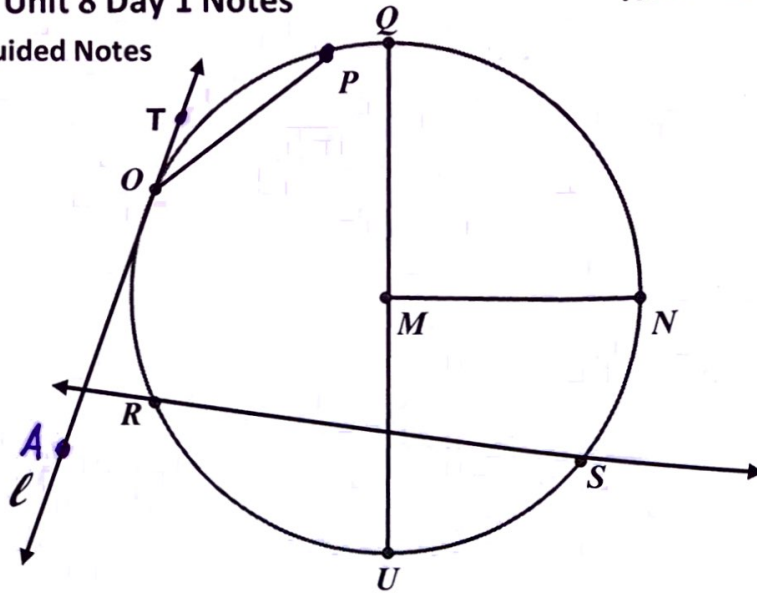


Honors Math 3: Unit 8 Day 1 Notes

Name _____

Arcs and Angles Guided Notes



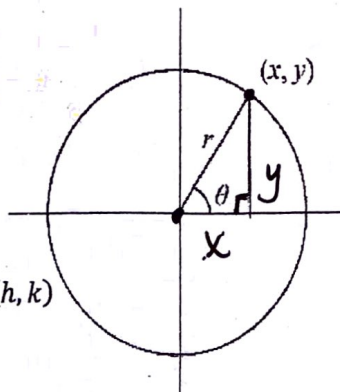
Term	Definition	Sketch	Example(s) from above
Circle/Center	All points equidistant from a given point called the center		$\odot M$
Chord	A segment whose endpoints are on the circle.		\overline{OP} , \overline{RS}
Diameter	A special chord that passes through the center.		\overline{QU}
Radius	A segment from the center to a point on the circle.		\overline{MN}
Secant	Any <u>line</u> , ray, or segment that contains a chord.		\overleftrightarrow{RS}
Tangent	A <u>line</u> , ray, or segment that lies in the plane of the circle and touches the circle in exactly one point.		\overrightarrow{OT} line l
Point of Tangency	The point where the tangent line, segment, or ray touches the circle.		point O
Minor Arc	Arc of a circle that measures less than 180 degrees.		\widehat{QN} , \widehat{UN}
Major Arc	Arc of a circle that measures more than 180 degrees.		\widehat{QOS} , \widehat{QNR}
Inscribed Angle	An angle whose vertex is a point on the circle and has sides that are chords.		$\angle POA$ $\angle POT$
Semicircle	Arc of a circle that measures 180 degrees.		\widehat{QNU} \widehat{UOQ}

Honors Math III - Equations of Circles Guided Notes

Name: _____

Equation of a Circle Centered at the Origin: $(0, 0)$

$$x^2 + y^2 = r^2$$



What if the center is not at the origin?

Equation of a Circle in STANDARD FORM centered at (h, k)

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

Write an equation of a circle with:

1. radius = 8, center = $(4, 3)$.

2. radius = 7, center = $(-3, -8)$.

$$(x-4)^2 + (y-3)^2 = 64$$

$$(x+3)^2 + (y+8)^2 = 49$$

Find the center and radius a circle with the equation of:

3. $(x-1)^2 + (y+4)^2 = 81$.

4. $(x-2)^2 + (y+3)^2 = 9$.

$$C(1, -4) \quad r=9$$

$$C(2, -3) \quad r=3$$

From General Form to Standard Form

To get an equation of a circle from general form to standard form, you must complete the square.

1. Given $x^2 - 8x + y^2 + 11 = 0$, put in standard form.

$(x-4)(x-4)$ ← $(x^2 - 8x + 16) + y^2 = -11 + 16$

$(\frac{b}{2})^2 = (\frac{-8}{2})^2 = (-4)^2 = 16$

$$(x-4)^2 + y^2 = 5 \quad \text{SF} \quad C(4, 0) \quad r=\sqrt{5}$$

2. Given $x^2 + y^2 + 4x - 6y = -4$, put in standard form.

$$(x^2 + 4x + 4) + (y^2 - 6y + 9) = -4 + 4 + 9$$

$(\frac{4}{2})^2 = 2^2 = 4$ $(\frac{-6}{2})^2 = (-3)^2 = 9$

$$(x+2)^2 + (y-3)^2 = 9 \quad C(-2, 3) \quad r=3$$

3. Given $3x^2 = 9 - 3y^2 - 6y$, put in standard form.

$$x^2 = 3 - y^2 - 2y$$

$$x^2 + (y^2 + 2y + 1) = 3 + 1$$

$$x^2 + (y+1)^2 = 4 \quad C(0, -1) \quad r=2$$

Equations of Circles Guided Practice

1. Find the radius and center for $(x - 5)^2 + (y - 2)^2 = 20$.

$$(5, 2) \quad r = \sqrt{20} = 2\sqrt{5}$$

2. Write the equation of a circle given the center is $(2, -5)$ with a radius of 7.

$$(x - 2)^2 + (y + 5)^2 = 49$$

3. Find the center and radius for $x^2 + y^2 - 16x + 18y = 47$.

$$(x - 8)^2 + (y + 9)^2 = 192 \quad C(8, -9) \quad r = \sqrt{192} = 8\sqrt{3}$$

Write the equation of the circle that satisfies each set of conditions.

4. Center $(0, 3)$,
radius = 7 units

$$x^2 + (y - 3)^2 = 49$$

5. Center $(-8, 7)$,
radius = $\frac{1}{2}$ units

$$(x + 8)^2 + (y - 7)^2 = \frac{1}{4}$$

6. Center $(-1, -5)$,
radius = 2 units.

$$(x + 1)^2 + (y + 5)^2 = 4$$

Find the center and radius of the circle with the given equation.

7. $x^2 + (y + 2)^2 = 4$

$$(0, -2), r = 2$$

8. $x^2 + y^2 = 144$

$$(0, 0) \quad r = 12$$

9. $(x - 3)^2 + (y - 1)^2 = 25$

$$(3, 1) \quad r = 5$$

10. $(x + 3)^2 + (y + 7)^2 = 81$

$$(-3, -7) \\ r = 9$$

11. $(x - 3)^2 + y^2 = 16$

$$(3, 0) \\ r = 4$$

12. $x^2 + y^2 + 6y = -50 - 14x$

$$(x + 7)^2 + (y + 3)^2 = 8 \\ (-7, -3), r = \sqrt{8} = 2\sqrt{2}$$

13. $x^2 + y^2 + 2x - 10 = 0$

$$(x + 1)^2 + y^2 = 11 \\ (-1, 0) \\ r = \sqrt{11}$$

14. $x^2 + y^2 - 18x - 18y + 53 = 0$

$$(x - 9)^2 + (y - 9)^2 = 109 \\ (9, 9) \quad \sqrt{109}$$

15. $x^2 + y^2 + 2x + 4y = 9$

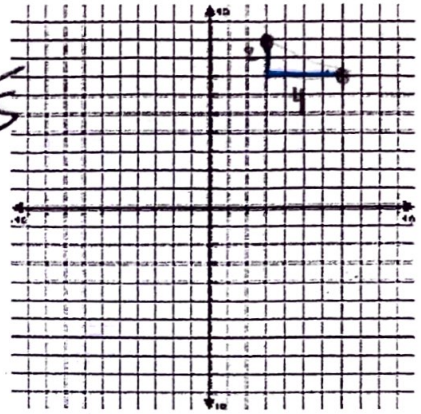
$$(x + 1)^2 + (y + 2)^2 = 14 \\ (-1, -2) \\ r = \sqrt{14}$$

Write the equation of the circle, in standard form, with:

4. Center (7,7) that passes through (3,9).

$$(x-7)^2 + (y-7)^2 = 20$$

$$r = 2\sqrt{5}$$

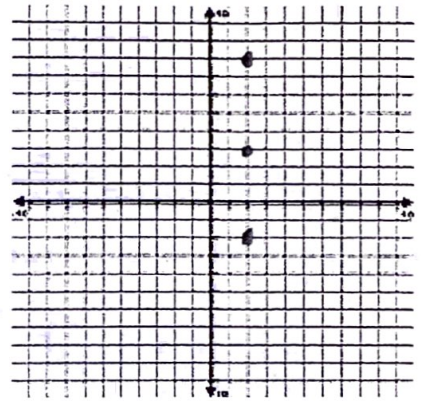


5. The endpoints of a diameter are at (2,8) and (2,-2).

$$(x-2)^2 + (y-3)^2 = 25$$

$$C(2,3)$$

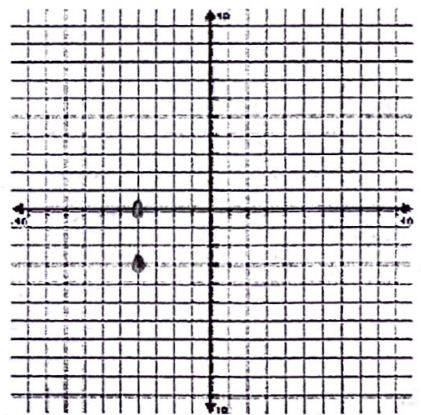
$$r=5$$



6. Center at (-4,-3) that is tangent to the x-axis.

$$(x+4)^2 + (y+3)^2 = 9$$

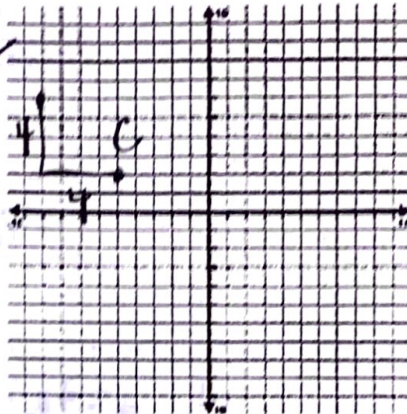
$$r=3$$



Advanced Equations of Circles Guided Practice

1. Write an equation of the circle with a center $(-5, 2)$ that passes through $(-9, 6)$.

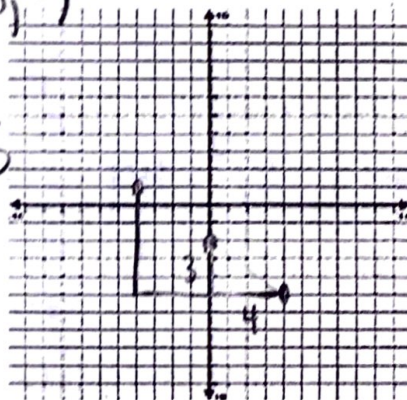
$$(x+5)^2 + (y-2)^2 = 32 \quad r=4\sqrt{2}$$



2. Write an equation of the circle if the endpoints of the diameter are $(-4, 1)$ and $(4, -5)$.

$$x^2 + (y+2)^2 = 25 \quad C(0, -2)$$

$$r=5$$



3. Write the equation of the circle with center at $(3, -7)$ and it tangent to the y-axis.

$$(x-3)^2 + (y+7)^2 = 9$$

$$r=3$$

