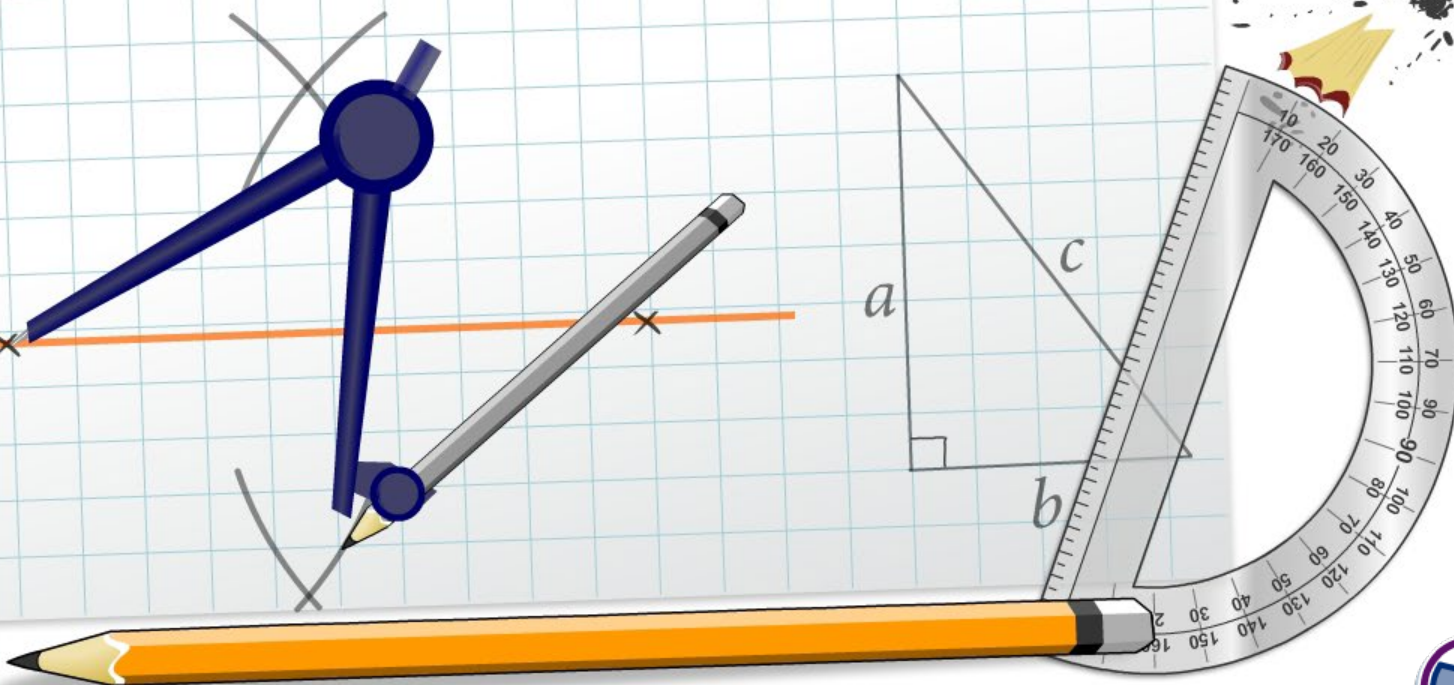


Circumference and Area



Common core icons



This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.



Slides containing examples of mathematical modeling are marked with this stamp.



This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

- 1) **Make sense of problems and persevere in solving them.**
- 2) **Reason abstractly and quantitatively.**
- 3) **Construct viable arguments and critique the reasoning of others.**
- 4) **Model with mathematics.**
- 5) **Use appropriate tools strategically.**
- 6) **Attend to precision.**
- 7) **Look for and make use of structure.**
- 8) **Look for and express regularity in repeated reasoning.**



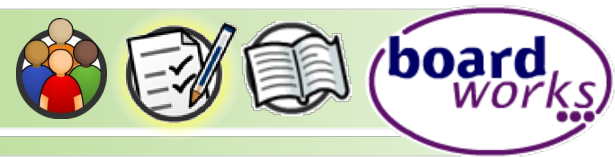
This icon indicates that the slide contains activities created in Flash. These activities are not editable.



This icon indicates teacher's notes in the Notes field.

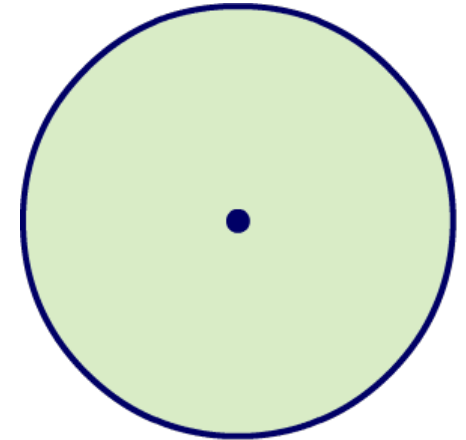


The formula for circumference



The **circumference** is the distance around the outside of the circle.

For any circle, the ratio between the circumference, C , and the diameter, d , is always the same number.



This number is called π (pi).

$$\pi = \frac{C}{d}$$

Rearrange this to get:

$$C = \pi d$$

So, for a circle of diameter, d , and radius, r :

$$\text{circumference} \\ = \pi d \quad \text{or} \quad = 2\pi r$$





The symbol π is used because pi is an irrational number. It cannot be written exactly.

When performing calculations involving the value π , an approximation for the value is required.

- for a rough approximation use 3.
- better approximations are 3.14 or $\frac{22}{7}$.
- the π button on a calculator can also be used.

Most questions will indicate which approximation to use.

When calculating formulas, write π as a symbol throughout and evaluate the expression at the end.



Jess is wrapping paper towel tubes for party decorations. She needs to enough wrapping paper for 6 tubes. Use $\pi = 3.14$ to find the length of wrapping paper needed.

Find the length of wrapping paper needed for one tube:

write the formula for circumference, C : $C = \pi d$

substitute for the values given: $= 3.14 \times 1.25$

Diameter, $d = 1.25$ inches

evaluate: $= 9.925$ in



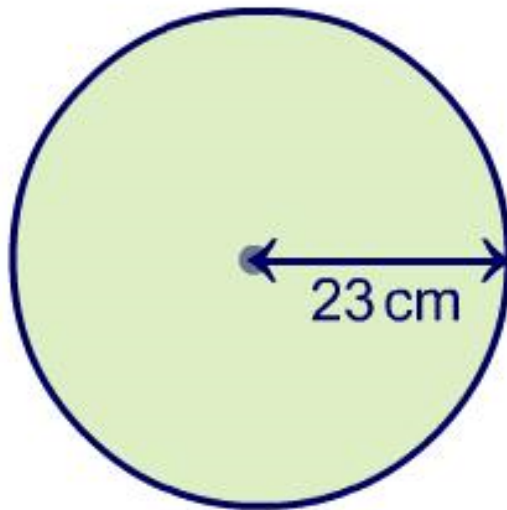
Multiply your answer by the number of tubes:

$$9.925 \times 6 = 23.55 \text{ in}$$



Use $\pi = 3.14$ to find the circumference of the following circles.

Circle: 1/6



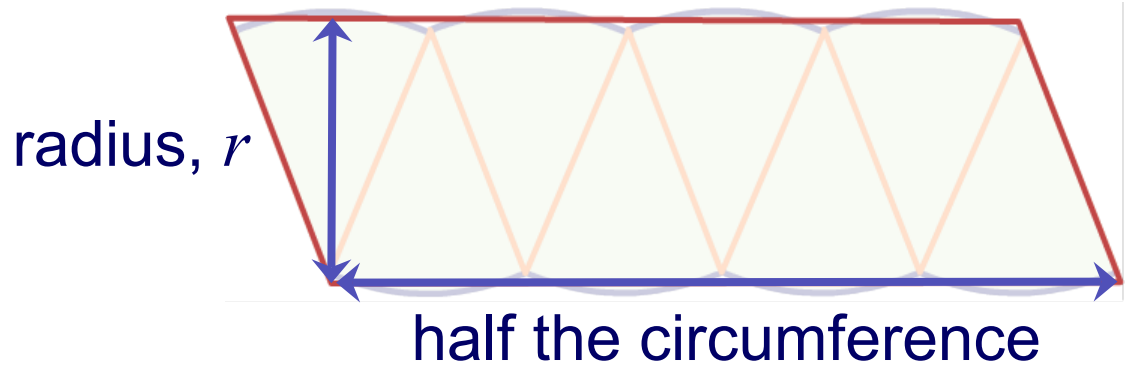
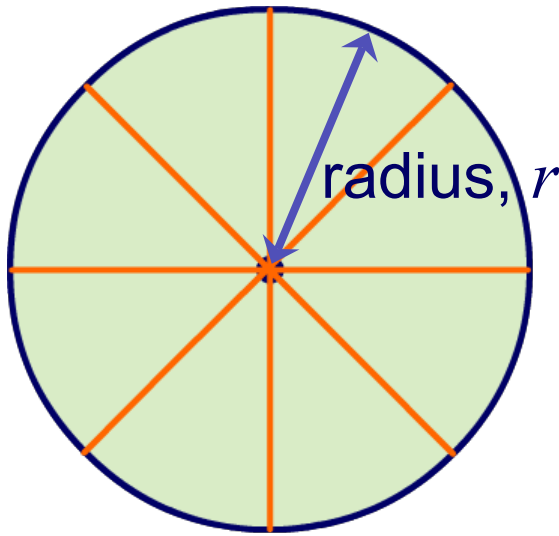
Find the circumference of the circle to the nearest tenth.



Formula for the area of a circle



The area of a circle can be found by dividing it into sectors and rearranging the pieces to form a parallelogram.



area of parallelogram = base \times height

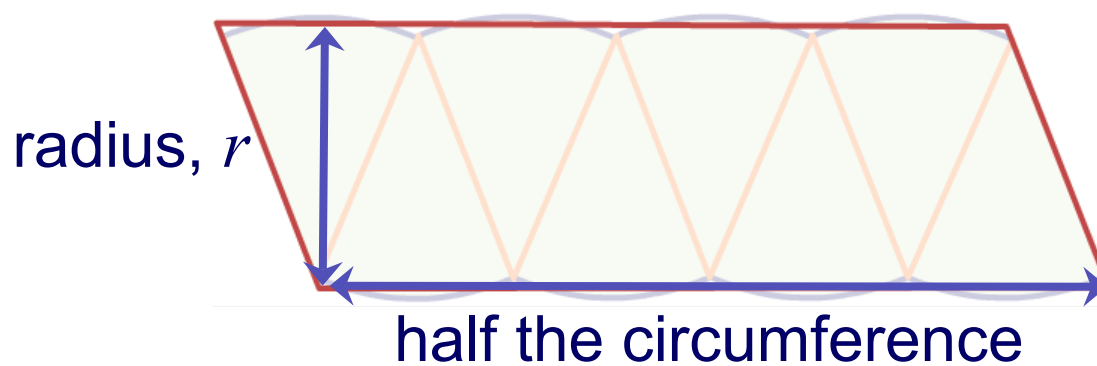
base \approx half the circumference, $\frac{C}{2}$

height \approx radius, r

Therefore, the area of circle $\approx \frac{C}{2} \cdot r$



Formula for the area of a circle



$$\text{area of circle, } A \approx \frac{C}{2} \cdot r$$

$$\text{circumference, } C = 2\pi r$$

$$A \approx \pi r \cdot r$$

$$\frac{C}{2} = \pi r$$

$$A \approx \pi r^2$$

The more sectors the circle is divided into, the more accurate the approximation becomes.

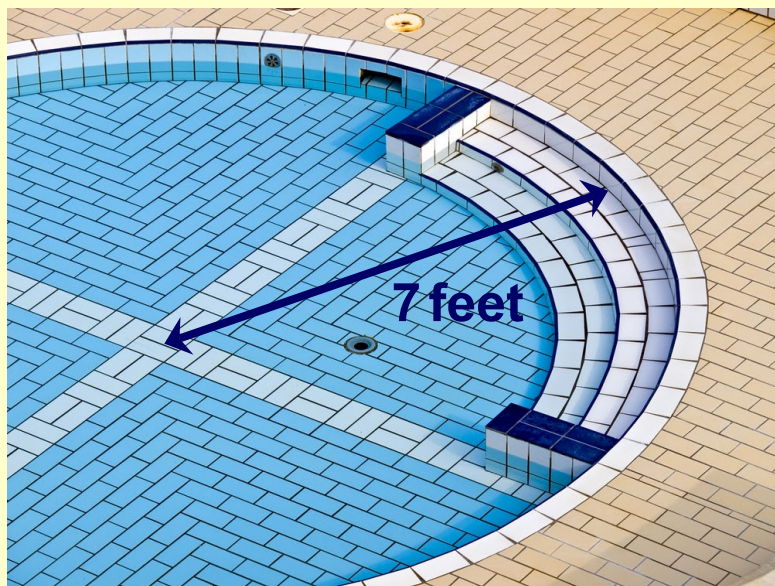
Therefore, for a circle of radius, r :

area of circle

$$A = \pi r^2$$

Esteban is buying a cover for his circular pool.
Use $\pi = 3.14$ to find the area of the cover he needs.

write the formula for the area, A , of a circle: $A = \pi r^2$



substitute for
the values given: $= 3.14 \times 7^2$

evaluate exponent: $= 3.14 \times 49$

evaluate: $= 153.86 \text{ feet}^2$

rounding: $= 154 \text{ feet}^2$



Use $\pi = 3.14$ to find the area of glass needed to replace this circular window.

write the formula for the radius, r , of a circle:

$$r = \frac{d}{2}$$

substitute for
the values given:

$$r = \frac{20 \text{ in}}{2}$$

evaluate:

$$r = 10 \text{ in}$$

write the formula for
the area, A , of a circle:

$$A = \pi r^2$$

substitute for
the values given:

$$= 3.14 \times (10 \text{ in})^2$$

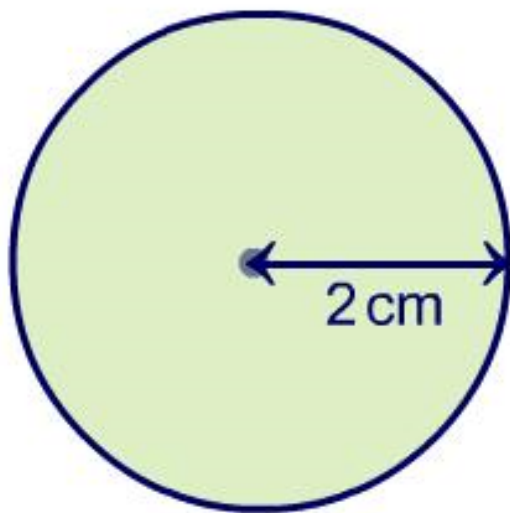
evaluate:

$$= 314 \text{ in}^2$$



Use $\pi = 3.14$ to find the area of the following circles.

Circle: 1/6



Find the area of the circle to the nearest tenth.

_____ cm²



Sort the formulas

Drag the formulas into the correct boxes according to the circle measurement they calculate.

radius

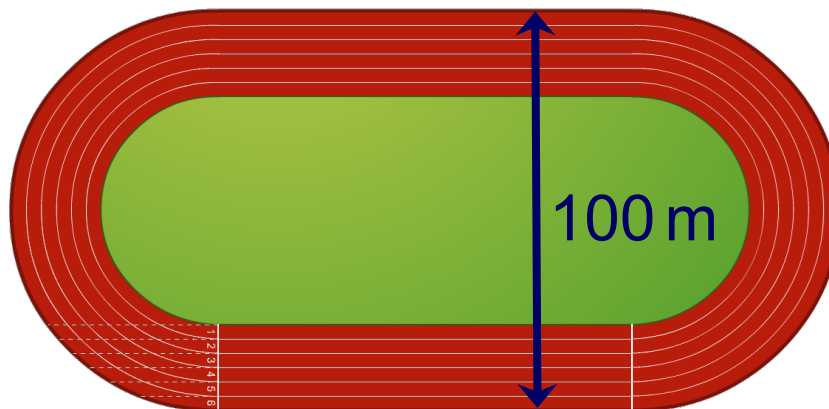
diameter

circumference

area

$$\frac{d}{2}$$





- This running track has 6 lanes that are each 1 m wide.
- The straight sections of the 6 lanes are 100 m long.
- The total width of the track is 100 m.

For a fair one-lap race, how far must the runner on the outside lane start in front of the runner on the inside lane?



Running track solution

MODELING



board
works

A running track has 6 lanes that are each 1 m wide.

The straight sections of the 6 lanes are 100 m long.

The total width of the track is 100 m.

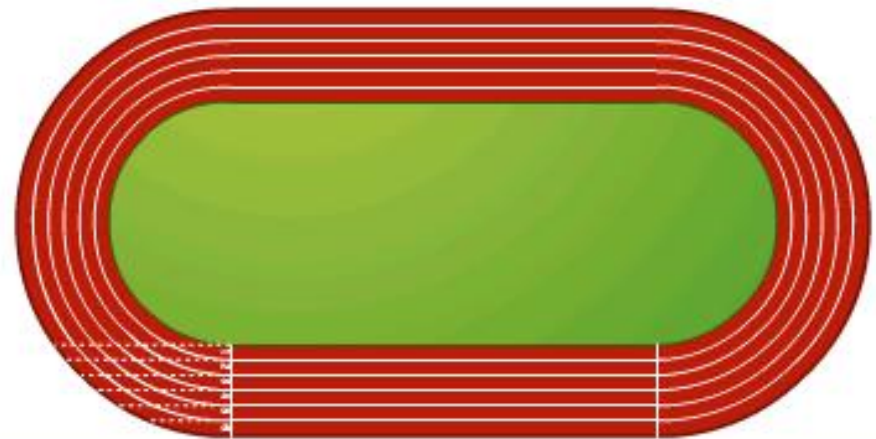
For a one-lap race to be fair, where must the runner on the outside lane start in relation to the runner on the inside lane?

Press on the buttons to model:

the whole track

each lane

the distance of each lane



**The runner in the outside lane needs to start $510.86 - 479.46$
 $= 31.4$ m in front of the runner in the inside lane.**