Area of a Circle

Apply the skill to decisions and designs

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Circle area is $A = \pi r^2$, in square units. For a diameter of 1 m, $r = 0.5$ m and $A = 0.25\pi$ m^2. Halve a disk area for a semicircle; subtract the inner disk area for a ring. Doubling radius makes the area four times as large.

Worked example

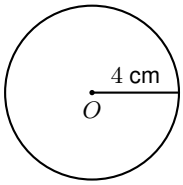
A circle has diameter 3 cm. Find its exact area.

1. Halve the diameter: $r = 3/2 = 1.5$ cm.
2. Square the radius: $1.5^2 = 2.25$ cm^2.
3. Multiply by π: $A = 2.25\pi$ cm^2.
Answer: 2.25π cm^2.

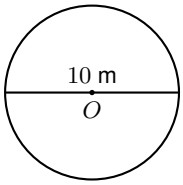
Practice Problems

Show your thinking.

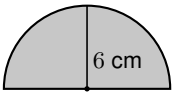
1. A circular sticker has radius 4 cm. Find the exact area of one sticker and the total area of four.



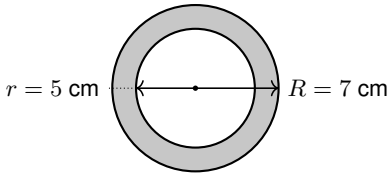
2. A circular garden of diameter 10 m needs 1 unit of cover per square meter. Use 3.14 for π. Find the area and how many whole units to buy.



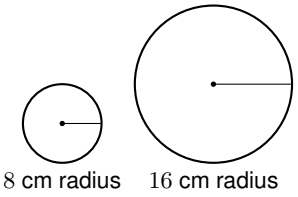
3. A semicircular fabric piece has radius 6 cm. How much fabric area does the piece cover? Give the exact area.



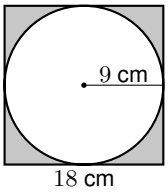
4. A circular washer has outer radius 7 cm and hole radius 5 cm. Find the metal area exactly.



5. A pizza radius doubles from 8 cm to 16 cm. Its price triples. Find the area and price factors and compare the area per dollar.



6. A disk of radius 9 cm is cut from a square sheet of side 18 cm. Find the exact area of the shaded scraps.



7. A radius-4 m circular lawn needs sod. Does a 50 m^2 kit suffice? Use 3.14 for π and find any shortage.

8. A circular pad needs area at least 36π cm^2 and diameter at most 13 cm. Which available radius works: 5, 6, or 7 cm?

Answer Key

1. One: 16π cm^2; four: 64π cm^2.
2. About 78.5 m^2. Buy 79 units.
3. 18π cm^2.
4. 24π cm^2.
5. Area factor 4; price factor 3; $4/3$ times the area per dollar.
6. $(324 - 81\pi)$ cm^2.
7. No; about 50.24 m^2 needed, short 0.24 m^2 using 3.14.
8. Radius 6 cm; area 36π cm^2 and diameter 12 cm.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Use the radius 4 cm in $A = \pi r^2$.
2. Square the radius: $4^2 = 16$ cm^2.
3. Multiply by π: $A = 16\pi$ cm^2.
4. For four stickers, $4(16\pi) = 64\pi$ cm^2.

Problem 2

1. The 10 m segment is the diameter. Use $r = 10/2 = 5$ m.
2. $A = \pi(5)^2 = 25\pi$ m^2.
3. Using 3.14 for π gives $3.14(25) = 78.5$ m^2.
4. $78 < 78.5 \le 79$, so buy 79 whole units.

Problem 3

1. Square the radius: $6^2 = 36$ cm^2.
2. The full disk would have area 36π cm^2.
3. The shaded region is half of that disk: $36\pi/2 = 18\pi$ cm^2.

Problem 4

1. Outer disk: $\pi(7)^2 = 49\pi$ cm^2.
2. Inner hole: $\pi(5)^2 = 25\pi$ cm^2.
3. Subtract areas, not radii: $(49 - 25)\pi = 24\pi$ cm^2.

Problem 5

1. Original area: $A_1 = \pi(8)^2 = 64\pi$ cm^2.
2. New area: $A_2 = \pi(16)^2 = 256\pi$ cm^2.
3. Area factor: $A_2/A_1 = (256\pi)/(64\pi) = 4$.
4. Divide the area factor 4 by the price factor 3: the area per dollar is $4/3$ times as large.

Problem 6

1. The square area is $18^2 = 324$ cm^2.
2. The disk area is $\pi(9)^2 = 81\pi$ cm^2.
3. Subtract the disk from the square: $(324 - 81\pi)$ cm^2.

Problem 7

1. Square the radius: $4^2 = 16$ m^2.
2. Using 3.14 for π, the area is $3.14(16) = 50.24$ m^2.
3. Shortage: $50.24 - 50 = 0.24$ m^2, so more sod is needed.

Problem 8

1. Area requires $\pi r^2 \ge 36\pi$, so $r^2 \ge 36$ and $r \ge 6$ cm for a positive radius.
2. Diameter requires $2r \le 13$, so $r \le 6.5$ cm.
3. Only 6 cm meets both bounds: $\pi(6)^2 = 36\pi$ cm^2 and $2(6) = 12$ cm.

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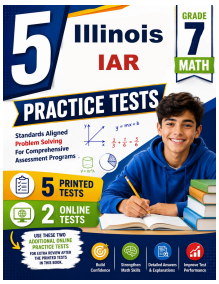

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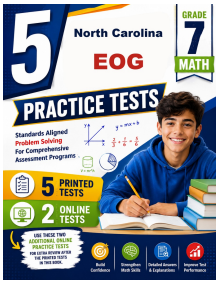

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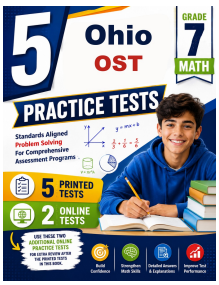

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