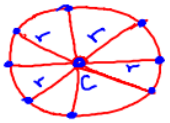
Equations of circles

Section P.2

p12-17.

- A circle is the set of points in a plane at a fixed distance (radius) from a fixed point (center).



- The standard form equation of a circle is: $(x-r)^2+(y-k)^2=r^2$

Center (r,k) radius r

- Example: $(x-2)^2+(y-3)^2=25$
- $(x+2)^2+(y+3)^2=25$
- $(x+5)^2+(y-7)^2=16$

- $(x-2)^2+(y-3)^2=25$ center $(2,3)$ radius 5
- $(x+2)^2+(y+3)^2=25$ center $(-2,-3)$ $r=5$
- $(x+5)^2+(y-7)^2=16$ Center $(-5,7)$ $r=4$

- Write the equation of a circle with center (4,7) and radius 8
- Application : p19#41---48

- $(x-4)^2+(y-7)^2=64$

Section P.2

Name/Date .

p19 # 41-42
47-48

In Exercises 41–44, find the standard form equation for the circle.

41. Center $(1, 2)$, radius 5

42. Center $(-3, 2)$, radius 1

43. Center $(-1, -4)$, radius 3

44. Center $(0, 0)$, radius $\sqrt{3}$

In Exercises 45–48, find the center and radius of the circle.

45. $(x - 3)^2 + (y - 1)^2 = 36$

46. $(x + 4)^2 + (y - 2)^2 = 121$

47. $x^2 + y^2 = 5$ $(2, -6)$ $r = 5$

48. $(x - 2)^2 + (y + 6)^2 = 25$

44. $x^2 + y^2 = (\sqrt{3})^2$

$\boxed{x^2 + y^2 = 3}$

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

47. $x^2 + y^2 = 5$ $\quad C(0,0)$ $\quad \boxed{r = \sqrt{5}}$

r^2

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

$r = \sqrt{5}$

Section P4 page 28-35

- Find the slope of the line through the two points :

x_1, y_1 $\quad x_2, y_2$

(-2,3) and (5,7) $\quad m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{7-3}{5-(-2)} = \boxed{\dfrac{4}{7}}$

- Page 28 example 1

a) (-1,2) and (4,-2) $\quad -\dfrac{4}{5}$

b) (1,1) and (3,4) $\quad \dfrac{3}{2}$

Point slope form

- The point slope form of an equation of a line is:

$y-y_1=m(x-x_1)$ with (x_1, y_1) coordinates of one point of the line.

- Find an equation of the line that passes through the point $(-3,-4)$ and has slope 2. write the equation in point slope form.

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

Parallel and perpendicular lines

- 2 parallel lines have the same slope.

Example: $y=2x+7$ and $y=2x-6$

a)Find an equation of a line parallel to $y=2x+5$ and passing through $(2,3)$

$y=mx+b$

$y=2x+b$

$3=2(2)+b$

$3=4+b$

$-4 \quad -4$

$b=-1$

$y=2x-1$

Perpendicular lines

- The slopes of 2 perpendicular lines are opposite reciprocal: (the product of slopes should equal −1)

$m1 = -\frac{1}{m2}$

Example: $y = -\frac{2}{3}x + 7$ *and* $y = \frac{3}{2}x - 6$

$-\frac{2}{3}$ ↓ $+\frac{3}{2}$

$-\frac{2}{3} \cdot \frac{3}{2} = -1$

- Find the equation of a line perpendicular to $2x+5$ and passing through $(2,3)$

$m_1 = 2$

$m_2 = -\frac{1}{2}$

$y = -\frac{1}{2}x + b$

$3 = -\frac{1}{2}(2) + b$

$3 = -1 + b$

$+1 \quad +1$

$b = 4$; $y = -\frac{1}{2}x + 4$

- Page 36: 3 to 6, 11 through 14 and page 37: 41 through 44.

In Exercises 41–44, (a) find an equation for the line passing through the point and parallel to the given line, and (b) find an equation for the line passing through the point and perpendicular to the given line. Support your work graphically.

Point	Line
41. (1, 2)	$y = 3x - 2$
42. (−2, 3)	$y = -2x + 4$
43. (3, 1)	$2x + 3y = 12$
44. (6, 1)	$3x - 5y = 15$

p37

41

x y

a) (1,2)

$y = mx + b$

$y = 3x + b$

// to $y = 3x - 2$

$2 = 3(1) + b$

$b = -1$

$y = 3x - 1$

b) (1,2)

$y = mx + b$

$y = -\frac{1}{3}x + b$

⊥ to $y = 3x - 2$

$2 = -\frac{1}{3}(1) + b$

$2 = -\frac{1}{3} + b$

$+\frac{1}{3} \quad +\frac{1}{3}$

$\frac{7}{3} = b$

$y = -\frac{1}{3}x + \frac{7}{3}$