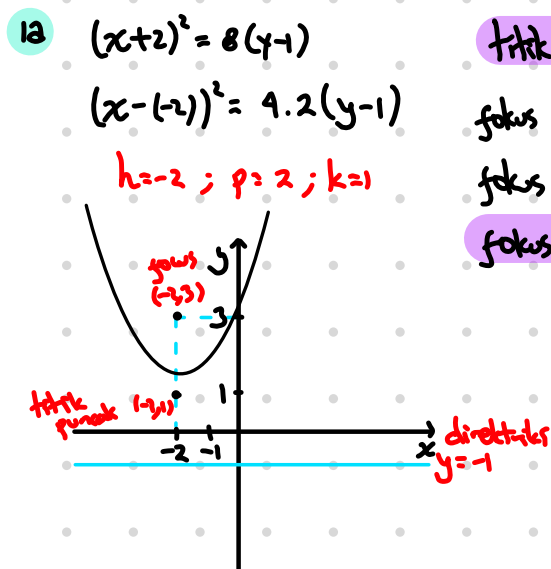


1. Tentukan titik puncak, fokus, dan direktriks dari parabola berikut, serta gambarlah grafiknya.

a.  $(x+2)^2 = 8(y-1)$

b.  $4x^2 + 16x - 16y + 32 = 0$



1b  $4x^2 + 16x - 16y + 32 = 0$

$4(x^2 + 4x) = 16y - 32$

$4(x+2)^2 - 16 = 16y - 32$

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

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

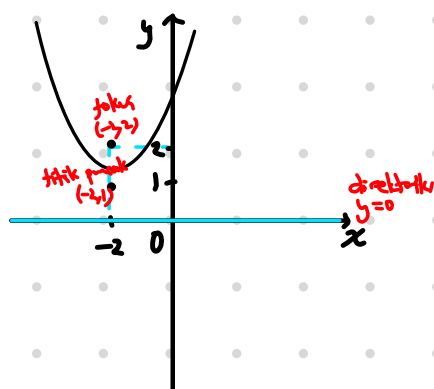
titik puncak  $(h,k) = (-2,1)$

fokus  $(h, p+k)$  direktriks  $y = k-p$

fokus  $(-2, 1+1)$   $y = 1-1$

fokus  $(-2, 2)$   $y = 0$

$h = -2 ; p = 1 ; k = 1$



2. Tentukan titik puncak, fokus, dan keeksentrikan dari elips berikut, serta gambarlah grafiknya.

a.  $\frac{(x+3)^2}{4} + \frac{(y+2)^2}{16} = 1$

b.  $x^2 + 4y^2 - 2x + 16y + 1 = 0$

2a  $\frac{(x+3)^2}{4} + \frac{(y+2)^2}{16} = 1$

titik puncak  $(h,k) = (-3,-2)$

titik puncak  $(-3, -2 \pm 4)$

titik puncak  $(-3, 2)$  dan  $(-3, -6)$

fokus  $(h, k \pm c)$

fokus  $(-3, -2 \pm \sqrt{12})$

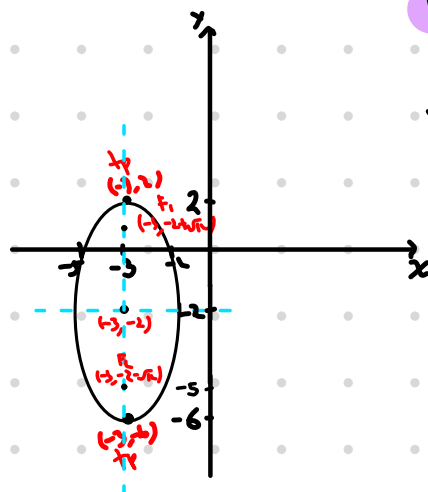
$F_1(-3, -2 - \sqrt{12})$   $F_2(-3, -2 + \sqrt{12})$

keeksentrikan  $e = c/a = \sqrt{12}/4 = \frac{\sqrt{3}}{2}$

geser lebar elips  $(\pm b + h, k)$

$(\pm 2 - 3, -2)$

$(-1, -2)$  dan  $(-5, -2)$



2b  $x^2 + 4y^2 - 2x + 16y + 1 = 0$

titik puncak  $(h \pm a, k)$

$x^2 - 2x + 4y^2 + 16y + 1 = 0$

$(x-1)^2 - 1 + 4[(y+2)^2 - 4] + 1 = 0$

titik puncak  $(-3, 2)$  dan  $(5, -2)$

fokus  $(h \pm c, k)$

fokus  $(1 \pm \sqrt{12}, -2)$

titik fokus  $(1 - \sqrt{12}, -2)$  dan  $(1 + \sqrt{12}, -2)$

keeksentrikan  $e = c/a = \sqrt{12}/4 = \frac{\sqrt{3}}{2}$

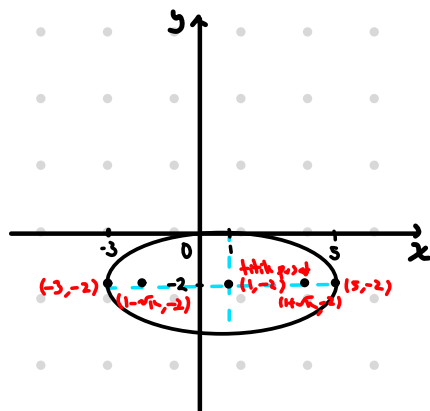
$a = 4$   $b = 2$   $h = 1$   $k = -2$

$c = a^2 - b^2 = 16 - 4 = 12$  geser tinggi elips  $(h, k \pm b)$

$c = \sqrt{12}$

$(1, -2 \pm 2)$

$(1, -4)$  dan  $(1, 0)$



3. Tentukan titik puncak, fokus, dan garis asimtot hiperbola berikut, serta gambarkan grafiknya.

a.  $\frac{(x+3)^2}{4} - \frac{(y+2)^2}{16} = 1$   
b.  $9x^2 - 16y^2 + 54x + 64y - 127 = 0$

3a  $\frac{(x+3)^2}{4} - \frac{(y+2)^2}{16} = 1$  titik puncak  $(h, k)$   
titik puncak  $(-3 \pm 2, -2)$

$h = -3, k = -2, a = 2, b = 4$  titik puncak  $(-5, -2)$  dan  $(-1, -2)$

$c^2 = a^2 + b^2$   
 $= 4 + 16$

$c = \sqrt{20} = 2\sqrt{5}$  fokus  $(h \pm c, k)$   
fokus  $(-3 \pm \sqrt{20}, -2)$

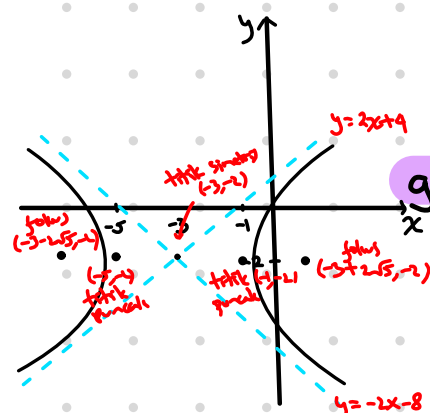
fokus  $(-3 - \sqrt{20}, -2)$  dan  $(-3 + \sqrt{20}, -2)$

garis asimtot  $y - k = \pm \left(\frac{b}{a}\right)(x - h)$

$y + 2 = \pm \left(\frac{4}{2}\right)(x + 3)$

$y + 2 = \pm 2(x + 3)$

garis asimtot  $y = 2x + 4$  dan  $y = -2x - 8$



3b  $9x^2 - 16y^2 + 54x + 64y - 127 = 0$  titik puncak  $(h, k)$

$9x^2 + 54x - 16y^2 + 64y = 127$

titik puncak  $(-3 \pm 4, 2)$

$9(x^2 + 6x) - 16(y^2 - 4y) = 127$

titik puncak  $(-7, 2)$  dan  $(1, 2)$

$9(x+3)^2 - 81 - 16(y-2)^2 + 64 = 127$

fokus  $(h \pm c, k)$

$9(x+3)^2 - 16(y-2)^2 = 144$

fokus  $(-3 \pm 5, 2)$

$\frac{(x+3)^2}{16} - \frac{(y-2)^2}{9} = 1$

fokus  $(-8, 2)$  dan  $(2, 2)$

garis asimtot  $y - k = \pm \left(\frac{b}{a}\right)(x - h)$

$y - 2 = \pm \left(\frac{3}{4}\right)(x + 3)$

$h = -3, k = 2, a = 4, b = 3$

$c^2 = a^2 + b^2$

$= 16 + 9$

$= 25$

$c = \sqrt{25} = 5$

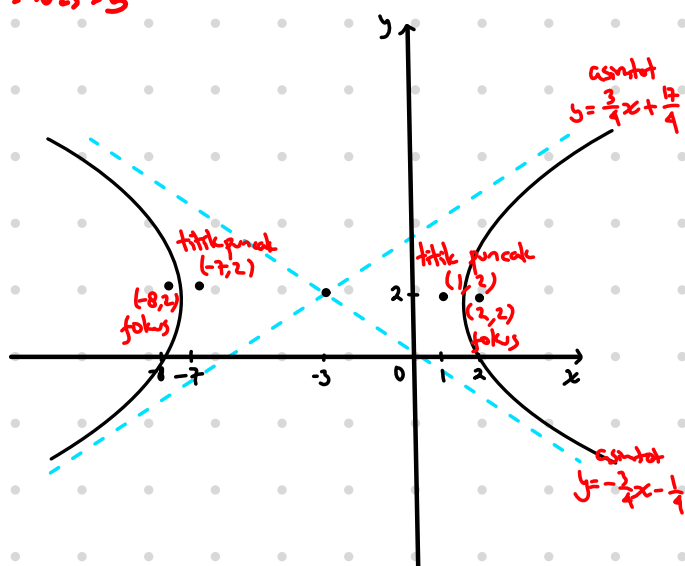
$y - 2 = \frac{3}{4}(x + 3)$   $y - 2 = -\frac{3}{4}(x + 3)$

$y = \frac{3}{4}x + \frac{9}{4} + 2$

$y = -\frac{3}{4}x - \frac{3}{4} + 2$

$y = \frac{3}{4}x + \frac{17}{4}$

$y = -\frac{3}{4}x - \frac{1}{4}$



4. Tentukan persamaan irisan kerucut berikut:

a. Parabola dengan puncak di  $(2, 3)$  dan fokus di  $(2, 5)$

b. Parabola dengan sumbu parabola vertikal, serta melalui titik  $(-2, 3), (0, 3), (1, 9)$ .

c. Elips dengan fokus  $(\pm 2, 2)$  dan yang melalui titik asal.

d. Hiperbola dengan puncak di  $(0, 0)$  dan  $(0, 6)$ , dan dengan sebuah fokus di  $(0, 8)$ .

4a parabola titik puncak  $(h, k)$   
fokus  $(2, 5)$

$h = 2, k = 3, p + k = 5$

$p + 3 = 5$

$p = 2$

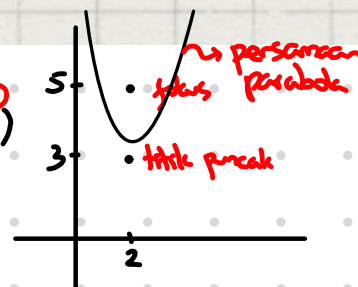
$(x - h)^2 = 4p(y - k)$

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

$(x - 2)^2 = 8(y - 3)$

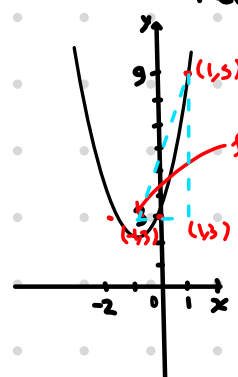
$x^2 - 4x + 4 = 8y - 24$

$x^2 - 4x - 8y + 28 = 0$



4b parabola sumbu vertikal

melalui titik  $(-2, 3), (0, 3), (1, 9)$



$(x - h)^2 = 4p(y - k)$

$(x - (-1))^2 = 4\left(\frac{1}{2}\right)(y - 1)$

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

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

$x^2 + 2x - \frac{1}{2}y + \frac{3}{2} = 0$

$(x - h)^2 = 4p(y - k)$

$(-2, 3) \leadsto (-2 - h)^2 = 4p(3 - k)$

$4 + 4h + h^2 = 12p - 4pk$

$(0, 3) \leadsto (0 - h)^2 = 4p(3 - k)$

$h^2 = 12p - 4pk$

substitusi  $12p - 4pk$  dgn  $h^2$

$4 + 4h + h^2 = h^2$

$4 + 4h = 0$

$4h = -4$

$h = -1$

$(-1)^2 = 12p - 4pk$

$1 = 12p - 4pk$

$-4pk = 1 - 12p$

substitusi:  $-4\left(\frac{1}{2}\right)k = 1 - 12\left(\frac{1}{2}\right)$

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

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

$k = 1$

$(1, 9) \leadsto (1 - (-1))^2 = 4p(9 - k)$

$4 = 4p(9 - k)$

$4 = 36p - 4pk$

$4 = 36p + 1 - 12p$

$3 = 24p$

$p = \frac{1}{8}$

sehingga

$h = -1; p = \frac{1}{8}; k = 1$

4c elips dgn fokus  $(\pm 2, 2)$  dlmelahi titik asal  
 fokus  $(h \pm c, k)$   $\hookrightarrow$  melalui  $(0, 0)$

$(0 \pm 2, 2) \sim h=0$   
 $c=\pm 2$   
 $k=2$

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

$(0, 0) \sim \frac{(0-h)^2}{a^2} + \frac{(0-k)^2}{b^2} = 1$

$$\frac{h^2}{a^2} + \frac{k^2}{b^2} = 1$$

$$\frac{0}{a^2} + \frac{4}{b^2} = 1$$

$$0 + \frac{4}{b^2} = 1$$

$4=b^2$

$c^2 = a^2 - b^2$   
 $(\pm 2)^2 = a^2 - b^2$   
 $4 = a^2 - b^2$   
 $a^2 = 4 + b^2$   
 $a^2 = 4 + 4$   
 $a^2 = 8$

sehingga  
 $a^2=8, b^2=4, h=0, k=2$

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

$$\frac{(x-0)^2}{8} + \frac{(y-2)^2}{4} = 1$$

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

$$4x^2 + 8(y^2 - 4y + 4) = 32$$

$$4x^2 + 8y^2 - 32y + 32 - 32 = 0$$

$$4x^2 + 8y^2 - 32y = 0$$

$$x^2 + 2y^2 - 8y = 0$$

4d hiperbola dgn puncak di  $(0, 0)$   $\Delta (0, 6)$   
 fokus  $(0, 8)$   $\hookrightarrow (h, k \pm a)$   
 $\hookrightarrow (h, k \pm c)$

sehingga  $h=0$

$$\begin{aligned} k-a &= 0 \\ k+a &= 6 \\ 2k &= 6 \\ k &= 3 \end{aligned}$$

$$\begin{aligned} k+a &= 6 \\ 3+a &= 6 \\ a &= 3 \end{aligned}$$

$k=3$   
 $a=3$

$$k \pm c = 8$$

$$3 \pm c = 8$$

$\pm c = 5$

$$c^2 = a^2 + b^2$$

$$(\pm 5)^2 = 3^2 + b^2$$

$$25 - 9 = b^2$$

$b^2 = 16$

persamaan hiperbola

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

$$\frac{(y-3)^2}{9} - \frac{(x-0)^2}{16} = 1$$

$$16(y^2 - 6y + 9) - 9x^2 = 144$$

$$16y^2 - 96y + 144 - 9x^2 - 144 = 0$$

$$16y^2 - 96y - 9x^2 = 0$$

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