

Intersection of Circles & Lines

1. Draw a graph of the circle with equation $x^2 + y^2 = 9$.

a) What are the solutions to the system of circle and line when the circle is given by $x^2 + y^2 = 9$, and the line is given by $y = 2$?

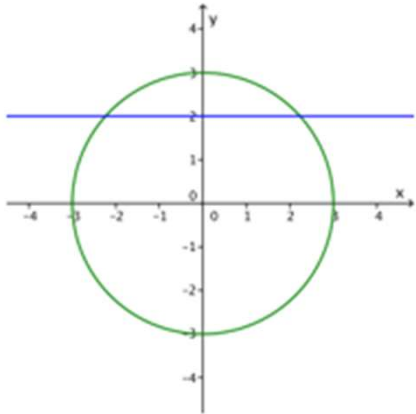
b) What happens when the line is given by $y = 3$?

c) What happens when the line is given by $y = 4$?

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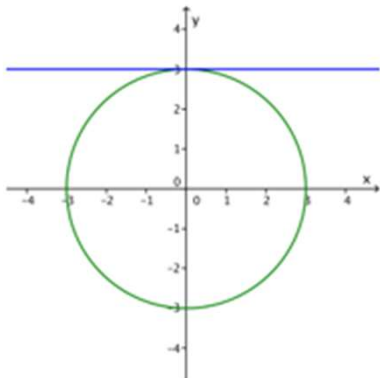
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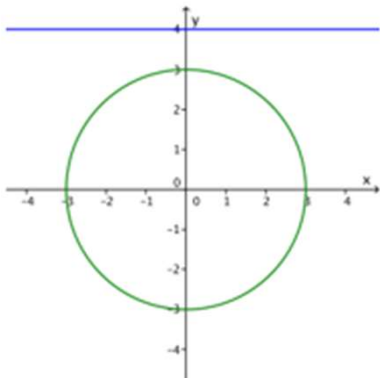
Substituting $y_2 = 2$ in the equation of the circle yields $x^2 + 4 = 9$, so $x^2 = 5$, and $x = \sqrt{5}$ or $x = -\sqrt{5}$. The solutions are $(-\sqrt{5}, 2)$ and $(\sqrt{5}, 2)$.

b) What happens when the line is given by $y = 3$?



Substituting $y_2 = 3$ in the equation of the circle yields $x^2 + 9 = 9$, so $x^2 = 0$. The line is tangent to the circle, and the solution is $(0, 3)$.

c) What happens when the line is given by $y = 4$?



Substituting $y = 4$ in the equation of the circle yields $x^2 + 16 = 9$, so $x^2 = -7$. Since there are no real numbers that satisfy $x^2 = -7$, there is no solution to this equation. This indicates that the line and circle do not intersect.