

STUFF NOT on old Finals / Test 5's.

Graph  $f(x) = 8x^2 - 4x - 18$  showing focus, directrix, vertex and all intercepts.

$$8x^2 - 4x - 18 = 8\left(x^2 - \frac{1}{2}x + \left(\frac{1}{4}\right)^2\right) - 18 - 8\left(\frac{1}{16}\right)$$

$$\frac{1}{2} \div 2 = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4} \rightsquigarrow \left(\frac{1}{4}\right)^2 = \frac{1}{16}$$

$$= 8\left(x - \frac{1}{4}\right)^2 - \frac{37}{2}$$

$$\frac{8}{16} = \frac{1}{2}$$

$$\begin{aligned} & -18 - \frac{1}{2} \\ & = (-18)\left(\frac{2}{2}\right) - \frac{1}{2} \\ & = \frac{-36 - 1}{2} = -\frac{37}{2} \end{aligned}$$

$$\frac{\frac{1}{3}}{\frac{6}{2}} = \frac{1}{2}$$

$$(h, k) = \left(\frac{1}{4}, -\frac{37}{2}\right)$$

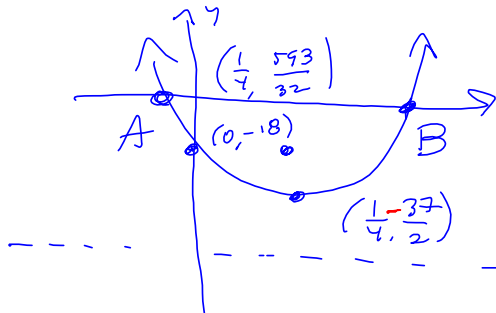
$$A = 8 = \frac{1}{4p} \Rightarrow 8p = \frac{1}{4}$$

$\Rightarrow p = \frac{1}{32}$  up & down  
 $\frac{1}{32}$  for focus & directrix

$$\frac{37 \cdot 16}{2 \cdot 16} - \frac{1}{32} = \frac{592 - 1}{32} = \frac{591}{32}$$

$$-y = \frac{591}{32}$$

$$\frac{37 \cdot 16}{32} + \frac{1}{32} = \frac{592 + 1}{32} = \frac{593}{32}$$



Now! x- & y- intercepts

y-int! (0, -18)

$$x\text{-int! } 8\left(x - \frac{1}{4}\right)^2 - \frac{37}{2} = 0$$

$$8\left(x - \frac{1}{4}\right)^2 = \frac{37}{2}$$

$$\left(x - \frac{1}{4}\right)^2 = \frac{37}{2} \cdot \frac{1}{8} = 2$$

$$x - \frac{1}{4} = \pm\sqrt{2}$$

$$x = \frac{1}{4} \pm \sqrt{2}$$

$$\rightarrow A = \left(\frac{1}{4} - \sqrt{2}, 0\right)$$

$$\rightarrow B = \left(\frac{1}{4} + \sqrt{2}, 0\right)$$

S 7,2

These numbers are ugly as the teacher. (and that's pretty bad)

$$405x^2 + 144y^2 - 4050x + 192y + 10189 = 180$$

Sketch, showing vertices, center and foci

$$405x^2 - 4050x + 144y^2 + 192y = -10009$$

$$405 \left( x^2 - \frac{4050x}{405} \right) + 144 \left( y^2 + \frac{192y}{144} \right) = -10009$$

$$405 \left( x^2 - 10x \right) + 144 \left( y^2 + \frac{4}{3}y \right) = -10009$$

$$405 \left( x^2 - 10x + 5^2 \right) + 144 \left( y^2 + \frac{4}{3}y + \left( \frac{2}{3} \right)^2 \right) = -10009 + 405(25) + 144 \left( \frac{4}{9} \right)$$

$$\left( \frac{116}{1} \right) \left( \frac{4}{9} \right) + \frac{144}{9} = \frac{1044 + 144 \cdot 4}{9} = 116 + \frac{144}{9}$$

$$\frac{116 \cdot 9}{9} + \frac{576}{9} = \frac{1044 + 576}{9} = \frac{1620}{9} = 180$$

So,

$$405(x-5)^2 + 144\left(y + \frac{2}{3}\right)^2 = 180$$

$$\frac{405(x-5)^2}{180} + \frac{144\left(y + \frac{2}{3}\right)^2}{180} = 1$$

$$\frac{9(x-5)^2}{4} + \frac{4\left(y + \frac{2}{3}\right)^2}{5} = 1$$

$$\frac{(x-5)^2}{\left(\frac{4}{9}\right)} + \frac{\left(y + \frac{2}{3}\right)^2}{\left(\frac{5}{4}\right)} = 1$$

$$\frac{405}{180} = 2.25 = 2 + \frac{25}{100} = 2 + \frac{1}{4} = 2 \frac{1}{4} + \frac{1}{4} = \frac{8}{4} + \frac{1}{4} = \frac{9}{4}$$

Bigger =  $a^2 = \frac{5}{4}$ ,  $b^2 = \frac{4}{9}$  = smaller

$$c^2 = a^2 - b^2 = \frac{5}{4} - \frac{4}{9} = \frac{45 - 16}{36} = \frac{29}{36} = c^2$$

$$\Rightarrow c = \pm \sqrt{\frac{29}{36}} = \pm \frac{\sqrt{29}}{6}$$

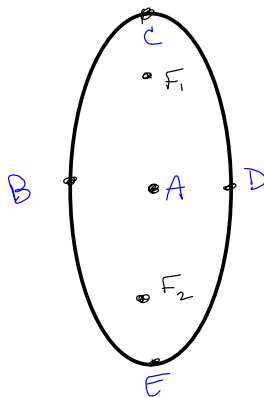
Take the positive.

$$c = \frac{\sqrt{29}}{6}$$

$$a = \sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{\sqrt{4}} = \frac{\sqrt{5}}{2} = 2$$

$$b = \sqrt{\frac{4}{9}} = \frac{2}{3}$$

$(h, k) = (5, -\frac{2}{3})$



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

$B = (\frac{13}{3}, -\frac{2}{3})$

$C = (5, -\frac{2}{3} + \frac{\sqrt{5}}{2})$

$D = (\frac{17}{3}, -\frac{2}{3})$

$E = (5, -\frac{2}{3} - \frac{\sqrt{5}}{2})$

$F_1 = (5, -\frac{2}{3} + \frac{\sqrt{29}}{6})$

$F_2 = (5, -\frac{2}{3} - \frac{\sqrt{29}}{6})$

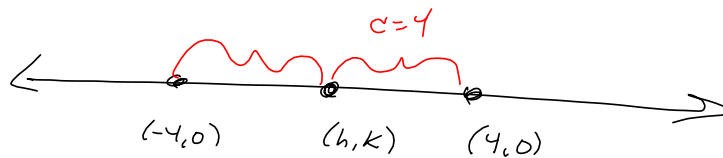
$$5 - \frac{16}{9} = \frac{45 - 16}{9} = \frac{29}{9}$$

Q2

$$e = \frac{1}{5} = \frac{c}{a} = \frac{4}{a} = \frac{1}{5} \Rightarrow \boxed{20 = a} \quad \frac{x^2}{20^2} + ? = 1$$

$$(\pm 4, 0)$$

$$(h, k) = (0, 0)$$



$$c=4, a=20 \Rightarrow$$

$$a^2 - c^2 = b^2$$

$$400 - 16 = b^2$$

$$386 = b^2$$

Now write eq'n:

$$\frac{x^2}{400} + \frac{y^2}{386} = 1$$

Queen  
A Night at  
the Opera.

$$\cancel{153x^2 + 36y^2 - 1530x + 48y + 3841 = 612}$$

$$\underline{\underline{-3229}}$$

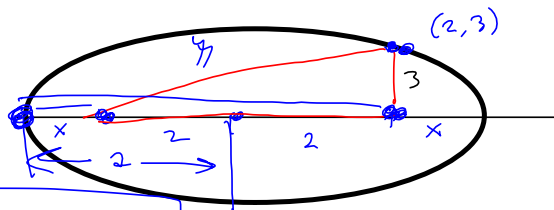
$$153x^2 - 1530x + 36y^2 + 48y = -3229$$

$$153(x^2 - 10x + 5^2) + 36(y + \frac{4}{3}y + (\frac{2}{3})^2) = -3229 + \underbrace{+53(25)}_{+1325} + \underbrace{+36(\frac{4}{9})}_{+16}$$

$$\frac{48}{36} = \frac{4}{3}$$

$$-3229 +$$

$$153(x-5)^2 + 36(y + \frac{2}{3})^2 = 612$$

#92  
§7.2

$$4^2 + 3^2 = y^2$$

$$2 = x + 2$$

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

$$2x + 4 = y + 3 \rightarrow y = 2x + 1$$

$$(2x + 1)^2 = 16 + 9 = 25$$

$$2x + 1 = \pm 5$$

$$2x = -1 \pm 5$$

$$x = \frac{-1 \pm 5}{2}$$