The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA II

Thursday, January 23, 2020 — 1:15 to 4:15 p.m., only

MODEL RESPONSE SET

Table of Contents

Question 25 2
Question 26 8
Question 27 13
Question 28 17
Question 29 23
Question 30 29
Question 31 33
Question 32 38
Question 33 42
Question 34 50
Question 35 57
Question 36 64
Question 37 72

Question 25

25 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

$$(p^{16} n^4)(p^{\frac{5}{2}} n^{\frac{4}{2}}) = p^{18} \cdot n^6 \cdot p^{\frac{1}{2}}$$

$$p^{16+\frac{5}{2}} n^{4+2} = p^{18+\frac{1}{2}} n^6$$

$$p^{\frac{37}{2}} n^6 = p^{\frac{37}{2}} n^6$$

yes they are equivalent

Score 2: The student gave a complete and correct response.

Question 25

25 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

$\sqrt{p^4}\sqrt{p^1}$

$p^2\sqrt{p}$

$\sqrt{n^4}$

n^2

$(p^2 n^{\frac{1}{2}})^8 \sqrt{p^5 n^4} = p^{18} n^6 \sqrt{p}$

$p^{16} n^4 \sqrt{p^5 n^4} = p^{18} n^6 \sqrt{p}$

$p^{18} n^6 \sqrt{p} \stackrel{\checkmark}{=} p^{18} n^6 \sqrt{p}$

They are equivalent because when you simplify the left hand side you get $p^{18} n^6 \sqrt{p}$.

Score 2: The student gave a complete and correct response.

Question 25

25 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

$p^4 p^1$

8

$$\left(p^2 n^{\frac{1}{2}}\right) \sqrt{p^5 n^4} = p^{18} n^6 \sqrt{p}$$

$$\neq$$

$$p^{16} n^4 p^2 n^2 \sqrt{p} = p^{18} n^6 \sqrt{p}$$

$$\boxed{p^{18} n^4 \sqrt{p} \neq p^{10} n^6 \sqrt{p}}$$

Score 1: The student made a computational error in the last line.

Question 25

25 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

$(n^4)(n^2)$

$p^{16} n^4 \sqrt{p^5 n^4} = p^{18} n^6 \sqrt{p}$

$p^{16} n^4 \sqrt{p^5}\, n^2$

$p^{16} n^6 \sqrt{p^5} = p^{18} n^6 \sqrt{p}$

Score 1: The student did not completely simplify the left side of the equation.

Question 25

25 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

$(p^{10} n^{8.5})(\sqrt{p^5 n^4})$

$p^3 n^6 \sqrt{p}$

18

6 3

2 3

$\times \quad \sqrt{p^{15} n^{12.5}} = p^{18} n^6 \sqrt{p}$

No, because $(p^2 n^{1/2})^8 \sqrt{p^5 n^4}$ does not equal $p^{18} n^6 \sqrt{p}$ when reduced.

Score 0: The student made multiple errors.

Question 25

25 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

$p = 1$

$n = 2$

$\left((1)^2 \ (2)^{\frac{1}{2}}\right)^8 \sqrt{(1)^5 \ (2)^4}$

$(1 \cdot 1.414)^8 \ \sqrt{1 \ 16}$

$16 \quad 4$

$64 \checkmark$

$(1)^{18} \ (2)^6 \sqrt{1}$

$1 \cdot 64\sqrt{1}$

$64\sqrt{1}$

$64 \checkmark$

Score 0: The student did not indicate a positive response and did not provide a correct justification.

Question 26

26 Show why $x - 3$ is a factor of $m(x) = x^3 - x^2 - 5x - 3$. Justify your answer.

$$
\begin{array}{r}
x^2+2x+1 \\
x-3 \overline{\big)\, x^3 - x^2 - 5x - 3} \\
+\,{}^{-}x^3 + 3x^2 \\
\hline
2x^2 - 5x \\
+\,{}^{-}2x^2 + 6x \\
\hline
x - 3 \\
+\,{}^{-}x + 3 \\
\hline
0
\end{array}
$$

x-3 is a factor of x^3-x^2-5x-3 when it is Multiplied by x^2+2x+1.

	x	-3	
x^3	x^3	$-3x^2$	x^2
$-x^2$	$2x^2$	$-6x$	$2x$
	x	-3	1
	$-5x$	-3	

Score 2: The student gave a complete and correct response.

Question 26

26 Show why $x - 3$ is a factor of $m(x) = x^3 - x^2 - 5x - 3$. Justify your answer.

$x - 3 = 0$
$+3 \quad +3$
$x = 3$

$3)\ x^3 - x^2 - 5x - 3$

1	-1	-5	-3
↓	3	6	3
1	2	1	0

remainder

$x^2 + 2x + 1$

Score 2: The student gave a complete and correct response.

26 Show why $x - 3$ is a factor of $m(x) = x^3 - x^2 - 5x - 3$. Justify your answer.

$(3)^3 - (3)^2 - 5(3) - 3$

$\downarrow$

$\boxed{0}$

Since we plugged x - 3 in
(as x = 3, the opposite) and
the remainder is 0, ∴
x - 3 is a factor.

Score 2: The student gave a complete and correct response.

Question 26

26 Show why $x - 3$ is a factor of $m(x) = x^3 - x^2 - 5x - 3$. Justify your answer.

$x - 3 = 0$
$+3 \quad +3$
$x = 3$

$(3)^3 - (3)^2 - 5(3) - 3 = 0$
$27 - 9 - 15 - 3$
$18 - 12$
6

Score 1: The student received one credit for substituting 3 and setting the expression equal to zero.

Question 26

26 Show why $x - 3$ is a factor of $m(x) = x^3 - x^2 - 5x - 3$. Justify your answer.

$$
\begin{array}{r l}
 & x^2 + 2x - \frac{3}{x-3} \\
x-3 & \overline{)\,x^3 - x^2 - 5x - 3} \\
 & \underline{x^3 - 3x^2} \\
 & \quad 2x^2 - 5x \\
 & \underline{-\ 2x^2 - 5x} \\
 & \qquad 0x - 3
\end{array}
$$

$\therefore x^2 + 2x - \frac{3}{x-3}$ is the quotient and $x-3$ is a factor of $m(x) = x^3 - x^2 - 5x - 3$.

Score 0: The student made multiple errors.

Question 27

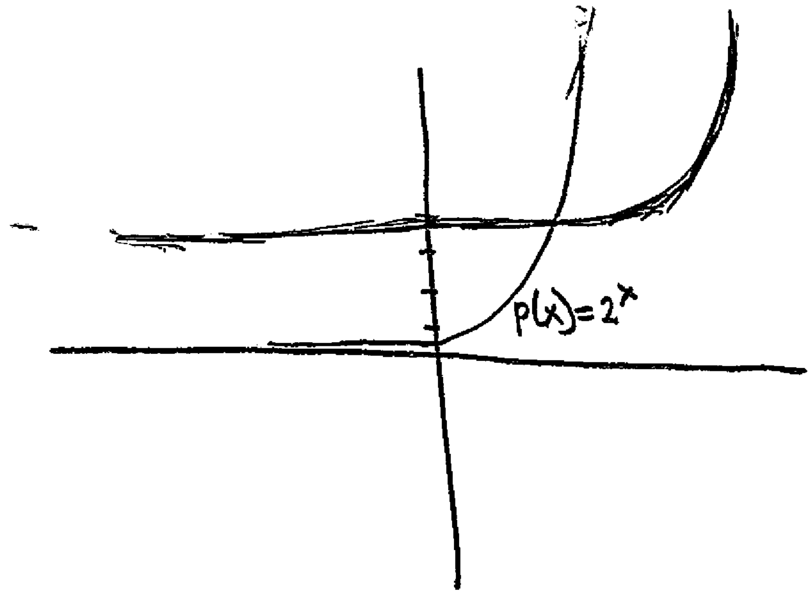
27 Describe the transformation applied to the graph of $p(x) = 2^x$ that form the new function $q(x) = 2^{x-3} + 4$.

q(x) would be 4 spaces higher and would be shifted to the right by 3.

Score 2: The student gave a complete and correct response.

Question 27

27 Describe the transformation applied to the graph of $p(x) = 2^x$ that form the new function $q(x) = 2^{x-3} + 4$.

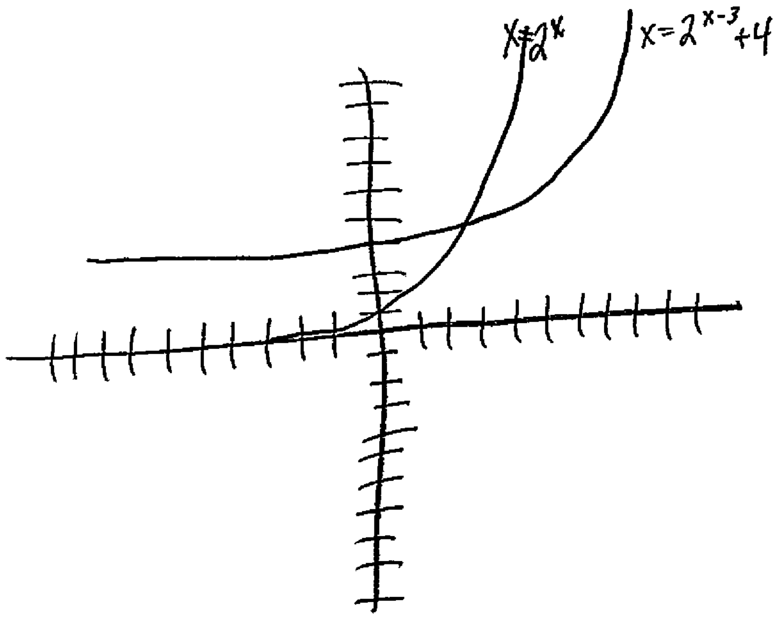


Up 4
Shifts to the
right by 3

Score 2: The student gave a complete and correct response.

Question 27

27 Describe the transformation applied to the graph of $p(x) = 2^x$ that form the new function $q(x) = 2^{x-3} + 4$.



The graph shifts 3 units up and 3 units to the right.

Score 1: The student made one error in describing the vertical shift.

Question 27

27 Describe the transformation applied to the graph of $p(x) = 2^x$ that form the new function $q(x) = 2^{x-3} + 4$.

left 4, up 3

Score 0: The student made multiple errors in the transformation.

Question 28

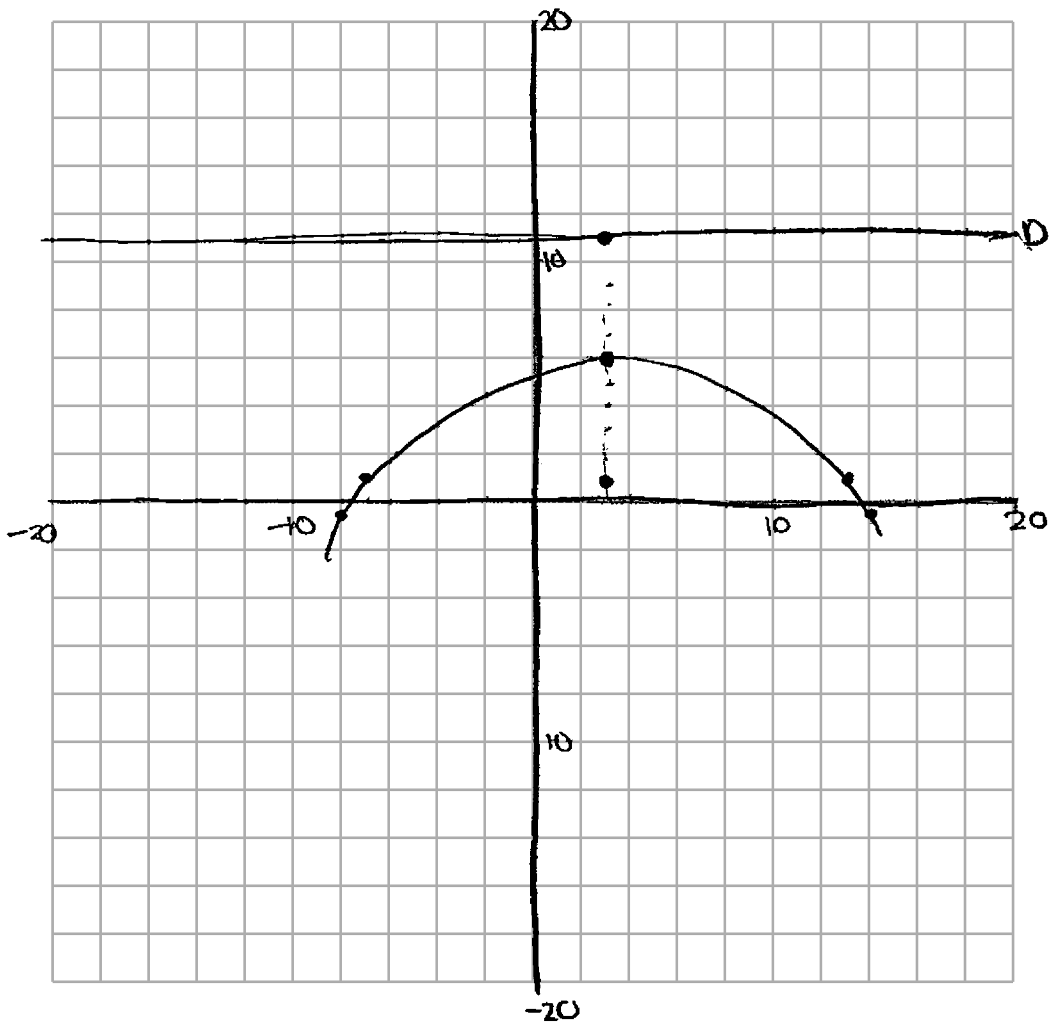
28 The parabola $y = -\frac{1}{20}(x - 3)^2 + 6$ has its focus at (3,1). Determine and state the equation of the directrix.

h k

(The use of the grid below is optional.)

directrix

$\boxed{y = 11}$



Score 2: The student gave a complete and correct response.

Question 28

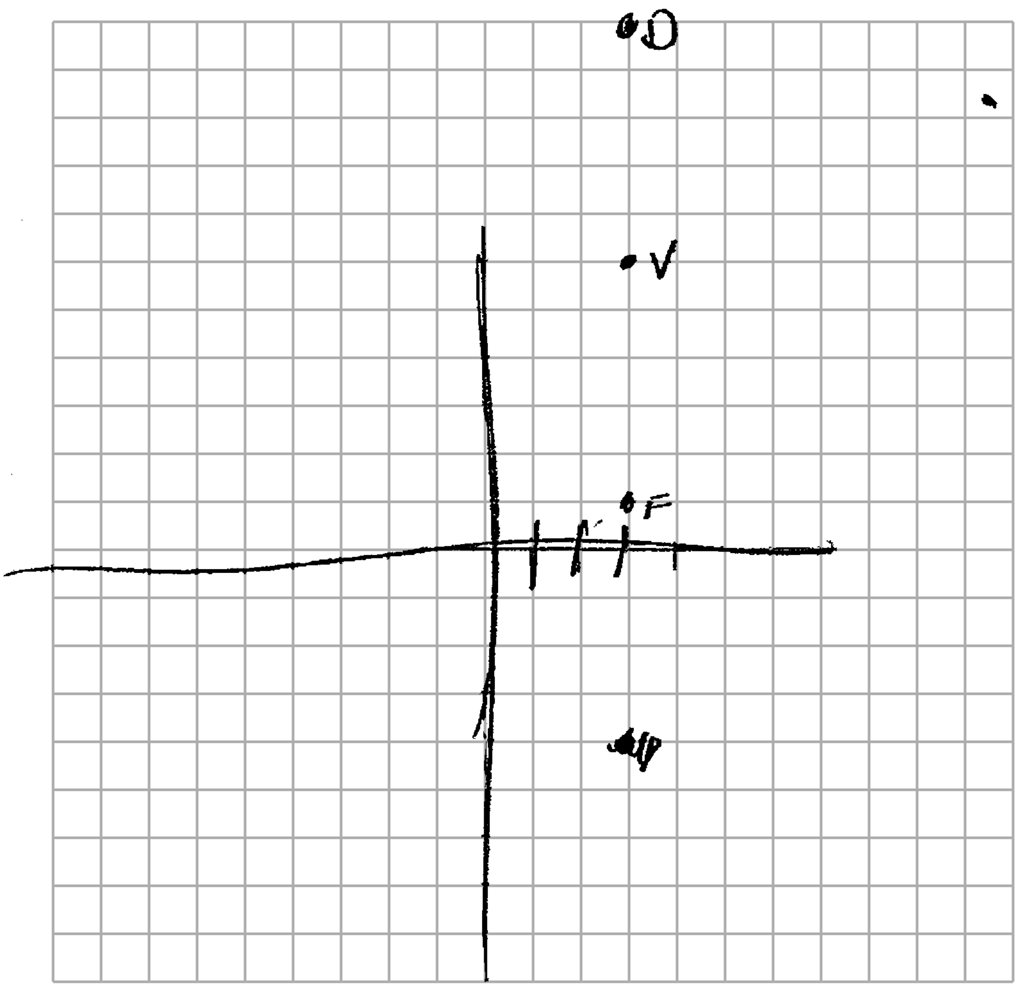
28 The parabola $y = -\frac{1}{20}(x - 3)^2 + 6$ has its focus at (3,1). Determine and state the equation of the directrix.

(The use of the grid below is optional.)

plug in find vertex

$V = (3,6)$

$\boxed{y = 11}$



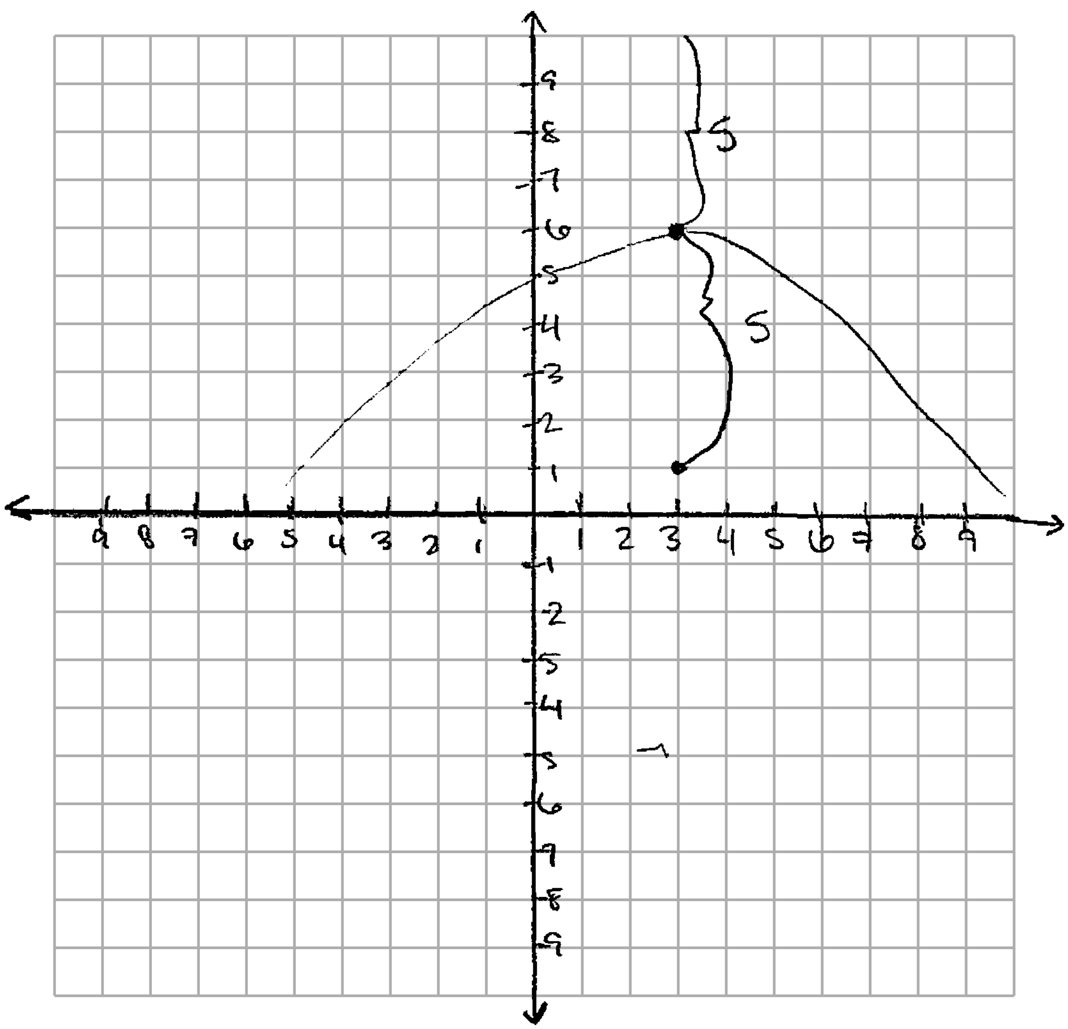
Score 2: The student gave a complete and correct response.

Question 28

28 The parabola $y = -\frac{1}{20}(x-3)^2 + 6$ has its focus at (3,1). Determine and state the equation of the directrix.

(The use of the grid below is optional.)

(3,11)



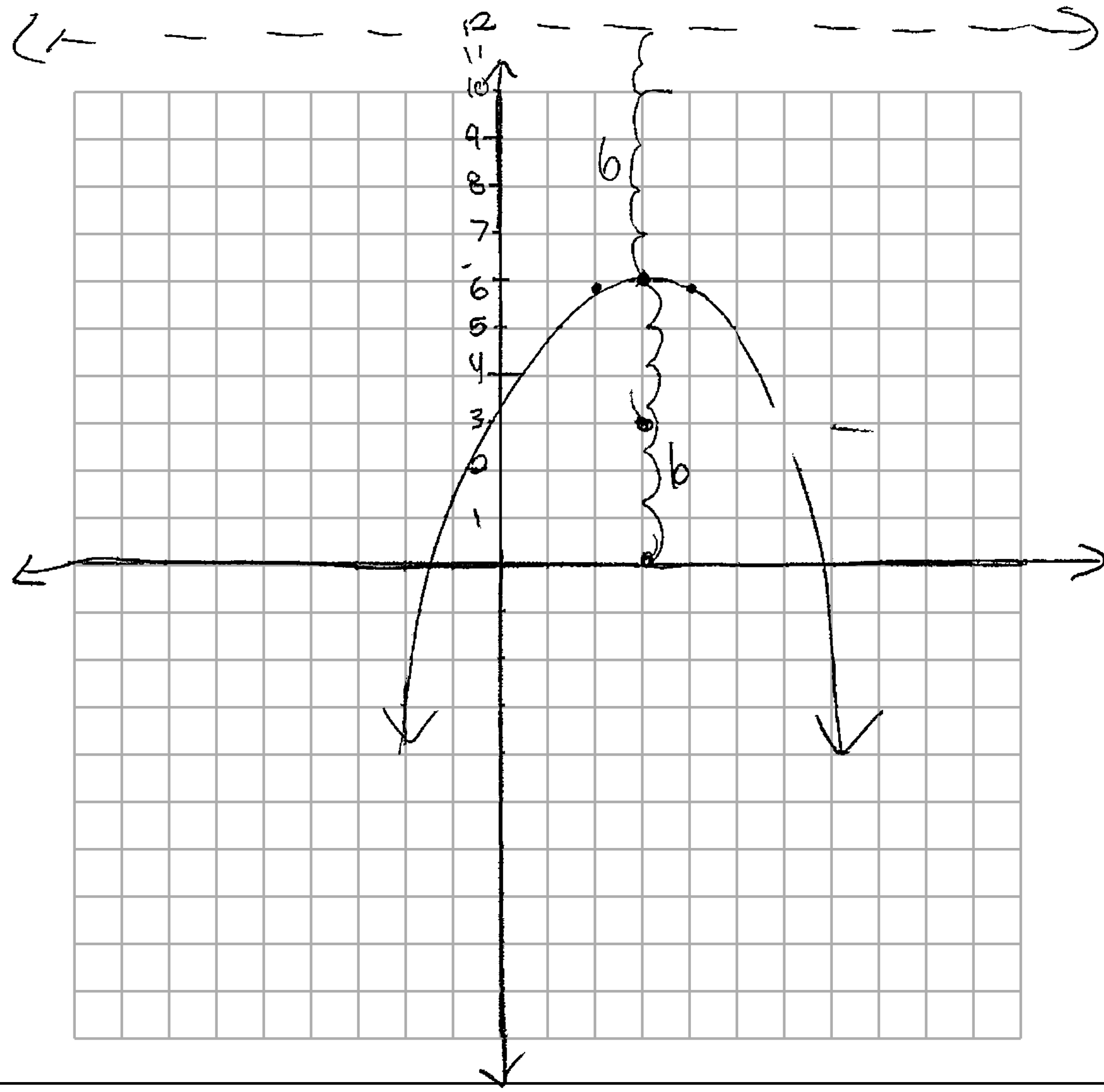
Score 1: The student stated the directrix as a coordinate.

Question 28

28 The parabola $y = -\frac{1}{20}(x - 3)^2 + 6$ has its focus at (3,1). Determine and state the equation of the directrix.

(The use of the grid below is optional.)

$\boxed{y=12}$



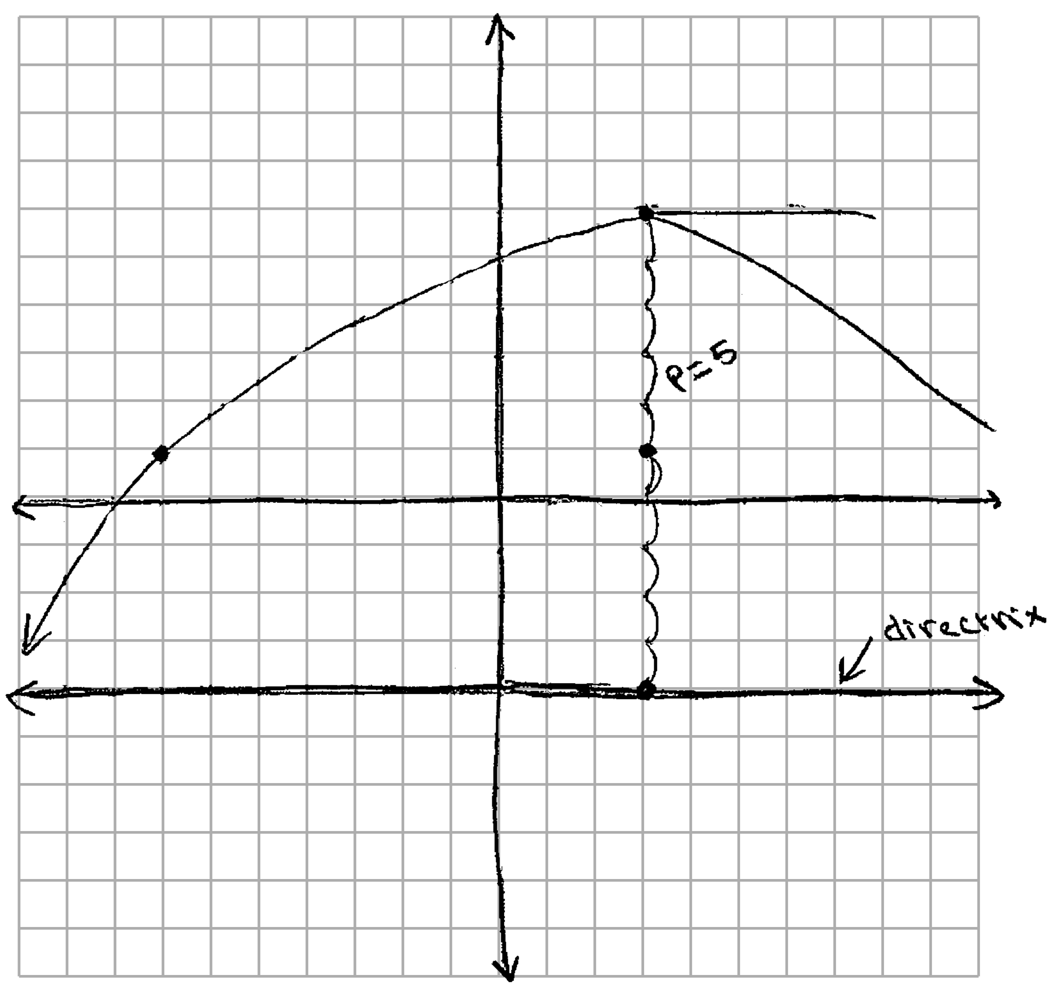
Score 1: The student used an incorrect focus to find the value of p.

28 The parabola $y = -\frac{1}{20}(x-3)^2 + 6$ has its focus at (3,1). Determine and state the equation of the directrix.

(The use of the grid below is optional.)

max of parabola y
is (3,6)
$6-1=\boxed{5}$
p-value

$\boxed{\text{directrix: } y=-4}$



Score 1: The student incorrectly placed the directrix below the focus.

Question 28

28 The parabola $y = -\frac{1}{20}(x - 3)^2 + 6$ has its focus at (3,1). Determine and state the equation of the directrix.

(The use of the grid below is optional.)

V (-3, 6)

directrix (3, 3.5)

Score 0: The student made multiple errors.

Question 29

29 Given the geometric series 300 + 360 + 432 + 518.4 + ..., write a geometric series formula, S_n, for the sum of the first n terms. Use the formula to find the sum of the first 10 terms, to the *nearest tenth*.

$$S_n = \frac{300 - 300(1.2)^n}{1 - 1.2}$$

$$S(10) = \frac{300 - 300(1.2)^{10}}{1 - 1.2}$$

$$S_{10} = 7787.6$$

Score 2: The student gave a complete and correct response.

Question 29

29 Given the geometric series 300 + 360 + 432 + 518.4 + ..., write a geometric series formula, S_n, for the sum of the first n terms. Use the formula to find the sum of the first 10 terms, to the *nearest tenth*.

$$S_n = \sum_{i=1}^{n} 300(1.2)^{i-1}$$

$$S_{10} = \sum_{i=1}^{10} 300(1.2)^{i-1} = 7787.6$$

Score 2: The student gave a complete and correct response.

Question 29

29 Given the geometric series 300 + 360 + 432 + 518.4 + ..., write a geometric series formula, S_n, for the sum of the first n terms. Use the formula to find the sum of the first 10 terms, to the *nearest tenth*.

$$\frac{300 = 300r^2}{300 = 300r^1}$$

$$\frac{6}{5} = r$$

$$S_n = \frac{a_1 - a_1 r^n}{1-r}$$

$$S_n = \frac{300 - 300\left(\frac{6}{5}\right)^n}{1-\frac{6}{5}}$$

$$S_{10} = \frac{300 - 300(6/5)^{10}}{1 - 6/5}$$

$$S_{10} = \frac{-1857.520927}{-.2}$$

$$S_{10} = 9287.604634$$

9287.6

Score 1: The student made one computational error.

Question 29

29 Given the geometric series 300 + 360 + 432 + 518.4 + ..., write a geometric series formula, S_n, for the sum of the first n terms. Use the formula to find the sum of the first 10 terms, to the *nearest tenth*.

$$S_n = \frac{a_1 - a_1 r^n}{1-r}$$

Geometric Series formula

$$\boxed{S_n = \frac{300 - 300(1.2)^n}{1 - 1.2}}$$

$$S_{10} = \frac{300 - 300(1.2)^{10}}{1 - 1.2}$$

$$S_{10} = \frac{300 - 300(6.191736422)}{-.2}$$

$$S_{10} = \frac{300 - 1857.5}{-.2}$$

$$S_{10} = \frac{-1557.5}{-.2} \rightarrow S_{10} = \boxed{7787.5}$$

Final answer

Score 1: The student made a rounding error.

Question 29

29 Given the geometric series 300 + 360 + 432 + 518.4 + ..., write a geometric series formula, S_n, for the sum of the first n terms. Use the formula to find the sum of the first 10 terms, to the *nearest tenth*.

$a_1 = 300$

$S_n = 300(n \cdot 1.2)$

300, 360, 432, 518.4, 622.08, 746.496,

895.7952, 1074.95424, 1289.945088, 1547.934106

7787.6046

≈ 7787

Score 0: The student wrote an incorrect geometric series formula and made a rounding error.

Question 29

29 Given the geometric series 300 + 360 + 432 + 518.4 + ..., write a geometric series formula, S_n, for the sum of the first n terms. Use the formula to find the sum of the first 10 terms, to the *nearest tenth*.

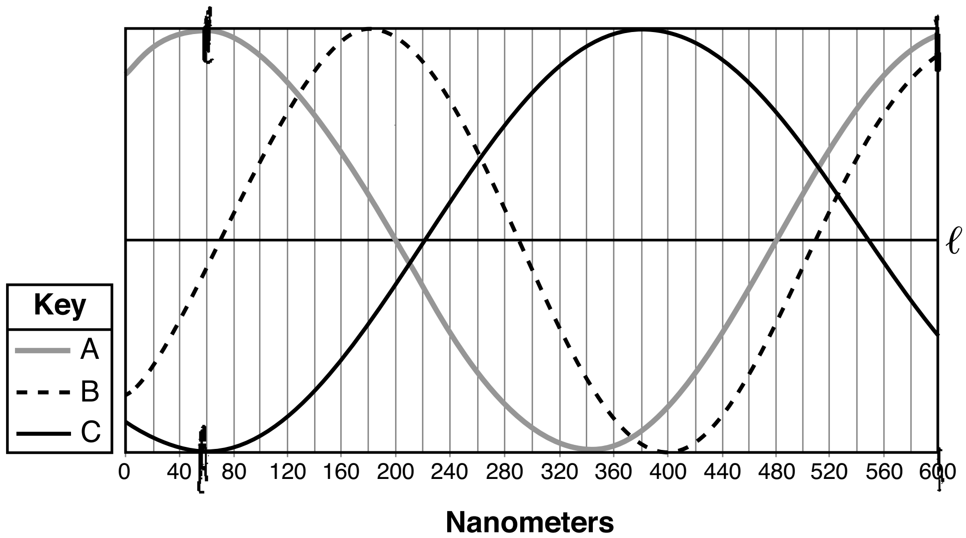
$$S_n = \frac{a_1 - a_1 r^n}{1-r}$$

$$\frac{518.4 - 432 \cdot \cdot^{10}}{1-4} =$$

Score 0: The student did not show enough correct work to receive any credit.

Question 30

30 Visible light can be represented by sinusoidal waves. Three visible light waves are shown in the graph below. The midline of each wave is labeled ℓ.



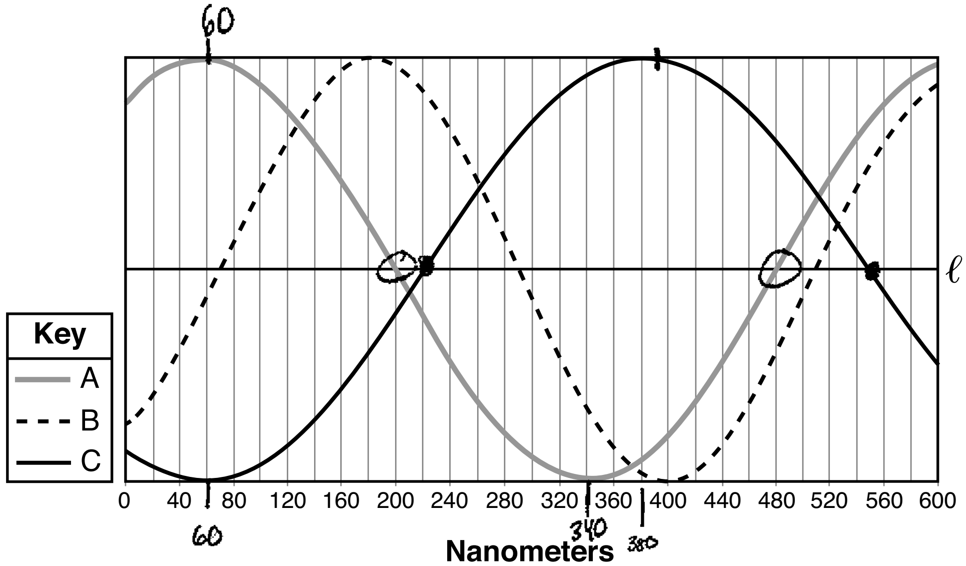
Based on the graph, which light wave has the longest period? Justify your answer.

Light C because its the only wave that does not go through 1 full period on the graph, meaning its longer and cant fit on thegraph.

Score 2: The student gave a complete and correct response.

Question 30

30 Visible light can be represented by sinusoidal waves. Three visible light waves are shown in the graph below. The midline of each wave is labeled ℓ.



Based on the graph, which light wave has the longest period? Justify your answer.

Line C because it has the greatest distance between its minimum and maximum 320 nm

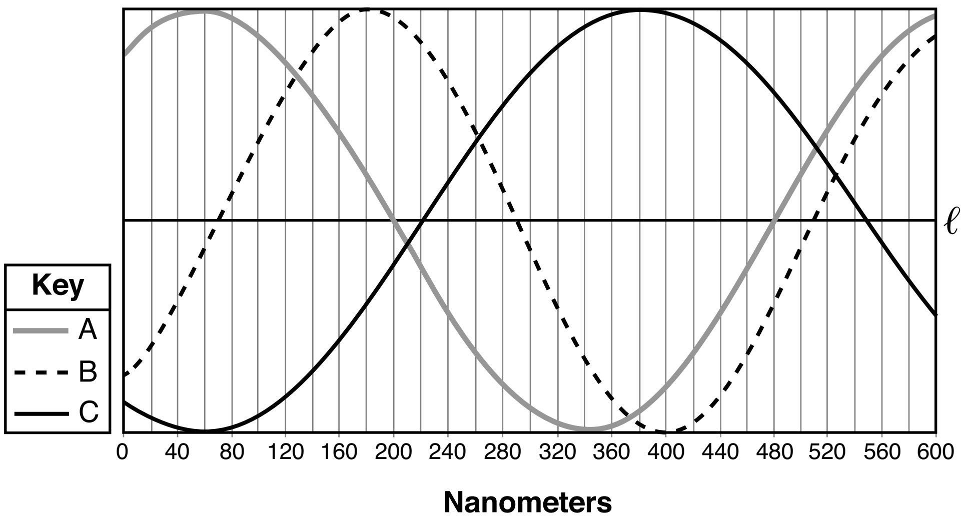
Line B 220 nm

Line A 280 nm

Score 2: The student gave a complete and correct response.

Question 30

30 Visible light can be represented by sinusoidal waves. Three visible light waves are shown in the graph below. The midline of each wave is labeled ℓ.



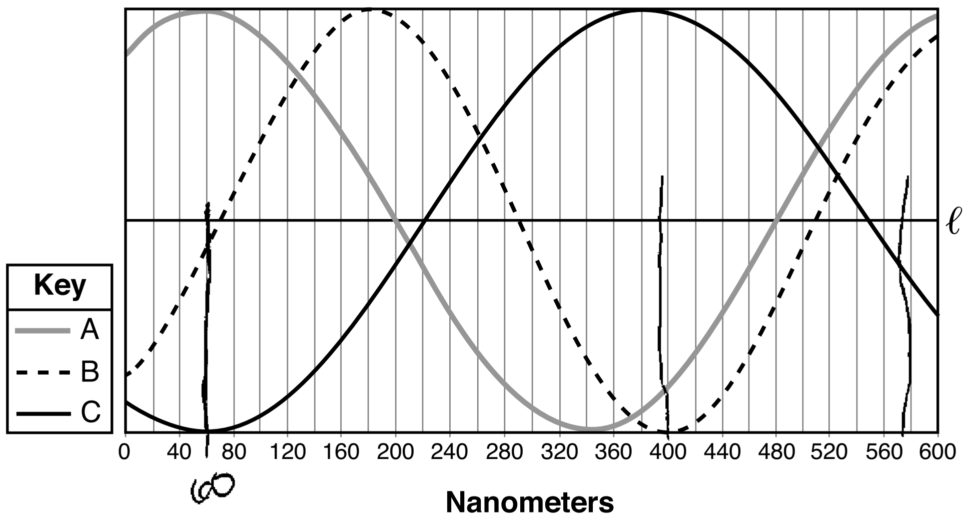
Based on the graph, which light wave has the longest period? Justify your answer.

Light wave C has the longest period because one period is about 330 nanometers while light waves A and B have shorter periods.

Score 1: The student received no credit for the justification.

Question 30

30 Visible light can be represented by sinusoidal waves. Three visible light waves are shown in the graph below. The midline of each wave is labeled ℓ.



Based on the graph, which light wave has the longest period? Justify your answer.

A because it's period takes up the most nanometers.

Score 0: The student did not show any correct work.

Question 31

31 Biologists are studying a new bacterium. They create a culture with 100 of the bacteria and anticipate that the number of bacteria will double every 30 hours. Write an equation for the number of bacteria, B, in terms of the number of hours, t, since the experiment began.

double every 30hrs

$\left(\frac{t}{30}\right)^2$

start w/ 100

$B(t)=100(2)^{t/30}$

Score 2: The student gave a complete and correct response.

Question 31

31 Biologists are studying a new bacterium. They create a culture with 100 of the bacteria and anticipate that the number of bacteria will double every 30 hours. Write an equation for the number of bacteria, B, in terms of the number of hours, t, since the experiment began.

$$200 = 100e^{r(30)}$$

$$\frac{\ln 2}{30} = \cancel{\ln e}^{30r}$$

$$B(t) = 100e^{\left(\frac{\ln 2}{30}\right)(t)}$$

Score 2: The student gave a complete and correct response.

Question 31

31 Biologists are studying a new bacterium. They create a culture with 100 of the bacteria and anticipate that the number of bacteria will double every 30 hours. Write an equation for the number of bacteria, B, in terms of the number of hours, t, since the experiment began.

$$B = 100(2)^{30t}$$

Score 1: The student applied the doubling time incorrectly.

Question 31

31 Biologists are studying a new bacterium. They create a culture with 100 of the bacteria and anticipate that the number of bacteria will double every 30 hours. Write an equation for the number of bacteria, B, in terms of the number of hours, t, since the experiment began.

$$100(2^{t/30}) =$$

Score 1: The student made a notation error by writing an expression, not an equation.

Question 31

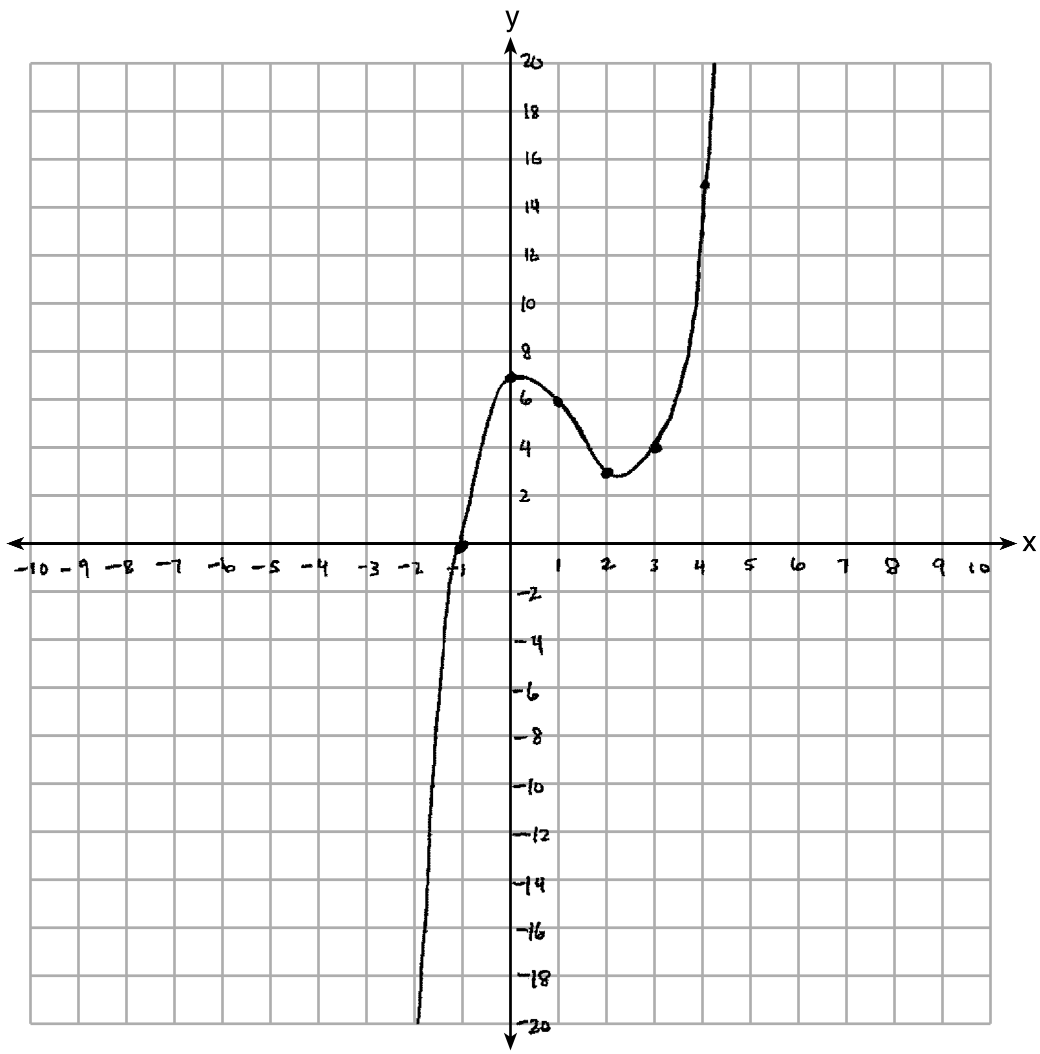
31 Biologists are studying a new bacterium. They create a culture with 100 of the bacteria and anticipate that the number of bacteria will double every 30 hours. Write an equation for the number of bacteria, B, in terms of the number of hours, t, since the experiment began.

$$y = 100(2)^{\frac{30}{t}}$$

Score 0: The student made multiple errors.

Question 32

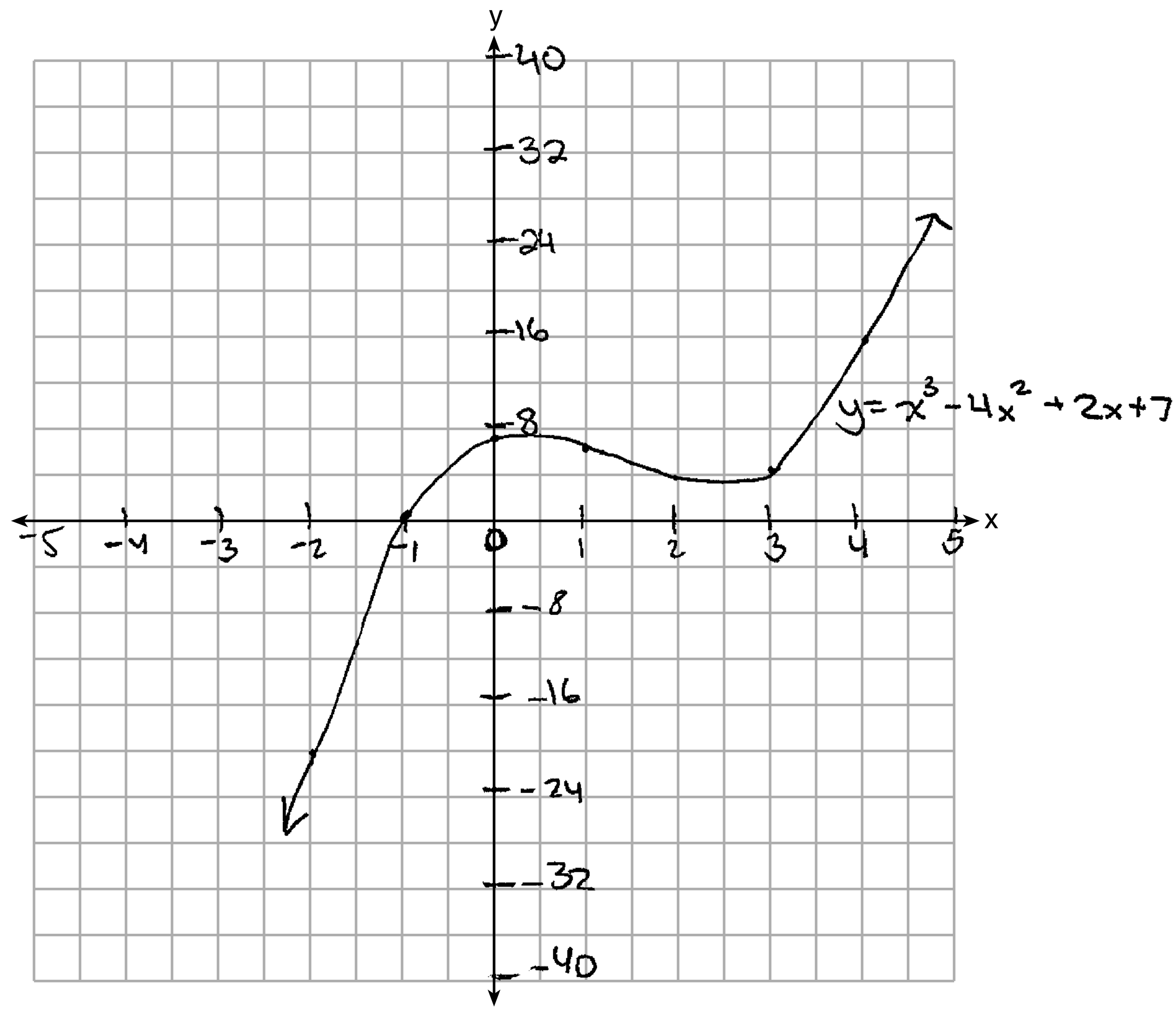
32 Graph $y = x^3 - 4x^2 + 2x + 7$ on the set of axes below.



Score 2: The student gave a complete and correct response.

Question 32

32 Graph $y = x^3 - 4x^2 + 2x + 7$ on the set of axes below.

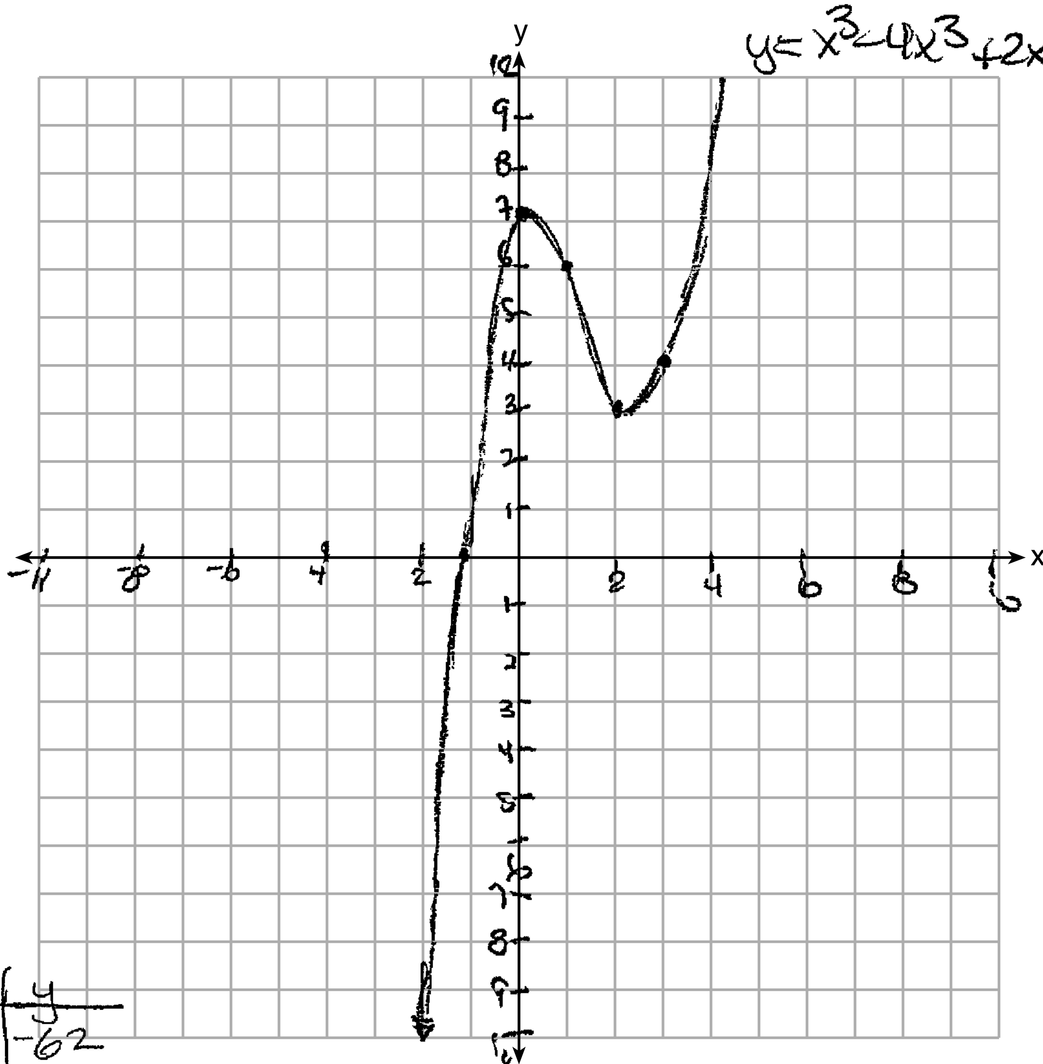


Score 2: The student gave a complete and correct response.

Question 32

32 Graph $y = x^3 - 4x^2 + 2x + 7$ on the set of axes below.

$y = x^3 - 4x^3 + 2x + 7$

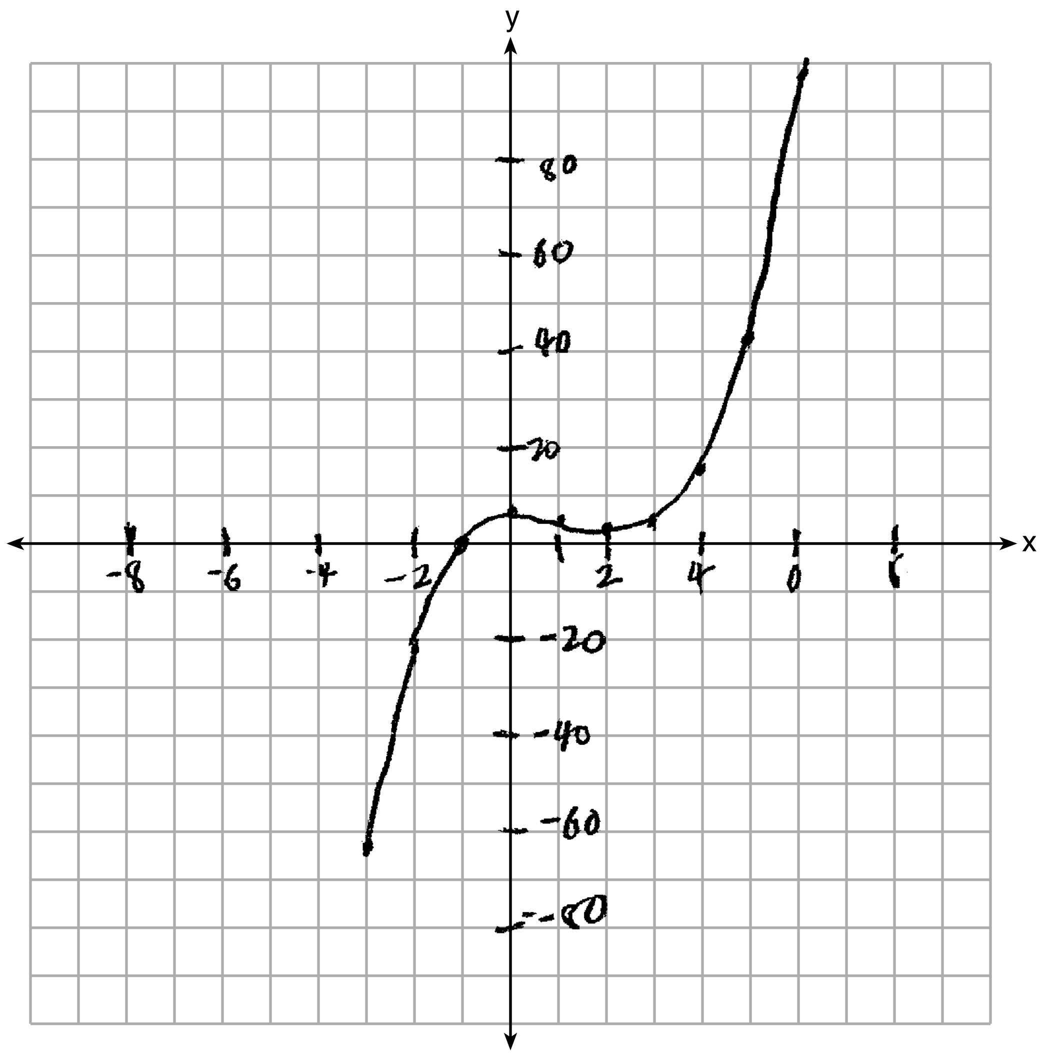


x	y
−3	−62
−2	21
−1	0
0	7
1	6
2	3
3	

Score 1: The student made one graphing error at the relative minimum.

Question 32

32 Graph $y = x^3 - 4x^2 + 2x + 7$ on the set of axes below.



Score 0: The student made multiple graphing errors.

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$r = \frac{4}{5}$

$a_n = 100(\frac{4}{5})^{n-1}$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

$S_n = \frac{100 - 100(\frac{4}{5})^{20}}{1 - \frac{4}{5}}$

$S_n = 494.235$ inches

40×12 in $= 480$

She will not have enough wire because for 20 pieces she needs about 494.24 inches but she only has 480 inches of wire

Score 4: The student gave a complete and correct response.

Question 33

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$\underset{a_1}{100}, \underset{a_2}{80}, \underset{a_3}{64}$

$\boxed{a_n = 100(0.8)^{n-1}}$

$r = 0.8$

$\left(\frac{80}{100}\right)$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

40ft → 480in

$$\text{Geometric Series} = \frac{100 - 100(0.8)^n}{1 - 0.8}$$

$$= \frac{100 - 100(0.8)^{20}}{0.2}$$

$$= 494.2353925$$

She will not have enough, she needs 494 inches of wire and she only has 480in.

Score 4: The student gave a complete and correct response.

Question 33

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$$\boxed{a_n = 100(.8)^{n-1}}$$

480 inches

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

$a_n = 100(.8)^{n-1}$

$a_4 = 100(.8)^3$

$= 51.2$

a_5 41

a_6 33

a_7 26

a_8 21

a_9 17

a_{10} 13

a_{11} 11

a_{12} 9

a_{13} 7

a_{14} 5

a_{15} 4

a_{16} 3.5

a_{17} 3

a_{18} 2.25

a_{19} 1.8

a_{20} 1.4

100
+80
+64
+51.2

no because it would use about 494 inches and she only has 480in.

Score 4: The student gave a complete and correct response.

Question 33

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$\frac{80}{100} = .8$

$r = .8$

$100(.8)^{n-1}$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

$$\begin{array}{r} 40 \\ \times\ 12 \\ \hline 480 \end{array}$$

$S_n = \frac{a_1 - a_1 r^n}{1-r}$

$S_n = \frac{100 - 100(.8)^{20}}{1-.8}$

$S_n = \frac{100 - 1.152921505}{.2}$

$S_n = 494.2353985$

she will not have enough wire.

Score 3: The student made a notation error by writing an expression, not an equation.

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$$\boxed{\begin{array}{l} a_1 = 100 \\ a_n = a_{n-1} \cdot (4/5) \end{array}}$$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

$a_1 = 100$

100, 80, 64, 51.2, 40.96, 32.768

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

$$\frac{100 - 100(4/5)^n}{(1 - 4/5)}$$

1 ft = 12 in

$$\boxed{494.235 \text{ inches}}$$

$$\frac{494.2353925}{12}$$

41.18628271

$\boxed{41.2}$

No she does not have enough wire to cut 20 peices because it comes out to be more than 40 feet.

Score 3: The student wrote a recursive formula in the first part.

Question 33

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$$a_n = 100(.8)^{n-1}$$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

$$a_n = 100(.8)^{19}$$

Score 2: The student answered the first part correctly.

Question 33

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

$$a_n = a_{n-1}(0.8)$$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

$$S_n \cancel{a_n} = \frac{a_1 - a_1 r^n}{1-r}$$

$$S_{20} = \frac{100 - 100(0.8)^{20}}{1-0.8}$$

$$= 494.2$$

Score 1: The student earned credit for correctly finding the amount of wire needed.

33 Sonja is cutting wire to construct a mobile. She cuts 100 inches for the first piece, 80 inches for the second piece, and 64 inches for the third piece. Assuming this pattern continues, write an explicit equation for a_n, the length in inches of the nth piece.

100, 80, 64

$a_n = ?$

$a_1 = 100$

$a_2 = .80$

$a_3 = 64$

$a_n = a_1 + (n-1)d$

$a_n = 100 + (n-1)d$

Sonja only has 40 feet of wire to use for the project and wants to cut 20 pieces total for the mobile using her pattern. Will she have enough wire? Justify your answer.

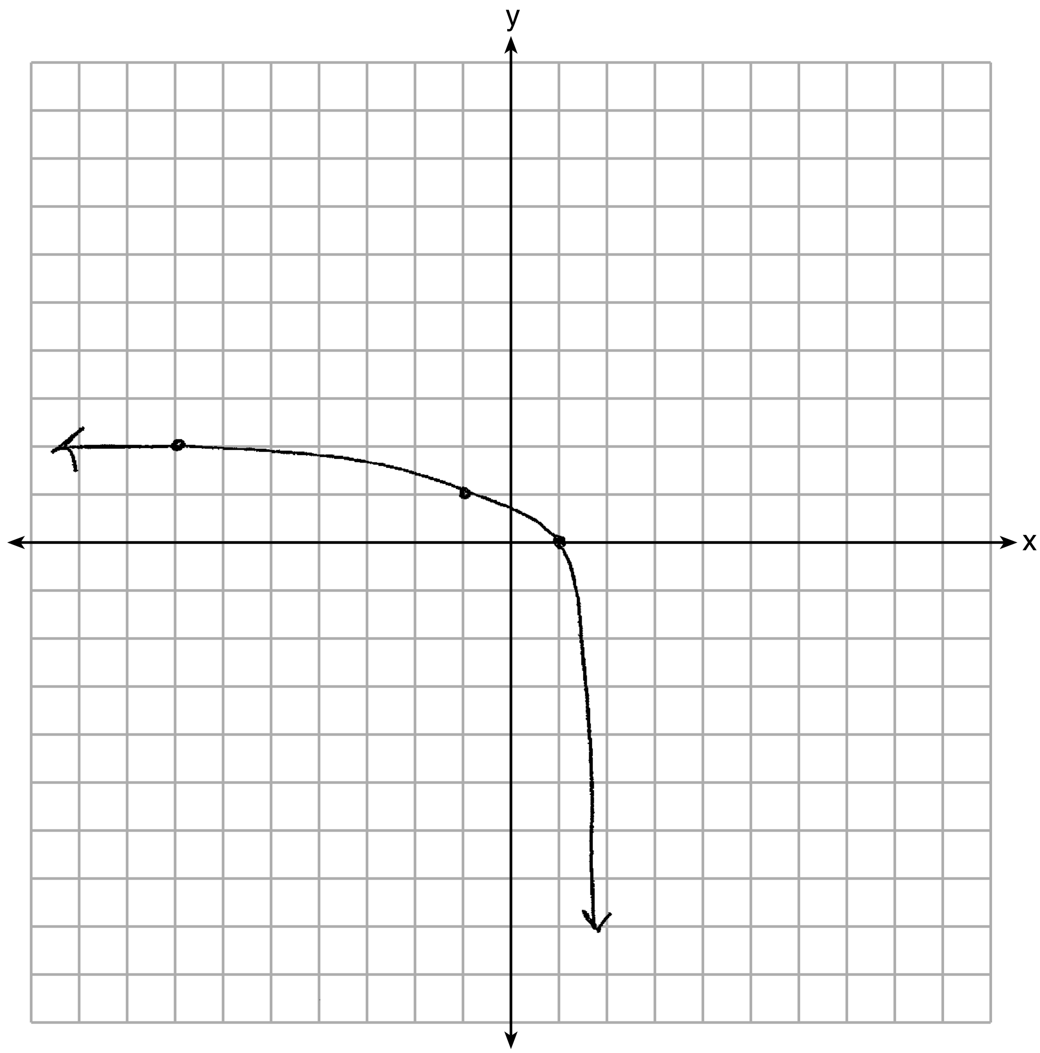
No because according to the geometric sequence formula it won't be enough.

Score 0: The student did not do enough correct work to receive any credit.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of f.

Domain: $(-\infty, 2)$

State the equation of the asymptote.

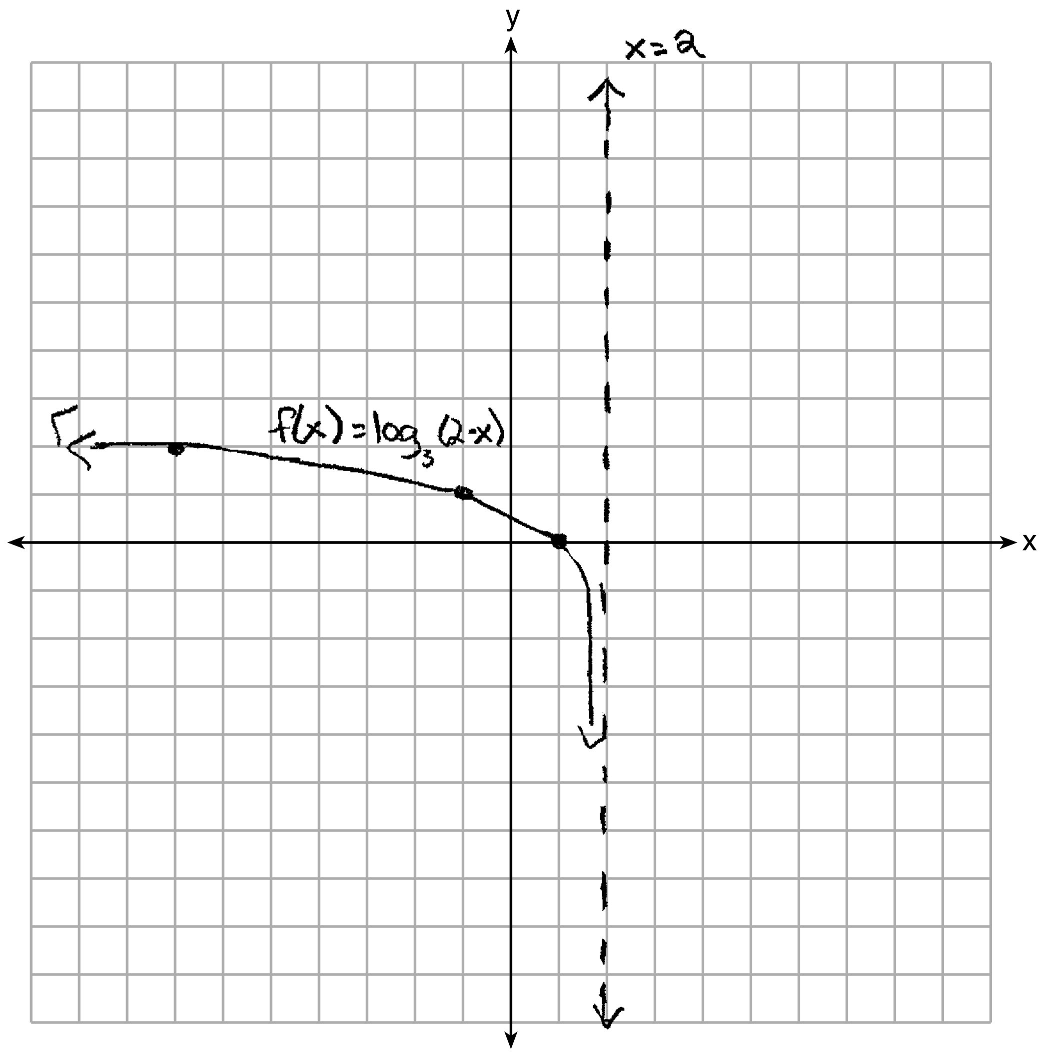
asymptote $x = 2$

Score 4: The student gave a complete and correct response.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of f.

The domain is all real numbers less than 2.

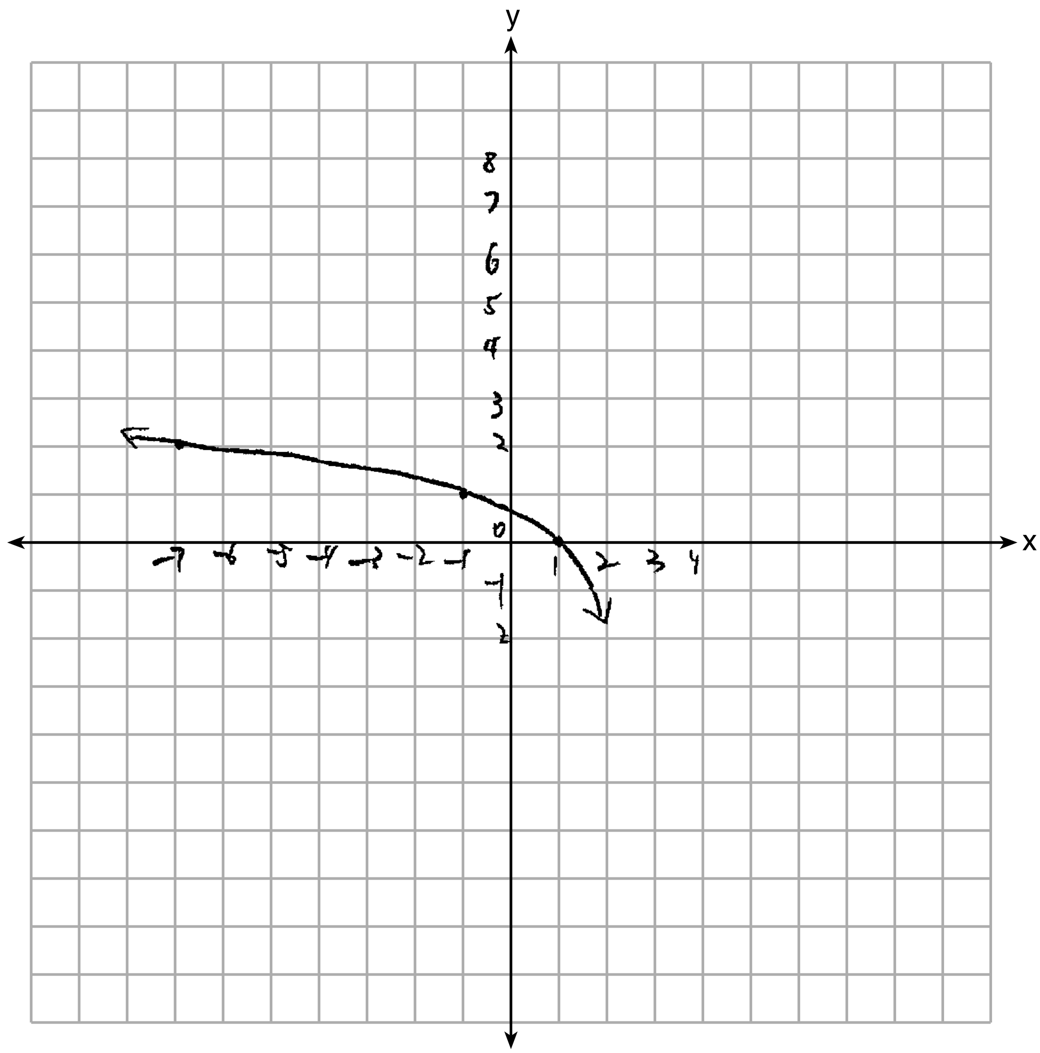
State the equation of the asymptote. The equation of the asymptote is x=2

Score 4: The student gave a complete and correct response.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of *f*.

Domain: $x < 2$.

State the equation of the asymptote.

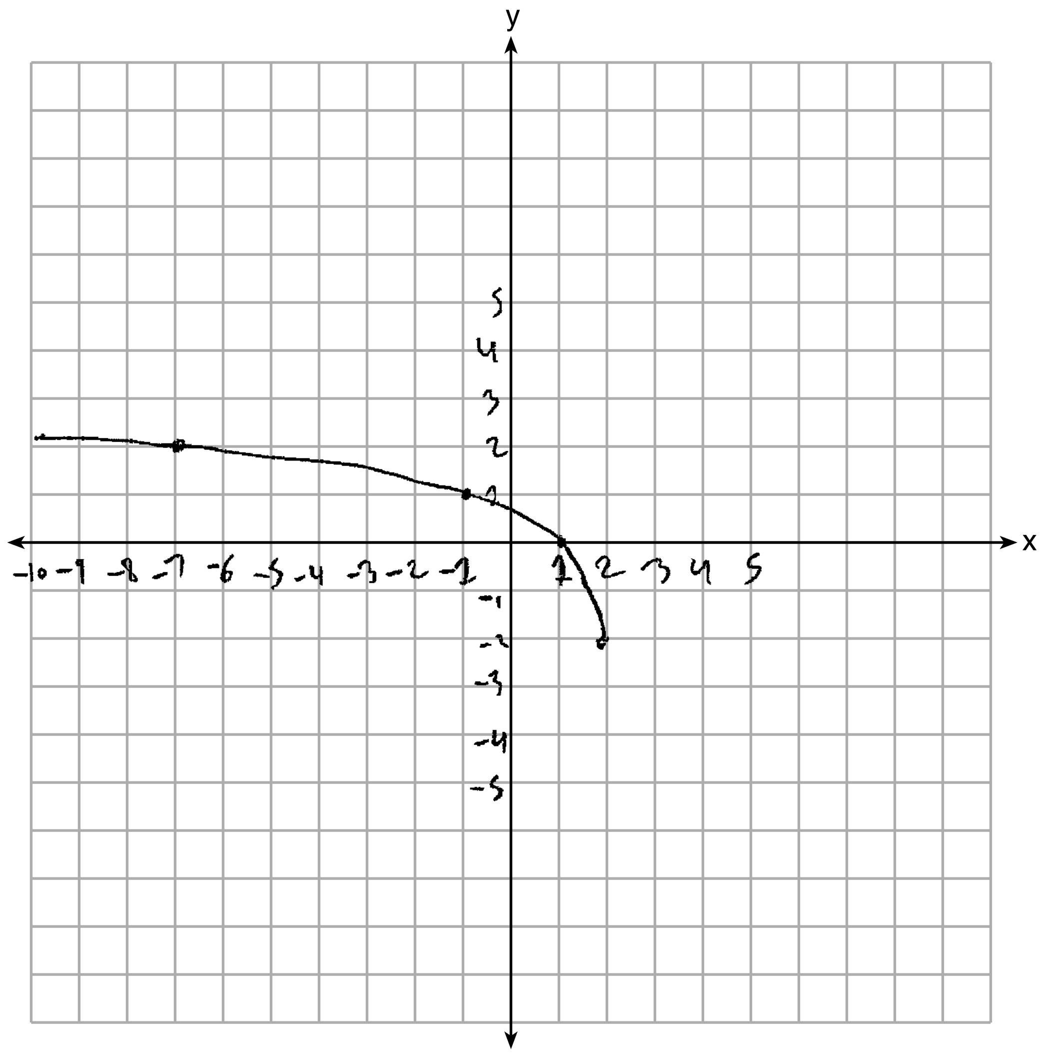
Equation of the asymptote: $y = \lim \log_3(2-x)$.

Score 3: The student did not state the correct equation of the asymptote.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of *f*.

domain of f: $x < 2$

State the equation of the asymptote.

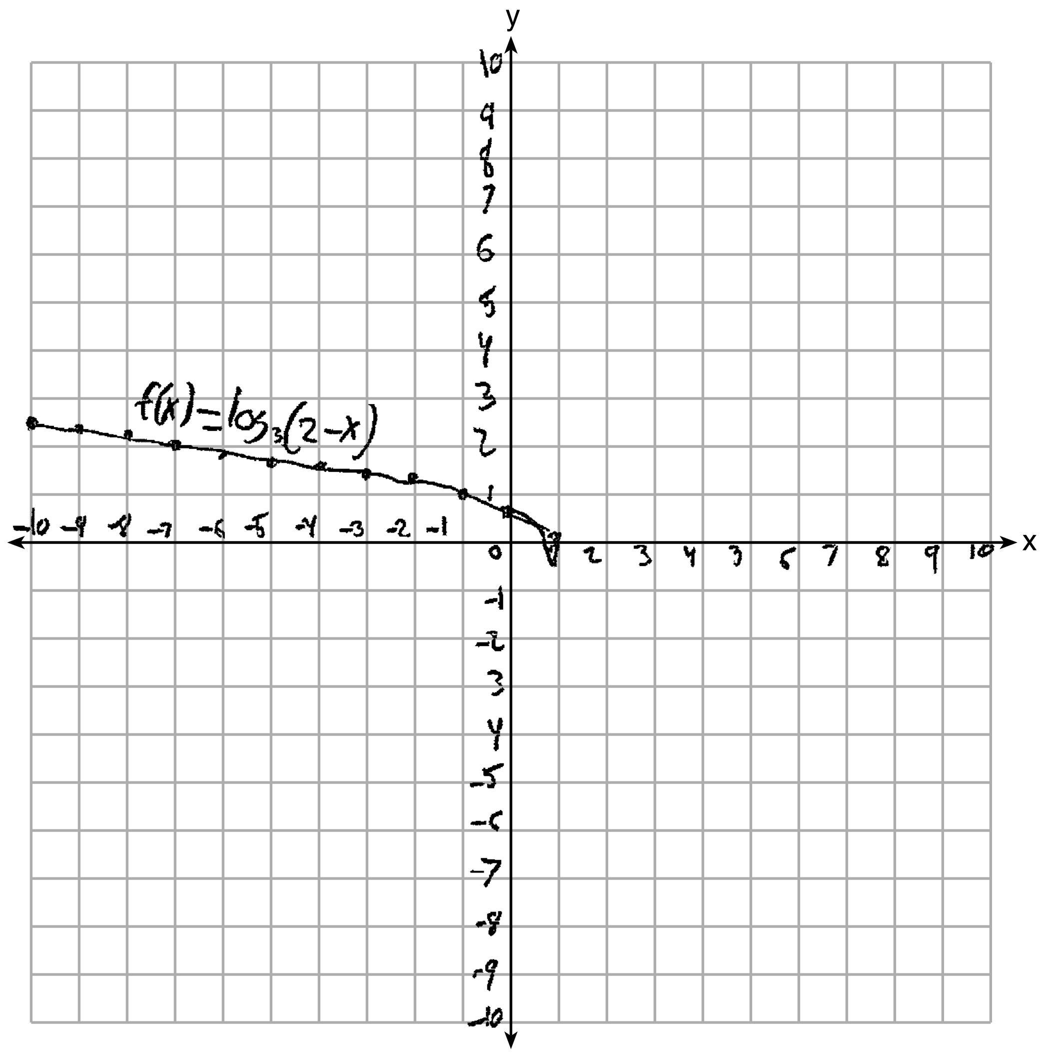
asymptote = $x = 2$

Score 3: The student made one graphing error.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of *f*.

d(f) $(-\infty, 1]$

State the equation of the asymptote.

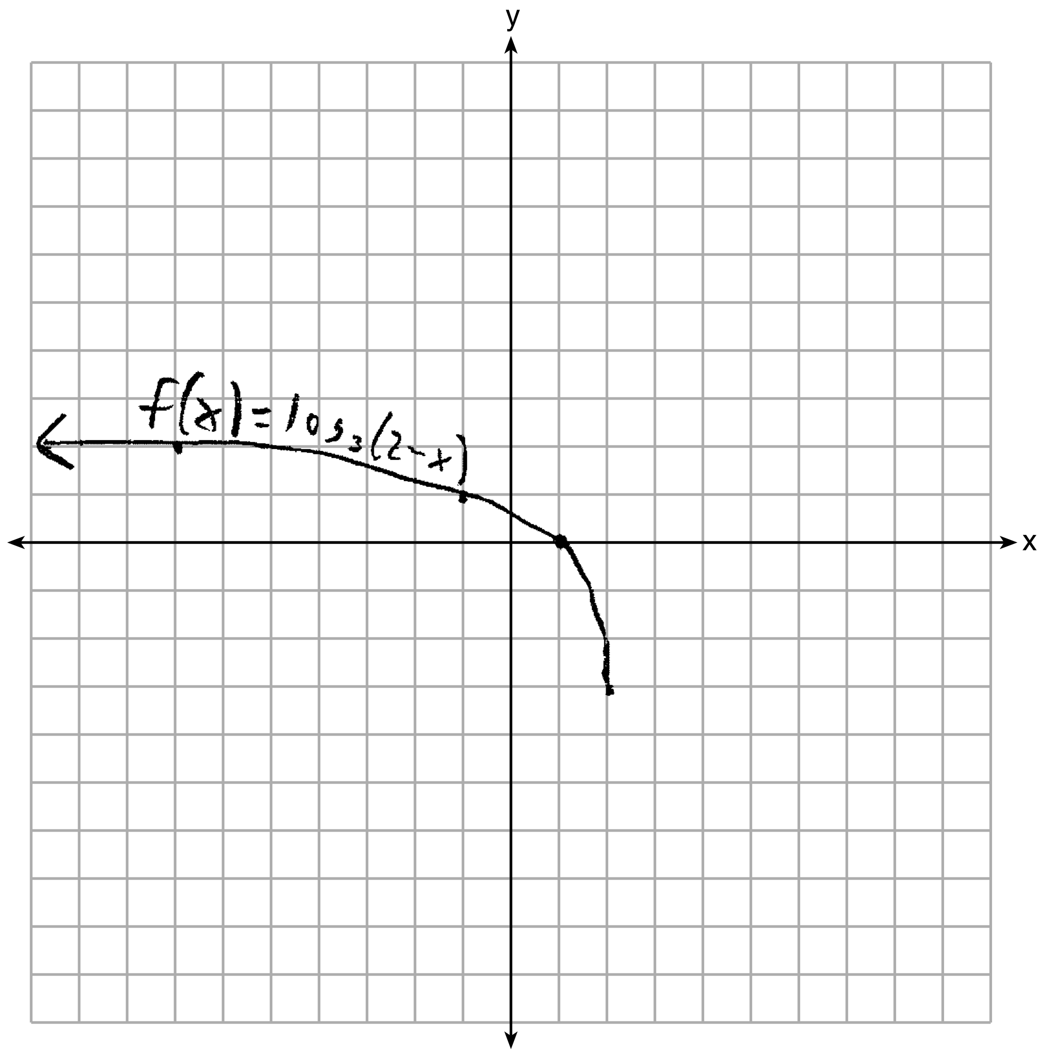
$x=2$

Score 2: The student made one graphing error and stated an incorrect domain.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of *f*.

$-\infty \leq x \leq 2$

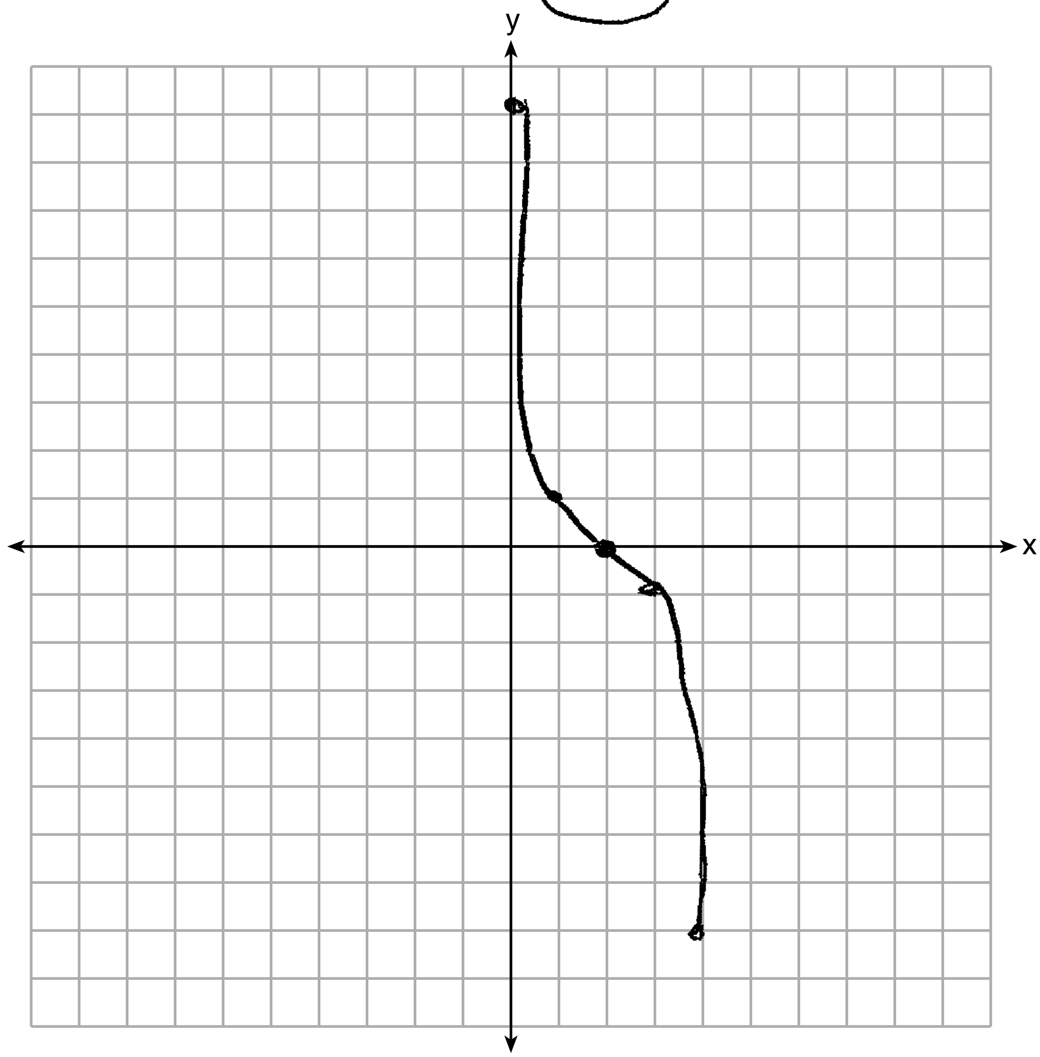
State the equation of the asymptote.

Score 1: The student received one credit for the graph.

Question 34

34 Graph the following function on the axes below.

$$f(x) = \log_3(2 - x)$$



State the domain of f.

$(-\infty, \infty)$

State the equation of the asymptote.

Score 0: The student did not show enough correct work to receive any credit.

Question 35

35 Algebraically solve the following system of equations.

$$(x - 2)^2 + (y - 3)^2 = 16$$
$$x + y - 1 = 0$$

$y = -x + 1$

$(x - 2)^2 + (-x - 2)^2 = 16$

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

$\frac{2x^2 + 8}{2} = \frac{16}{2}$

$x^2 + 4 = 8$

$x^2 = 4$

$x = \pm 2$

$2 + y - 1 = 0$

$y + 1 = 0$

$y = -1$

$-2 + y - 1 = 0$

$y = +3$

$(2, -1)$ or $(-2, 3)$

Score 4: The student gave a complete and correct response.

Question 35

35 Algebraically solve the following system of equations.

$$(x - 2)^2 + (y - 3)^2 = 16$$
$$x + y - 1 = 0$$

$(y-1)(-y-1)$

$y^2 + y + y + 1$

$x = -y + 1$

$(x-2)^2 + (y-3)^2 = 16$

$((-y+1)-2)^2 + (y-3)^2 = 16$

$(-y-1)^2 + (y-3)^2 = 16$

$y^2 + 2y + 1 + y^2 - 6y + 9 = 16$

$2y^2 - 4y + 10 = 16$

$y^2 - 2y + 5 = 8$

$y^2 - 2y - 3 = 0$

$(y-3)(y+1) = 0$

$y = 3 \mid y = -1$

$x = -y + 1$

$x = -(3) + 1$

$x = -3 + 1$

$x = -2$

$\boxed{(-2, 3)}$

$x = -y + 1$

$x = -(-1) + 1$

$x = 1 + 1$

$x = 2$

$\boxed{(2, -1)}$

Score 4: The student gave a complete and correct response.

Question 35

35 Algebraically solve the following system of equations.

$$(x - 2)^2 + (y - 3)^2 = 16$$
$$x + y - 1 = 0$$

$(x-2)^2+(y-3)^2=16$

$y=-x+1$

$(x-2)^2+(-x+1-3)^2=16$

$(x-2)^2+(-x-2)^2=16$

$(x-2)(x-2)+(-x-2)\cdot(-x-2)=16$

$x^2-4x+4+(-x-2)$

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

$2x^2+8=16$

$2x^2-8=0$

$2(x^2-4)=0$

$2(x-2)(x+2)$

$x-2=0$ $\quad$ $x+2=0$

$x=2$ $\quad$ $x=-2$

$y=-1$

$y=3$

Score 3: The student did not show solutions that are paired.

Question 35

35 Algebraically solve the following system of equations.

$$(x - 2)^2 + (y - 3)^2 = 16$$
$$x + y - 1 = 0$$

$x+y=1 \rightarrow y=-x+1$

$(x-2)^2+(-x-1-3)^2=16$

$x^2 -4x +4 + x^2 +8x +16 = 16$

$2x^2+4x+20=16$

$\frac{2x^2+4x+4}{2}=0$

$x^2+2x+2=0$

$(x+2)(x+2)=0$

$x=2 \quad x=-2$

$y=-(-2)+1$
$y=3$
$(-2,3)$

$y=-(-2)+1$
$y=3$
$(-2,3)$

$(x-2)(x-2)$
$x^2-2x-2x+4$
x^2-4x+4

$(-x-4)(-x-4)$
$x^2+4x+4x+16$
$x^2+8x+16$

$(2x+2)(x+2)$
$2x^2+4x+2x+4$

$(x+2)(x+1)$
$x^2+2x+x+2$

$(2x+2)(x+1)$
$2x^2+2x+2x+2$
$2x^2+4x+2$

$2x+2=0$
$\quad -2 \quad -2$
$\frac{2x}{2}=\frac{-2}{2}$
~~$x=-1$~~

Score 2: The student made a transcription error and a factoring error.

Question 35

35 Algebraically solve the following system of equations.

$$(x-2)^2 + (y-3)^2 = 16$$
$$x + y - 1 = 0 \quad y = -x + 1$$

$(x-2)^2 + (y-3)^2 = 16$

$(x-2)^2 + (-x+1-3)^2 = 16$

$(x^2 - 4x + 4) + (x^2 + 4x + 4) = 16$

$2x^2 + 8 - 16 = 0$

$2x^2 - 16 = 0$

$2(x^2 - 8) = 0$

$\boxed{x = 2}$

$x^2 - 8 = 0$
$+8 \quad 8$

$x = \sqrt{8}$

$\boxed{x = 2\sqrt{2}}$

	$-x$	-2
$-x$	x^2	$2x$
-2	$2x$	4

	x	-2
x	x^2	$-2x$
-2	$-2x$	$+4$

Score 1: The student wrote a correct quadratic equation in one variable.

Question 35

35 Algebraically solve the following system of equations.

$$(x - 2)^2 + (y - 3)^2 = 16$$
$$x + y - 1 = 0$$

$$x^2 - 4 + y^2 - 9 = 16$$
$$+4 \qquad\qquad +4$$
$$x^2 + y^2 - 9 = 20$$
$$+9 \qquad +9$$
$$x^2 + y^2 = 29$$

Score 0: The student did not show any relevant correct work.

35 Algebraically solve the following system of equations.

$$(x-2)^2+(y-3)^2=16$$
$$x+y-1=0$$

$(x-2)^2 + (y-3)^2$

$(x-2)(x-2)$ $(y-3)(y-3)$

$x^2-2x-2x+4$ $y^2-3y-3y+9$

$x^2-4x+4 = y^2-6y+9$

$x-2 \mid x+2$

$x+2$

$y+3$

$y+3$

$x=-2$

$y=3$

$x=-2$

Score 0: The student obtained one correct solution by an obviously incorrect procedure.

Question 36

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

11 11 9 8 8

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth.*

$y = 101.523 \times .883^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

when air pressure is 29 kPa, altitude is 10.07 (Km)

$$\frac{29}{101.523} = \frac{101.523}{101.523} \times .883^x$$

$$.28565 = .883^x$$

$$\frac{\log(.28565)}{\log(.883)} = \frac{x \log(.883)}{\log(.883)}$$

$$\boxed{10.07 = x}$$

Score 4: The student gave a complete and correct response.

Question 36

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth.*

stat, calc, expreg

$y = 101.523(.883)^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$$\frac{29}{101.523} = \frac{\cancel{101.523}(.883)^x}{\cancel{101.523}}$$

$.2856\ldots = .883^x$

$x = \log_{.883} .2856\ldots$

$x = 10.07$ km

Score 4: The student gave a complete and correct response.

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

$101.523(.883)^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$\cancel{101(.883)^{29}}$

~~2.75 km~~

$29 = 101.523(.883)^x$

$.286 = .883^x$

$\frac{\log .286}{} = \frac{\log .883x}{}$

$x = 10.07$

Score 3: The student made a notation error by writing an expression, not an equation.

Question 36

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

$y = 101.523(0.883)^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$y = 101.523(0.883)^x$

$\frac{29 = 101.523(0.883)^x}{101.523}$

$\boxed{x = 10 \text{ km}}$

$.2856 = (.883)^x$

$\frac{\log .2856 = x \log .883}{\log .883}$

Score 3: The student made a rounding error.

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	x	**Altitude** (km)	0	1	2	3	4	5
y	y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

$y=ab^x$

$a=101.523$

$b=0.883$

$y=101.523(0.883)^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$y=101,523(0.883)^x$

$\frac{29}{101.523}=\frac{\cancel{101.523}(0.883)^x}{\cancel{101.523}}$

$0.286=(0.883)^x$

$\frac{\ln 0.286}{\ln 0.883}=\frac{\cancel{\ln} x\ \cancel{0.883}}{\ln \cancel{0}.883}$

$x=\boxed{10.06 \text{ KM}}$

Score 2: The student made one rounding error and one notation error writing the logarithm.

Question 36

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

$y = a(b)^x$

$y = 101.523(.883)^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$$\frac{29}{101.523} = \frac{101.523(.883)^x}{101.523}$$

$.286 = (.883)^x$

Score 2: The student earned credit for the correct exponential regression equation.

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth.*

$y = a(b)^x$

$y = 101.438(.883)^x$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$y = 101.438(.883)^{29}$

2.75 km

Score 1: The student made a computation error in the first part and earned no credit for the second part.

36 The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

$y = -9.37x + 99.43$

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

$y = -9.37(29) + 99.43$

$y = -172.3$

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

at tim=0

$$n(t) = \frac{0+1}{0+5} + \frac{18}{0+0+15} = \frac{1}{5}_{*3} + \frac{18}{15} = \frac{21}{15} = 1.4$$

$$a(t) = \frac{9}{3} = 3$$

the antibiotic is made with more active ingredient because at $t=0$ $3>1$

Question 37 is continued on the next page.

Score 6: The student gave a complete and correct response.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$\frac{t+1}{t+5} + \frac{18}{t^2+8t+15} = \frac{9}{t+3}$$

$$\cancel{(t+3)}\cancel{(t+5)}\frac{t+1}{\cancel{t+5}} + \frac{18}{\cancel{(t+3)}\cancel{(t+5)}} = \frac{9}{\cancel{t+3}}$$

$$(t+1)(t+3) + 18 = 9(t+5)$$

$$t^2+4t+3+18 = 9t+45$$

$$t^2+4t+21 = 9t+45$$

$$-9t-45 \quad -9t-45$$

$$t^2-5t-24=0$$

$$(t-8)(t+3)$$

$$t=8 \quad \cancel{t=-3}$$

Can't have (−) time

After 8 hours the 2 drugs will have the same amount of active ingredient in the blood

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

$n(0)$
$a(0)$

antibiotic

Question 37 is continued on the next page.

Score 5: The student gave an incomplete justification for "antibiotic".

Question 37 continued.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$\frac{t+1}{t+5} + \frac{18}{t^2+8t+15} = \frac{9}{t+3}$$

$$(t+1)(t+3)+18 = 9(t+5)$$

$$t^2+4t+3+18 = 9t+45$$

$$t^2+4t+21 = 9t+45$$

$$t^2-5t-24=0$$

$$(t-8)(t+3)=0$$

$$t=8 \qquad \cancel{t=-3}$$

~~After~~ 8 hours

$t=8$ hours

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

$t=1$

$$\frac{1+1}{1+5} + \frac{18}{1^2+8(1)+15} = \frac{13}{12}$$

$$\frac{9}{1+3} = \frac{9}{4} \times \frac{3}{3} = \boxed{\frac{27}{12}}$$

If you plug in 1 for both equation you see that equation a(t) has a higher fraction hence it's made with a greater amount

Question 37 is continued on the next page.

Score 4: The student mistakenly substituted 1 for the initial time and did not reject $t = -3$.

Question 37 continued.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$\frac{t+3}{(t+3}\frac{(t+1)}{(t+5)}+\frac{18}{t^2+8t+15} = \frac{(9)\ t+5}{(t+3)(t+5}$$

$(t+5)(t+3)$

$t+3$
$t+1$
$1 \quad 3$
$t^2 \quad 3$

$(t+3)(t+1) + 18 = 9t + 45$

$t^2 + 4t + 3 + 18 = 9t + 45$

$-9t - 45 \qquad -9t - 45$

$t^2 - 5t - 24 = 0$

$(t+3)(t-8)$

$\boxed{t = -3\ \cancel{3}\ 8}$

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

n(t)=nasal

a(t)=anti~~biotic~~

$0 = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$

Question 37 is continued on the next page.

Score 4: The student earned credit for correctly solving for $t = 8$.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$(t+5)(t+3)\left(\frac{t+1}{\cancel{t+5}}\right)+\left(\frac{18}{\cancel{(t+5)}(t+3)}\right)^{\cancel{(t+5)(t+3)}}=\left(\frac{9}{\cancel{t+3}}\right)^{(t+5)\cancel{(t+3)}}$$

$$(t+1)(t+3)+18=9(t+5)$$

$$t^2+4t+3+18=9t+45$$

$$t^2-5t-24=0$$

$$(t-8)(t+3)=0$$

$$t=\cancel{-3},8$$

$$t=8$$

$\therefore$ after 8 hours, they will have the same amount of active ingredient.

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

$$n(t)\ \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Question 37 is continued on the next page.

Score 3: The student did not earn any credit in the first part and did not reject $t = -3$ in the second part.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$\frac{t+1}{t+5} + \frac{18}{t^2+8t+15} = \frac{9}{t+3}$$

$$\frac{(t+1)(t+3)}{(t+5)(t+3)} + \frac{18}{(t+5)(t+3)} = \frac{9(t+5)}{(t+5)(t+3)}$$

$t^2+3t+t+3$

$(t+1)(t+3)+18-9(t+5)$ $\qquad$ $8, -3$

$t^2+4t+3 \quad +18 - 9t - 45$

$t^2-5t-42+18$

$4 \quad t^2-5t-24 \Rightarrow (t-8)(t+3)$

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

a(t) has a greater amount of active ingredient because when both equations are plugged into the calculator at t=0, n(t) has 7/5 milligrams of active ingredient and a(t) has 3 milligrams.

Question 37 is continued on the next page.

Score 3: The student did not provide enough work to justify $t = 8$.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$\frac{(t+3)}{(t+3)}\frac{t+1}{t+5}+\frac{18(L}{t^2+8t+15}=\frac{9}{t+3}$$

$$(t+3)(t+5)$$

$$t=8$$

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

The antibiotic is made with a greater amount of the active ingredient because it has a greater y-intercept, (0, 3) compared to the nasal spray's (0, 1.4)

Question 37 is continued on the next page.

Score 2: The student only earned credit for the first part.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$$\frac{t+1}{t+5} + \frac{16/8}{t^2+8t+15} = \frac{9}{t+3}$$

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2 + 8t + 15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

Question 37 is continued on the next page.

Score 1: The student earned credit by stating 8.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$\boxed{\text{8hours}}$

Question 37

37 Sarah is fighting a sinus infection. Her doctor prescribed a nasal spray and an antibiotic to fight the infection. The active ingredients, in milligrams, remaining in the bloodstream from the nasal spray, $n(t)$, and the antibiotic, $a(t)$, are modeled in the functions below, where t is the time in hours since the medications were taken.

$$n(t) = \frac{t+1}{t+5} + \frac{18}{t^2+8t+15}$$

$$a(t) = \frac{9}{t+3}$$

Determine which drug is made with a greater initial amount of active ingredient. Justify your answer.

n(T) is the one that has the greater amount of active ingrediant becuse when you solve for T you end up getting a higher number the A(T)

Question 37 is continued on the next page.

Score 0: The student did not provide enough correct work to earn any credit.

Question 37 continued.

Sarah's doctor told her to take both drugs at the same time. Determine algebraically the number of hours after taking the medications when both medications will have the same amount of active ingredient remaining in her bloodstream.

$n(T) = \frac{T+1}{t+5} + \frac{.18}{T^2+8t+15}$ $a(T) = \frac{9}{t+3}$

$\frac{9}{T+5} = \frac{T+1}{T+5} + \frac{18}{T^2+8t+15}$

$\frac{9}{\cancel{T+3}} = \frac{T+1}{\cancel{T+5}} + \frac{18}{\cancel{(T+3)}\cancel{(T+5)}}$

$9 = T+1+18$

$9 = T+19$

$-19 \quad -19$

$T = 10$