	A	B	C	D
=				
1	a	2		

A1 *a*

$y = 2\,\csc(2x + \frac{3\cdot\pi}{4}) + 0$

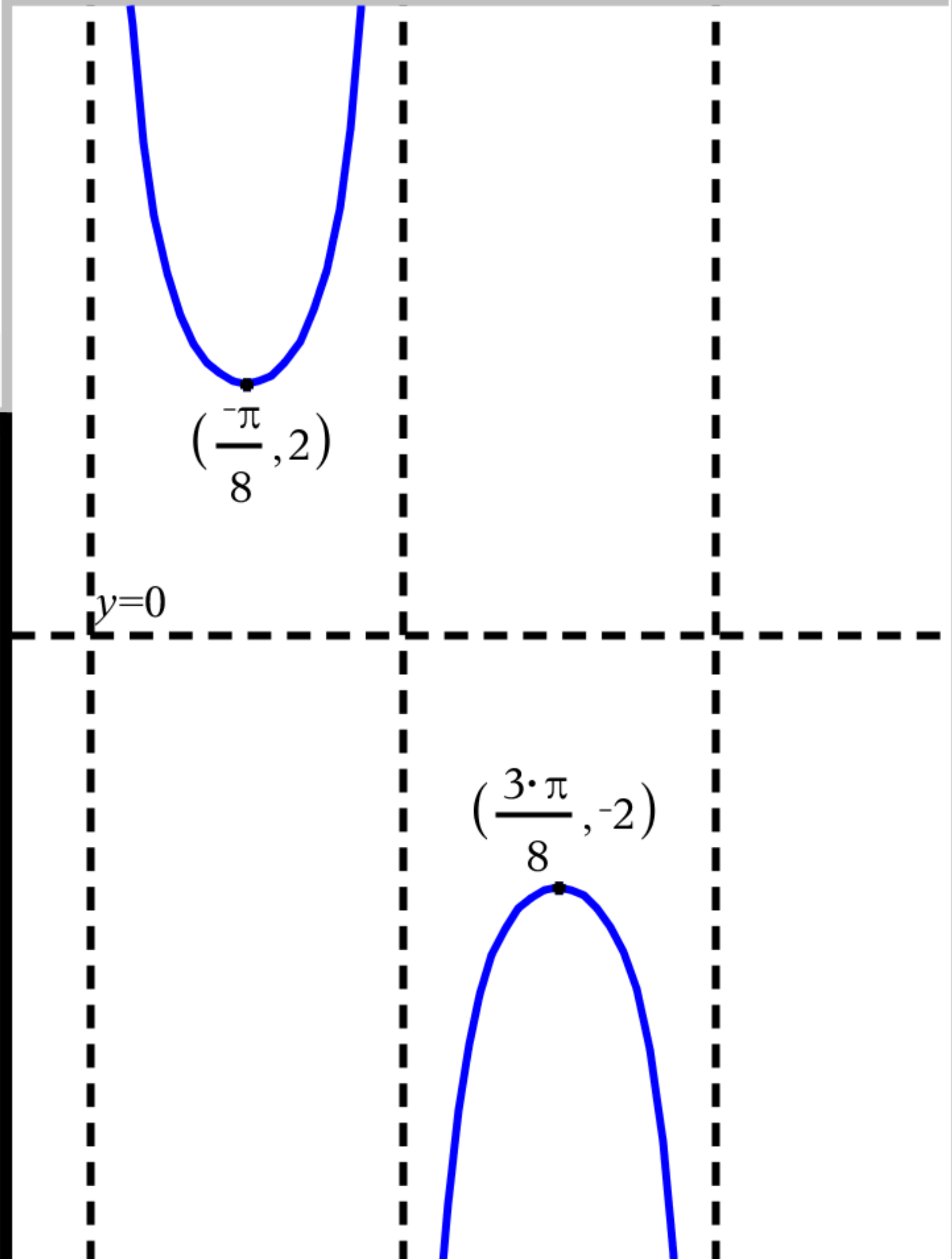
$y = 2\,\csc(2(x + \frac{3\cdot\pi}{8})) +$

Period $(\frac{-3\cdot\pi}{8}, \frac{5\cdot\pi}{8})$

Amplitude 2   Equation of Midline $y = 0$

Equation of Asymptotes $x = \frac{-3\cdot\pi}{8}$ $x = \frac{\pi}{8}$ $x = \frac{5\cdot\pi}{8}$

Equation of All Asymptotes $x = \frac{-3\cdot\pi}{8} + \frac{n\cdot\pi}{2}$ with $n \in \mathbb{Z}$



Finding b and horizontal shift

Shift to left because start $=\frac{-3\cdot\pi}{8}$

We know y=acsc(b(x $+\frac{3\cdot\pi}{8}$)) $+$ d

Period of this function $\left(\frac{-3\cdot\pi}{8},\frac{5\cdot\pi}{8}\right)$

This gives us a period length of $\frac{5\cdot\pi}{8}-\frac{-3\cdot\pi}{8}=\pi$

$|b|=2\cdot\pi\div\pi=2\cdot\pi\cdot\frac{1}{\pi}=2$

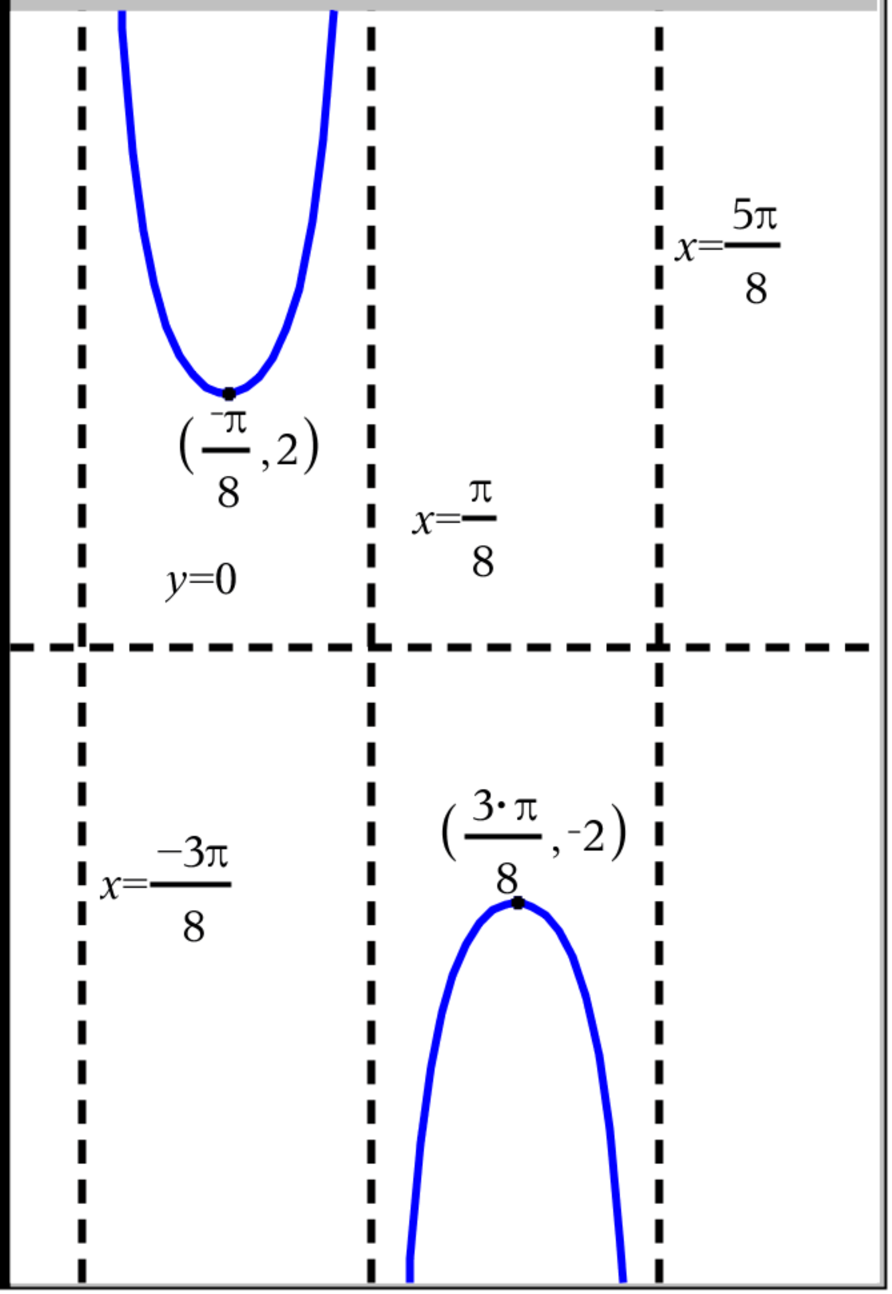
Since this IS NOT a reflection,

both a and b are positive

This means y=a **csc(**2**(x** $+\frac{3\cdot\pi}{8}$**))** $+$ d

Since the midline is y=0 , this means

y=**a csc(**2**(x** $+\frac{3\cdot\pi}{8}$**))** $+$ 0



Finding a this is the distance from the midline to the local extremes

$|{}^{-}2-0|=2$

$|0-2|=2$

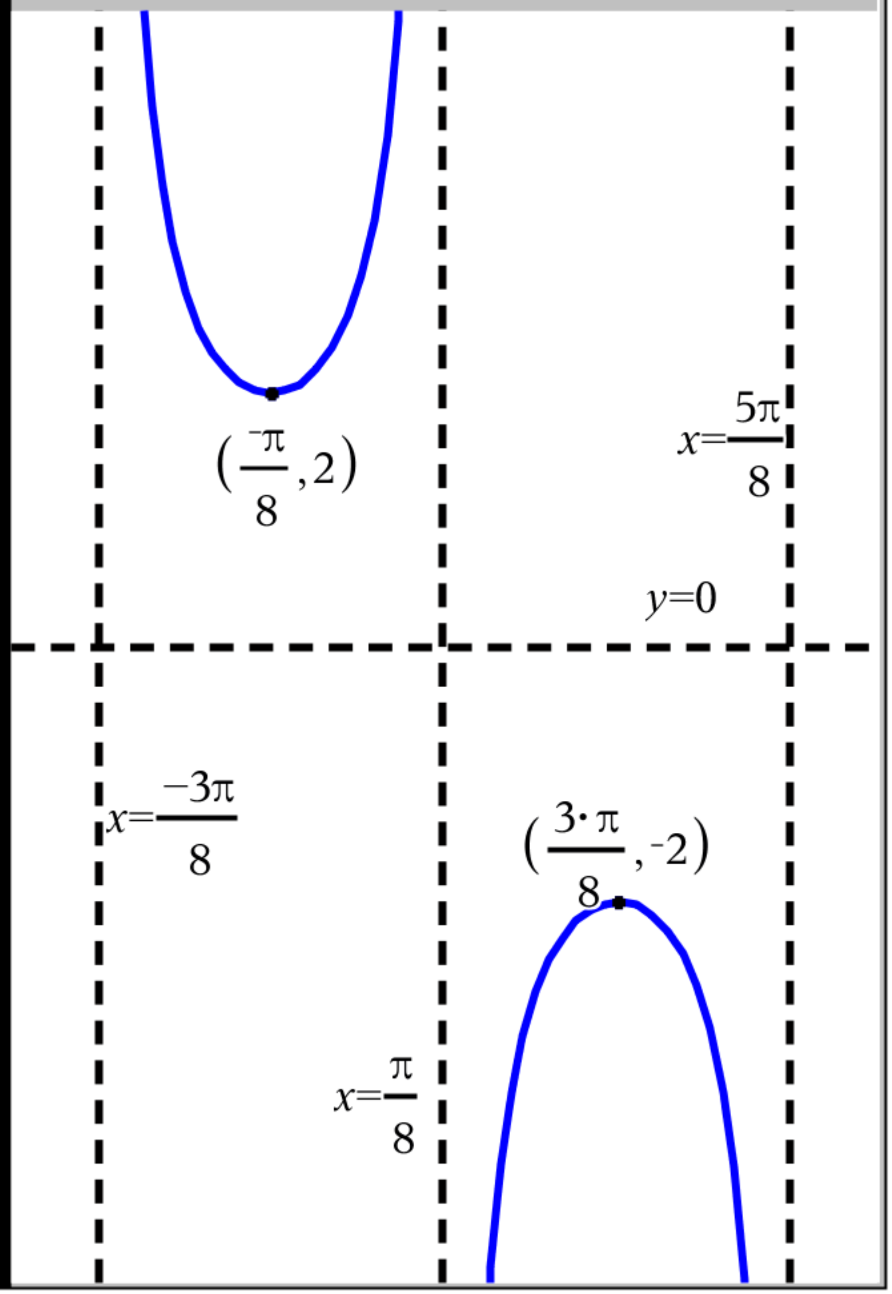
This is NOT a VERTICAL reflection

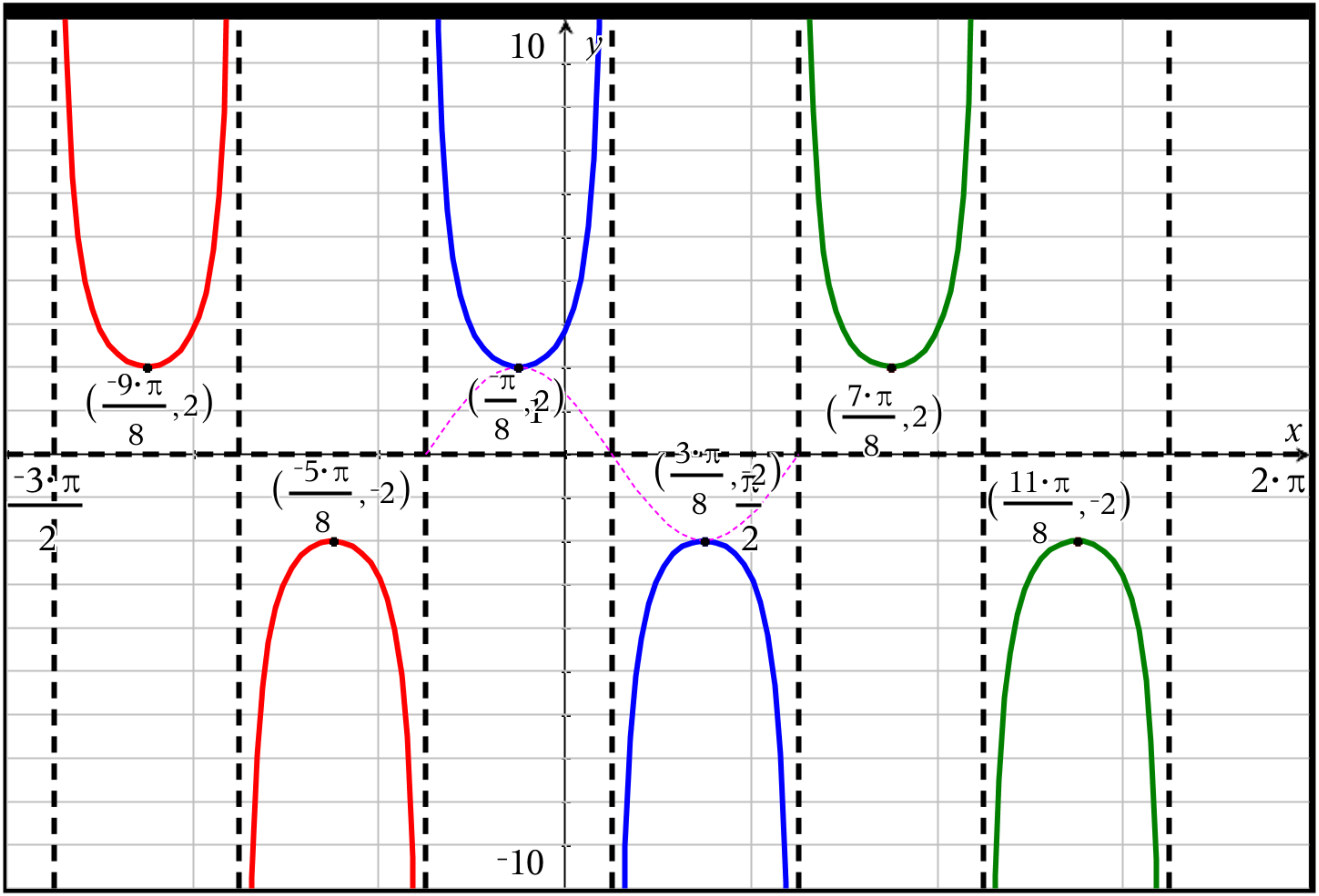
So a=2

So we know that

$$y=2\csc\left(2\left(x+\frac{3\cdot\pi}{8}\right)\right)+0$$

$$y=2\csc\left(2x+\frac{3\cdot\pi}{4}\right))+0$$




10
y
x
-10
$\frac{-3\cdot\pi}{2}$
$2\cdot\pi$
$(\frac{-9\cdot\pi}{8},2)$
$(\frac{-\pi}{8},2)$
$(\frac{7\cdot\pi}{8},2)$
$(\frac{-5\cdot\pi}{8},-2)$
$(\frac{3\cdot\pi}{8},-2)$
$(\frac{11\cdot\pi}{8},-2)$
$\frac{\pi}{2}$

	A	B	C	D
=				
1	a	-3		

A1 *a*

$y = {}^{-}3\ \sec\left(\frac{1}{2}x + \frac{\pi}{2}\right) + 1$

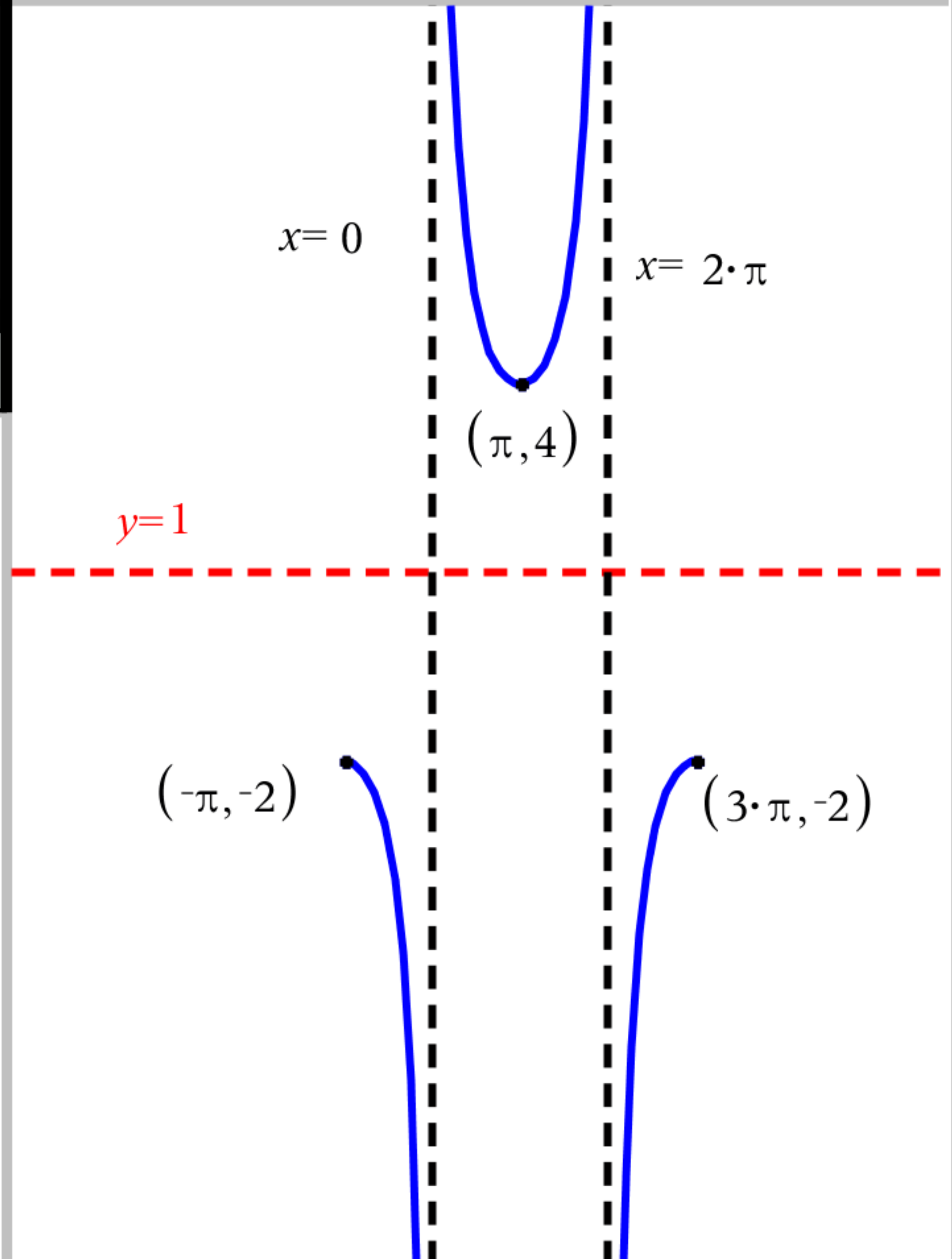
$y = {}^{-}3\ \sec\left(\frac{1}{2}(x + \pi)\right) + 1$

Period $[{}^{-}\pi, 3\cdot\pi)$

Amplitude 3 Equation of Midline $y = 1$

Equation of Asymptotes $x = 0$ $x = 2\cdot\pi$

Equation of All Asymptotes $x = 0 + 2\cdot n\cdot\pi$ with $n \in \mathbb{Z}$



Finding b and horizontal shift

Shift to left because start $= {}^{-}\pi$

We know $y=a\sec(b(x+\pi))+d$

Period of this function $[{}^{-}\pi, 3\cdot\pi)$

This gives us a period length of $3\cdot\pi - {}^{-}\pi = 4\cdot\pi$

$$|b| = 2\cdot\pi \div 4\cdot\pi = 2\cdot\pi \cdot \frac{1}{4\cdot\pi} = \frac{1}{2}$$

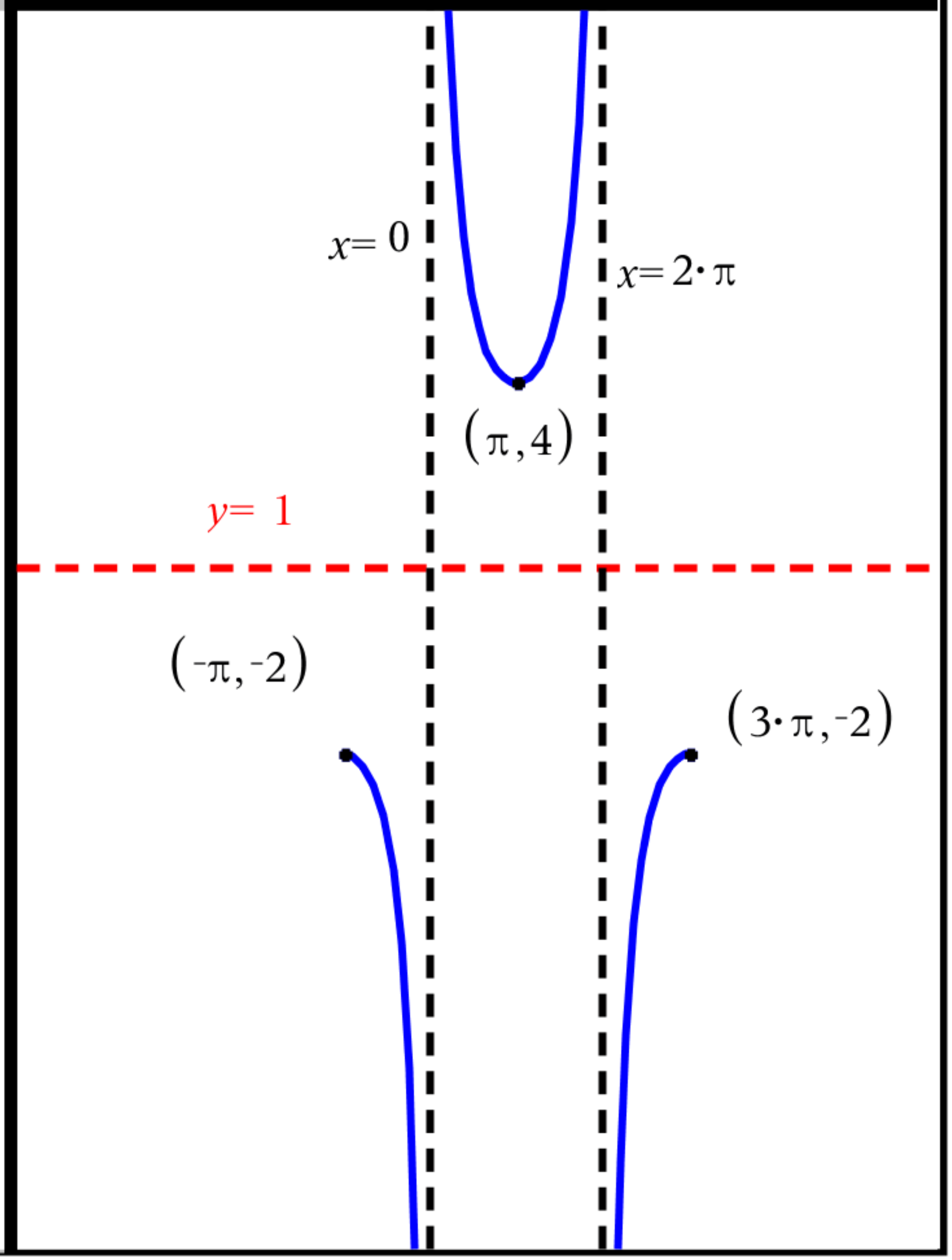
Since this IS NOT a reflection,

both a and b are positive

This means $y = a\ \mathbf{sec}\left(\frac{1}{2}(x+\pi)\right)+d$

Since the midline is $y=1$, this means

$y = a\ \mathbf{sec}\left(\frac{1}{2}(x+\pi)\right)+1$



Finding a this is the distance from the midline to the local extremes

$|{}^{-}2 - 1| = 3$

$|1 - 4| = 3$

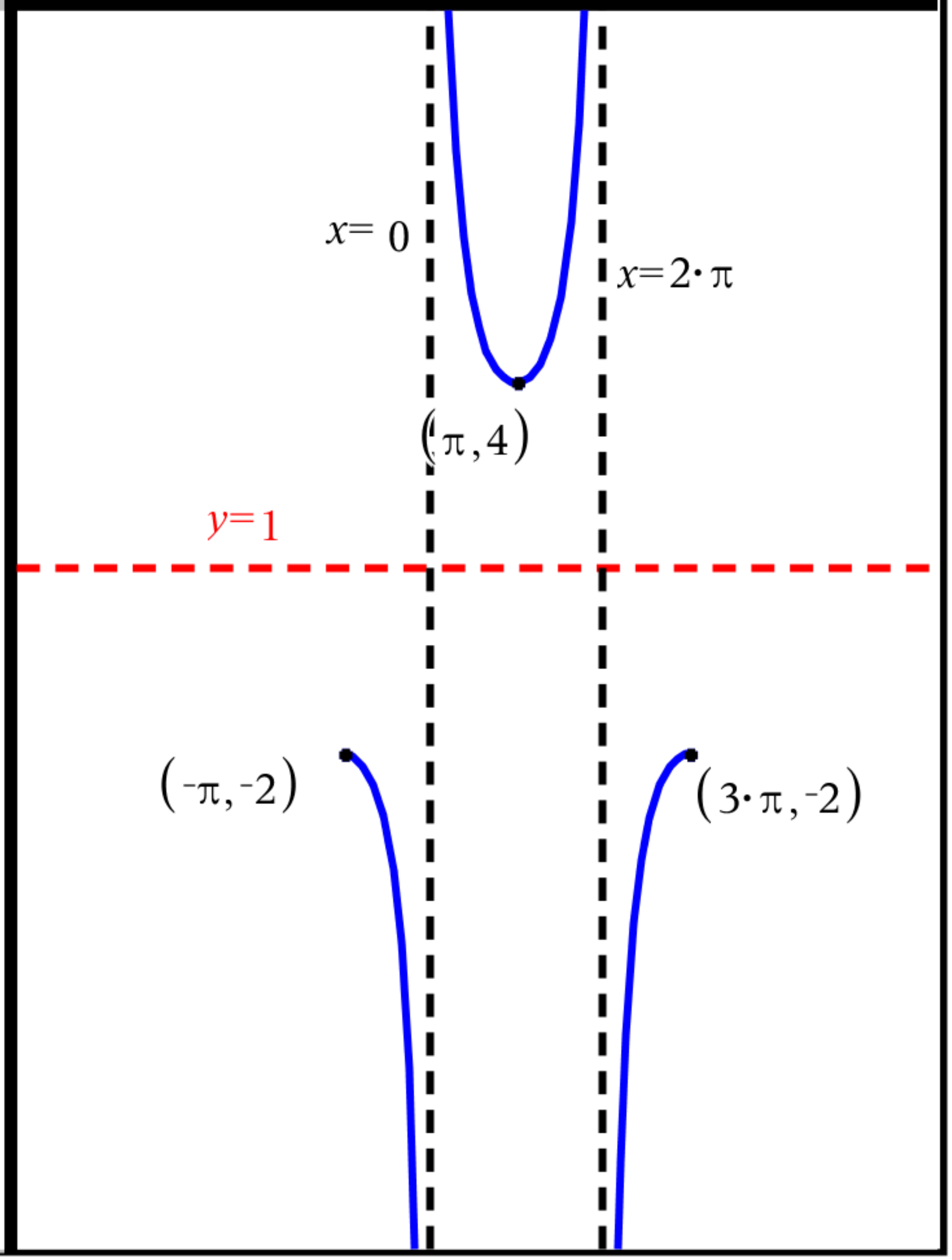
This is a VERTICAL reflection

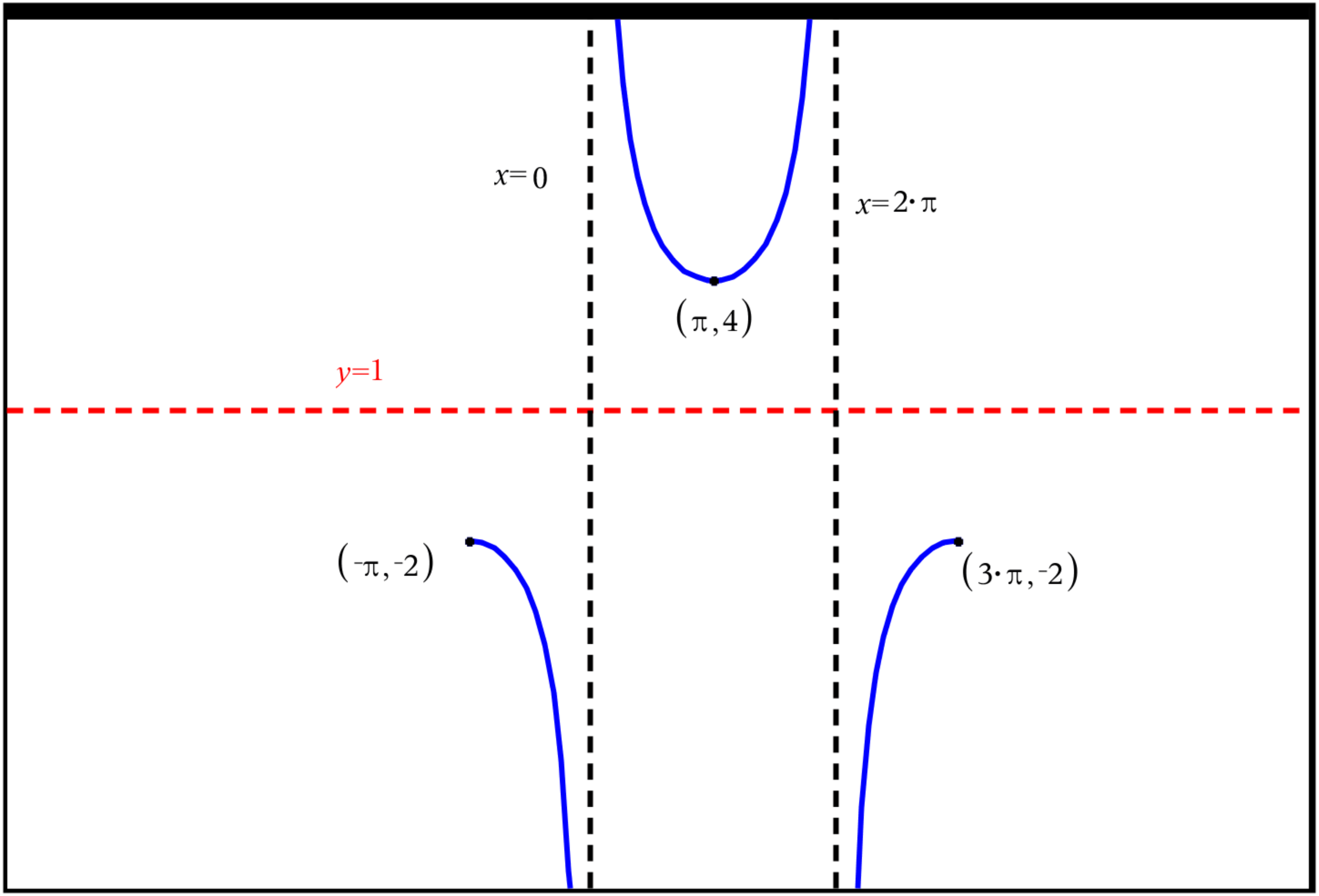
So $a = {}^{-}3$

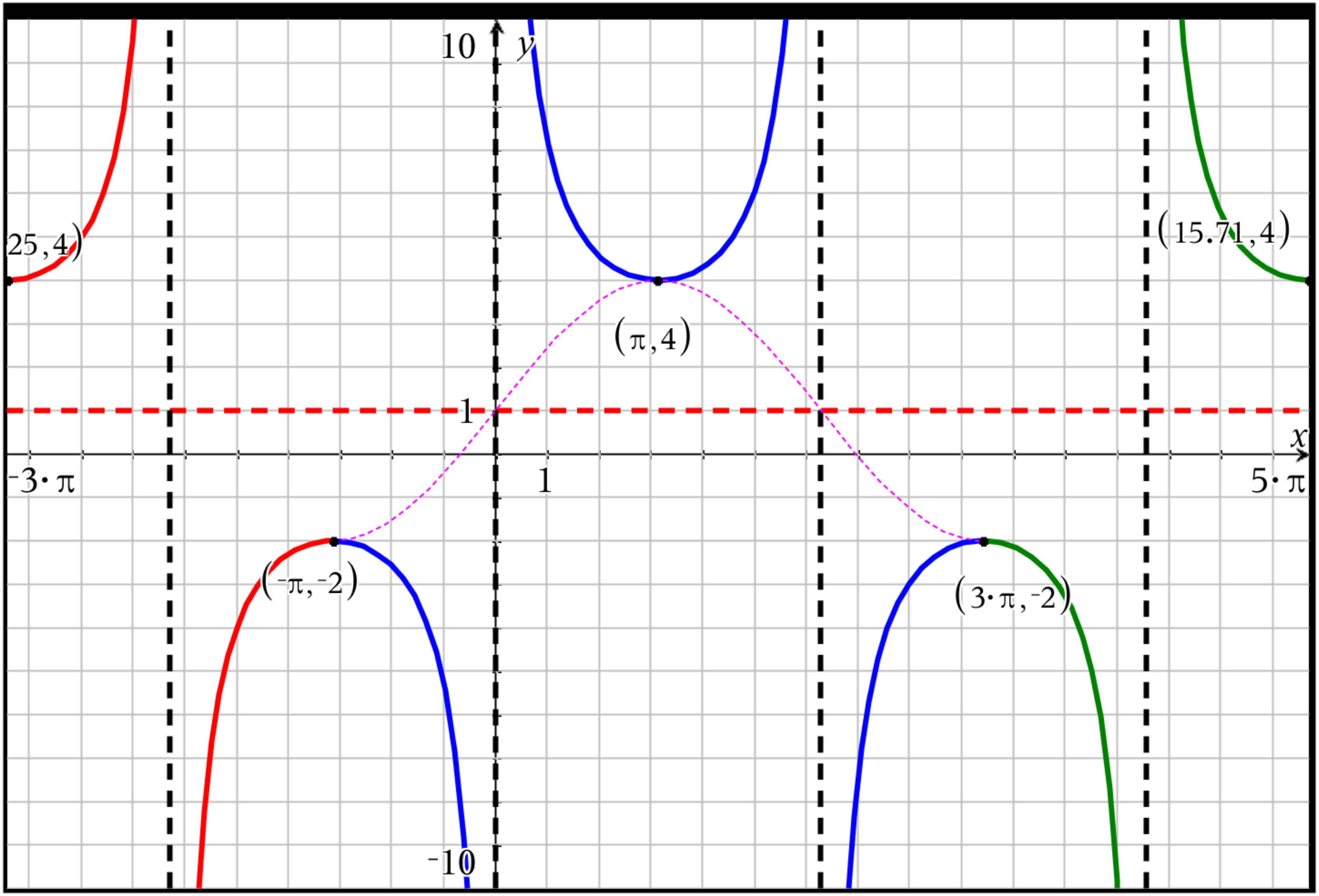
So we know that

$$y = {}^{-}3\,\mathbf{sec}\left(\frac{1}{2}(x + \pi)\right) + 1$$

$$y = {}^{-}3\,\mathbf{sec}\left(\frac{1}{2}x + \frac{\pi}{2}\right) + 1$$




x= 0
x=2· π
(π, 4)
y=1
(-π, -2)
(3· π, -2)



10
y
25,4)
(15.71,4)
(π,4)
1
x
⁻3·π
1
5·π
(⁻π,⁻2)
(3·π,⁻2)
⁻10

	A	B	C
=			
1	a	-3	
2	b	5	

A1 *a*

$y = -3\csc\left(5x - \frac{7\pi}{4}\right) + 0$

Period

$\left(\frac{7\pi}{20}, \frac{3\pi}{4}\right)$

Midline

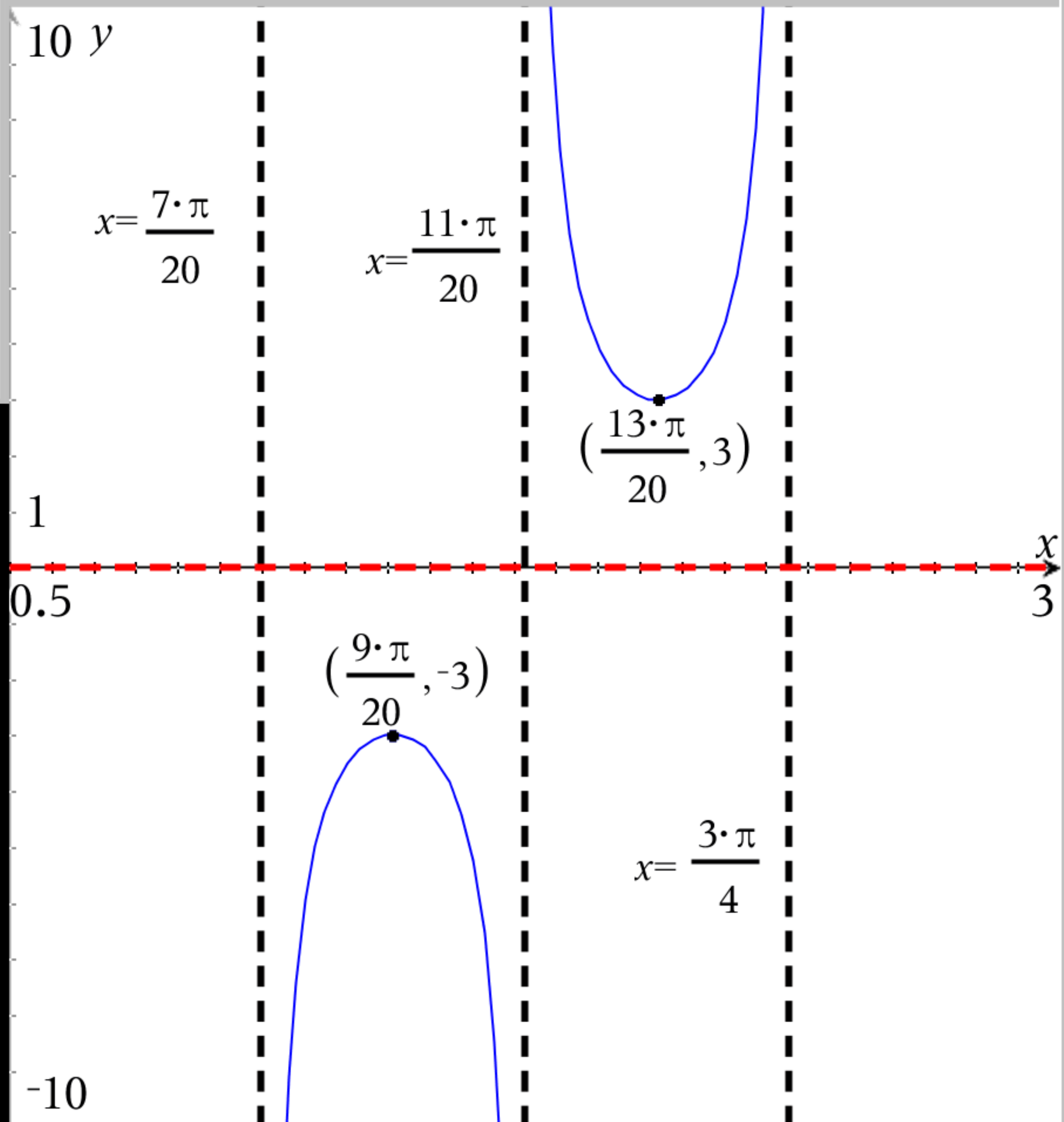
$y = 0$

Local Extremes

$\left(\frac{9\pi}{20}, -3\right)$ $\left(\frac{13\pi}{20}, 3\right)$

Asymptotes

$x = \frac{7\pi}{20}$ $x = \frac{11\pi}{20}$ $x = \frac{3\pi}{4}$



Step 1 What are the a, b,c d of the transformation?

a= -3 b= 5 c = $\frac{-7\cdot\pi}{4}$ d = 0

Step 2: Factor INTERIOR function

$y=-3\,\csc(5x - \frac{7\cdot\pi}{4}) + 0$ **NOTE: This asking you to do this** $\frac{-7\cdot\pi}{4} \div 5 = \frac{-7\cdot\pi}{4} \cdot \frac{1}{5} = \frac{-7\cdot\pi}{20}$

$y=-3\,\csc(5(x - \frac{7\cdot\pi}{20})) + 0$

Note: Since $\frac{c}{b} = \frac{-7\cdot\pi}{20}$ we know that the horizontal shift is SHIFT RIGHT

Note: Since b = 5, We know that there is a horizontal compression

Note: Since we know there is SHIFT RIGHT

and we have factored form, A period begins at x = $\frac{7\cdot\pi}{20}$

Step 3: Determine the length of period using $\text{period} = \frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div 5 = 2\cdot\pi \cdot \frac{1}{5} = \frac{2\cdot\pi}{5}$ So we know the period is $\frac{2\cdot\pi}{5}$ LONG a=$^-3$ b=5 c =$\frac{^-7\cdot\pi}{4}$ d =0 y=$^-3\,\mathbf{csc}(5\,\mathbf{x} - \frac{7\cdot\pi}{4}) + 0$ y=$^-3\,\mathbf{csc}(5\,(\mathbf{x} - \frac{7\cdot\pi}{20})) + 0$

period length is $\frac{2\cdot\pi}{5}$ and ONE PERIOD starts at $\frac{7\cdot\pi}{20}$

Step 4: Determine the FIVE IMPORTANT x values

start =$\frac{7\cdot\pi}{20}$ (this is the first asymptote of cosecant)

start +$\frac{1\cdot\mathbf{period}}{4} = \frac{7\cdot\pi}{20} + \frac{\pi}{10} = \frac{9\cdot\pi}{20}$ (this is where one of the local extremes occurs)

start +$\frac{2\cdot\mathbf{period}}{4} = \frac{7\cdot\pi}{20} + \frac{\pi}{5} = \frac{11\cdot\pi}{20}$ (this is the second asymptote of cosecant)

start +$\frac{3\cdot\mathbf{period}}{4} = \frac{7\cdot\pi}{20} + \frac{3\cdot\pi}{10} = \frac{13\cdot\pi}{20}$ (this is where one of the local extremes occurs)

start +$\mathbf{period} = \frac{7\cdot\pi}{20} + \frac{2\cdot\pi}{5} = \frac{3\cdot\pi}{4}$ (this is the third asymptote of cosecant)

$a = -3$ $b = 5$ $c = \frac{-7\cdot\pi}{4}$ $d = 0$ $y = -3\,\mathbf{csc}(5x - \frac{7\cdot\pi}{4}) + 0$ $y = -3\,\mathbf{csc}(5(x - \frac{7\cdot\pi}{20})) + 0$

period length is $\frac{2\cdot\pi}{5}$ and ONE PERIOD starts at $\frac{7\cdot\pi}{20}$

"cool stuff" happens at x = $\{\frac{7\cdot\pi}{20}, \frac{9\cdot\pi}{20}, \frac{11\cdot\pi}{20}, \frac{13\cdot\pi}{20}, \frac{3\cdot\pi}{4}\}$

Step 5: Use d to determine midline $y = 0$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred

$a = -3$ $b = 5$

Since a $<$ 0 and b $>$ 0 ,

we know that THERE IS vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

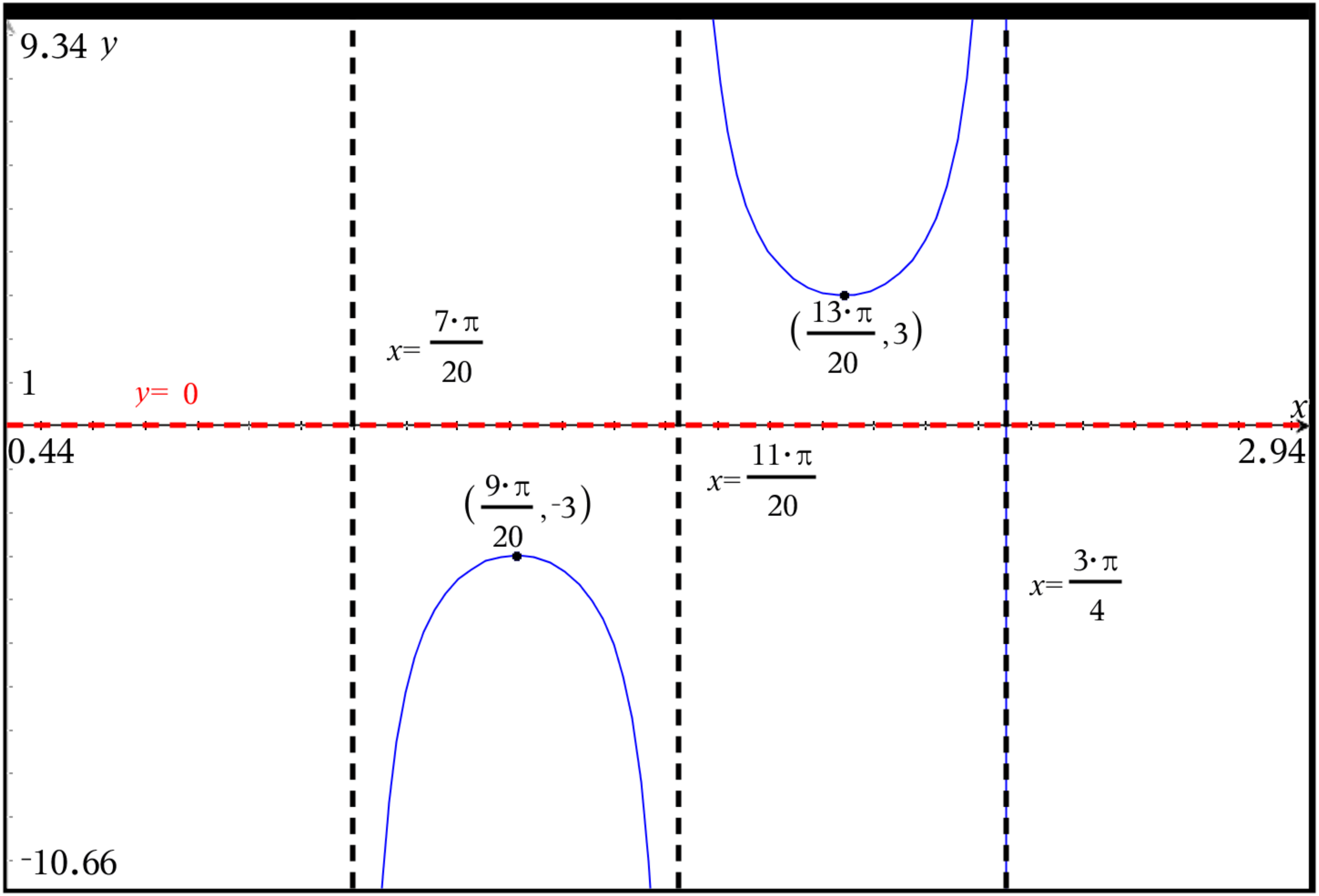
Since $a = -3$ and $d = 0$

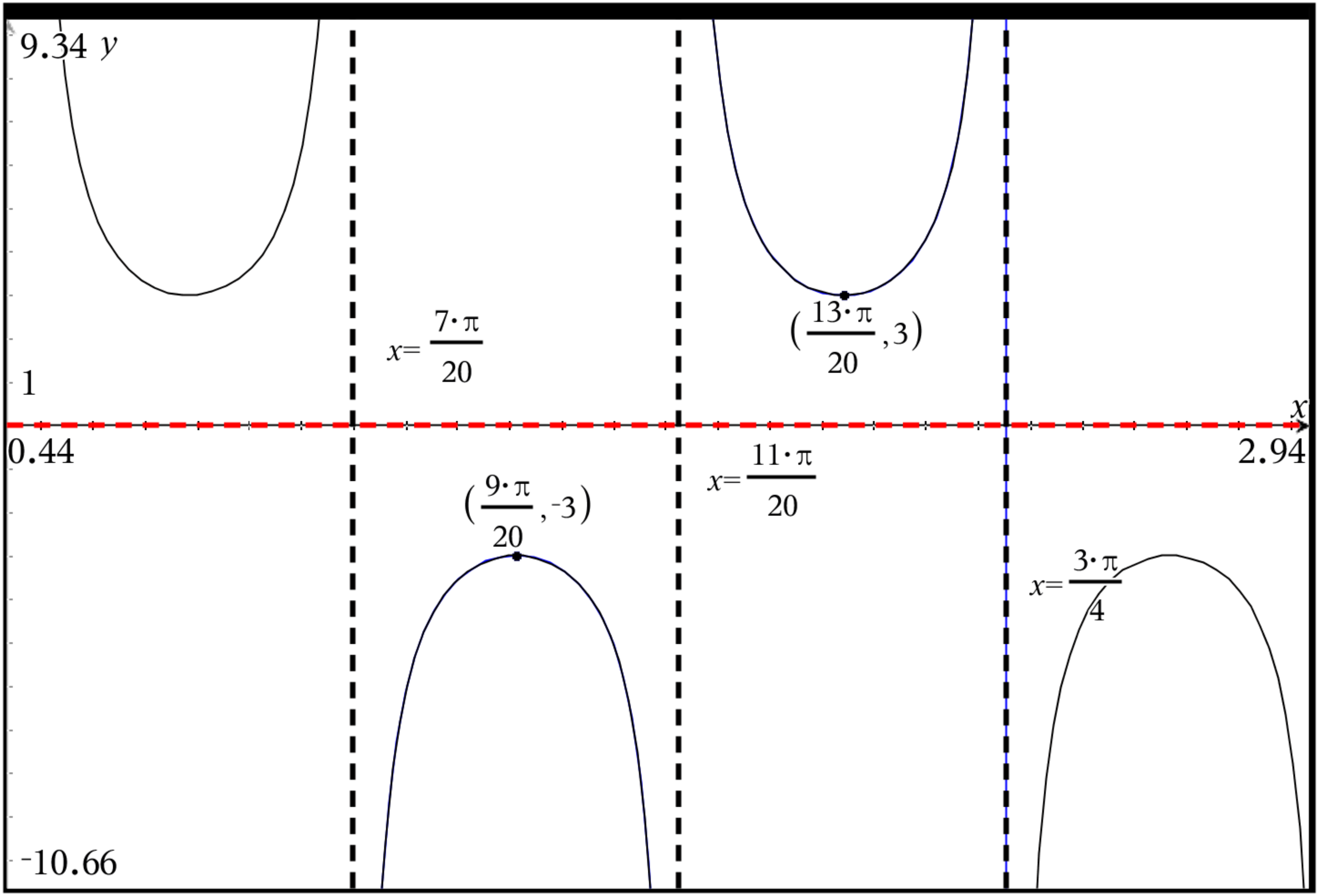
local extremes (top and bottom of "U" shape) occur at $y = d + |a| = 0 + 3 = 3$ (bottom of a "U")

$y = d - |a| = 0 - 3 = -3$ (top of a "U")

Step 8: Build local extremes

$(\frac{9\cdot\pi}{20}, 3)$ and $(\frac{13\cdot\pi}{20}, -3)$


9.34 y
1
y= 0
x
0.44
2.94
-10.66
x= 7·π/20
(13·π/20, 3)
x= 11·π/20
(9·π/20, -3)
x= 3·π/4


9.34 y
1
-10.66
0.44
2.94
x
$x=\frac{7\cdot\pi}{20}$
$(\frac{13\cdot\pi}{20},3)$
$(\frac{9\cdot\pi}{20},-3)$
$x=\frac{11\cdot\pi}{20}$
$x=\frac{3\cdot\pi}{4}$

	A	B	C
=			
1	a	5	
2	b	2/3*π	

A1 *a*

$y=5\csc\left(\frac{2\cdot\pi}{3}x - 12\cdot\pi\right) - 7$

Period: $(18, 21)$

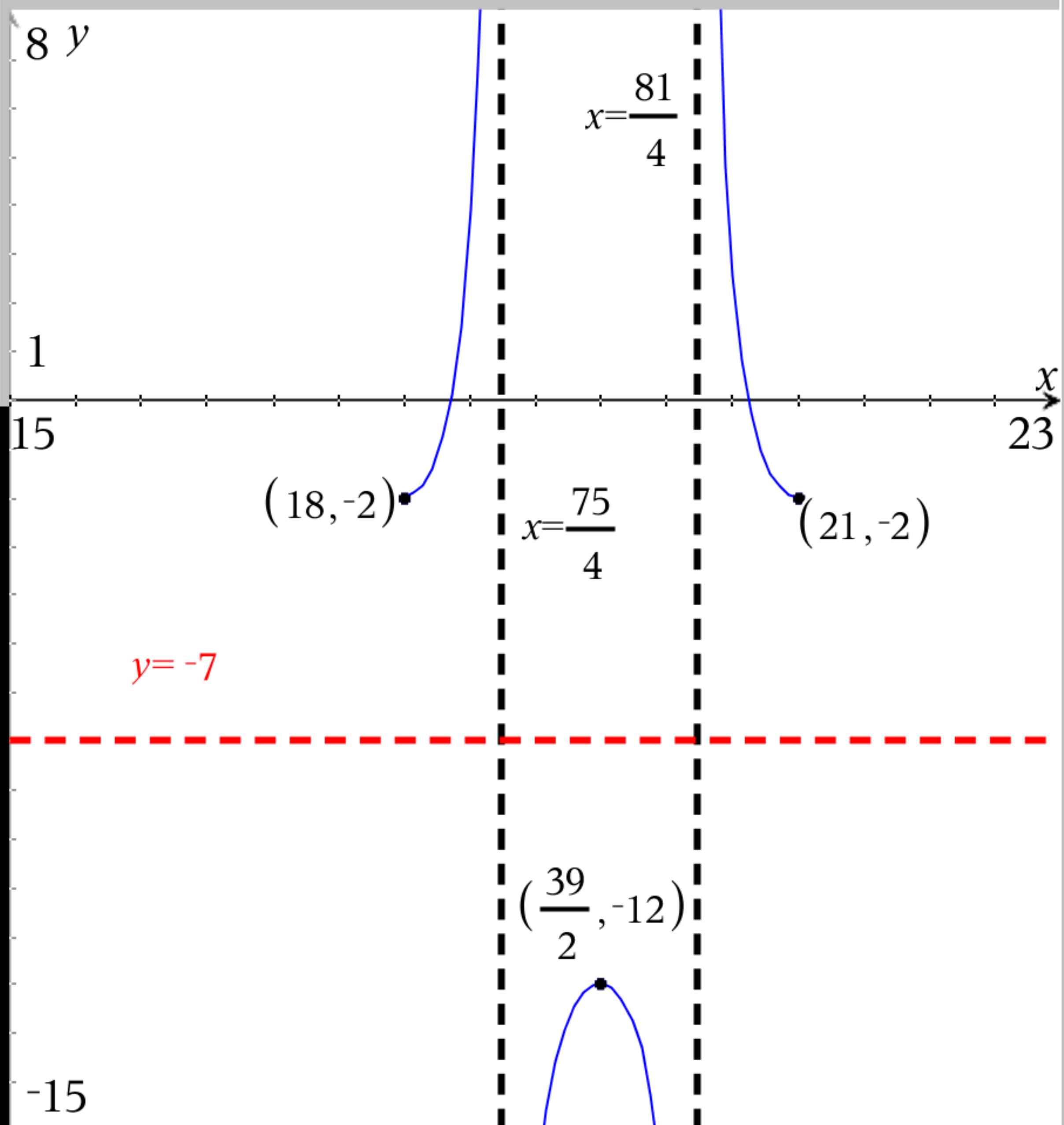
Midline: $y = -7$

Local Extremes

$(18, -2)$ $\left(\frac{39}{2}, -12\right)$ $(21, -2)$

Asymptotes

$x = \frac{75}{4}$ $x = \frac{81}{4}$



Step 1 What are the a, b,c d of the transformation?

$a=5$ $b=\frac{2\cdot\pi}{3}$ $c=^{-}12\cdot\pi$ $d=^{-}7$

Step 2: Factor INTERIOR function

$y=5\,\mathbf{sec}\left(\frac{2\cdot\pi}{3}\mathbf{x} - 12\cdot\pi\right) - 7$ **NOTE: This asking you to do this** $^{-}12\cdot\pi \div \frac{2\cdot\pi}{3} = ^{-}12\cdot\pi \cdot \frac{3}{2\cdot\pi} = ^{-}18$

$y=5\,\mathbf{csc}\left(\frac{2\cdot\pi}{3}(\mathbf{x} - 18)\right) - 7$

Note: Since $\frac{c}{b}=^{-}18$ we know that the horizontal shift is SHIFT RIGHT

Note: Since $b=\frac{2\cdot\pi}{3}$, We know that there is a horizontal compression

Note: Since we know there is SHIFT RIGHT

and we have factored form, A period begins at $x=18$

Step 3: Determine the length of period using $\text{period}=\frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div \frac{2\cdot\pi}{3} = 2\cdot\pi \cdot \frac{3}{2\cdot\pi} = 3$ So we know the period is 3 LONG

$a=5$ $b=\frac{2\cdot\pi}{3}$ $c=^{-}12\cdot\pi$ $d=^{-}7$ $y=5\sec(\frac{2\cdot\pi}{3}x - 12\cdot\pi) - 7$ $y=5\sec(\frac{2\cdot\pi}{3}(x - 18)) - 7$

period length is 3 and ONE PERIOD starts at 18

Step 4: Determine the FIVE IMPORTANT x values

start $=18$ (this is the first local extreme of secant)

start $+\frac{1\cdot \textbf{period}}{4} = 18+\frac{3}{4}=\frac{75}{4}$ (this is where first asymptote occurs)

start $+\frac{2\cdot \textbf{period}}{4} = 18+\frac{3}{2}=\frac{39}{2}$ (this is the second local extreme of secant)

start $+\frac{3\cdot \textbf{period}}{4} = 18+\frac{9}{4}=\frac{81}{4}$ (this is the second asymptote of secant)

start $+\textbf{period} = 18+3=21$ (this is the last local extreme of secant)

$a=5$ $b=\frac{2\cdot\pi}{3}$ $c=^-12\cdot\pi$ $d=^-7$ $y=5\sec(\frac{2\cdot\pi}{3}x-12\cdot\pi)-7$ $y=5\sec(\frac{2\cdot\pi}{3}(x-18))-7$

period length is 3 and ONE PERIOD starts at 18

"cool stuff" happens at x =$\{18,\frac{75}{4},\frac{39}{2},\frac{81}{4},21\}$

Step 5: Use d to determine midline $y=^-7$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred

$a=5$ $b=\frac{2\cdot\pi}{3}$

Since a $>$ 0 and b $>$ 0 ,

we know that NO vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

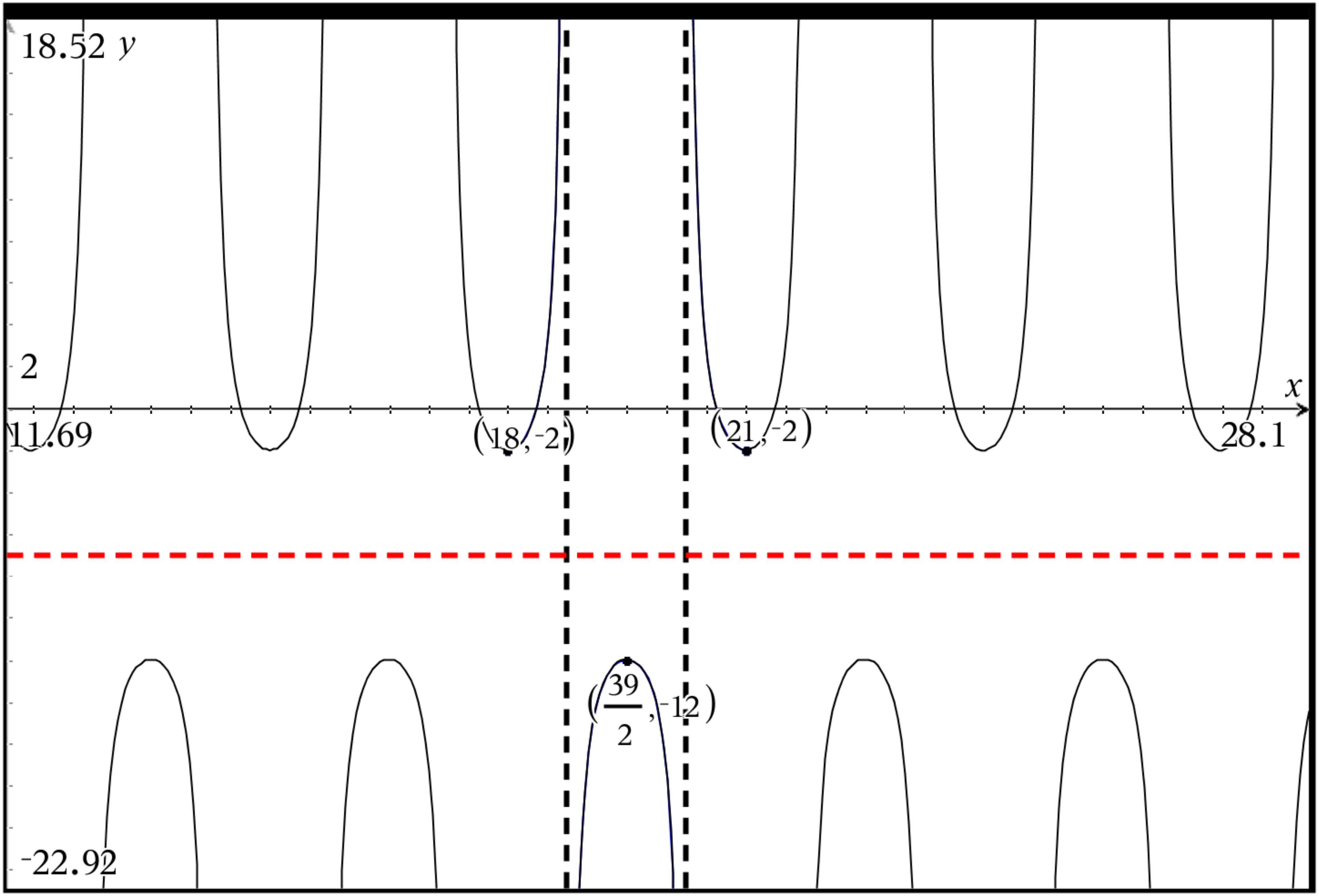
Since a =5 and d=-7

local extremes (top and bottom of "U" shape) occur at $y=d+|a|=^-7+5=^-2$ (bottom of a "U")

$y=d-|a|=^-7-5=^-12$ (top of a "U")

Step 8: Build local extremes

$(18,^-12)$ and $(\frac{39}{2},^-2)$ and $(21,^-12)$


18.52 y
2
x
11.69
28.1
(18, -2)
(21, -2)
(39/2, -12)
-22.92

	A	B	C
=			
1	a	-3/2	
2	b	6	

A1 *a*

$y=\frac{-3}{2}\cos(6x + 5\cdot\pi) + 1$

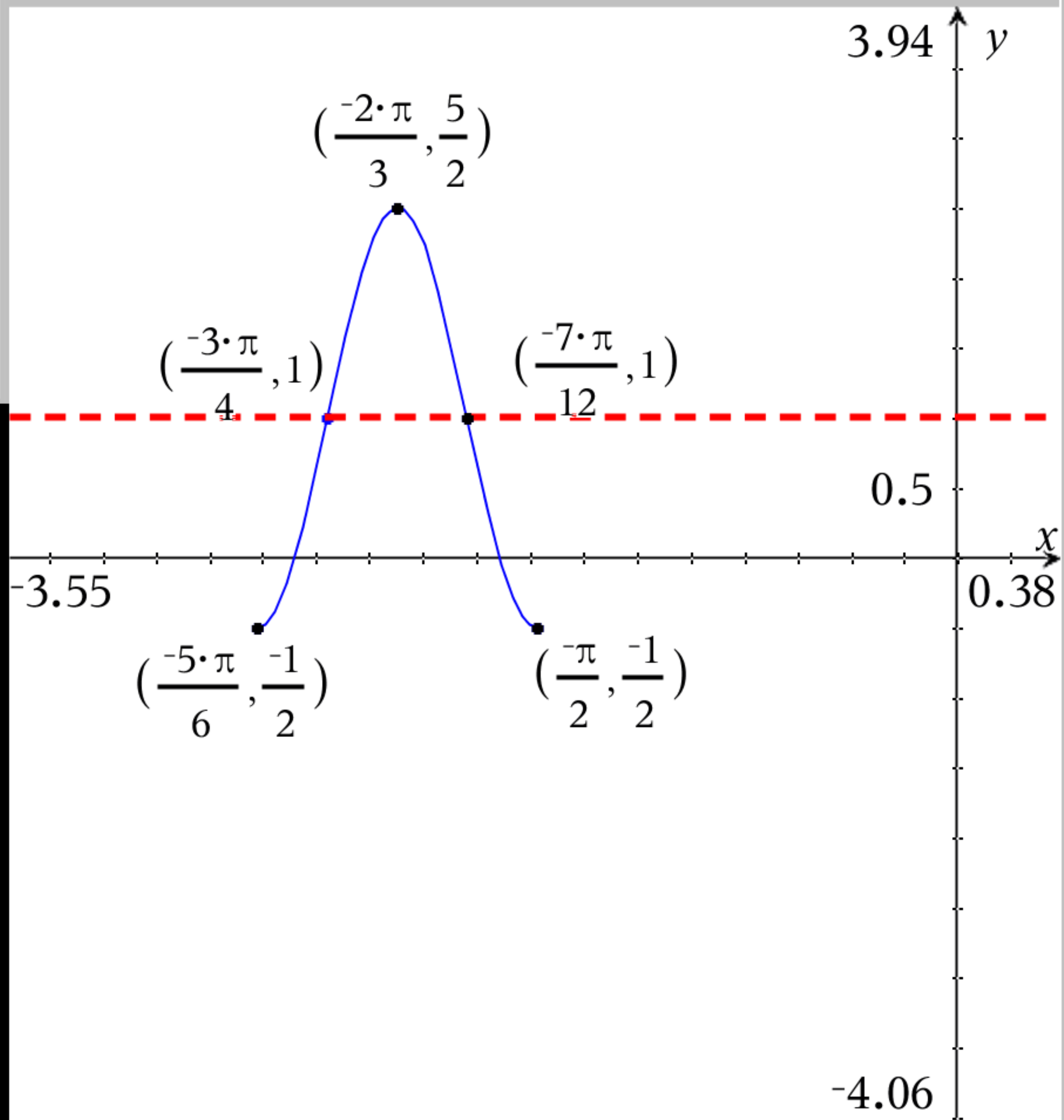
Period	Midline
$\left(\frac{-5\cdot\pi}{6}, \frac{-\pi}{2}\right)$	$y = 1$

Local Extremes

$\left(\frac{-5\cdot\pi}{6}, 1\right)$ $\left(\frac{-2\cdot\pi}{3}, 1\right)$ $\left(\frac{-\pi}{2}, \frac{-1}{2}\right)$

Intersections with midline

$\left(\frac{-3\cdot\pi}{4}, 1\right)$ $\left(\frac{-7\cdot\pi}{12}, 1\right)$



Step 1 What are the a, b,c d of the transformation?

$a=\frac{-3}{2}$ $b=6$ $c=5\cdot\pi$ $d=1$

Step 2: Factor INTERIOR function

$y=\frac{-3}{2}\cos(6x + 5\cdot\pi) + 1$ **NOTE: This asking you to do this** $5\cdot\pi \div 6 = 5\cdot\pi \cdot \frac{1}{6} = \frac{5\cdot\pi}{6}$

$y=\frac{-3}{2}\csc\left(6\left(x + \frac{5\cdot\pi}{6}\right)\right) + 1$

Note: Since $\frac{c}{b} = \frac{5\cdot\pi}{6}$ we know that the horizontal shift is SHIFT LEFT

Note: Since b = 6 , We know that there is a horizontal compression

Note: Since we know there is SHIFT LEFT

and we have factored form, A period begins at $x = \frac{-5\cdot\pi}{6}$

Step 3: Determine the length of period using $\text{period} = \frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div 6 = 2\cdot\pi \cdot \frac{1}{6} = \frac{\pi}{3}$ So we know the period is $\frac{\pi}{3}$ LONG

$a=\frac{-3}{2}$ $b=6$ $c=5\cdot\pi$ $d=1$ $y=\frac{-3}{2}\cos(6x+5\cdot\pi)+1$ $y=\frac{-3}{2}\cos\left(6\left(x+\frac{5\cdot\pi}{6}\right)\right)+1$

period length is $\frac{\pi}{3}$ and ONE PERIOD starts at $\frac{-5\cdot\pi}{6}$

Step 4: Determine the FIVE IMPORTANT x values

start $=\frac{-5\cdot\pi}{6}$ (this is the first local extreme of cosine)

start $+\frac{1\cdot\textbf{period}}{4}=\frac{-5\cdot\pi}{6}+\frac{\pi}{12}=\frac{-3\cdot\pi}{4}$ (this is where first intersection of midline occurs)

start $+\frac{2\cdot\textbf{period}}{4}=\frac{-5\cdot\pi}{6}+\frac{\pi}{6}=\frac{-2\cdot\pi}{3}$ (this is the second local extreme of cosine)

start $+\frac{3\cdot\textbf{period}}{4}=\frac{-5\cdot\pi}{6}+\frac{\pi}{4}=\frac{-7\cdot\pi}{12}$ (this is where first intersection of midline occurs)

start $+\textbf{period}=\frac{-5\cdot\pi}{6}+\frac{\pi}{3}=\frac{-\pi}{2}$ (this is the last local extreme of cosine)

$a=\frac{-3}{2}$ b=6 c =$5\cdot\pi$ d =1 $y=\frac{-3}{2}\cos(6x+5\cdot\pi)+1$ $y=\frac{-3}{2}\cos\left(6\left(x+\frac{5\cdot\pi}{6}\right)\right)+1$

period length is $\frac{\pi}{3}$ and ONE PERIOD starts at $\frac{-5\cdot\pi}{6}$

"cool stuff" happens at x =$\left\{\frac{-5\cdot\pi}{6},\frac{-3\cdot\pi}{4},\frac{-2\cdot\pi}{3},\frac{-7\cdot\pi}{12},\frac{-\pi}{2}\right\}$

Step 5: Use d to determine midline $y=1$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred $a=\frac{-3}{2}$ $b=6$

Since a $<$ 0 and b $>$ 0 ,

we know that THERE IS A vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

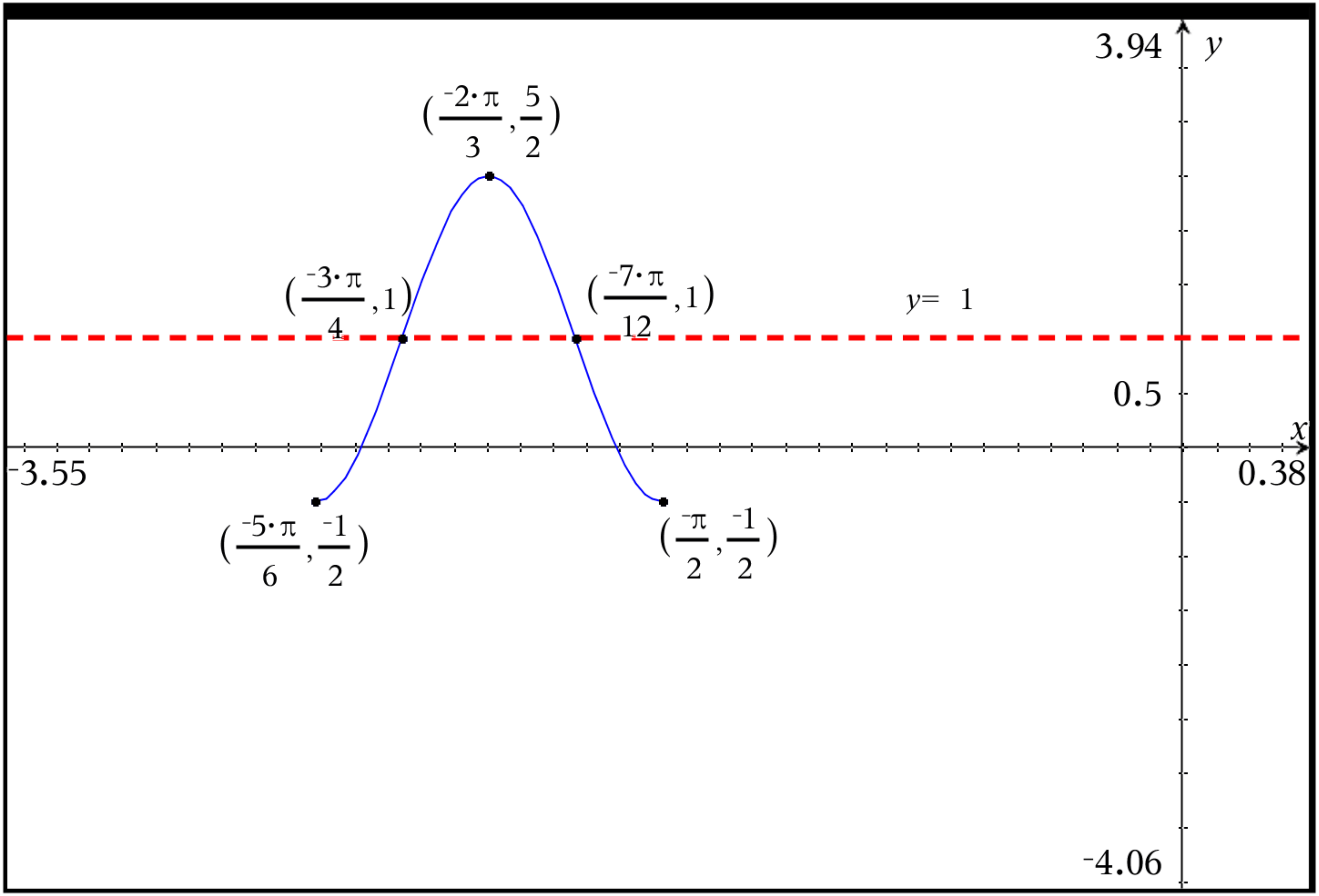
Since $a=\frac{-3}{2}$ and d=1

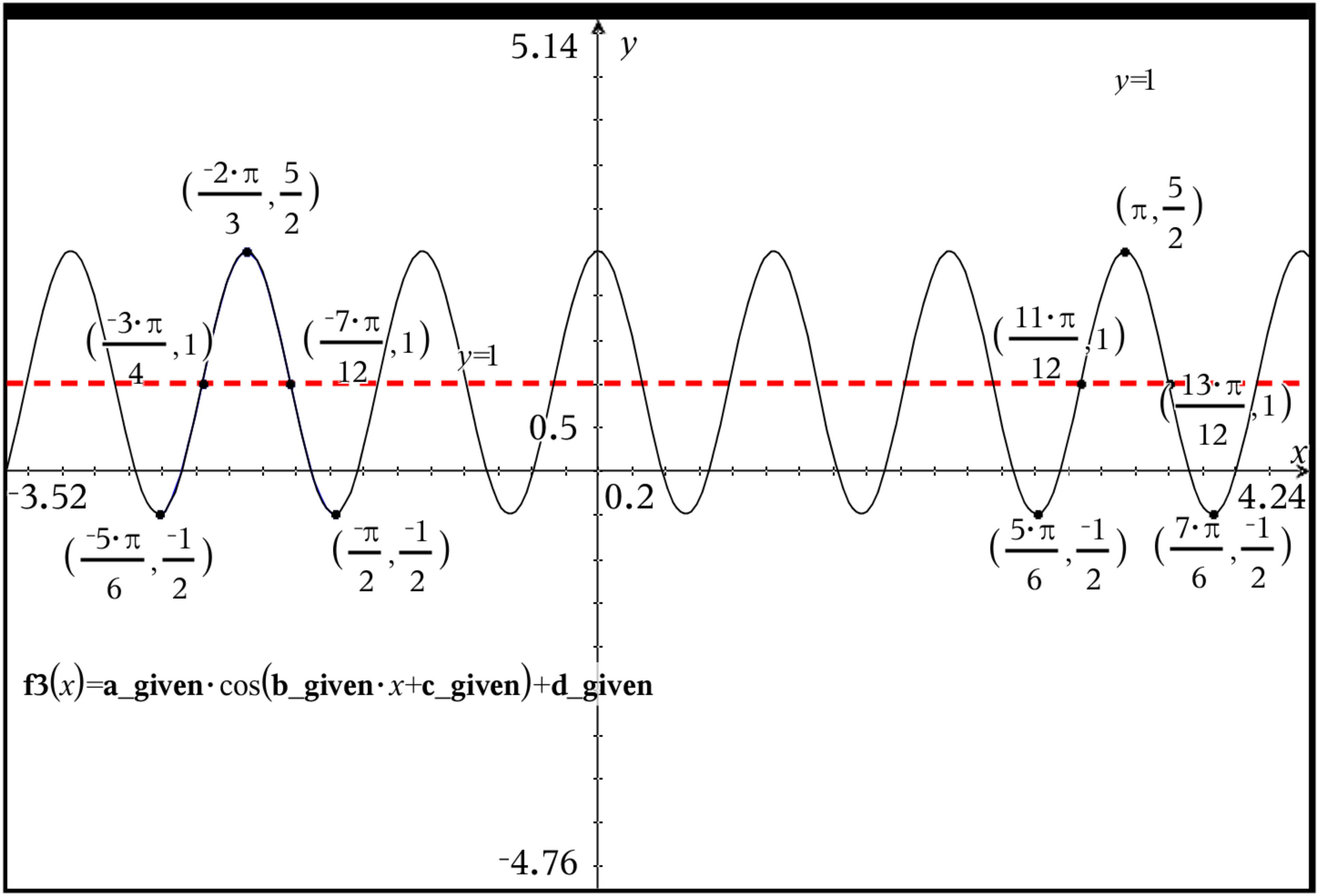
local extremes (top and bottom of "U" shape) occur at $y=d+|a|=1+\frac{3}{2}=\frac{5}{2}$ (TOP of a "U")

$y=d-|a|=1-\frac{3}{2}=\frac{-1}{2}$ (BOTTOM of a "U")

Step 8: Build local extremes

$\left(\frac{-5\cdot\pi}{6},\frac{-1}{2}\right)$ and $\left(\frac{-2\cdot\pi}{3},\frac{5}{2}\right)$ and $\left(\frac{-\pi}{2},\frac{-1}{2}\right)$


3.94
y
$(\frac{-2\cdot\pi}{3},\frac{5}{2})$
$(\frac{-3\cdot\pi}{4},1)$
$(\frac{-7\cdot\pi}{12},1)$
y= 1
0.5
x
-3.55
0.38
$(\frac{-5\cdot\pi}{6},\frac{-1}{2})$
$(\frac{-\pi}{2},\frac{-1}{2})$
-4.06



5.14
y
y=1
$(\frac{-2\cdot\pi}{3}, \frac{5}{2})$
$(\pi, \frac{5}{2})$
$(\frac{-3\cdot\pi}{4}, 1)$
$(\frac{-7\cdot\pi}{12}, 1)$
y=1
$(\frac{11\cdot\pi}{12}, 1)$
$(\frac{13\cdot\pi}{12}, 1)$
0.5
x
-3.52
0.2
4.24
$(\frac{-5\cdot\pi}{6}, \frac{-1}{2})$
$(\frac{-\pi}{2}, \frac{-1}{2})$
$(\frac{5\cdot\pi}{6}, \frac{-1}{2})$
$(\frac{7\cdot\pi}{6}, \frac{-1}{2})$
f3(x)=a_given·cos(b_given·x+c_given)+d_given
-4.76

	A
=	
1	SHIFT LEFT
2	SHIFT DOWN
3	Horizontal REFLECTIO
4	STRETCH period
5	Vertically STRETCH
6	
7	
8	
9	
10	
11	

A1 "SHIFT LEFT "

Fact 1: Shift LEFT implies $\left(x+\frac{18\cdot\pi}{5}\right)$

inside the secant function

So we know y $= a \sec\left(b\left(x+\frac{18\cdot\pi}{5}\right)\right)+d$

start $=\frac{-18\cdot\pi}{5}$

Fact 2: Shift DOWN implies d $= -8$

outside the secant function

So we know y $= a \sec\left(b\left(x+\frac{18\cdot\pi}{5}\right)\right)-8$

Fact 3: There is a HORIZONTAL reflection

This means b < 0

Fact 4: There is a stretch of period to $48\cdot\pi$

$0<|b|<1$

Use $|b|=\frac{2\cdot\pi}{\textbf{period}}=2\cdot\pi\div48\cdot\pi=2\cdot\pi\cdot\frac{1}{48\cdot\pi}=\frac{1}{24}$

Fact 3 and Fact 4 tell us $|b|=\frac{1}{24}$ that b $=\frac{-1}{24}$ because of the horizontal reflection

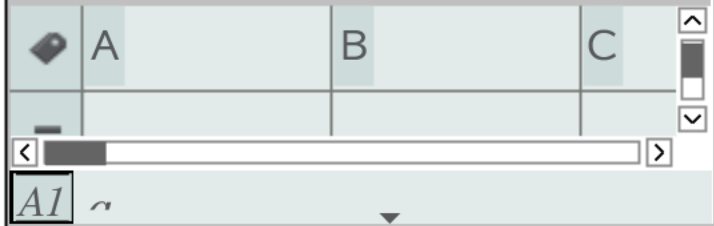
We now know y $=a\sec\left(\frac{-1}{24}\left(x+\frac{18\cdot\pi}{5}\right)\right)-8$

Fact 5: Vertically Stretch by a factor of $\frac{15}{2}$

and the fact that NO vertical reflection has occurred we know a $=\frac{15}{2}$

We now know y $=\frac{15}{2}\sec\left(\frac{-1}{24}\left(x+\frac{18\cdot\pi}{5}\right)\right)-8$

Problem 7



$$y=\frac{15}{2}\sec\left(\frac{^-1}{24}x-\frac{3\cdot\pi}{20}\right)-8$$

Period

$$\left(\frac{^-18\cdot\pi}{5},\frac{222\cdot\pi}{5}\right)$$

Midline

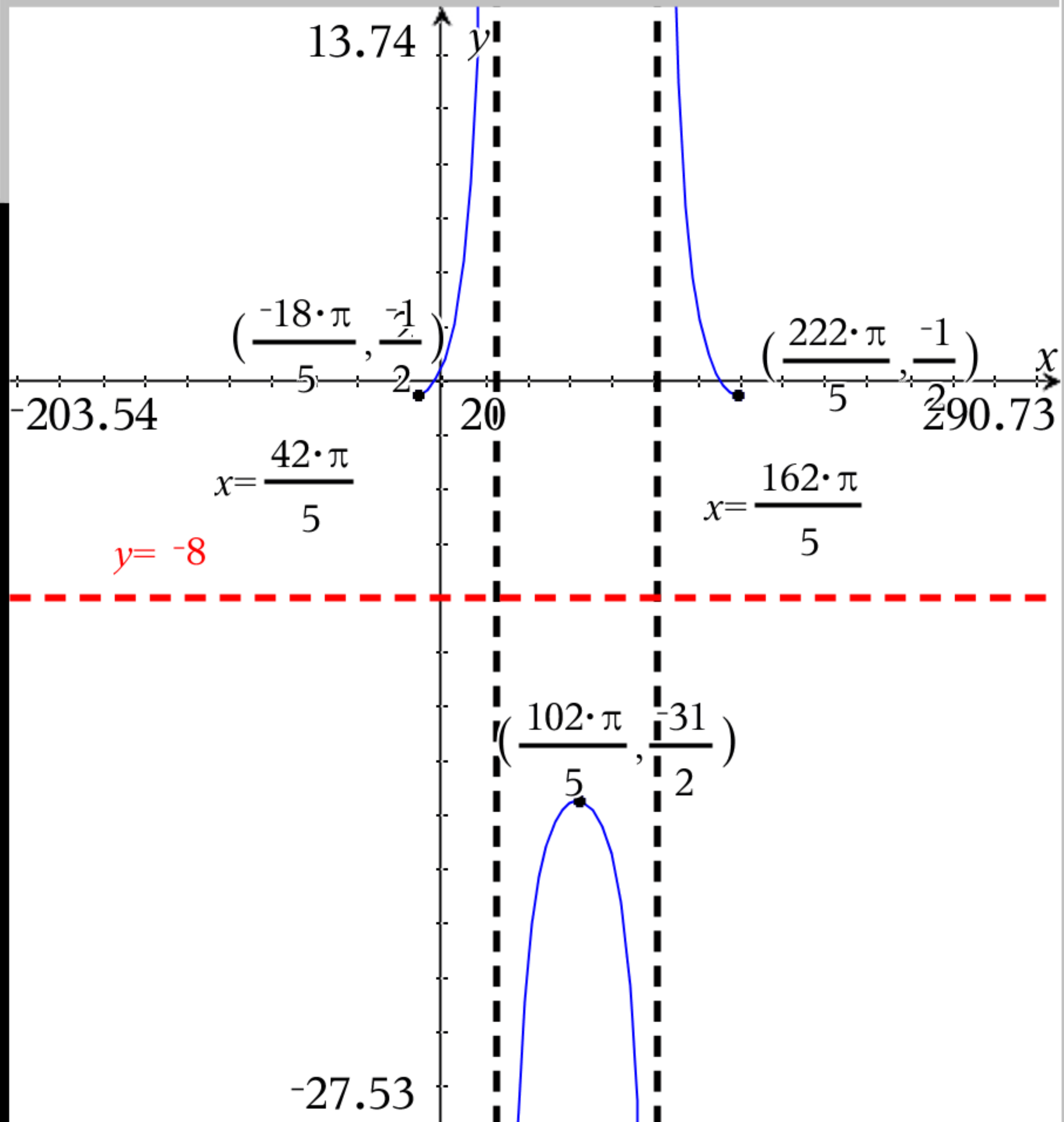
$$y={^-8}$$

Local Extremes

$$\left(\frac{^-18\cdot\pi}{5},\frac{^-1}{2}\right)\quad\left(\frac{102\cdot\pi}{5},\frac{^-31}{2}\right)\quad\left(\frac{222\cdot\pi}{5},\frac{^-1}{2}\right)$$

Asymptotes

$$x=\frac{42\cdot\pi}{5}\quad x=\frac{162\cdot\pi}{5}$$



Step 1 What are the a, b,c d of the transformation?

$a=\frac{15}{2}$ $b=\frac{-1}{24}$ $c=\frac{-3\cdot\pi}{20}$ $d=-8$

Step 2: Factor INTERIOR function

$y=\frac{15}{2}\sec\left(\frac{-1}{24}x-\frac{3\cdot\pi}{20}\right)-$ **NOTE: This asking you to do this** $\frac{-3\cdot\pi}{20}\div\frac{-1}{24}=\frac{-3\cdot\pi}{20}\cdot -24=\frac{18\cdot\pi}{5}$

$y=\frac{15}{2}\sec\left(\frac{-1}{24}\left(x+\frac{18\cdot\pi}{5}\right)\right)-8$

Note: Since $\frac{c}{b}=\frac{18\cdot\pi}{5}$ we know that the horizontal shift is SHIFT LEFT

Note: Since $b=\frac{-1}{24}$, We know that there is a horizontal stretch

Note: Since we know there is SHIFT LEFT

and we have factored form, A period begins at $x=\frac{-18\cdot\pi}{5}$

Step 3: Determine the length of period using $\text{period}=\frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi\div\frac{-1}{24}=2\cdot\pi\cdot 24=48\cdot\pi$ So we know the period is $48\cdot\pi$ LONG

$a=\frac{15}{2}$ $b=\frac{-1}{24}$ $c=\frac{-3\cdot\pi}{20}$ $d=-8$ $y=\frac{15}{2}\sec\left(\frac{-1}{24}x-\frac{3\cdot\pi}{20}\right)-8$ $y=\frac{15}{2}\sec\left(\frac{-1}{24}\left(x+\frac{18\cdot\pi}{5}\right)\right)-8$

period length is $48\cdot\pi$ and ONE PERIOD starts at $\frac{-18\cdot\pi}{5}$

Step 4: Determine the FIVE IMPORTANT x values

$\text{start}=\frac{-18\cdot\pi}{5}$ (this is the first local extreme of secant)

$\text{start}+\frac{1\cdot\text{period}}{4}=\frac{-18\cdot\pi}{5}+12\cdot\pi=\frac{42\cdot\pi}{5}$ (this is where first asymptote occurs)

$\text{start}+\frac{2\cdot\text{period}}{4}=\frac{-18\cdot\pi}{5}+24\cdot\pi=\frac{102\cdot\pi}{5}$ (this is the second local extreme of secant)

$\text{start}+\frac{3\cdot\text{period}}{4}=\frac{-18\cdot\pi}{5}+36\cdot\pi=\frac{162\cdot\pi}{5}$ (this is the second asymptote of secant)

$\text{start}+\text{period}=\frac{-18\cdot\pi}{5}+48\cdot\pi=\frac{222\cdot\pi}{5}$ (this is the last local extreme of secant)

$a=\frac{15}{2}$ $b=\frac{-1}{24}$ $c=\frac{-3\cdot\pi}{20}$ $d=-8$ $y=\frac{15}{2}\sec(\frac{-1}{24}x - \frac{3\cdot\pi}{20}) - 8$ $y=\frac{15}{2}\sec(\frac{-1}{24}(x +)) - 8$

period length is $48\cdot\pi$ and ONE PERIOD starts at $\frac{-18\cdot\pi}{5}$

"cool stuff" happens at $x=\{\frac{-18\cdot\pi}{5}, \frac{42\cdot\pi}{5}, \frac{102\cdot\pi}{5}, \frac{162\cdot\pi}{5}, \frac{222\cdot\pi}{5}\}$

Step 5: Use d to determine midline $y=-8$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred $a=\frac{15}{2}$ $b=\frac{-1}{24}$

Since a $>$ 0 and b $<$ 0 ,

we know that NO vertical reflection and THERE IS horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

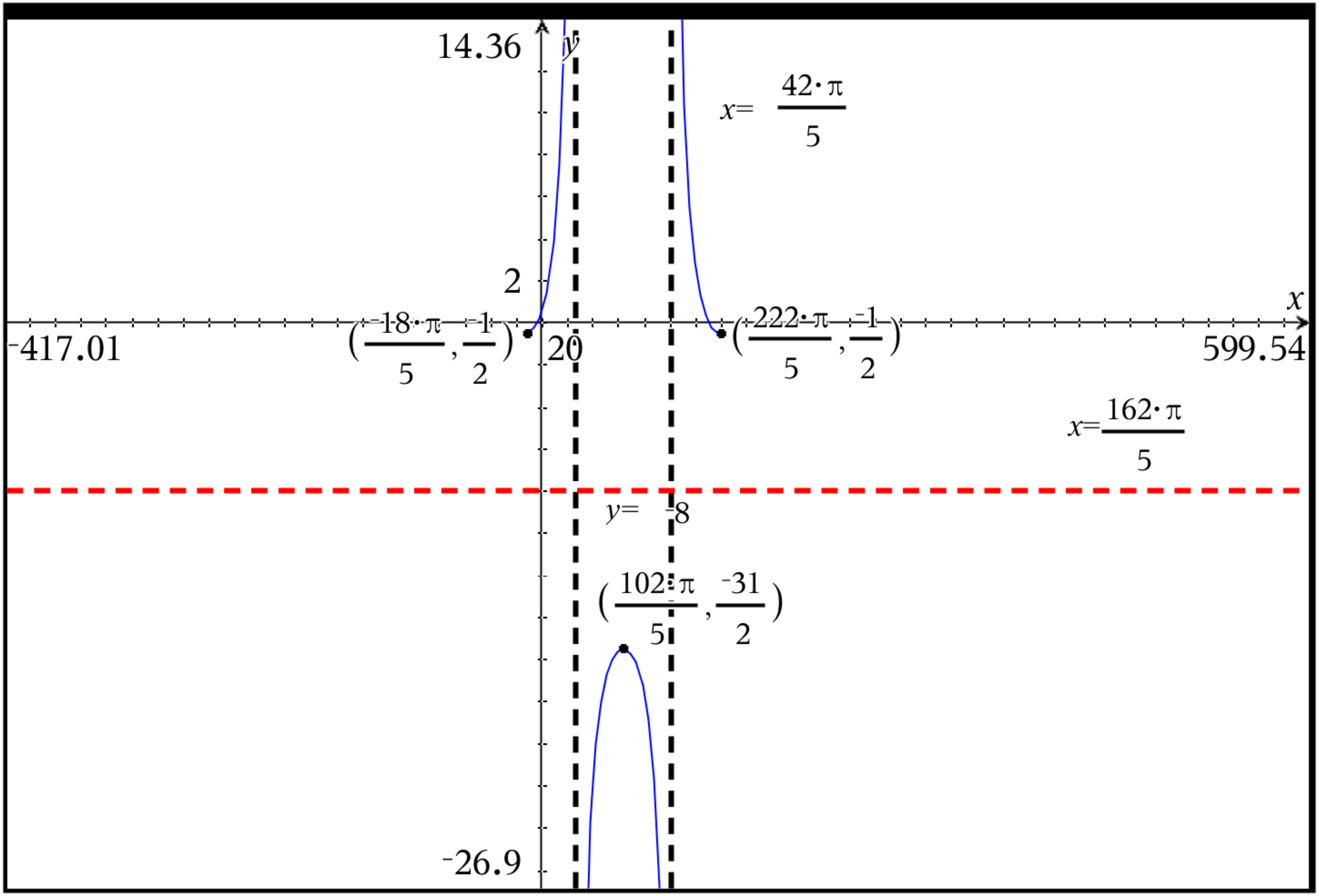
Since $a=\frac{15}{2}$ and $d=-8$

local extremes (top and bottom of "U" shape) occur at $y=d+|a|=-8+\frac{15}{2}=\frac{-1}{2}$ (bottom of a "U")

$y=d-|a|=-8-\frac{15}{2}=\frac{-31}{2}$ (top of a "U")

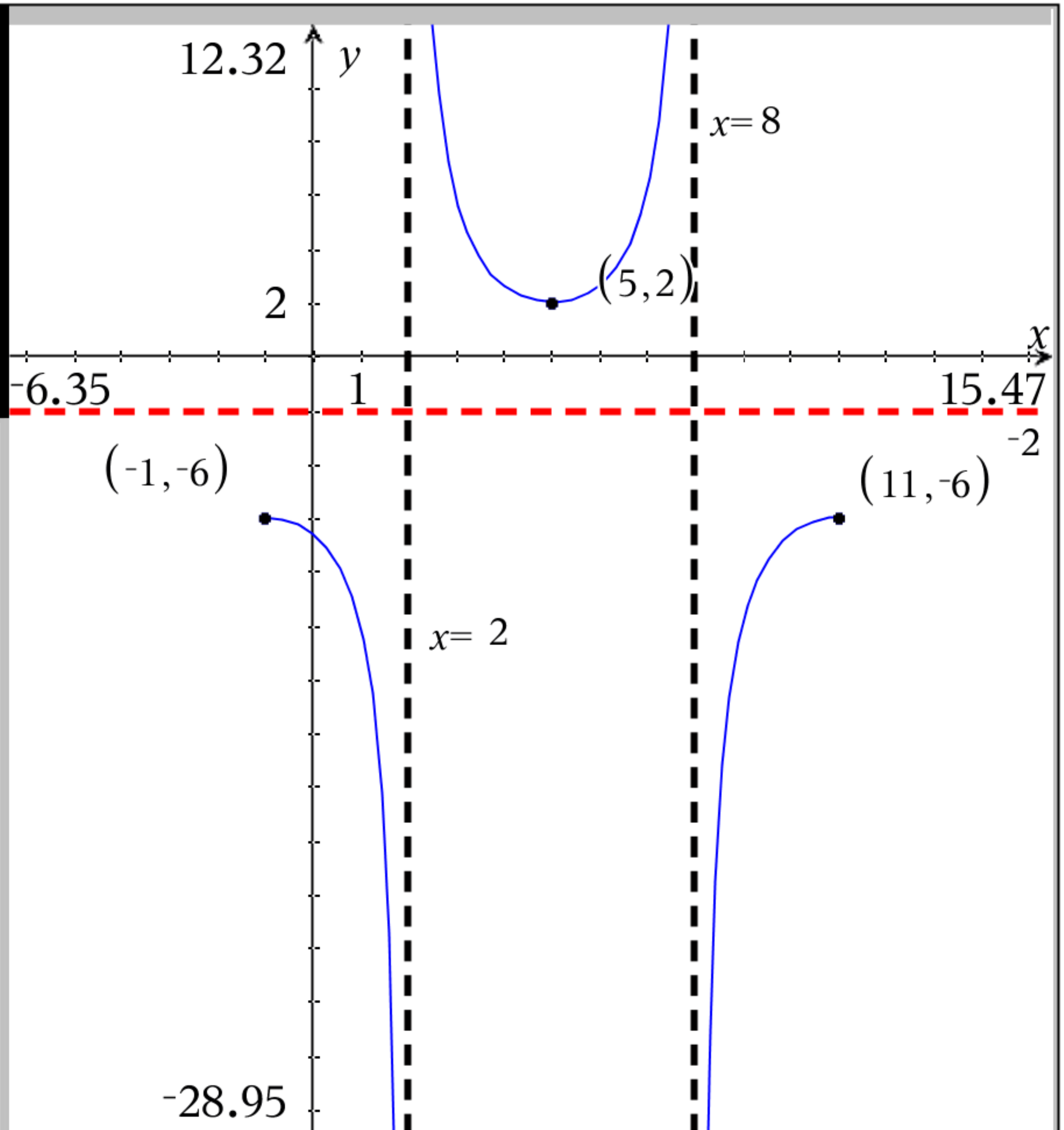
Step 8: Build local extremes

$(\frac{-18\cdot\pi}{5}, \frac{-31}{2})$ and $(\frac{102\cdot\pi}{5}, \frac{-1}{2})$ and $(\frac{222\cdot\pi}{5}, \frac{-31}{2})$


14.36
y
2
x
-417.01
599.54
20
-26.9
$x=\frac{42\cdot\pi}{5}$
$x=\frac{162\cdot\pi}{5}$
$y=-8$
$(\frac{-18\cdot\pi}{5},\frac{-1}{2})$
$(\frac{222\cdot\pi}{5},\frac{-1}{2})$
$(\frac{102\cdot\pi}{5},\frac{-31}{2})$

	A	B	C
=			
1	a	-4	
2	b	1*π/6	

A1 *a*



$y = -4\sec\left(\frac{\pi}{6}x + \frac{\pi}{6}\right) - 2$

$y = -4\sec\left(\frac{\pi}{6}(x + 1)\right) - 2$

Period

(-1,11)

Midline

y = -2

Local Extremes

(-1,-6) (5,2) (11,-6)

Asymptotes

x = 2 x = 8

Step 1 What are the a, b,c d of the transformation?

a= -4 b= $\frac{\pi}{6}$ c = $\frac{\pi}{6}$ d = -2

Step 2: Factor INTERIOR function

y= $-4\,\mathbf{sec}\left(\frac{\pi}{6}\mathbf{x} + \frac{\pi}{6}\right) - 2$ **NOTE: This asking you to do this** $\frac{\pi}{6} \div \frac{\pi}{6} = \frac{\pi}{6} \cdot \frac{6}{\pi} = 1$

y= $-4\,\mathbf{csc}\left(\frac{\pi}{6}(\mathbf{x} + 1)\right) - 2$

Note: Since $\frac{c}{b}$ =1 we know that the horizontal shift is SHIFT LEFT

Note: Since b = $\frac{\pi}{6}$, We know that there is a horizontal stretch

Note: Since we know there is SHIFT LEFT

and we have factored form, A period begins at x = -1

Step 3: Determine the length of period using period $= \frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div \frac{\pi}{6} = 2\cdot\pi \cdot \frac{6}{\pi} = 12$ So we know the period is 12 LONG a= $^-4$ b= $\frac{\pi}{6}$ c = $\frac{\pi}{6}$ d = $^-2$ y= $^-4\,\mathbf{sec}\left(\frac{\pi}{6}\mathbf{x} + \frac{\pi}{6}\right) - 2$ y= $^-4\,\mathbf{sec}\left(\frac{\pi}{6}(\mathbf{x} + 1)\right) - 2$

period length is 12 and ONE PERIOD starts at $^-1$

Step 4: Determine the FIVE IMPORTANT x values

start = $^-1$ (this is the first local extreme of secant)

start + $\frac{1\cdot \mathbf{period}}{4}$ = $^-1$ + 3 = 2 (this is where first asymptote occurs)

start + $\frac{2\cdot \mathbf{period}}{4}$ = $^-1$ + 6 = 5 (this is the second local extreme of secant)

start + $\frac{3\cdot \mathbf{period}}{4}$ = $^-1$ + 9 = 8 (this is the second asymptote of secant)

start + **period** = $^-1$ + 12 = 11 (this is the last local extreme of secant)

$a = -4$ $b = \frac{\pi}{6}$ $c = \frac{\pi}{6}$ $d = -2$ $y = -4\sec\left(\frac{\pi}{6}x + \frac{\pi}{6}\right) - 2$ $y = -4\sec\left(\frac{\pi}{6}(x + 1)\right) - 2$

period length is 12 and ONE PERIOD starts at -1

"cool stuff" happens at x = {-1, 2, 5, 8, 11}

Step 5: Use d to determine midline $y = -2$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred $a = -4$ $b = \frac{\pi}{6}$

Since a $<$ 0 and b $>$ 0 ,

we know that THERE IS A vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

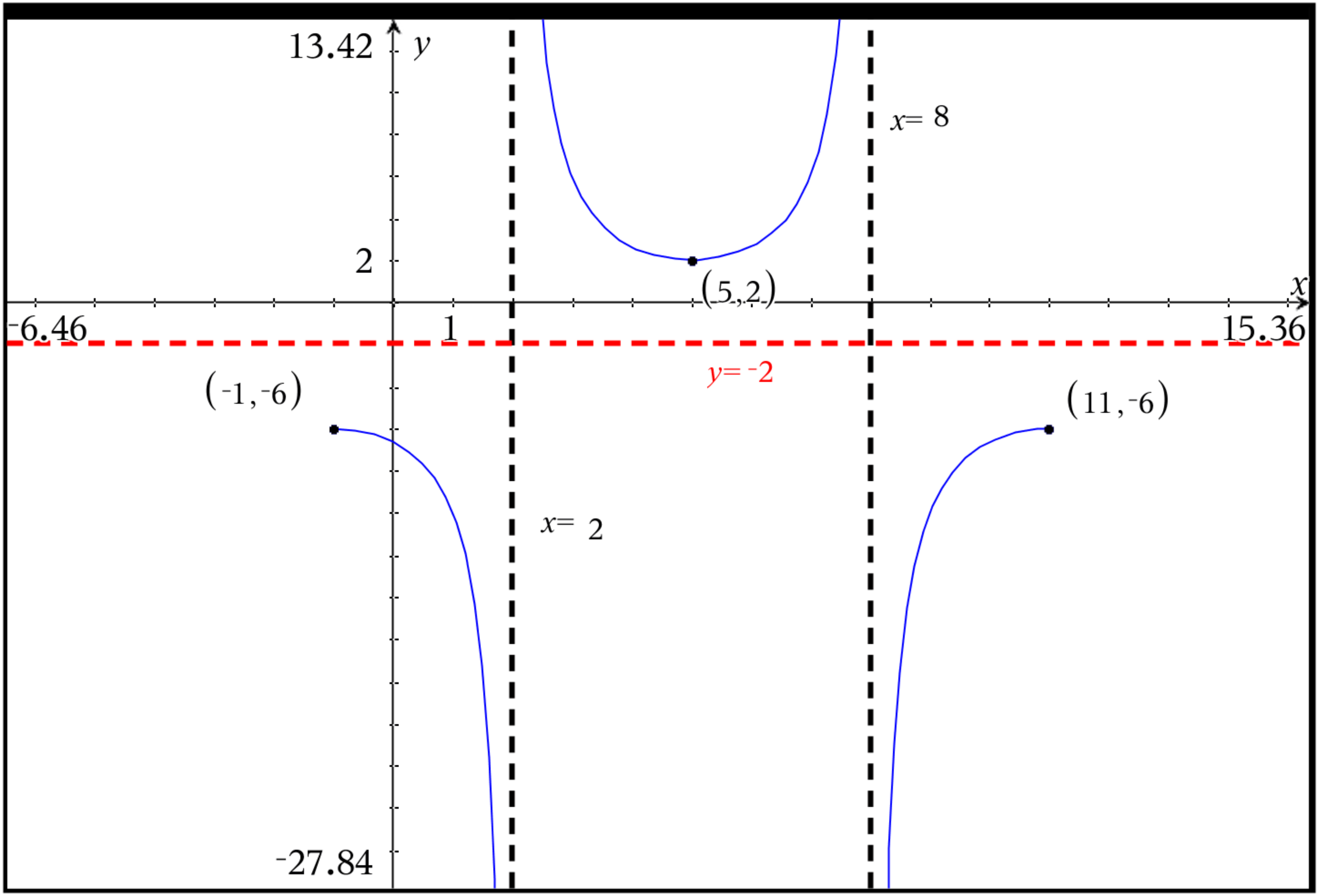
Since $a = -4$ and $d = -2$

local extremes (top and bottom of "U" shape) occur at $y = d + |a| = -2 + 4 = 2$ (bottom of a "U")

$y = d - |a| = -2 - 4 = -6$ (top of a "U")

Step 8: Build local extremes

$(-1, -6)$ and $(5, 2)$ and $(11, -6)$


13.42
y
x= 8
2
(5,2)
x
-6.46
1
15.36
y= -2
(-1,-6)
(11,-6)
x= 2
-27.84