

Circle

Everything you need for circle questions, equations, arcs, sectors, angles, and tangents with the exact traps college board likes to set.

1 What the question is really asking

Most SAT circle questions are really testing whether you can move between three description of the same circle: **an equation** (algebra), **a picture with radii** and angles(geometry), and **a piece of the circle** like an arc or sector (proportional reasoning).

Once you can translate freely between those three, almost every circle question collapses into “plug into a formula” or “set up a proportion”.

2 The equation of circle

Standard form: a circle with center (h, k) and radius r is

written as :

$$(x - h)^2 + (y - k)^2 = r^2$$

General form: if you see $x^2 + y^2 + Dx + Ey + F = 0$, the SAT wants you to complete the square on the x-terms and y-terms separately to get back to standard form. This is the single most common circle skill test on the digital SAT.

3

Arc, sectors and proportion.

An arc or a sector is always some **fraction of the whole circle**, and that fraction is set by the central angle. The whole engine behind every arc/sector question is one proportion:

$$\text{central angle} / 360^\circ = \text{arc length} / \text{circumference} = \text{sector area} / \text{total area}$$

Set up whichever two ratios the question gives you, cross - multiply, and solve. You almost never need to memorize a separate "arc length formula"-the proportion does the same job and is harder to misremember.

Circumference

$$C = 2\pi r$$

Area

$$A = \pi r^2$$

Arc Length

$$S = r \cdot \theta$$

(θ in rad)

5

Mistakes that quietly cost points



Sign flip in standard form $(x - h)^2 + (y - k)^2 = r^2$ means the center is (h, k) . student see "x+3" and think the center's x value is 3 but it's actually is -3.



Forgetting to add to both sides: When completing the square, the number you add to "complete" the x-term or y-term must also be added to the right -hand side of the equation.



r^2 vs r

The right side of the standard form is r^2 , not r . If the equation ends in " $= 49$ ", the radius is 7, not 49



Degree vs radians

Arc length $s = r\theta$ only works when θ is in **radians**. If the angle is given in degrees, convert first (multiply by $\pi/180$) or use the proportion method.