Bellwork Alg 2B Friday, January 19, 2018

Sum of the first n terms of a geometric series: $S_n = \frac{a_1(1-r^n)}{1-r}$

1. Find the sum of the first 13 terms of this series: $25000 + -2500 + 250 + -25 + \ldots$

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2. Find the sum of the terms in this series: $13 + 39 + 117 + 351 + \ldots + 62178597$

3. Write the equation of the hyperbola with Vertices at $(-4, 19)$ & $(-4, -3)$ and a Focus at $(-4, -7)$.

4. State the coordinates of the Vertex, Focus, and equation of the Directrix for this parabola:
$x = -6(y+3)^2 - 5$

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Answers

Sum of the first n terms of a geometric series: $S_n = \frac{a_1(1-r^n)}{1-r}$

1. Find the sum of the first 13 terms of this series: $25000 + -2500 + 250 + -25 + \ldots$

$a_1 = 25000$

$n = 13$

$r = -0.1$

$S_{13} = \frac{25000(1-(-.1)^{13})}{1--.1} = 22727.\overline{27}$

$= 22727\frac{27}{99}$

$= 22727\frac{3}{11}$

2. Find the sum of the terms in this series: $13 + 39 + 117 + 351 + \ldots + 62178597$

$a_1 = 13$

$r = 3$

$n = 15$

$a_n = a_1 \cdot r^{n-1}$

$62178597 = 13 \cdot 3^{n-1}$

$4782969 = 3^{n-1}$

$\log_3 4782969 = n-1$

$14 = n-1$

$n = 15$

$S_{15} = \frac{13(1-3^{15})}{(1-3)}$

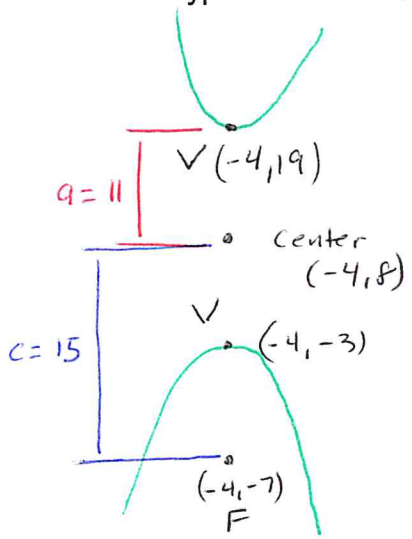
$S_{15} = 93,267,889$

3. Write the equation of the hyperbola with Vertices at $(-4, 19)$ & $(-4, -3)$ and a Focus at $(-4, -7)$.

Center

$\left(-4, \frac{19+-3}{2}\right)$

$(-4, 8)$



$\frac{(y-8)^2}{121} - \frac{(x+4)^2}{104} = 1$

$a^2 \qquad b^2$

$a = 11 \quad a^2 = 121$

$c = 15 \quad c^2 = 225$

$c^2 = a^2 + b^2$

$225 = 121 + b^2$

$104 = b^2$

4. State the coordinates of the Vertex, Focus, and equation of the Directrix for this parabola:

$x = -6(y+3)^2 - 5$

Vertex $(-5, -3)$

Focus $(-5\frac{1}{24}, -3)$

$\downarrow$

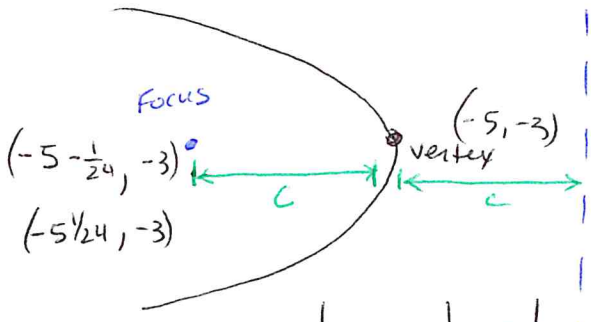
$(-\frac{121}{24}, -3)$

Directrix

$X = -4\frac{23}{24}$

$\downarrow$

$X = \frac{-119}{24}$



Directrix

$X = -5 + \frac{1}{24}$

$X = -4\frac{23}{24}$

$c = \frac{1}{4|a|} = \frac{1}{4 \cdot 6} = \frac{1}{24}$