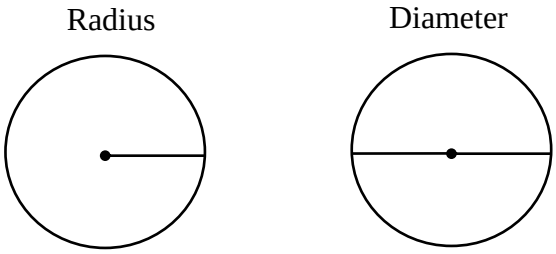
GEOMETRY: CIRCLES

Lesson 1 Area & Circumference of Circles

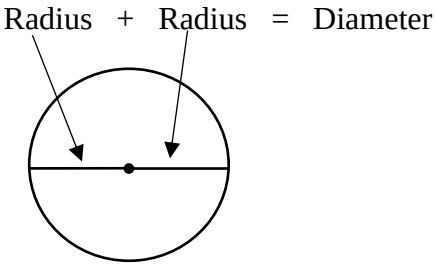
1. Radius and Diameter

What is a circle?
We all know what a circle is, but what is the definition used in Geometry? It is a shape formed by of all the points that are the same distance from the center point of the circle.

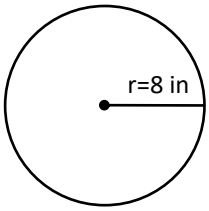
Radius and Diameter
The radius of a circle is a line segment from the center of the circle to edge of the circle. The diameter of a circle is a straight line segment through the center point of the circle with endpoints on the edge of the circle. A diameter cuts a circle into two equal halves.



What is the relationship between a radius and a diameter?
Notice that you can think of the diameter of a circle as two radiuses.

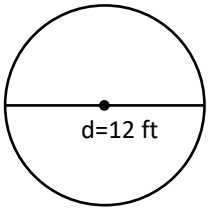


The length of the diameter is 2 x the length of the radius.
If a problem gives you the length of the radius, you can calculate the length of the diameter.



If radius = 8, then diameter is 2 x 8 = 16.

The length of the radius is half the length of the diameter.
If a problem gives you the length of the diameter, you can calculate the length of the radius.



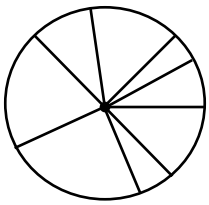
If diameter = 12, then radius is ½ x 12 = 6.

TIP – If you have trouble remembering which is the radius and which is the diameter, remember that the radius is shorter than the diameter, and the word ***radius*** is also shorter than the word ***diameter***.

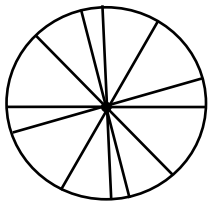
How many radiuses does a circle have?
How many diameters does a circle have?
A circle has an infinite number of radiuses and diameters.

Any line segment from the center of a circle to the edge of the circle is a radius of that circle.
Any line segment from one edge of the circle through the center to the other edge of the circle is a diameter of that circle.

8 Radiuses



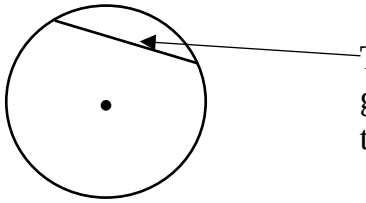
6 Diameters



Think about it – How else could the diagram showing a circle with 6 diameters be labeled?

It could also be labeled 12 radiuses, because each diameter is made up of 2 radiuses.

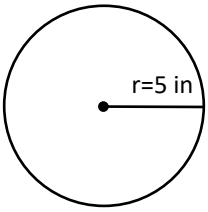
Note that not every line connecting two points on the edge of a circle is a diameter. The line must go through the center of the circle to be a diameter.



This is not a diameter because it does not go through the center of the circle. This type of line segment is called a chord.

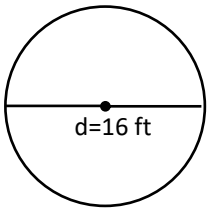
Practice One *Answers – p. 13*

For each circle below, state the radius and diameter.



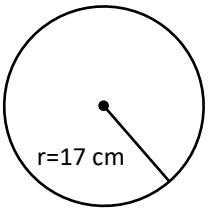
1. Radius = _____

Diameter = _____



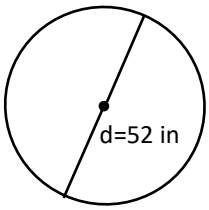
2. Radius = _____

Diameter = _____



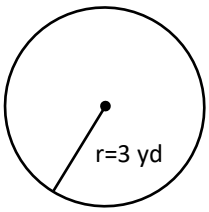
3. Radius = _____

Diameter = _____



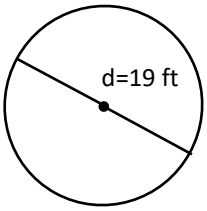
4. Radius = _____

Diameter = _____



5. Radius = _____

Diameter = _____



6. Radius = _____

Diameter = _____

2. CIRCUMFERENCE

The distance around the edge of a circle is called the circumference. This is the same idea as the perimeter of a rectangle or square, but for circles it is called circumference.

To calculate the circumference of a circle, use the formula:
Circumference = 2π(radius) which means 2 x π x radius

The symbol π is the Greek letter pi. It is a constant that always has the value of 3.14. You can enter 3.14 on your calculator, or you can press the EXP key next to the = sign and the value of pi is displayed.

Circumference = 2π(radius) is often written as **C = 2πr**.
On the HiSET formula sheet, it will be provided as Circumference = 2π(radius).

Example 1
What is the approximate circumference of a circle that has a radius of 8 feet?

C = 2πr Write out the formula.
C = 2(3.14)(8) Substitute the values for pi and radius.
C = 50.24 Calculate.
Answer: 50 feet

Example 2
What is the approximate circumference of a circle with a diameter of 30 inches?

Notice that the formula requires the radius, but the problem gives you diameter. Since you know that the radius is half of the diameter, the radius is ½ x 30 = 15.

C = 2πr Write out the formula.
C = 2(3.14)(15) Substitute the values for pi and radius (½ x diameter).
C = 94.2 Calculate.
Answer: 94 inches

NOTE – A very common mistake with this problem would be to enter 30 into the formula, instead of 15. Be aware that the circumference formula requires the radius, but the problem may provide either the diameter or the radius.

Alternate Circumference Formula
You may have noticed that: **C = 2πr** could also be written as **C = πd**
This is because we know that 2 x radius is the same as diameter. **C = 2πr = πd**

We will stick with Circumference = 2π(radius) because that is the way you will see it on the formula sheet for the HiSET Math Test, but both C = 2πr and C = πd are correct.

Example 3

What expression could you use to calculate the circumference of a circle with a radius of 16 miles?

A. 16π B. $8\pi^2$ C. 32π D. $16\pi^2$ E. 8π

Notice that you need an expression answer, and that all the answer choices include the π symbol.

$C = 2\pi r$ Write out the formula.
$C = 2(\pi)(16)$ Substitute the value for radius.
Don't substitute 3.14 for π, because π appears in all the answer choices.
$C = 32\pi$ Calculate.

Answer: C. 32π

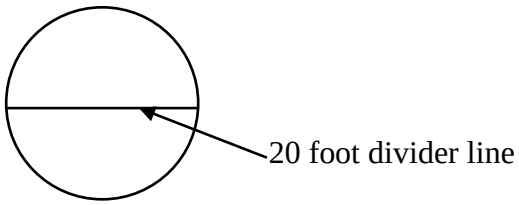
Example 4

A circular garden has a 20 foot long straight divider line across the center to separate the flowers from the vegetables. About how many feet is the distance around the edge of the garden?

A. 31 ft B. 40 ft C. 50 ft D. 63 ft E. 36 ft

In a problem like this there is no mention of radius, diameter, or circumference, so you have to realize that since you are asked to calculate the distance around the edge of a circle, this is a problem where you need to calculate circumference.

If you're not sure what to do, just like in any geometry problem, start by drawing a picture.



$C = 2\pi r$ Write out the formula.
$C = 2(3.14)(10)$ Substitute the values for pi and radius (½ x diameter).
$C = 62.8$ Calculate.

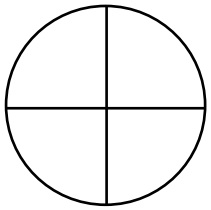
Answer: D. 63 ft

NOTE– you know that the divider line is a diameter of the circle because the problem tells you that it goes across the center of the circle.

Example 5

The circle shown below is divided into 4 equal sections. If the circumference is 44 inches, about how long is each of the four divider lines that go from the center of the circle to the edge of the circle?

A. 10 in B. 6 in C. 8 in D. 7 in E. 22 in



We know that the 2 long lines are diameters because the sections they form are equal in size. Notice that each of the 4 short divider lines is a radius of the circle.

Notice also that you are given circumference and asked to calculate the radius. This is different from most circumference problems, where the problem provides the radius or diameter, and asks you to calculate the circumference.

$C = 2\pi r$	Write out the formula.
$44 = 2(3.14)(r)$	Substitute the values for pi and circumference.
$44 = 6.28(r)$	Calculate.
$44 \div 6.28 = r$	Divide to get r.
$7.006 = r$	

Answer: D. 7 in

If you can get as far as $44 = 6.28(r)$, but aren't sure what to do next to get the value of r, use trial and error with the multiple choice answers provided.
You know that 6.28 x radius = 44, and that each multiple choice answer is a possible value for the radius.
Multiply each multiple choice answer x 6.28 until you find the one that gives you 44.

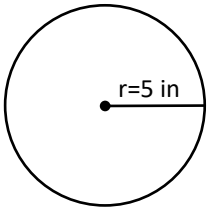
Try A. 10	Does 6.28 x 10 = 44?	No, it is 62.8, so 10 is not the radius.
Try B. 6	Does 6.28 x 6 = 44?	No it is 37.68, so 6 is not the radius.
Try C. 8	Does 6.28 x 8 = 44?	No, it is 50.24, so 8 is not the radius.
Try D. 7	Does 6.28 x 7 = 44?	Yes, it is 43.96 → 44, so 7 is the radius.

Answer: D. 7 in

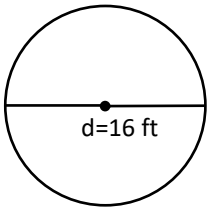
NOTE – This problem provides circumference, and asks for the radius. You could also have a problem that provides circumference and asks for diameter. You would do the same calculation as above and get 7 for the radius, and then would have to remember to multiply x 2 to get 14 for the diameter. Be sure to read the problem carefully and to answer the question that is being asked.

Practice Two *Answers – p. 13*

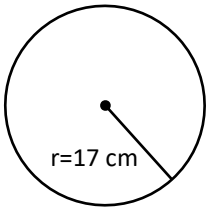
Calculate the approximate circumference of each circle below.



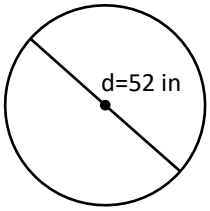
1. Circumference = _____



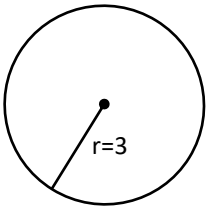
2. Circumference = _____



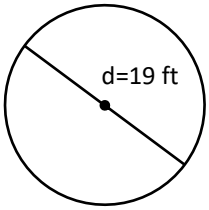
3. Circumference = _____



4. Circumference = _____



5. Circumference = _____



6. Circumference = _____

7. What is the approximate circumference of a circle whose diameter is 12 cm?

A. 24 cm B. 6 cm C. 75 cm D 38 cm E. 83 cm

8. What expression could be used to get the circumference of a circle with a radius of 12 cm?

A. 12π B. 24π C. 6π D. 42π E. 18π

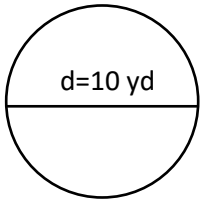
9. What is the approximate radius of a circle whose circumference is 182 inches?
A. 29 in B. 1,143 in C. 286 in D. 36 in E. 92 in

10. About how long is the diameter of a circle whose circumference is 75 ft?
A. 12 ft B. 236 ft C. 471 ft D. 42 ft E. 24 ft

11. A museum wants to put a railing around a circular display space. If the distance from the center of the display space to the railing is 14 feet, about how many feet is the distance around the outside edge of the display space?
A. 28 ft B. 44 ft C. 88 ft D. 56 ft E. 48 ft

12. The distance across the center of a circular tablecloth is 60 inches. Which of the expressions below could you use to calculate how many inches of lace trim will be needed to trim the outside edge of the tablecloth?
A. $(2)(60)\pi$ B. $60 \div \pi$ C. $(2)(30)\pi$ D. 30π E. $30 \div \pi$

13. In an outdoor game, each contestant has to run around the outside edge of a circular game area 4 times. Using the game area shown below, where the line measuring 10 yards splits the circle into two equal halves, about how many yards does each contestant have to run?
A. 31 yd B. 63 yd C. 251 yd D. 126 yd E. 40 yd



14. A circular sign measures 200 inches around the edge. About how long is the line that divides the circle in half?
A. 32 in B. 100 in C. 628 in D. 314 in E. 64 in

3. Area of a Circle

The area of a circle is the amount of flat space inside the circumference of the circle.
The formula for finding the area of a circle is **Area = π(radius)^2**.

To calculate the area, first square the radius and then multiply x 3.14.
Area is calculated in square units, just like the area of a square or rectangle.

Area = π(radius)^2 is often written as **$A = \pi r^2$**.
On the HiSET formula sheet, it will be provided as Area = π(radius)^2.

Reminder – To square a number means to multiply the number times itself.
$9^2 = 9 \times 9 = 81$ (9^2 does **not** mean 9 x 2)
$5^2 = 5 \times 5 = 25$ (5^2 does **not** mean 5 x 2)

Careful – Be sure to square the radius first, and then multiply x 3.14. This is because Order of Operations rules say to simplify exponents before doing multiplication

Example 1
What is the approximate area of a circle whose radius measures 6 cm?

$A = \pi r^2$ Write out the formula.
$A = (3.14)(6^2)$ Substitute the values for pi and radius.
$A = 3.14 \times 36$ Calculate.
$A = 113.04$
Answer: 113 cm^2

Example 2
About how many square feet is the area of a circle whose diameter measures 25 ft?
Notice that the problem provides the diameter, but the formula requires the radius.

$A = \pi r^2$ Write out the formula.
$A = (3.14)(12.5^2)$ Substitute the values for pi and radius (½ x diameter).
$A = 3.14 \times 156.25$ Calculate.
$A = 490.625$
Answer: 491 ft^2

Example 3

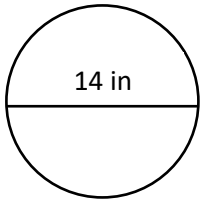
A circular game board is divided into 2 equal parts by a 14 inch line. About how many square inches is the surface of the game board?

A. 615 in^2 B. 28 in^2 C. 88 in^2 D. 154 in^2 E. 44 in^2

The way the question is asked is a clue about how to do this problem. It asks for squares inches. Any time an answer is asked for in square in, square ft, square cm, or square anything, you know it is an area problem.

You also know that the 14 inch line is a diameter of the circle because the problem tells you it divides the circle into 2 equal parts.

It may help to draw a picture.

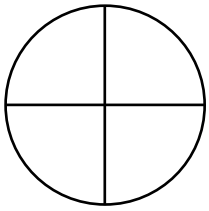


$A = \pi r^2$ Write out the formula.
$A = (3.14)(7^2)$ Substitute the values for pi and radius (½ x diameter).
$A = 3.14 \times 49$ Calculate.
$A = 153.86$
Answer: D. 154 in^2

Example 4

A circle is divided into 4 equal sections as shown below. If each dividing line is 14 inches from the center of the circle to the edge of the circle, what expression can be used to find the area of the circle?

A. 14π B. 28π C. 196π D. 49π E. $196\pi^2$



Notice that you need an expression answer, and that all the answer choices include the π symbol.

$A = \pi r^2$ Write out the formula.
$A = \pi(14^2)$ Substitute the value for radius.
Don't substitute 3.14 for π, because π appears in all the answer choices.
$A = \pi(196)$ Calculate.
$A = 196\pi$ Write in standard form.
Answer: C. 196π

Note About Rounding

You can enter 3.14 for π, or you can press the EXP key. The EXP key uses the full value of π, which is a tiny bit larger than the rounded down number of 3.14, so calculations using the EXP key will produce an answer that is a tiny bit larger than calculations using 3.14 for π.

Consider the calculation for the area of a circle with a radius of 17 inches.

$A = \pi r^2$	Write out the formula.
$A = (3.14)(17^2)$	Substitute the values for pi and radius.
$A = 3.14 \times 289$	Calculate.
$A = 907.46$	

This calculation was done using 3.14 for π, with the answer of:

$A = 907.46$, which rounds down to 907 in^2

If you used the EXP key instead of entering 3.14, your answer would be:

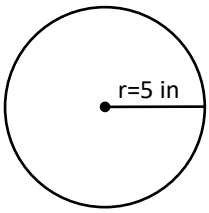
$A = 907.92$, which rounds up to 908 in^2

Either 907 in^2 or 908 in^2 would be correct. You will not have to choose between them because they will not both be in the multiple choice answers.

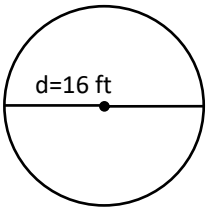
So, the correct multiple choice answer may be 1 less than or 1 greater than the answer you calculate. Don't think your answer is wrong. Just realize that it may be a little different because of rounding. Often the numbers calculated both ways round to the same number, but not always.

Practice Three *Answers – p. 17*

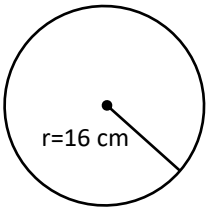
Calculate the approximate area of each circle below.



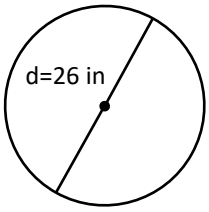
1. Area = _____



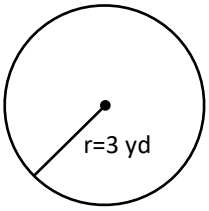
2. Area = _____



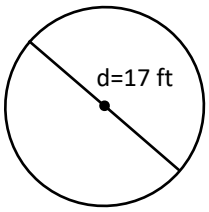
3. Area = _____



4. Area = _____



5. Area = _____



6. Area = _____

7. Which expression would you use to calculate the area of a circle whose radius is 4 miles?

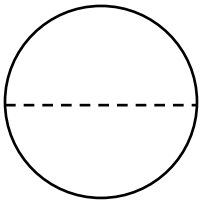
A. $16\pi^2$ B. 4π C. 8π D. 16π E. $8\pi^2$

8. What is the approximate area of a circle whose diameter is 34 cm?

A. 107 cm^2 B. 1,156 cm^2 C. 907 cm^2 D. 3,630 cm^2 E. 289 cm^2

9. The figure below shows the surface of a circular poster with a 38 inch dotted line across the center. About how many square inches is the surface of the poster?

A. 1,134 in^2 B. 4,534 in^2 C. 119 in^2 D. 1,341 in^2 E. 1,193 in^2



10. A student needs 5 wooden circles for a project. If each circle needs to be 3 inches across the center, about how many square inches of wood in total are needed?

A. 7 in^2 B. 28 in^2 C. 141 in^2 D. 47 in^2 E. 35 in^2

11. A piece of glass is needed for a circular window with a diameter of 24 inches. Which expression represents the amount of glass that is needed?

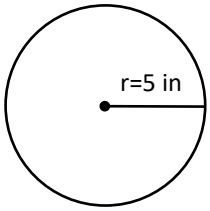
A. $24\pi^2$ B. 144π C. 576π D. $144\pi^2$ E. $12\pi^2$

12. About how many square feet of sod are needed to cover a circular area that has a radius of 15 feet?

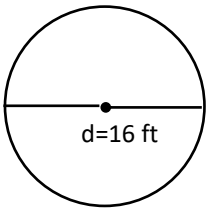
A. 94 ft^2 B. 47 ft^2 C. 707 ft^2 D. 225 ft^2 E. 691 ft^2

ANSWER KEY Lesson 1 Area & Circumference of Circles

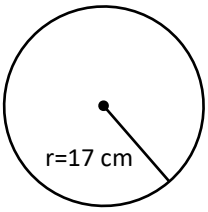
Practice One



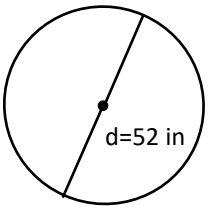
1. Radius = **5 in**
Diameter = **10 in**



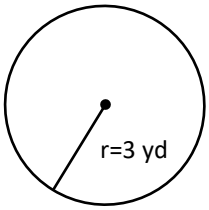
2. Radius = **8 ft**
Diameter = **16 ft**



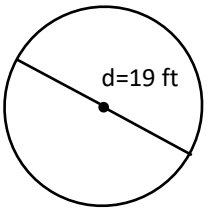
3. Radius = **17 cm**
Diameter = **34 cm**



4. Radius = **26 in**
Diameter = **52 in**

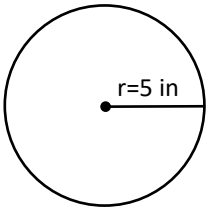


5. Radius = **3 yd**
Diameter = **6 yd**



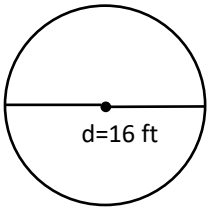
6. Radius = **9.5 ft**
Diameter = **19 ft**

Practice Two



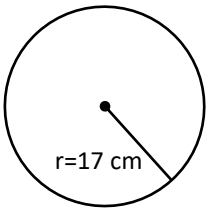
1. Circumference = **31 in**

C = 2πr	Write out the formula.
C = 2(3.14)(5)	Substitute.
C = 31.4 in	Calculate.



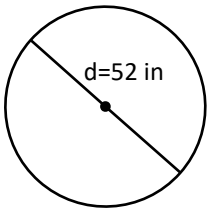
2. Circumference = **50 ft**

C = 2πr	Write out the formula.
C = 2(3.14)(8)	Substitute.
C = 50.24 ft	Calculate.



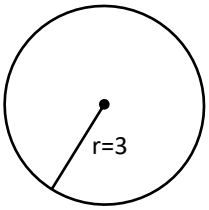
3. Circumference = **107 cm**

C = 2πr	Write out the formula.
C = 2(3.14)(17)	Substitute.
C = 106.76 cm	Calculate.



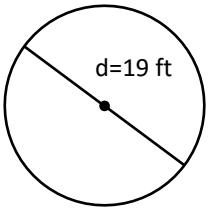
4. Circumference = **163 in**

C = 2πr	Write out the formula.
C = 2(3.14)(26)	Substitute.
C = 163.28 in	Calculate.



5. Circumference = **19 yd**

C = 2πr	Write out the formula.
C = 2(3.14)(3)	Substitute.
C = 18.84 yd	Calculate.



6. Circumference = **60 ft**

C = 2πr	Write out the formula.
C = 2(3.14)(9.5)	Substitute.
C = 59.66 ft	Calculate.

7. What is the approximate circumference of a circle whose diameter is 12 cm?

A. 24 cm B. 6 cm C. 75 cm **D 38 cm** E. 83 cm

C = 2πr	Write out the formula.
C = 2(3.14)(6)	Substitute the values for pi and radius (½ x diameter).
C = 37.68	Calculate.

Answer: D. 38 cm

8. What expression could be used to get the circumference of a circle with a radius of 12 cm?

A. 12π **B. 24π** C. 6π D. 42π E. 18π

Notice that you need an expression answer, and that all the answer choices include the π symbol.

C = 2πr	Write out the formula.
C = 2(π)(12)	Substitute the value for radius.
	Don't substitute 3.14 for π, because π appears in all the answer choices.
C = 24π	Calculate.

Answer: B. 24π

9. What is the approximate radius of a circle whose circumference is 182 inches?

A. 29 in B. 1,143 in C. 286 in D. 36 in E. 92 in

In this problem, you are given circumference and asked for the radius of the circle.

C = 2πr	Write out the formula.
182 = 2(3.14)(r)	Substitute the values for pi and circumference.
182 = 6.28(r)	Calculate.
182 ÷ 6.28 = r	Divide to get r.
28.98 = r	

Answer: A. 29 in

10. About how long is the diameter of a circle whose circumference is 75 ft?
A. 12 ft B. 236 ft C. 471 ft D. 42 ft **E. 24 ft**

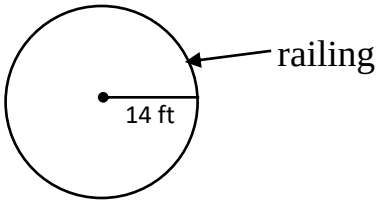
In this problem, you are given circumference and asked for the diameter of the circle.

$C = 2\pi r$	Write out the formula.
$75 = 2(3.14)(r)$	Substitute the values for pi and circumference.
$75 = 6.28(r)$	Calculate.
$75 \div 6.28 = r$	Divide to get r.
$11.94 = r$	
$11.94 \times 2 = 23.88$	Multiply radius x 2 to get diameter.

Answer: E. 24 ft

11. A museum wants to put a railing around a circular display space. If the distance from the center of the display space to the railing is 14 feet, about how many feet is the distance around the outside edge of the display space?
A. 28 ft B. 44 ft **C. 88 ft** D. 56 ft E. 48 ft

There is no mention of radius, diameter, or circumference, so you have to recognize that this is a circumference problem and that the radius is 14 feet. With any geometry problem, if you're not sure what to do, drawing a picture may help you get started.



$C = 2\pi r$	Write out the formula.
$C = 2(3.14)(14)$	Substitute the values for pi and radius.
$C = 87.92$	Calculate.

Answer: C. 88 ft

12. The distance across the center of a circular tablecloth is 60 inches. Which of the expressions below could you use to calculate how many inches of lace trim will be needed to trim the outside edge of the tablecloth?
A. $(2)(60)\pi$ B. $60 \div \pi$ **C. $(2)(30)\pi$** D. 30π E. $30 \div \pi$

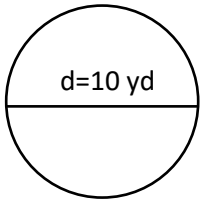
Trim around the edge of a circle is circumference, so use the circumference formula. Notice that you need an expression answer, and that all the answer choices include the π symbol.

$C = 2\pi r$	Write out the formula.
$C = 2\pi(30)$	Substitute the value for radius (½ x diameter). Don't substitute 3.14 for π, because π appears in all the answer choices.
$C = (2)(30)\pi$	Rewrite. Remember, numbers multiplied times each other can be in any order.

Answer: C. $(2)(30)\pi$

13. In an outdoor game, each contestant has to run around the outside edge of a circular game area 4 times. Using the game area shown below, where the line measuring 10 yards splits the circle into two equal halves, about how many yards does each contestant have to run?

A. 31 yd B. 63 yd C. 251 yd **D. 126 yd** E. 40 yd



Distance around the outside edge of a circular game area is circumference, so use the circumference formula.

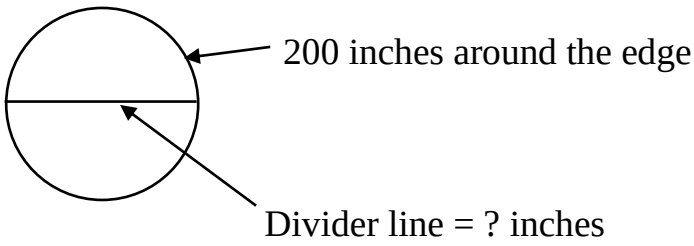
$C = 2\pi r$	Write out the formula.
$C = 2(3.14)(5)$	Substitute the values for pi and radius (½ x diameter).
$C = 31.4$	Calculate.
$31.4 \times 4 = 125.6$	Contestants have to run around the circle 4 times, so multiply x 4.

Answer: D. 126 yd

14. A circular sign measures 200 inches around the edge. About how long is the line that divides the circle in half?

A. 32 in B. 100 in C. 628 in D. 314 in **E. 64 in**

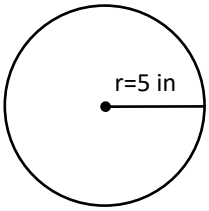
In this problem, you are given circumference and asked for the diameter of the circle. If you're not sure what to do, drawing a picture may help you get started.



$C = 2\pi r$	Write out the formula.
$200 = 2(3.14)(r)$	Substitute the values for pi and circumference.
$200 = 6.28(r)$	Calculate.
$200 \div 6.28 = r$	Divide to get r.
$31.847 = r$	
$31.847 \times 2 = 63.69$	Multiply radius x 2 to get diameter.

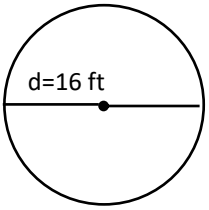
Answer: E. 64 in

Practice Three



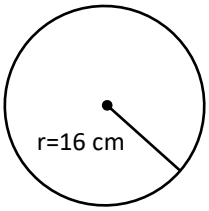
1. Area = **79 in^2**

$A = \pi r^2$	Write out the formula.
$A = 3.14(5^2)$	Substitute.
$A = 3.14(25)$	Calculate.
$A = 78.5\ in^2$	



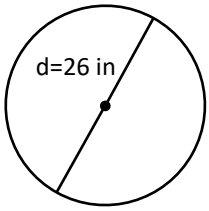
2. Area = **201 ft^2**

$A = \pi r^2$	Write out the formula.
$A = 3.14(8^2)$	Substitute.
$A = 3.14(64)$	Calculate.
$A = 200.96\ ft^2$	



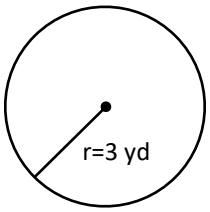
3. Area = **804 cm^2**

$A = \pi r^2$	Write out the formula.
$A = 3.14(16^2)$	Substitute.
$A = 3.14(256)$	Calculate.
$A = 803.84\ cm^2$	



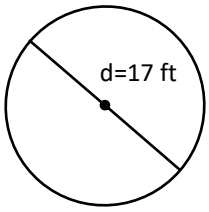
4. Area = **531 in^2**

$A = \pi r^2$	Write out the formula.
$A = 3.14(13^2)$	Substitute.
$A = 3.14(169)$	Calculate.
$A = 530.66\ in^2$	



5. Area = **28 yd^2**

$A = \pi r^2$	Write out the formula.
$A = 3.14(3^2)$	Substitute.
$A = 3.14(9)$	Calculate.
$A = 28.26\ yd^2$	



6. Area = **227 ft^2**

$A = \pi r^2$	Write out the formula.
$A = 3.14(8.5^2)$	Substitute.
$A = 3.14(72.25)$	Calculate.
$A = 226.865\ ft^2$	

7. Which expression would you use to calculate the area of a circle whose radius is 4 miles?

A. $16\pi^2$ B. 4π C. 8π **D. 16π** E. $8\pi^2$

Notice that you need an expression answer, and that all the answer choices include the π symbol.

$A = \pi r^2$ Write out the formula.
$A = \pi(4^2)$ Substitute the value for radius.
Don't substitute 3.14 for π, because π appears in all the answer choices.
$A = \pi(16)$ Calculate.
$A = 16\pi$ Write in standard form.
Answer: D. 16π

8. What is the approximate area of a circle whose diameter is 34 cm?

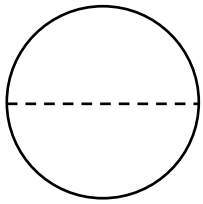
A. 107 cm^2 B. 1,156 cm^2 **C. 907 cm^2** D. 3,630 cm^2 E. 289 cm^2

$A = \pi r^2$ Write out the formula.
$A = (3.14)(17^2)$ Substitute the values for pi and radius (½ x diameter).
$A = 3.14 \times 289$ Calculate.
$A = 907.46$
Answer: C. 907 cm^2

NOTE – The answer of 907 cm^2 was calculated using 3.14 for π.
If you use the EXP key for π, you will get 907.92, which rounds to 908 cm^2.
Recognize that this difference is due to rounding, and choose answer C. 907 cm^2.

9. The figure below shows the surface of a circular poster with a 38 inch dotted line across the center. About how many square inches is the surface of the poster?

A. 1,134 in^2 B. 4,534 in^2 C. 119 in^2 D. 1,341 in^2 E. 1,193 in^2



The way the question is asked is a clue about how to do this problem. Since it asks for the answer in square inches, you know this is an area problem. You also know that the dotted line is a diameter of the circle because it goes across the center of the circle.

$A = \pi r^2$ Write out the formula.
$A = (3.14)(19^2)$ Substitute the values for pi and radius (½ x diameter).
$A = 3.14 \times 361$ Calculate.
$A = 1,133.54$
Answer: A. 1,134 in^2

10. A student needs 5 wooden circles for a project. If each circle needs to be 3 inches across the center, about how many square inches of wood in total are needed?

A. 7 in^2 B. 28 in^2 C. 141 in^2 D. 47 in^2 **E. 35 in^2**

$A = \pi r^2$ Write out the formula.
$A = (3.14)(1.5^2)$ Substitute the values for pi and radius (½ x diameter).
$A = 3.14 \times 2.25$ Calculate.
$A = 7.065$
$7.065 \times 5 = 35.325$ 5 circles are needed, so multiply that area x 5.
Answer: E. 35 in^2

11. A piece of glass is needed for a circular window with a diameter of 24 inches. Which expression represents the amount of glass that is needed?

A. $24\pi^2$ **B. 144π** C. 576π D. $144\pi^2$ E. $12\pi^2$

Notice that you need an expression answer, and that all the answer choices include the π symbol.

$A = \pi r^2$ Write out the formula.
$A = \pi(12^2)$ Substitute the value for radius (½ x diameter).
Don't substitute 3.14 for π, because π appears in all the answer choices.
$A = \pi(144)$ Calculate.
$A = 144\pi$ Write in standard form.
Answer: B. 144π

12. About how many square feet of sod are needed to cover a circular area that has a radius of 15 feet?

A. 94 ft^2 B. 47 ft^2 **C. 707 ft^2** D. 225 ft^2 E. 691 ft^2

$A = \pi r^2$ Write out the formula.
$A = (3.14)(15^2)$ Substitute the values for pi and radius.
$A = 3.14 \times 225$ Calculate.
$A = 706.5$
Answer: C. 707 ft^2