Diameter or Radius of a Circle
Given Circumference

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Learning Objectives

In this concept, you will learn to find the diameter or radius of a circle given the circumference.

Marcus is helping his coach design an obstacle course for the weekend’s fitness tournament. They dug a circular water pit with a circumference of 18 feet. Marcus has to cut a balance beam that the students will use to cross the pit. The beam is going across the center of the pit. How can Marcus determine how long the balance beam should be to cover the diameter of the pit?

In this concept, you will learn to find the diameter or radius of a circle given the circumference.

Finding the Diameter or Radius

The circumference of a circle is equal to pi times the diameter.

\[ C = \pi d \]

The diameter is two times the radius, so the equation for the circumference of a circle using the radius is two times pi times the radius.
If you are given the circumference but not the radius or the diameter, you can still solve for one or the other using these formulas. 
Let’s look at an example.

Find the diameter of a circle with a circumference of 21.98 feet.
To work on this problem, you will need the formula for finding the circumference of a circle using the diameter.

\[ C = \pi d \]

First, fill in the given information.

\[ 21.98 = (3.14)d \]

Next, solve the problem by dividing both sides by 3.14. The 3.14 will cancel out on the right side of the equation, leaving \( d \). Then divide 21.98 by 3.14.

\[
\begin{align*}
3.14 & \mid 21.98 \\
7 & \quad \quad \quad \\
314 & \mid 2198 \\
7 & \\
\end{align*}
\]

When dividing decimals, move the decimal point two places to make the divisor a whole number then divide as usual.

The answer is, the diameter is 7 feet.
You can use the same approach to solving for the radius as you did the diameter. Just remember to divide the diameter by two to get the radius.
If you were asked to find the radius instead of the diameter, you would simply divide 7 feet by 2 because the radius is one-half the measure of the diameter.
The radius of the circle is 3.5 feet.
You can also use the circumference and radius equation.

### Practice Long Division

You may use this tool to practice long division if you need a refresh on the process:

[URL: http://www.ck12.org/flx/render/embeddedobject/255749]

### Examples

#### Example 1

Earlier, you were given a problem about Marcus and the obstacle course.

The circumference of the circular water pit is 18 feet. How can Marcus use this information to determine how long the beam needs to be to go across the center of the pit? Marcus needs to figure out the diameter of the pit.

He will need to use the formula for finding the circumference of a circle using the diameter.

\[ C = \pi d \]

First, fill in the given information.

\[ 18 = (3.14)d \]

Next, solve the problem by dividing both sides by 3.14. The 3.14 will cancel out on the right side of the equation, leaving \( d \). Then divide 18 by 3.14.

\[
\begin{array}{c|c}
3.14 & 18.00 \\
\hline
& \\
\end{array}
\]

When dividing decimals, move the decimal point two places to make the divisor a whole number then divide as usual.
The diameter is 5.72 feet, so the beam needs to be at least that long.

**Example 2**

Use the equation for the circumference of a circle to answer the following question.

What is the radius of a circle with a circumference of 34.54 feet?

To work on this problem, you will need the formula for finding the circumference of a circle using the diameter.

\[
C = \pi d
\]

First, fill in the given information.

\[
34.54 = (3.14)d
\]

Next, solve the problem by dividing both sides by 3.14. The 3.14 will cancel out on the right side of the equation, leaving \(d\). Then divide 34.54 by 3.14.

\[
3.14 \div 34.54
\]

When dividing decimals, move the decimal point two places to make the divisor a whole number then divide as usual.

\[
11
\]

\[
314 \div 3454
\]

The diameter of this circle is 11 feet.

Then, because the radius is half of the diameter, divide the diameter by 2.

\[
\frac{11}{2} = 5.5
\]

The radius of this circle is 5.5 feet.
Example 3

Find the diameter given the circumference.

\[ C = 31.4 \text{ m} \]

To work on this problem, you will need the formula for finding the circumference of a circle using the diameter.

\[ C = \pi d \]

First, fill in the given information.

\[ 31.4 = (3.14)d \]

Next, solve the problem by dividing both sides by 3.14.

\[
\begin{array}{c|c c c c c c}
& & & & & \downarrow & \\
\text{314)} & 314 & \downarrow & 0 & \downarrow & \downarrow & \\
& & & & 314 & \downarrow & \\
\end{array}
\]

The diameter of this circle is 10 m.

Example 4

Find the diameter given the circumference.

\[ C = 28.26 \text{ in} \]

To work on this problem, you will need the formula for finding the circumference of a circle using the diameter.

\[ C = \pi d \]

First, fill in the given information.

\[ 28.26 = (3.14)d \]

Next, solve the problem by dividing both sides by 3.14.

\[
\begin{array}{c|c c c c c c}
& & & & & \downarrow & \\
\text{314)} & 2826 & \downarrow & 9 & \downarrow & \downarrow & \\
& & & & 2826 & \downarrow & \\
\end{array}
\]
The diameter of this circle is 9 inches.

Example 5

Find the diameter given the circumference.

\[ C = 23.55 \text{ in} \]

To work on this problem, you will need the formula for finding the circumference of a circle using the diameter.

\[ C = \pi d \]

First, fill in the given information.

\[ 23.55 = (3.14)d \]

Next, solve the problem by dividing both sides by 3.14.

\[ \frac{23.55}{3.14} = d \]

\[ d = 7.5 \]

The diameter is 11 inches.

Review

Find the diameter of each circle given the circumference.

1. \( C = 37.68 \text{ in.} \)
2. \( C = 40.82 \text{ in.} \)
3. \( C = 18.84 \text{ in.} \)
4. \( C = 28.26 \text{ ft.} \)
5. \( C = 56.52 \text{ m.} \)
6. \( C = 17.27 \text{ m.} \)
7. \( C = 19.468 \text{ ft.} \)
8. \( C = 30.772 \text{ ft.} \)

Find the radius of each circle given the circumference.

9. \( C = 25.2 \text{ in.} \)
10. \( C = 37.68 \text{ in.} \)
11. \( C = 12.56 \text{ in.} \)
12. \( C = 15.7 \text{ ft.} \)
13. \( C = 7.85 \text{ m.} \)
14. \( C = 50.24 \text{ m.} \)
15. \( C = 21.98 \text{ m.} \)
16. \( C = 14.13 \text{ ft.} \)

**Review (Answers)**

To see the Review answers, open this PDF file and look for section 10.7.

**Resources**

1. Funk Dooby. https://www.flickr.com/photos/funkdooby/15247621938/in/photolist-peo3Mq-dVyr2Z-8U5cfF-fzKmNgT-pe3Gdg-btNMYh-9u3LZs-6ng6s-pneg3v-peo2Jy-peprZV-pepZ6n-pvTEUD-pvQX71-pvSqKZ-pwijBo-pw3LjK-pvA3pK-ptyb3-pvUaKz-penMXC-penxl0-pvfp4a-pvftwi-pvzW8g-pvx9q2-fNHRqg-cVkrq-kqJ83x-j2vhvk-a61GjF-8zwQbw-a64xos-s2hYyV-ePgCR4-8Y32jW-cCUhdu-cCUpCo-cCUsgA-7LRi7h-cCUjzU-cCUmYW-cCVhlL-s2ieba-ejM2Hs-cCVe0L-6V2Ym-cDdY6W-s29PiW-orYdh9;https://www.flickr.com/photos/funkdooby/15243845607/in/photolist-pe3Gdg-btNMYh-9u3LZs-6ng6s-pneg3v-peo2Jy-peprZV-pepZ6n-pvTEUD-pvQX71-pvSqKZ-pwijBo-pw3LjK-pvA3pK-ptyb3-pvUaKz-penMXC-penxl0-pvfp4a-pvftwi-pvzW8g-pvx9q2-fNHRqg-cVkrq-kqJ83x-j2vhvk-a61GjF-8zwQbw-a64xos-s2hYyV-ePgCR4-8Y32jW-cCUhdu-cCUpCo-cCUsgA-7LRi7h-cCUjzU-cCUmYW-cCVhlL-s2ieba-ejM2Hs-cCVe0L-6V2Ym-cDdY6W-s29PiW-orYdh9-oavBPg-fFF6hZ-bTxCC9c-s2bMVo . publicdomain