

$$21.) \quad 36, \underbrace{\quad}, 96$$

$$36 \cdot r^2 = 96$$

$$\sqrt{r^2} = \sqrt{\frac{96}{36}}$$

$$r = \pm \frac{\sqrt{96}}{6} =$$

$$\textcircled{\pm} \frac{4\sqrt{6}}{6}$$

$$= \pm \frac{2\sqrt{6}}{3}$$

$$36 \cdot \frac{2\sqrt{6}}{3}$$

$$\textcircled{24\sqrt{6}}$$

$$\sum_{n=2}^6 n^2$$

$$4 + 9 + 16 + 25 + 36$$

$$15.) \quad 104 + 114 + 124 + \dots$$

$$S_{12} = \frac{12}{2} \left(104 + \frac{214}{1} \right)$$

$$a_n = 10n + 94$$

$$a_{12} = 214$$

$$S = \frac{a_1}{1-r}$$

$$|r| < 1$$

$$12.) \quad a_8 = 25$$

$$a_{20} = 61$$

$$(8, 25)$$

$$(20, 61)$$

$$d = 3$$

$$a_n - a_{n\#} = d(n - n\#)$$

$$a_{30} - 25 = 3(30 - 8)$$

$$S_n = \frac{n}{2}(a_1 + a_n) \quad \boxed{-3, 2, 7, \dots}$$

$$116 = \frac{n}{2}(-3 + 5n - 8)$$

$$232 = 5n^2 - 11n$$

$$a_n = 5n - 8$$

$$0 = 5n^2 - 11n - 232$$

$$0 = (n-8)(\cancel{5n+29})$$

$$n=8$$

$$20.) \quad 36, \underbrace{\quad, 96}$$

$$36 + 2d = 96$$

$$d =$$

$$24.) a_n = 40000 (1.04)^{n-1}$$

$$S_8 = 40000 \left(\frac{1 - 1.04^8}{1 - 1.04} \right)$$

$$|r| < 1$$

8.1 Apply The Distance & Midpoint Formulas
8.3 Circles



*See printout.

Distance Formula

KEY CONCEPT

For Your Notebook

The Distance Formula

The distance d between (x_1, y_1) and (x_2, y_2) is $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Midpoint Formula

KEY CONCEPT

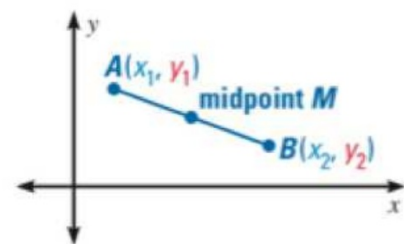
For Your Notebook

The Midpoint Formula

A line segment's *midpoint* is equidistant from the segment's endpoints. The **midpoint formula**, shown below, gives the midpoint of the line segment joining $A(x_1, y_1)$ and $B(x_2, y_2)$.

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

In words, each coordinate of M is the mean of the corresponding coordinates of A and B .



ex: $(0, 6), (5, -4)$

a) Find the distance between the two points.

b) Find the midpoint of the line segment joining the two points.

Conic Sections

conic section - a figure formed by the intersection of a plane and a double-napped cone.



Parabola



Circle



Ellipse



Hyperbola

circle - locus of points equidistant from a center

Standard Form

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

Where:

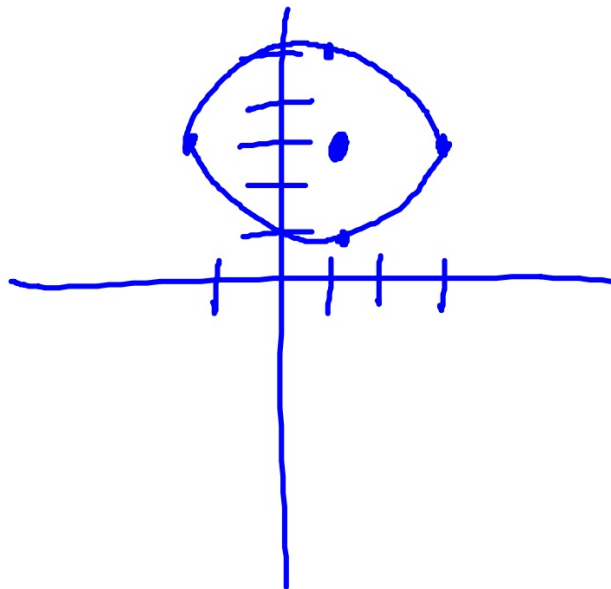
(h, k): Center

r: radius

ex: Sketch. Then state the center and radius.

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

$C(1, 3)$
 $r = 2$



ex: Sketch. Then state the center and radius.

$$\text{b) } x^2 + (y+5)^2 = 9$$

$$C : (0, -5)$$

$$r = 3$$

REVIEW

ex: Complete the square.

a) $x^2 - 8x + 13$

$$\underbrace{x^2 - 8x + 16}_{(x-4)^2} + \underbrace{-16}_{\left(\frac{-8}{2}\right)^2} + 13$$

b) $x^2 + 10x - 1$

ex: Rewrite from general to standard form. Then sketch and state the center and radius.

a) $x^2 + y^2 + 2x - 6y + 5 = 0$

$$\underbrace{x^2 + 2x + \frac{1}{4}}_{\text{}} + \underbrace{-\frac{1}{4}}_{\text{}} + \underbrace{y^2 - 6y + 9}_{\text{}} + \underbrace{-9}_{\text{}} + 5 = 0$$

$$(x+1)^2 + (y-3)^2 = 5$$

$$C: (-1, 3)$$

$$r = \sqrt{5} \approx 2.2$$

ex: Rewrite from general to standard form. Then sketch and state the center and radius.

b) $x^2 + y^2 + 6x - 4y + 12 = 0$

$$x^2 + 6x + \underline{9} + \underline{-9} + y^2 - 4y + \underline{4} + \underline{-4} + 12 = 0$$

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

$$C: (-3, 2)$$

$$r = 1$$

ex: Write an equation in standard form of the circle with the given characteristics.

a)

center: $(6, 4)$

Area: 9π

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

$$r =$$

$$9\pi = \pi r^2$$

$$3 = r$$

ex: Write an equation in standard form of the circle with the given characteristics.

b)

Endpoints of a diameter: $(-7, -1)$, $(-9, 5)$

Center: use midpoint formula
radius: use distance formula
between center and
one endpoint

ex: Write an equation in standard form of the circle with the given characteristics.

c)

Center: (4, 3)

Lies tangent to the line $y=6$

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

