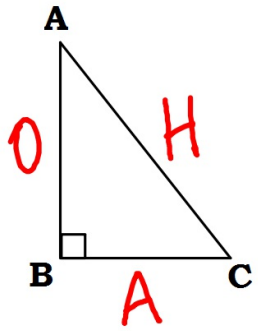
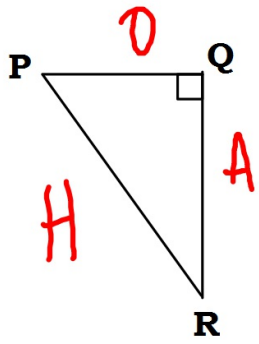
Spiral Review:

1. Use the right triangle to the right, label the side opposite <C with an "O", the side adjacent to <C with an "A", and the hypotenuse with a "H".



2. Use the right triangle to the right, label the side opposite <R with an "O", the side adjacent to <R with an "A", and the hypotenuse with a "H".



p.647 9.2 Ellipses (Day 1)

$$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$$

*horizontal (major axis)

eccentricity: $e=\frac{c}{a}$

foci: (h±c, k)

vertices: (h±a, k)

$$**c=\sqrt{a^2-b^2}**$$

$$\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$$

*vertical (major axis)

eccentricity: $e=\frac{c}{a}$

foci: (h, k±c)

vertices: (h, k±a)

Students will be able to find the center, vertices, foci, and eccentricity of the ellipse.

Example 1: Find the center, vertices, foci, and eccentricity of the ellipse.

a.) $\frac{x^2}{16}+\frac{y^2}{81}=1$

vertical

$a=\sqrt{81}$ $b=\sqrt{16}$ $c=\sqrt{81-16}$

$a=9$ $b=4$ $c=\sqrt{65}$

center: $(0,0)$

vertices: $(0,\pm 9)$

$(0,-9)$ $(0,9)$

foci: $(0,\pm\sqrt{65})$

eccentricity: $e=\frac{\sqrt{65}}{9}$

b.) $\frac{(x+3)^2}{12}+\frac{(y-2)^2}{16}=1$

vertical

$a=\sqrt{16}$ $b=\sqrt{12}$ $c=\sqrt{16-12}$

$a=4$ $b=2\sqrt{3}$ $c=\sqrt{4}$

$c=2$

center: $(-3,2)$

vertices: $(-3,6)(-3,-2)$

foci: $(-3,4)(-3,0)$

eccentricity: $e=\frac{2}{4}=\frac{1}{2}$

Students will be able to find the standard form of the equation of the ellipse, state characteristics, and sketch.

Example 2: Find the standard form of the equation of the ellipse, find the center, foci, vertices, and eccentricity, and sketch.

a.) $4x^2+49y^2-196=0$

$\frac{4x^2}{196}+\frac{49y^2}{196}=\frac{196}{196}$

$\frac{x^2}{49}+\frac{y^2}{4}=1$

horizontal

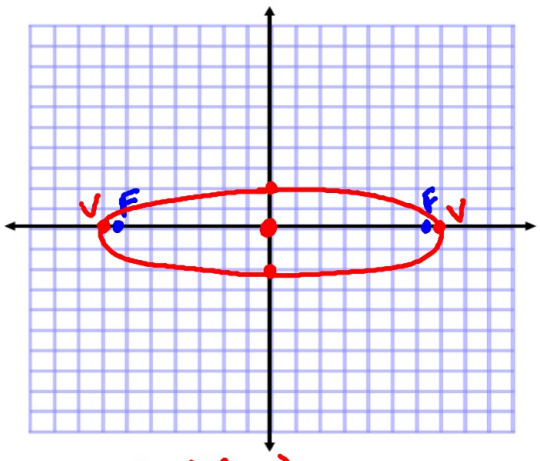
$a=7$ $b=2$ $c=\sqrt{49-4}$

$=\sqrt{45}$

$c=3\sqrt{5}$

≈ 6.7

center: $(0,0)$



vertices: $(7,0)(-7,0)$

foci: $(3\sqrt{5},0)(-3\sqrt{5},0)$

eccentricity: $e=\frac{3\sqrt{5}}{7}$

Students will be able to find the standard form of the equation of the ellipse, state characteristics, and sketch.

b.) $9x^2 + 4y^2 - 54x + 40y + 37 = 0$

$9x^2 - 54x + 4y^2 + 40y = -37$

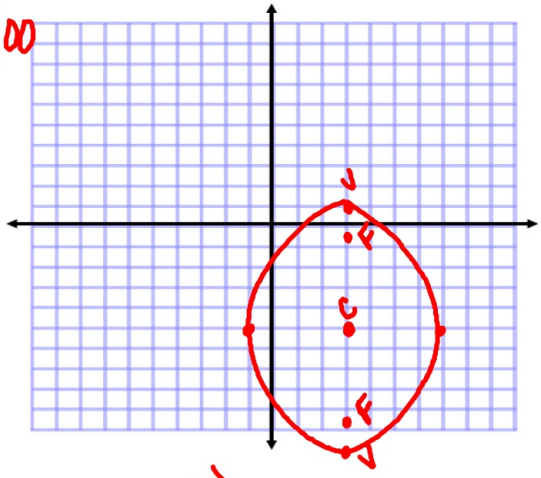
$9(x^2 - 6x + 9) + 4(y^2 + 10y + 25) = -37 + 81 + 100$

$\frac{9(x-3)^2}{144} + \frac{4(y+5)^2}{144} = \frac{144}{144}$

$\frac{(x-3)^2}{16} + \frac{(y+5)^2}{36} = 1$

vertical $a=6, b=4$

$c = 2\sqrt{5}$



center: $(3, -5)$

vertices: $(3, -5 \pm 6)$

$(3, -11)$ $(3, 1)$

foci: $(3, -5 \pm 2\sqrt{5})$

eccentricity: $e = \frac{2\sqrt{5}}{6} = \frac{\sqrt{5}}{3}$

Students will be able to find the standard form of the equation of the ellipse, state characteristics, and sketch.

c.) $x^2 + 4y^2 - 6x + 20y - 2 = 0$

$x^2 - 6x + 4y^2 + 20y = 2$

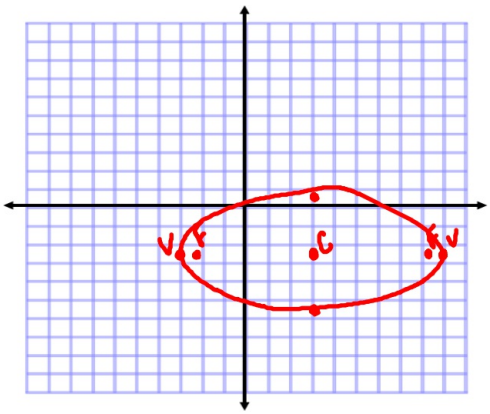
$x^2 - 6x + 9 + 4(y^2 + 5y + \frac{25}{4}) = 2 + 9 + 25$

$\frac{(x-3)^2}{36} + \frac{4(y+\frac{5}{2})^2}{36} = \frac{36}{36}$

$\frac{(x-3)^2}{36} + \frac{(y+\frac{5}{2})^2}{9} = 1$

horizontal

$a=6, b=3, c=\sqrt{27} = 3\sqrt{3}$



center: $(3, -\frac{5}{2})$

vertices: $(3 \pm 6, -\frac{5}{2})$

$(9, -\frac{5}{2})$ $(-3, -\frac{5}{2})$

foci: $(3 \pm 3\sqrt{3}, -\frac{5}{2})$

eccentricity: $e = \frac{3\sqrt{3}}{6} = \frac{\sqrt{3}}{2}$

Students will be able to find the eccentricity of the ellipse.

Example 3: Find the eccentricity of the ellipse.

a.) $\frac{x^2}{25} + \frac{y^2}{49} = 1$

$a=7, b=5, c=\sqrt{24} = 2\sqrt{6}$

eccentricity: $e = \frac{2\sqrt{6}}{7}$

b.) $4x^2 + 3y^2 - 8x + 18y + 19 = 0$

$4x^2 - 8x \quad + 3y^2 + 18y \quad = -19$

$4(x^2 - 2x + 1) + 3(y^2 + 6y + 9) = -19 + 4 + 27$

$\frac{4(x-1)^2}{12} + \frac{3(y+3)^2}{12} = \frac{12}{12}$

$\frac{(x-1)^2}{3} + \frac{(y+3)^2}{4} = 1$

$a=2$
$b=\sqrt{3}$
$c=1$

eccentricity: $e = \frac{1}{2}$

Turn-in: p.654 (34, 44)

HW: p.654 (9, 11, 29-45 odds)