

So, the area, A , of a circle with radius r is: $\pi r \times r = \pi r^2$
 So, $A = \pi r^2$

We can use this formula to find the area of any circle when we know its radius.

Example

The face of a dime has diameter 1.8 cm.

- Estimate the area of the face of the dime.
- Calculate the area. Give the answer to 2 decimal places.

The diameter of the face of a dime is 1.8 cm.

So, its radius is:

$$\frac{1.8 \text{ cm}}{2} = 0.9 \text{ cm}$$



- The area of the face of the dime is about $3 \times r^2$.

$$r \doteq 1$$

$$\text{So, } r^2 = 1$$

$$\text{and } 3 \times r^2 = 3 \times 1$$

$$= 3$$

The area of the face of the dime is approximately 3 cm^2 .

- Use the formula: $A = \pi r^2$

Substitute: $r = 0.9$

$$A = \pi \times 0.9^2$$

Use a calculator.

Key in: π \times 0.9 x^2 ENTER to display 2.544690049

$$A \doteq 2.54469$$

The area of the face of the dime is 2.54 cm^2 to 2 decimal places.

If your calculator does not have an x^2 key, key in 0.9×0.9 instead of 0.9^2 .

$$\text{Since } 1 \text{ mm} = 0.1 \text{ cm}$$

$$\text{Then } 1 \text{ mm}^2 = 1 \text{ mm} \times 1 \text{ mm}$$

$$= 0.1 \text{ cm} \times 0.1 \text{ cm}$$

$$= 0.01 \text{ cm}^2$$

This illustrates that when an area in square centimetres has 2 decimal places, the area is given to the nearest square millimetre. In the *Example*, the area 2.54 cm^2 is written to the nearest square millimetre.

Practice

Number Strategies

Arrange these digits to make the greatest number:

7, 1, 8, 2, 4, 3, 9

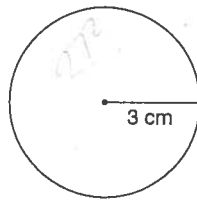
Arrange the same digits to make the least number.

Calculate the sum and the difference of the two numbers.

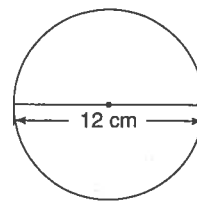


1. Estimate the area of each circle.

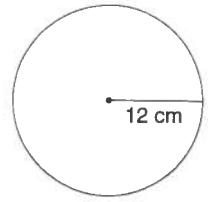
a)



b)



c)



2. Calculate the area of each circle in question 1.
Give the answers to the nearest square millimetre.

3. a) Use the results of questions 1 and 2.
What if you double the radius of a circle.
What happens to its area?
b) What do you think happens to the area of a circle if you triple its radius?
Justify your answers.

4. **Assessment Focus** Use 0.5-cm grid paper.

Draw a circle with radius 5 cm.

Draw a square outside the circle that just encloses the circle.

Draw a square inside the circle so that its vertices lie on the circle.

- a) How can you use the areas of the two squares to estimate the area of the circle?
b) Check your estimate in part a by calculating the area of the circle.
c) Repeat the activity for circles with different radii.
Record your results.
Show your work.

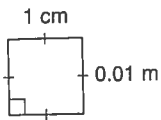
5. In the biathlon, athletes shoot at targets.

Each target is 50 m from the athlete.

Find the area of each target.

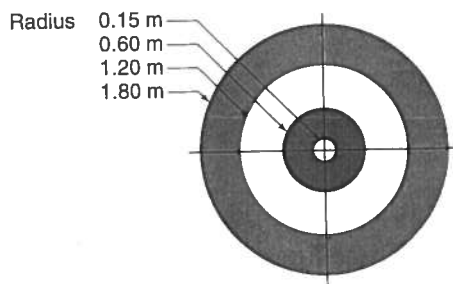
- a) The target for the athlete who is standing is a circle with diameter 11.5 cm.
b) The target for the athlete who is prone is a circle with diameter 4.5 cm.

Give the answers to the nearest square centimetre.



6. a) A square has side length 1 cm.
- What is the area of the square in square centimetres?
 - What is the area of the square in square metres?
 - Use the results of parts i and ii to write 1 cm^2 in square metres.
- b) A calculator display shows the area of a circle as 7.068583471 m^2 .
What is this area rounded to the nearest square centimetre?

7. In curling, the target area is a bull's eye series of 4 concentric circles.



Concentric circles have the same centre.

- Calculate the area of the smallest circle.
Write the area to the nearest square centimetre.
- When a smaller circle overlaps a larger circle, a ring is formed.
Calculate the area of each ring on the target area to the nearest square centimetre.

8. The bottom of a swimming pool is a circle with circumference 31.4 m.
What is the area of the bottom of the pool?
Give the answer to the nearest square metre.

9. A large pizza has diameter 35 cm.
Two large pizzas cost \$19.99.
A medium pizza has diameter 30 cm.
Three medium pizzas cost \$24.99.
Which is the better deal: 2 large pizzas or 3 medium pizzas?
Justify your answer.



Take It Further

Reflect

When you know the radius of a circle, how can you calculate its area?
Include an example in your explanation.