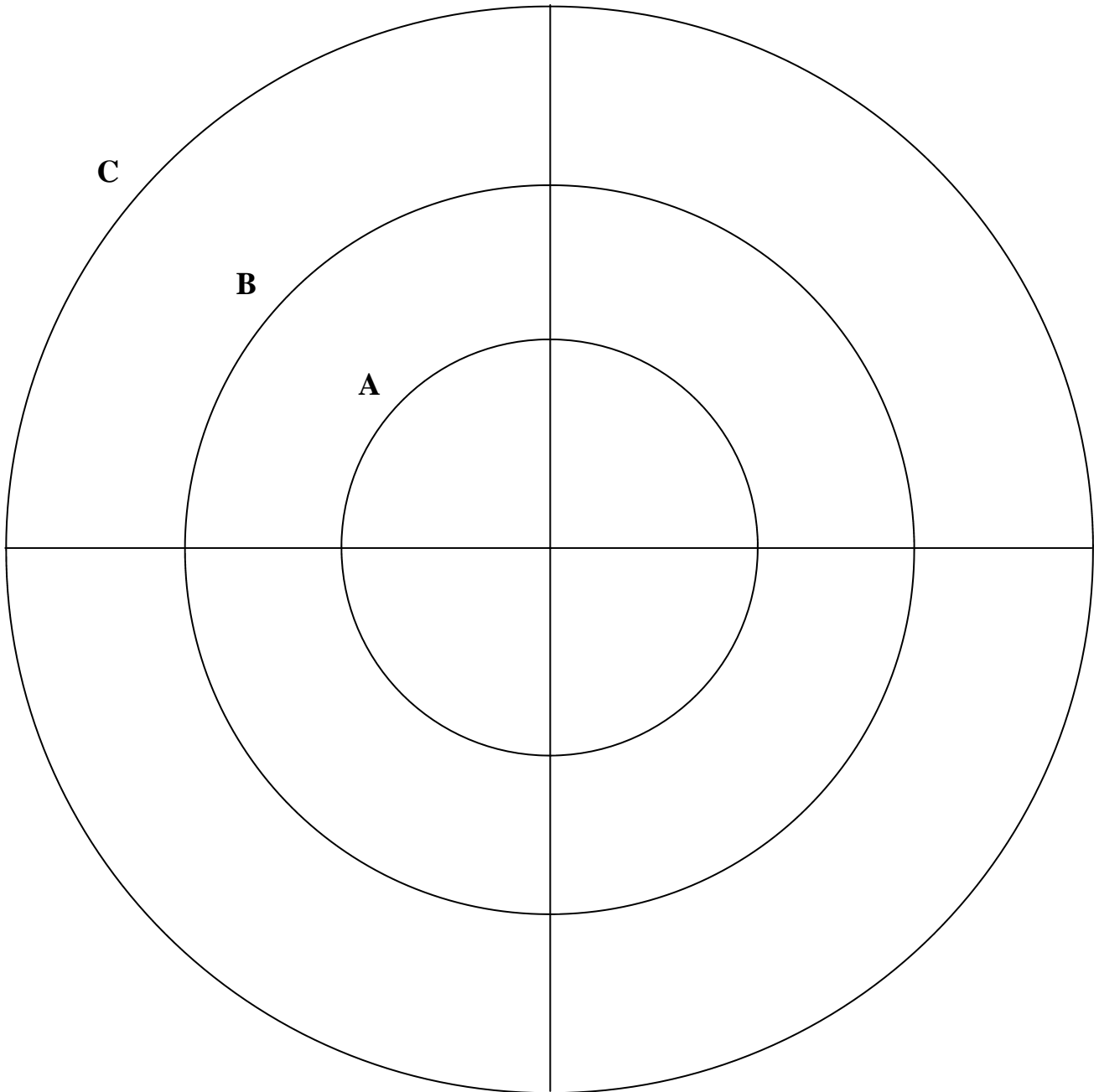Circle B: Circumference: _____   Diameter: _____   Circumference ÷ Diameter = _____

Circle C: Circumference: _____   Diameter: _____   Circumference ÷ Diameter = _____

π © Digital Lesson.com

Use **string** and a **ruler** to measure in millimeters. Round the division answer to the **hundredths** place.

Circle A: Circumference: **210mm**   Diameter: **66mm**   Circumference ÷ Diameter = **3.18**

Circle B: Circumference: **365mm**   Diameter: **115mm**   Circumference ÷ Diameter = **3.17**

Circle C: Circumference: **540mm**   Diameter: **171mm**   Circumference ÷ Diameter = **3.16**

π © Digital Lesson.com

π Discovering Pi

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Pi Basics

Pi is a number that expresses the constant ratio of the circumference of a circle to its diameter. The Greek letter π is used to represent this ratio. Pi is an infinite decimal. Since its digits never repeat in a pattern and never end it is called an irrational number. The decimal 3.14 and the fraction 22/7 are frequently used approximations of pi.

Ancient civilizations discovered the concept of pi thousands of years ago. Since then people have worked hard to calculate as many digits of pi as they were able. In the eighteenth and nineteenth centuries pi was successfully calculated to hundreds of digits. In the twentieth century, thanks to computers, pi has been calculated to billions and even trillions of digits.

Pi Day is often celebrated on March 14 (3.14) with some celebrations beginning at 1:59 (3.14159). On Pi Day students can participate in a number of pi-related activities. Enter "pi" or "Pi Day" into an internet search engine and you will find pi history, pi jokes, pi poems, pi facts, and other pi activities. Bring some in to share with your class!

One pi joke by John Evans goes like this:
　　Q: What do you get if you divide the circumference of a jack-o-lantern by its diameter?
　　A: _____

While it is interesting to know that the **circumference of a circle divided by its diameter always equals pi**, there are several practical uses for pi. Pi can be used to find the circumference and the area of a circle. It is also used in more advanced mathematical studies.

Pi is used to find the circumference of a circle. The formula for the circumference of a circle is $C=2\pi r$ or $C=\pi d$, where r is the radius of the circle and d is the diameter of the circle. These two formulas are similar since two times the radius is equal to the diameter. Using 3.14 for pi, what would be the approximate circumference of a circle with a diameter of 5 feet? Show your equation and answer on the line that follows.

_____

Pi is also used to find the area of a circle. The formula for the area of a circle is $A=\pi r^2$. Using 3.14 for pi, what is the approximate area of a circle with a radius of 4 inches? Show your equation and answer on the line that follows.

_____

The first 100 digits of pi are 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510
　　　　　　　　　　　　　　　　58209 74944 59230 78164 06286 20899 86280 34825 34211 70679

Now that you've had a **piece of pi** you can share some with others! Share some of the pi jokes, songs, facts or history that you have found in your research of pi.

π Discovering Pi

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One pi joke by John Evans goes like this:
    Q: What do you get if you divide the circumference of a jack-o-lantern by its diameter?
    A: **Pumpkin pi.**

While it is interesting to know that the **circumference of a circle divided by its diameter always equals pi**, there are several practical uses for pi. Pi can be used to find the circumference and the area of a circle. It is also used in more advanced mathematical studies.

Pi is used to find the circumference of a circle. The formula for the circumference of a circle is $C=2\pi r$ or $C=\pi d$, where r is the radius of the circle and d is the diameter of the circle. These two formulas are similar since two times the radius is equal to the diameter. Using 3.14 for pi, what would be the approximate circumference of a circle with a diameter of 5 feet? Show your equation and answer on the line that follows.
            C = 3.14 x 5   so   C = 15.7 ft.

Pi is also used to find the area of a circle. The formula for the area of a circle is $A=\pi r^2$. Using 3.14 for pi, what is the approximate area of a circle with a radius of 4 inches? Show your equation and answer on the line that follows.
            A = 3.14 x 4^2 = 3.14 x 16 = 50.24 in.^{2}

The first 100 digits of pi are 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510
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Now that you've had a **piece of pi** you can share some with others! Share some of the pi jokes, songs, facts or history that you have found in your research of pi.

Lesson Description: Discovering Pi is a lesson designed to give students a hands-on experience that will help them truly grasp the concept of pi. The students use string and a ruler to measure the circumference and diameter of three different circles. They then calculate the ratio of circumference to diameter, perhaps not realizing that they are really calculating pi. Students also read and complete the Pi Basics sheet. Finally, if you celebrate Pi Day on March 14th, have students share pi jokes, pi songs, pi facts, and pi history before EATING PIE. Of course students love this last part!!

Math Content: Pi, Area of a Circle, Circumference of a Circle, Millimeter Measurement

Time Required: 1-2 Class Periods (Celebrate Pi Day on March 14th!!)

Discovering Pi includes:
* 1 Discovering Pi Hands-On worksheet and 1 Hands-On answer key
* 1 Discovering Pi Basics sheet and 1 Basics answer key
* 2 Discovering Pi Teacher Tips pages
* 1 Discovering Pi Cover Page

Materials Needed: String, Metric Rulers, Pie (optional), and Pi Day research, jokes, songs, etc.

Suggested Grade Level: 5th - 8th

Teacher Testimonial:
Pi Day (March 14) was one of the biggest hits with my students last year! We learned about pi, told pi jokes, sang pi songs (that's a first in my math class!), and learned pi facts and pi history. Best of all, WE ATE PIE!! The students learned how to find the circumference and area of a circle. They also learned where pi comes from. Most importantly, we created a special day to have fun while we were learning. I believe that many of my students will remember March 14th in a special way from now on.

Teacher Tips:
* Have students complete the Hands-On Pi worksheet the day before Pi Day. Then have them do the Pi Basics worksheet for homework. Also, tell them in advance if you will give extra credit for Pi Day jokes, songs, facts, history, etc.
* Use string that does not fray or come apart if at all possible on the Hands-On Pi worksheet. Teach students to mark the string and then measure it using their ruler.
* Try the Hands-On Pi worksheet measurements yourself, ahead of time. You will be better prepared to help the students and to anticipate measurement questions. Make sure students understand that each centimeter on the ruler is actually 10 millimeters and that these measurements are done in millimeters. Help them to see that when they divide the circumference by the diameter they should have gotten close to pi (3.14). Discuss the fact that their calculations will not be exact, or even the same as another student's, since the measurements are not exact.

Teacher Tips (continued):

* On Pi Day use the beginning of the period to correct the Hands-On Pi and Pi Basics worksheets. Then allow students to share what they have learned about Pi. I gave extra credit to my "Pi Singers" or just let them eat first! You might even have a contest for the student that can memorize the most digits of pi.
* The end of the period should be for eating pie! I collected pies from students in the morning in the school cafeteria so they could be refrigerated. Some classes brought in 10 pies for a class of 33 students. It was a bit of a chore cutting all of that pie in the 15 minutes or so that were left in the period, but the students really enjoyed it! I have 3 or 4 students start cutting the pies ahead of time. Make sure to have several pie servers.
* Invite other staff members or administration over for a song, a joke, and a piece of pie.
* The web links below will give you other great ideas for your pi day celebration.
* There is nothing about eating pie on the handouts in case you want to celebrate Pi Day without the pie or want to do this activity on another day.

Pi Links: (Below are some links that have lots of pi information and activities for Pi Day.)
http://www.joyofpi.com/
http://www.joyofpi.com/pilinks.html
http://www.exploratorium.edu/learning_studio/pi/
http://mathforum.org/t2t/faq/faq.pi.html
http://www.mathwithmrherte.com/pi_day.htm
http://www.ga.k12.pa.us/academics/MS/PiDay/
http://www.winternet.com/~mchristi/piday.html

Pi Book: (This is an excellent book filled with fun facts, history, and the **first million** digits of pi!)
The Joy of Pi by David Blatner

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