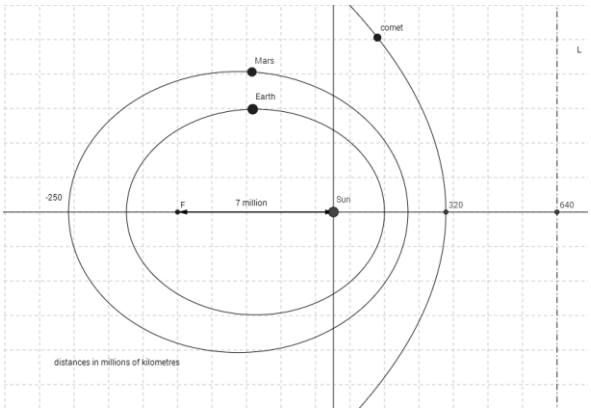


equation for comet

centre = (320,0) focus = (0,0) focal length = 320

$-y^2 = 4a(x-320)$ $4a = 4\times320 = 1280$

$y^2 = -1280(x-320)$

Position of asteroid when it crosses the orbit of the comet is when x = 0

$y^2 = -1280(x-320) = -1280(0-320) = 409600$

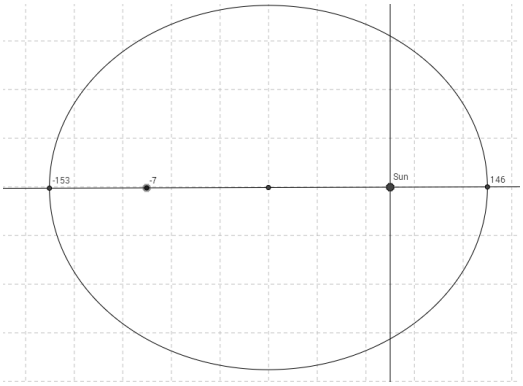
$y = 640$

Asteroid is 640 million km from the sun when it crosses the orbit of the comet.

1

3

equation of earth



foci (0,0) and (-7,0) x-intercepts (146,0) and (-153,0) centre (-3.5,0)

$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ a = 149.9 b = ? c = 3.5

$b = \sqrt{(a^2-c^2} = \sqrt{149.5^2-3.5^2} = 149.46$

$\frac{(x+3.5)^2}{149^2}+\frac{y^2}{149.46^2}=1$

2

position of asteroid when it crosses the orbit of the earth

when x = 0

$\frac{(0+3.5)^2}{149^2}+\frac{y^2}{149.46^2}=1$ $5.518\times10^{-4}+\frac{y^2}{149.46^2}=1$

$\frac{y^2}{149.46^2} = 0.999$ $y^2 = 22325.97$

y = 149.41876 = 149 million km

When the asteroid crosses the earth's orbit it is 149 million km from the sun.

3