

GRAPH $r = \frac{15}{4 + \cos \theta} \cdot \frac{\frac{1}{4}}{\frac{1}{4}} = \frac{\boxed{\frac{15}{4}}}{1 + \boxed{\frac{1}{4}} \cos \theta}$

① WRITE IN STANDARD FORM $r = \frac{ep}{1 \pm e \cos \theta}$

② FIND $e, p, \text{DIR} + \text{SHAPE}$

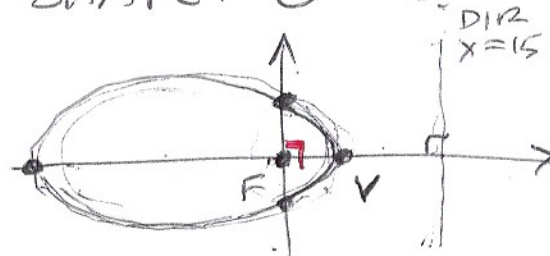
$$e = \frac{1}{4} \quad ep = \frac{15}{4}$$

$$\frac{1}{4}p = \frac{15}{4}$$

$$p = 15$$

DIR: $x = +15$

SHAPE: $0 < e < 1 \rightarrow \text{ELLIPSE}$



③ FIND $x-, y-\text{INT}$

θ
POS $x-\text{INT}$ 0

POS $y-\text{INT}$ $\frac{\pi}{2}$

NEG $x-\text{INT}$ π

NEG $y-\text{INT}$ $\frac{3\pi}{2}$

r

$$\frac{15}{4 + \cos 0} = \frac{15}{4 + 1} = 3$$

$$\frac{15}{4 + \cos \frac{\pi}{2}} = \frac{15}{4 + 0} = \frac{15}{4}$$

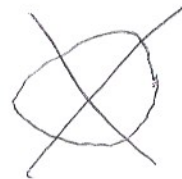
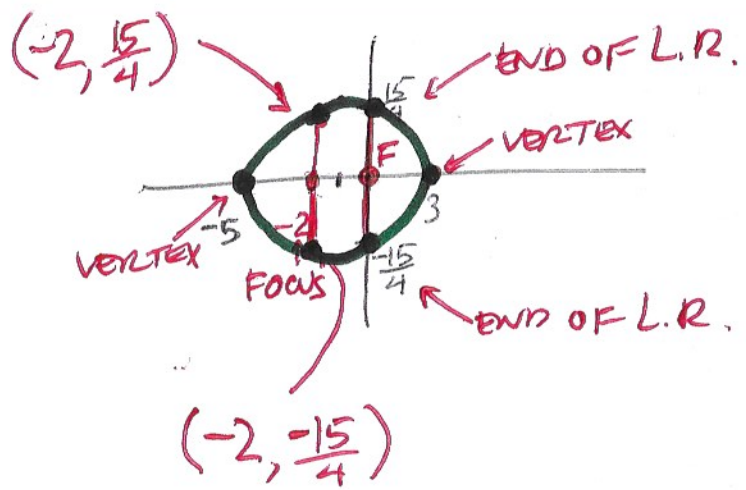
$$\frac{15}{4 + \cos \pi} = \frac{15}{4 - 1} = 5$$

$$\frac{15}{4 + \cos \frac{3\pi}{2}} = \frac{15}{4 + 0} = \frac{15}{4}$$

$r > 0$

DIFFERENT $\rightarrow$ VERTICES

SAME $\rightarrow$ ENDPOINTS OF LATUS RECTUM



LATUS RECTUM / LATERA RECTA
 ⊥ TO LINE THROUGH FOCI + VERTICES
 AND PASS THROUGH A FOCUS

DONE USING
 X-, y-
 CORRESPONDING

$$\begin{aligned} \text{CENTER} &= \text{MIDPOINT OF VERTICES, OF FOCI} \\ &= \frac{1}{2}(3 + -5) \\ &= -1 \end{aligned}$$

$$\begin{aligned} \text{OTHER FOCUS} &= 2 * \text{CENTER} = \text{SUM OF VERTICES} \\ &= 2(-1) &= 3 + -5 \\ &= -2 &= -2 \end{aligned}$$

SKETCH $r = \frac{12}{2-3\cos\theta}$ USING HANDOUT

$$\textcircled{1} \quad r = \frac{12}{2-3\cos\theta} \xrightarrow{\frac{1}{2}} = \frac{6}{1-\frac{3}{2}\cos\theta}$$

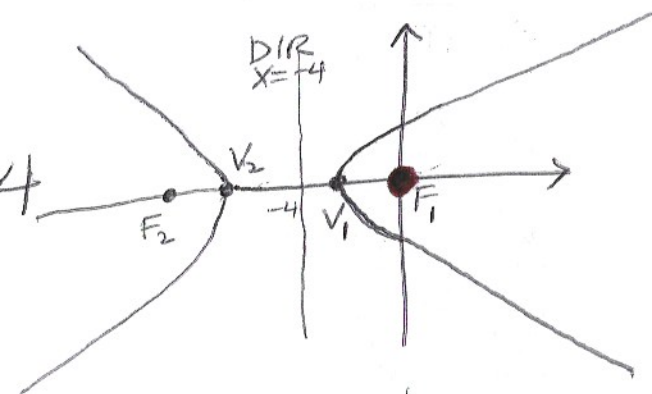
$$\textcircled{2} \quad e = \frac{3}{2} \quad ep = 6$$

$$\frac{2}{3} \left(\frac{3}{2} p \right) = (6)^{\frac{2}{3}}$$

$$p = 4 \rightarrow \text{DIR } x = -4$$

$e > 1$ HYPERBOLA

ROUGH SKETCH



$\textcircled{3} \quad \frac{\theta}{0}$
 NEG ~~POS~~ X-INT 0
 POS Y-INT $\frac{\pi}{2}$
 NEG X-INT π
 NEG Y-INT $\frac{3\pi}{2}$

$$\frac{r}{\frac{12}{2-3 \cdot 1}} = -12$$

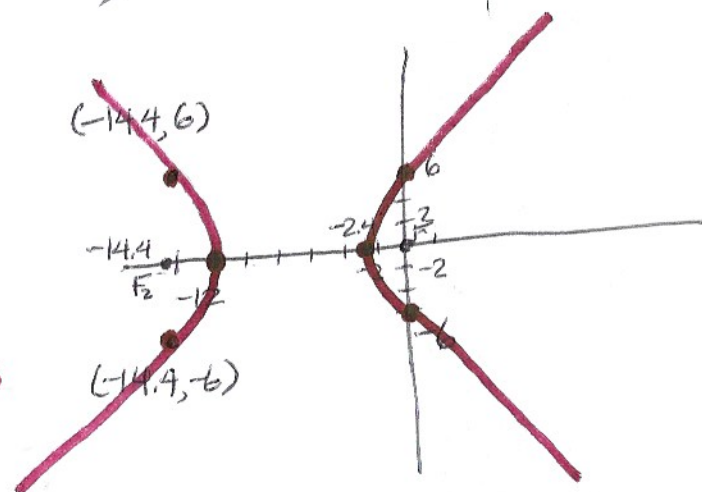
$$\frac{12}{2-3 \cdot 0} = 6$$

$$\frac{12}{2-3(-1)} = \frac{12}{5} = 2.4$$

$$\frac{12}{2+3 \cdot 0} = 6$$

DIFFERENT $\rightarrow$
 VERTICES

SAME $\rightarrow$
 ENDPOINTS
 OF L.R.



$$\textcircled{4} \quad \frac{1}{2}(-12 + -2.4) = -6 - 1.2 = -7.2$$

$$\textcircled{5} \quad 2(-7.2) = -14.4$$

OTHER FOCUS

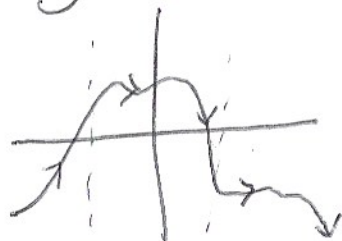
center

$$\text{OR } -12 + -2.4 = -14.4$$

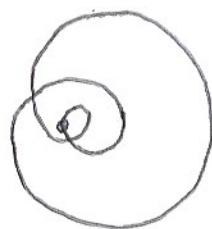
OTHER FOCUS

10.6 PARAMETRIC CURVES

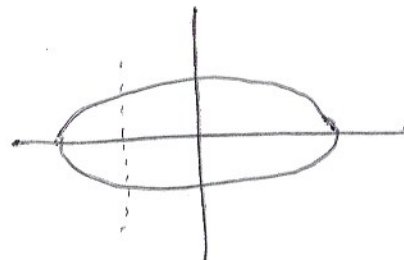
$y = f(x)$ PASSES V.L.T



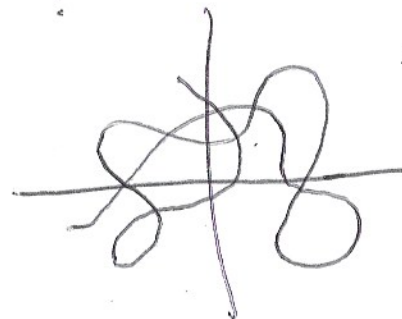
POLAR



$$x^2 + 4y^2 = 16$$



?



eg. TURTLE
WANDERING
THE XY-PLANE

AT ANY POINT IN TIME,
TURTLE/POINT CAN ONLY BE IN
1 PLACE

IE. FOR 1 VALUE OF t (TIME),
THERE CAN ONLY BE
1 x AND 1 y

IE. x, y ARE FUNCTIONS OF t

IE. $x = f(t), y = g(t)$ PARAMETRIC
EQUATION