

Using complete sentences, write the distance based definition of "parabola".

SCORE: \_\_\_\_ / 2 PTS

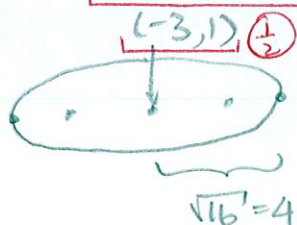
A PARABOLA IS THE LOCUS OF POINTS IN A PLANE  
WHICH ARE EQUIDISTANT  
FROM A FIXED LINE AND A FIXED POINT NOT ON THE LINE.

GRADED BY ME

Find the foci and vertices of the ellipse  $3x^2 + 4y^2 + 18x - 8y - 17 = 0$ .

SCORE: \_\_\_\_ / 5 PTS

$$\begin{aligned} 3x^2 + 18x + 4y^2 - 8y &= 17 \\ 3(x^2 + 6x) + 4(y^2 - 2y) &= 17 \\ \textcircled{\frac{1}{2}} \quad 3(x^2 + 6x + 9) + 4(y^2 - 2y + 1) &= 17 + 3(9) + 4(1) \quad \textcircled{\frac{1}{2}} \\ 3(x+3)^2 + 4(y-1)^2 &= 48 \quad \textcircled{\frac{1}{2}} \\ \frac{(x+3)^2}{16} + \frac{(y-1)^2}{12} &= 1 \quad \textcircled{\frac{1}{2}} \end{aligned}$$



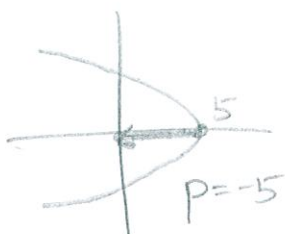
$$\begin{aligned} c^2 &= 16 - 12 = 4 \\ c &= 2 \end{aligned}$$

$$\begin{aligned} \text{VERTICES} &= (-3 \pm 4, 1) \\ &= (1, 1), (-7, 1) \quad \textcircled{1} \\ \text{FOCI} &= (-3 \pm 2, 1) \\ &= (-1, 1), (-5, 1) \quad \textcircled{1} \end{aligned}$$

The focus of a parabola is at the origin, and its vertex is at (5, 0).

SCORE: \_\_\_\_ / 2 PTS

Find the equation of the parabola.



$$\begin{aligned} y^2 &= 4(-5)(x-5) \\ y^2 &= -20(x-5) \\ \textcircled{\frac{1}{2}} \quad \textcircled{1} \quad \textcircled{\frac{1}{2}} \end{aligned}$$

Fill in the blanks. **NO NEED TO SHOW WORK.**

SCORE: \_\_\_\_ / 3 PTS

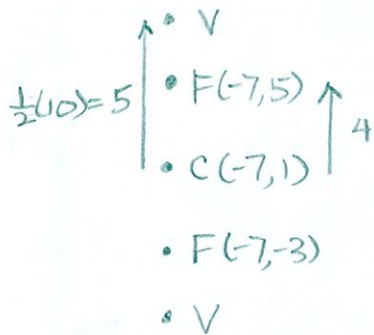
[a] The latera recta of an ellipse are perpendicular to THE MAJOR AXIS and pass through THE FOCI.

[b] The eccentricity of the ellipse  $\frac{x^2}{12} + \frac{y^2}{13} = 1$  is  $\frac{\sqrt{13}}{13}$ .  $c^2 = 13 - 12 = 1 \rightarrow c = 1$   
 $e = \frac{c}{a} = \frac{1}{\sqrt{13}}$

Find the equation of the ellipse with foci  $(-7, 5)$  and  $(-7, -3)$ , and a major axis of length 10.

SCORE: \_\_\_\_ / 4 PTS

CENTER =  $(-7, \frac{5+(-3)}{2}) = (-7, 1)$



$$\frac{(x+7)^2}{9} + \frac{(y-1)^2}{25} = 1$$

$$5^2 = 4^2 + b^2$$

$$b^2 = 9$$

Find the vertex, focus and equation of the directrix of the parabola  $2x^2 - 20x + y + 51 = 0$ .

SCORE: \_\_\_\_ / 4 PTS

$$2x^2 - 20x = -y - 51$$

$$x^2 - 10x = -\frac{1}{2}y - \frac{51}{2}$$

$$x^2 - 10x + 25 = -\frac{1}{2}y - \frac{51}{2} + 25$$

$$(x-5)^2 = -\frac{1}{2}y - \frac{1}{2}$$

$$(x-5)^2 = -\frac{1}{2}(y+1) \rightarrow 4p = -1 \rightarrow p = -\frac{1}{4}$$

DIRECTRIX  $y = -1 + \frac{1}{4} \rightarrow y = -\frac{3}{4}$

VERTEX  $(5, -1)$

FOCUS  $(5, -1 - \frac{1}{4}) = (5, -\frac{5}{4})$



MUST HAVE  
"y = "

$\frac{1}{2}$  FOR EACH  
UNDERLINED ITEM