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## ALGEBRAIC AND TRANSCENDENTAL FUNCTIONS
## E- PORTFOLIO

1) Concentric circumferences are circles with the same center but different radius. Determine the equation and the graph that models the figure shown with the following measures of the diameters: 5.2cm, 15.6cm, 26cm and 36.4cm.
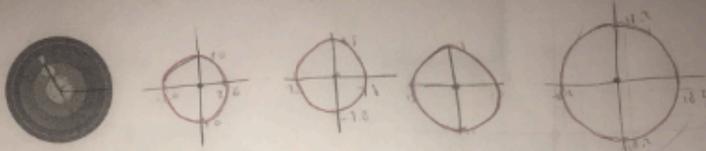


$1 - 5.2 = 2.6$

$2 - 15.6 = 7.8$     circle = 65 cm

$3 - 26 = 13$

$4 - 36.4 = 18.2$     $\boxed{x^2 + y^2 = 4225}$
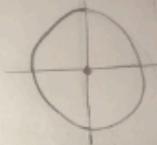
2) A communication satellite is located at an elliptic orbit, having the Earth as one of its focus. The major axis of the orbit is 32,400 miles long and its minor axis is 24,800 miles long. Determine the equation of the orbit and its graph showing the position of the Earth. Assume that the focus is in the "x-axis" and the center is at the origin.

$$\boxed{\frac{x^2}{262440000} + \frac{y^2}{153760000} = 1}$$
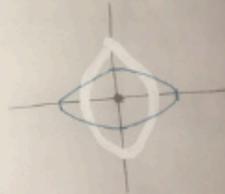
MA = 32,400/2 =

MC = 24,800/2 = b

$a = 16,200$

$b = 12,400$

3) A parabolic arc with a vertical focal axis has wideness in its base of 40ft and a height to its center of 15ft. Determine the equation of the arc, assuming that its vertex is at the origin.

×20
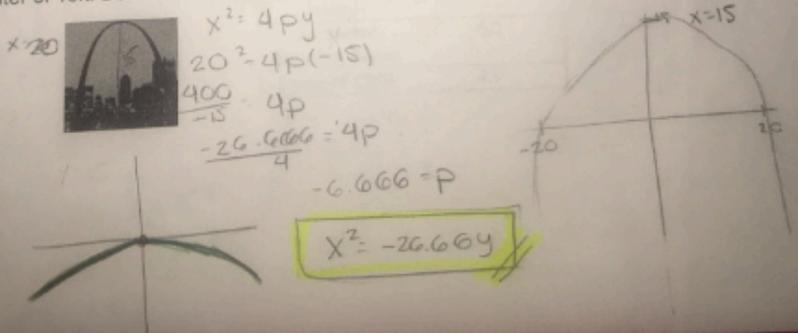
$x^2 = 4py$

$20^2 = 4p(-15)$

$\frac{400}{-5} = 4p$

$\frac{-26.6666}{4} = 4p$

$-6.666 = p$

$\boxed{x^2 = -26.66y}$

x=15

-20     10

Problems

**4)** A biologist is researching a newly-discovered species of bacteria. At time $t = 0$ hours, he puts one hundred bacteria into what he has determined to be a favorable growth medium. Six hours later, he measures 450 bacteria. Assuming exponential growth, what is the constant growth rate "$r$" for the bacteria? Sketch the graph for the growth model.

$450 = 100 \, e^{r \cdot 6}$

$4.5 = e^{r \cdot 6}$

$\ln 4.5 = \ln e^{r \cdot 6}$

$1.504 = r6$

$\dfrac{1.504}{6} = r$

$\boxed{r = 0.25 / hour}$

$y = 100 \, e^{0.25x}$
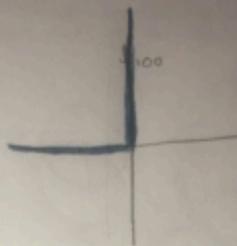
**5)** In 1935 Charles Richter defined the magnitude of an earthquake to be

$$M = \log \frac{I}{S}$$

where I is the intensity of the earthquake (measured by the amplitude of a seismograph reading taken 100 km from the epicenter of the earthquake) and S is the intensity of a "standard earthquake" (whose amplitude is 1 micron $= 10^{-4}$ cm). $\left( M = \log \frac{I}{S} - \log I = 0 \right)$

Sketch the graph of the magnitude of the Ricther scale as a function of the intensity of the earthquake. Use the graph to find the intensity of the three most recent earthquakes in the world, occurred early today, November the 9th.

$(0.1)$

| Place | Magnitude on the Ricther scale |
|---|---|
| Solomon Islands | 4.6 |
| Southeast Honshu, Japan | 6.0 |
| Coast of Chile | 4.9 |

$M = \log \frac{I}{S}$

$10^{M} = \frac{I}{S}$

$10^{m} \cdot S = I$

$SI - 10^{4.6}$

$SHJ = 10^{6.0}$

$CC = 10^{4.9}$