The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA II

Wednesday, August 14, 2019 — 12:30 to 3:30 p.m., only

MODEL RESPONSE SET

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Question 25

25 At Andrew Jackson High School, students are only allowed to enroll in AP U.S. History if they have already taken AP World History or AP European History. Out of 825 incoming seniors, 165 took AP World History, 66 took AP European History, and 33 took both. Given this information, determine the probability a randomly selected incoming senior is allowed to enroll in AP U.S. History.

$$\frac{165}{825} + \frac{66}{825} - \frac{33}{825} = \frac{198}{825}$$

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

Question 25

25 At Andrew Jackson High School, students are only allowed to enroll in AP U.S. History if they have already taken AP World History or AP European History. Out of 825 incoming seniors, 165 took AP World History, 66 took AP European History, and 33 took both. Given this information, determine the probability a randomly selected incoming senior is allowed to enroll in AP U.S. History.

$\frac{165}{825}$ = AP World , A= AP World students

$\frac{66}{825}$ = AP Euro , B= AP Euro students

$\frac{33}{825}$ = World + Euro

$$P(A \text{ or } B) = P(A) + P(B) - P(A+B)$$

$$\frac{165}{825} + \frac{66}{825} - \frac{33}{825}$$

$$P(A \text{ or } B) = \frac{231}{825} - \frac{33}{825}$$

$$P(A \text{ or } B) = \frac{198}{825}$$

= .24 or 24% will be allowed to enroll in AP U.S. History

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

Question 25

25 At Andrew Jackson High School, students are only allowed to enroll in AP U.S. History if they have already taken AP World History or AP European History. Out of 825 incoming seniors, 165 took AP World History, 66 took AP European History, and 33 took both. Given this information, determine the probability a randomly selected incoming senior is allowed to enroll in AP U.S. History.

$$\frac{33}{825} + \frac{165}{825} + \frac{66}{825}$$

$$= \frac{264}{825} = \boxed{\frac{8}{25}}$$

Score 1: The student misapplied the addition rule.

Question 25

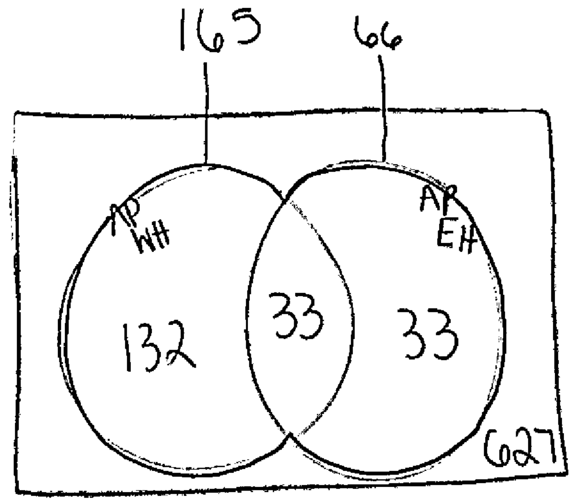
25 At Andrew Jackson High School, students are only allowed to enroll in AP U.S. History if they have already taken AP World History or AP European History. Out of 825 incoming seniors, 165 took AP World History, 66 took AP European History, and 33 took both. Given this information, determine the probability a randomly selected incoming senior is allowed to enroll in AP U.S. History.

seniors = 825

AP WH = 165

AP EH = 66

both = 33



= 825

132 + 33 + 33

$\boxed{\text{198 students}}$

Score 1: The student did not divide by 825.

Question 25

25 At Andrew Jackson High School, students are only allowed to enroll in AP U.S. History if they have already taken AP World History or AP European History. Out of 825 incoming seniors, 165 took AP World History, 66 took AP European History, and 33 took both. Given this information, determine the probability a randomly selected incoming senior is allowed to enroll in AP U.S. History.

825 in total
165 took AP WH
66 took AP EH
33 took both

$\boxed{33/825}$

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

Question 26

26 Explain what a rational exponent, such as $\frac{5}{2}$ means. Use this explanation to evaluate $9^{\frac{5}{2}}$.

The numerator is the power which the base is raised to and the denominator is the root

$\sqrt{9^5} = \boxed{243}$

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

Question 26

26 Explain what a rational exponent, such as $\frac{5}{2}$ means. Use this explanation to evaluate $9^{\frac{5}{2}}$.

A Fraction

represents $\frac{5}{2}$ ← power ← root

$(\sqrt[2]{9})^5$

3^5

$\boxed{243}$

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

Question 26

26 Explain what a rational exponent, such as $\frac{5}{2}$ means. Use this explanation to evaluate $9^{\frac{5}{2}}$.

$\frac{5}{2}$, as a rational exponent means 5 halves. This can be rationalized to 2.5, by dividing 5 and 2. $9^{\frac{5}{2}}$, can be evaluated by multiplying 9 by itself 2.5 times, to which you arrive at an answer of $\boxed{243}$

Score 1: The student gave an incomplete explanation.

Question 26

26 Explain what a rational exponent, such as $\frac{5}{2}$ means. Use this explanation to evaluate $9^{\frac{5}{2}}$.

It is bigger than 1, so it will
produce a higher ncmber than
it is raising. It is also 2.5.

Score 0: The student did not provide a correct explanation.

Question 27

27 Write $-\frac{1}{2}i^3(\sqrt{-9}-4)-3i^2$ in simplest $a+bi$ form.

$\frac{1}{2}i(\sqrt{-9}-4)+3$

$\frac{1}{2}i(3i-4)+3$

$1.5i^2-2i+3$

$-1.5-2i+3$

$\boxed{1.5-2i}$

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

Question 27

27 Write $-\frac{1}{2}i^3\left(\sqrt{-9} - 4\right) - 3i^2$ in simplest $a + bi$ form.

$-\frac{1}{2}i^3\left(\sqrt{-9} - 4\right) - 3i^2$

$\frac{1}{2}i\,(3i - 4) + 3$

$i = i$
$i^2 = -1$
$i^3 = -i$
$i^4 = 1$

$-\frac{3}{2} - 2i + 3$

$\boxed{-2i + \frac{3}{2}}$

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

Question 27

27 Write $-\frac{1}{2}i^3(\sqrt{-9}-4)-3i^2$ in simplest $a+bi$ form.

$\frac{1}{2}i(\sqrt{-9}-4)-3(1)$

$-1 \quad i \quad 1 \quad -i$

$\frac{1}{2}i(3i-4)-3$

$1.5i^2-2i-3$

$1.5-2i-3$

$-1.5-2i$

Score 1: The student incorrectly substituted for i^2.

Question 27

27 Write $-\frac{1}{2}i^3\left(\sqrt{-9} - 4\right) - 3i^2$ in simplest $a + bi$ form.

$.5i(3i-4)+3$

$-1.5-2i+3$

$-\frac{3}{2}$

$\underline{-3}$

$\boxed{\frac{-9}{2}-2i}$

Score 1: The student made one computational error.

Question 27

27 Write $-\frac{1}{2}i^3(\sqrt{-9} - 4) - 3i^2$ in simplest $a + bi$ form.

$-\frac{1}{2}i^3(\sqrt{-9} - 4) - 3i^2$ $\boxed{-4 + .5i}$

$.5i(-3-4)+3$

$.5i(-7)+3$

$.5i-4$

Score 0: The student made multiple computational errors.

Question 28

28 A person's lung capacity can be modeled by the function $C(t) = 250\sin\left(\frac{2\pi}{5}t\right) + 2450$, where $C(t)$ represents the volume in mL present in the lungs after t seconds. State the maximum value of this function over one full cycle, and explain what this value represents.

max value = M + A   M = 2450 = midline
A = 250 = amplitude

max = 2450 + 250

max = 2700

2700 represents the maximum amount of air a person's lungs can hold in milliliters.

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

Question 28

28 A person's lung capacity can be modeled by the function $C(t) = 250\sin\left(\frac{2\pi}{5}t\right) + 2450$, where $C(t)$ represents the volume in mL present in the lungs after t seconds. State the maximum value of this function over one full cycle, and explain what this value represents.

on calculator
$Y_1 = 250\sin\left(\frac{2\pi}{5}t\right) + 2450$)
2nd calc 4: maximum (-498.75, 2700)

max = 2700

After 2700 seconds a person's lung capacity has expanded completely.

Score 1: The student gave an incorrect explanation.

Question 28

28 A person's lung capacity can be modeled by the function $C(t) = 250\sin\left(\frac{2\pi}{5}t\right) + 2450$, where $C(t)$ represents the volume in mL present in the lungs after t seconds. State the maximum value of this function over one full cycle, and explain what this value represents.

the Maximum Value of this function
over one full cycle is ~~two~~ 2450

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

Question 29

29 Determine for which polynomial(s) $(x + 2)$ is a factor. Explain your answer.

$$P(x) = x^4 - 3x^3 - 16x - 12$$
$$Q(x) = x^3 - 3x^2 - 16x - 12$$

$P(-2) = 60$ $\quad$ $Q(-2) = 0$

$Q(x)$ since $Q(-2) = 0$
$(x + 2)$ must be a factor

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

Question 29

29 Determine for which polynomial(s) $(x + 2)$ is a factor. Explain your answer.

$$P(x) = x^4 - 3x^3 - 16x - 12$$
$$Q(x) = x^3 - 3x^2 - 16x - 12$$

$P(-2) = (-2)^4 - 3(-2)^3 - 16(-2) - 12$
$= 16 + 24 + 32 - 12$
$= 60$

$Q(-2) = (-2)^3 - 3(-2)^2 - 16(-2) - 12$
$= -8 - 12 + 32 - 12$
$= 0$

$(x+2)$ is a factor of $Q(x) = x^3 - 3x^2 - 16x - 12$ because -2 equals zero.

Score 1: The student gave an incomplete explanation.

Question 29

29 Determine for which polynomial(s) $(x + 2)$ is a factor. Explain your answer.

$$P(x) = x^4 - 3x^3 - 16x - 12$$
$$Q(x) = x^3 - 3x^2 - 16x - 12$$

$$\begin{aligned} x+2 &= 0 \\ -2 \quad & -2 \\ x &= -2 \end{aligned}$$

$$\begin{array}{r|rrrr} & 1 & -3 & -16 & -12 \\ -2 & 1 & -2 & 10 & 12 \\ \hline & 1 & -5 & -6 & 0 \end{array} \qquad \begin{array}{r|rrrrr} & 1 & -3 & 0 & -16 & -12 \\ -2 & 1 & -2 & 10 & -20 & 72 \\ \hline & 1 & -5 & 10 & -36 & 60 \end{array}$$

X

$(x+2)(x^2-5x-6) = Q(x)$

$Q(x)$.

Score 1: The student gave no explanation.

Question 29

29 Determine for which polynomial(s) $(x + 2)$ is a factor. Explain your answer.

$$P(x) = x^4 - 3x^3 - 16x - 12$$
$$Q(x) = x^3 - 3x^2 - 16x - 12$$

$x^3(x-3\ )-4(4x-3)$

$x^2(x-3)-4(4x+3$

$(x^2+4)(x-3)(4x+3)$

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

$Q(x)=x^3-3x^2-16x-12$

when factored it leaves you with a solution of $(x+2)$

Score 0: The student made multiple errors.

Question 30

30 On July 21, 2016, the water level in Puget Sound, WA reached a high of 10.1 ft at 6 a.m. and a low of −2 ft at 12:30 p.m. Across the country in Long Island, NY, Shinnecock Bay's water level reached a high of 2.5 ft at 10:42 p.m. and a low of −0.1 ft at 5:31 a.m.

The water levels of both locations are affected by the tides and can be modeled by sinusoidal functions. Determine the difference in amplitudes, in feet, for these two locations.

Puget Sound

$10.1 - -2 = 12.1$ 4.05 ft normal water level

$\frac{12.1}{2} = 6.05$ amp water level

Long Island

$2.5 - -0.1 = 2.6$ 1.2 ft normal water level

$\frac{2.6}{2} = 1.3$ amp

Puget Sounds amplitude is greater by 4.75 feet

$6.05 - 1.3 = 4.75$ ft

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

Question 30

30 On July 21, 2016, the water level in Puget Sound, WA reached a high of 10.1 ft at 6 a.m. and a low of −2 ft at 12:30 p.m. Across the country in Long Island, NY, Shinnecock Bay's water level reached a high of 2.5 ft at 10:42 p.m. and a low of −0.1 ft at 5:31 a.m.

The water levels of both locations are affected by the tides and can be modeled by sinusoidal functions. Determine the difference in amplitudes, in feet, for these two locations.

— 10.1

— 4.05 6.05

— −2

— 2.5

— 1.2 1.3

— .1

$$\begin{array}{r} 6.05 \\ -1.3 \\ \hline \end{array}$$

4.75ft

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

Question 30

30 On July 21, 2016, the water level in Puget Sound, WA reached a high of 10.1 ft at 6 a.m. and a low of −2 ft at 12:30 p.m. Across the country in Long Island, NY, Shinnecock Bay's water level reached a high of 2.5 ft at 10:42 p.m. and a low of −0.1 ft at 5:31 a.m.

The water levels of both locations are affected by the tides and can be modeled by sinusoidal functions. Determine the difference in amplitudes, in feet, for these two locations.

Puget Sound, Wa
high 10.1 ft.
low −2ft

amp - 12.1

Long Island, Ny
high 2.5 ft
low −0.1

amp - 2.6

difference = 12.1
− 2.6
$\boxed{9.5}$

Score 1: The student made an error finding the amplitudes.

Question 30

30 On July 21, 2016, the water level in Puget Sound, WA reached a high of 10.1 ft at 6 a.m. and a low of −2 ft at 12:30 p.m. Across the country in Long Island, NY, Shinnecock Bay's water level reached a high of 2.5 ft at 10:42 p.m. and a low of −0.1 ft at 5:31 a.m.

The water levels of both locations are affected by the tides and can be modeled by sinusoidal functions. Determine the difference in amplitudes, in feet, for these two locations.

6.05

1.3

Score 1: The student did not determine the difference in amplitudes.

Question 30

30 On July 21, 2016, the water level in Puget Sound, WA reached a high of 10.1 ft at 6 a.m. and a low of −2 ft at 12:30 p.m. Across the country in Long Island, NY, Shinnecock Bay's water level reached a high of 2.5 ft at 10:42 p.m. and a low of −0.1 ft at 5:31 a.m.

The water levels of both locations are affected by the tides and can be modeled by sinusoidal functions. Determine the difference in amplitudes, in feet, for these two locations.

Amp = max − min

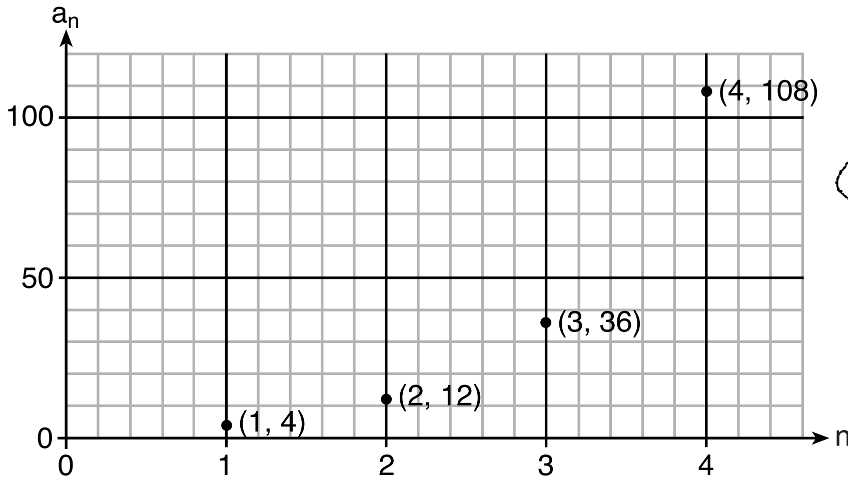
$A_1 = 10.1 ft - (-2 ft)$ $\quad A_1 = 12 \quad 12 - 2.51 = \boxed{9.49}$

$A_2 = 2.5 ft - (-.01 ft)$ $\quad A_2 = 2.51$

Score 0: The student made multiple errors.

Question 31

31 Write a recursive formula, a_n, to describe the sequence graphed below.



Geometric

not ~~Arithmetic~~

$a_1 =$

a_n

x	y
1	4
2	12
3	36
4	108

+1, +1, +1, +1

×3, ×3, ×3

x↑1 y*4

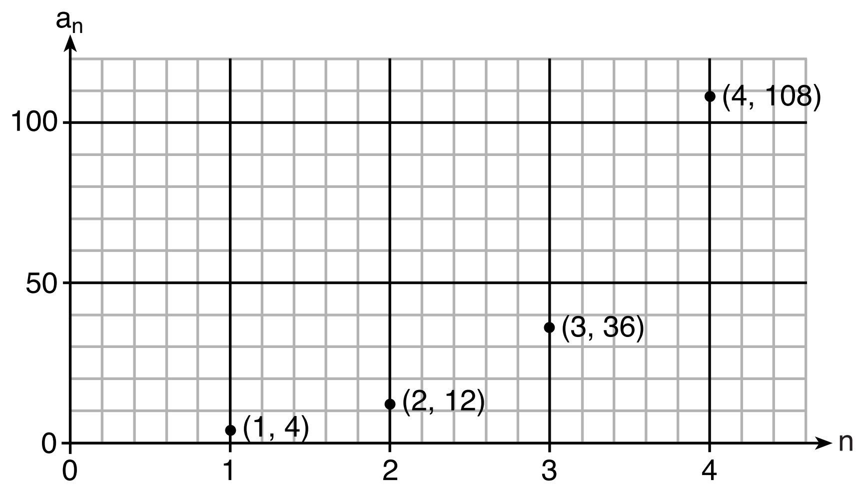
$$\boxed{\begin{array}{l} a_1 = 4 \\ a_n = 3a_{n-1} \end{array}}$$

answer

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

Question 31

31 Write a recursive formula, a_n, to describe the sequence graphed below.



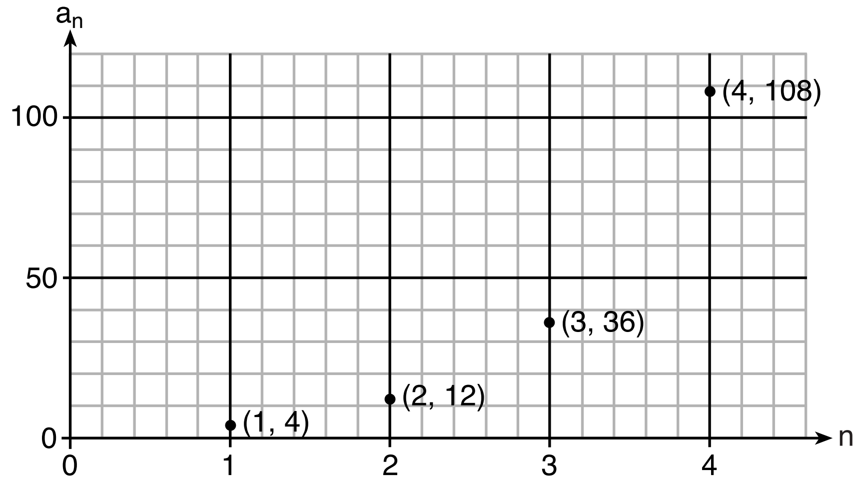
$a_1 = 4$

$a_n = 4(3)^{n-1}$

Score 1: The student wrote an explicit formula.

Question 31

31 Write a recursive formula, a_n, to describe the sequence graphed below.



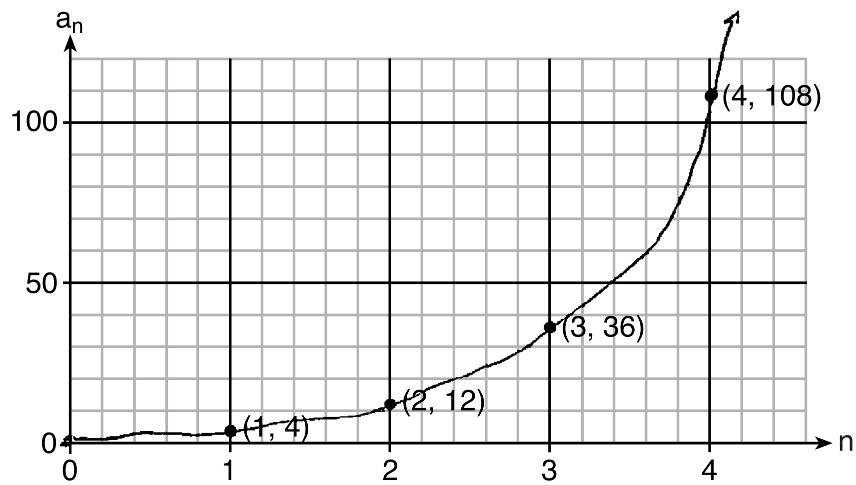
$a_1 = 4$

$a_n = 3 \quad {}_{n-1}$

Score 1: The student made a notation error.

Question 31

31 Write a recursive formula, a_n, to describe the sequence graphed below.



(1, 4)
↓ x3
(2, 12)

y = x + 3

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

32 Sketch the graphs of $r(x) = \frac{1}{x}$ and $a(x) = |x| - 3$ on the set of axes below. Determine, to the *nearest tenth*, the positive solution of $r(x) = a(x)$.

$y^2+3y-1=0$

$y = \frac{1}{y} - 3$ $\quad \frac{-3 \pm \sqrt{9+4}}{2}$

$y = \frac{1}{x}$

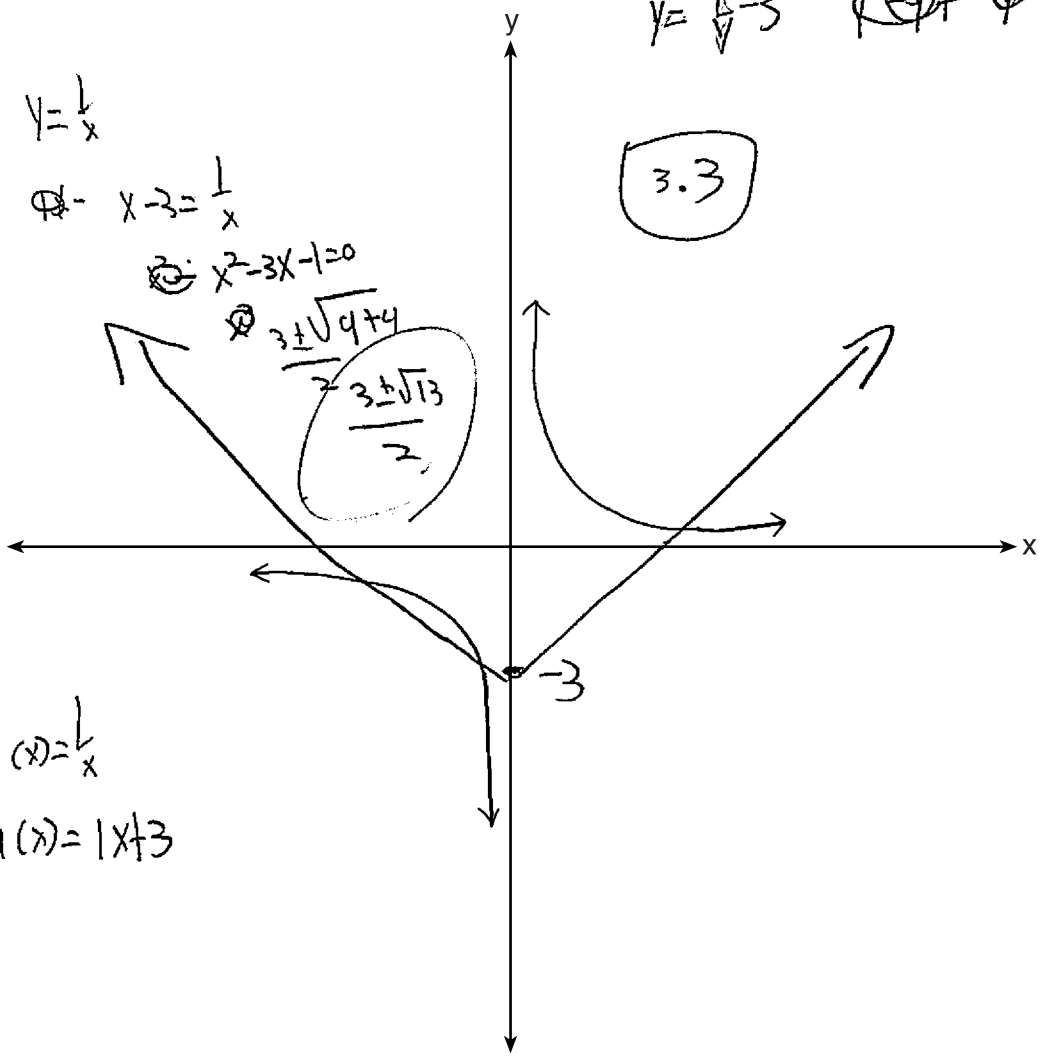
$x - 3 = \frac{1}{x}$

$x^2 - 3x - 1 = 0$

$\frac{3 \pm \sqrt{9+4}}{2}$

$\frac{3 \pm \sqrt{13}}{2}$

$\boxed{3.3}$



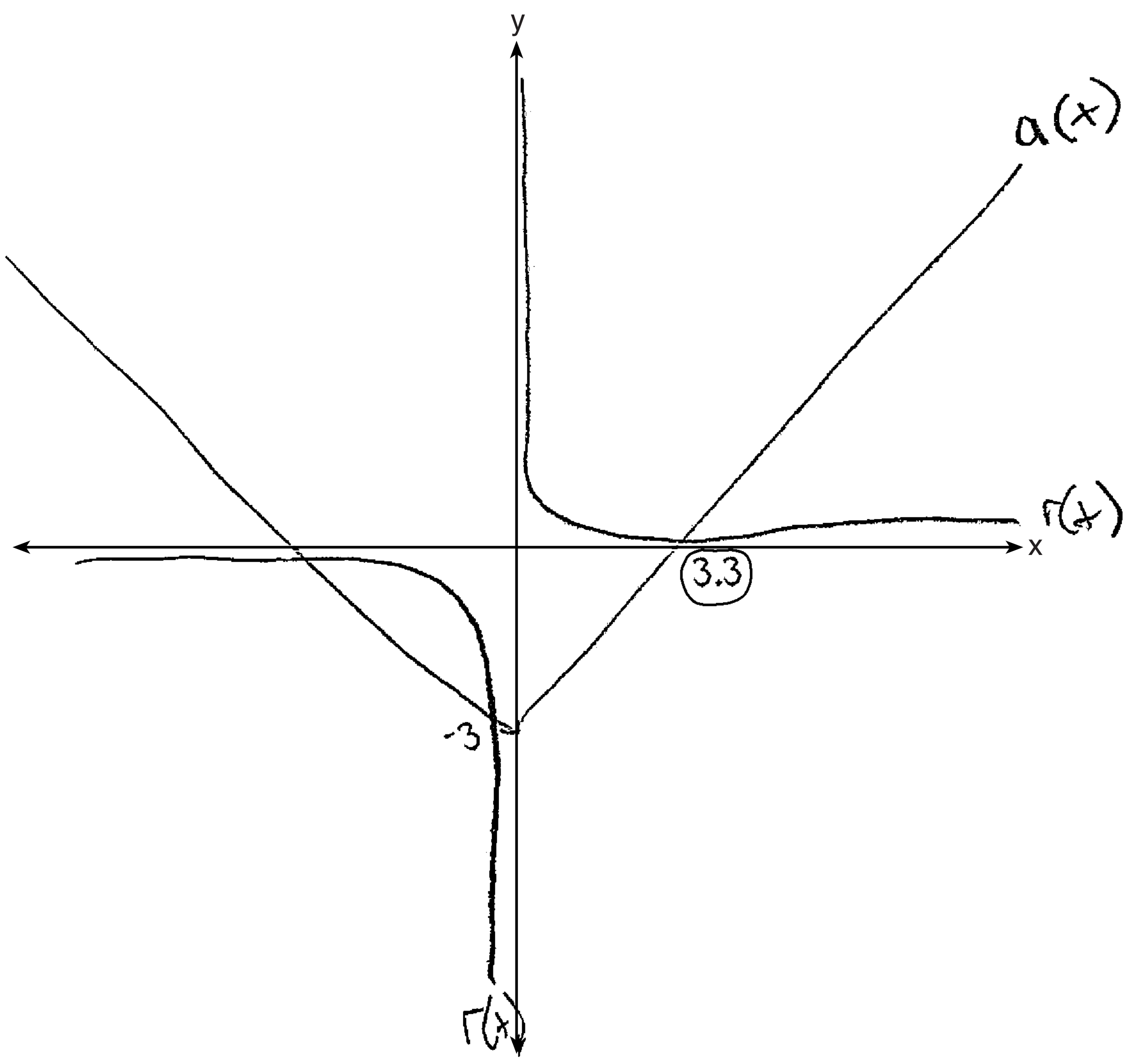
$r(x) = \frac{1}{x}$

$a(x) = |x| + 3$

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

Question 32

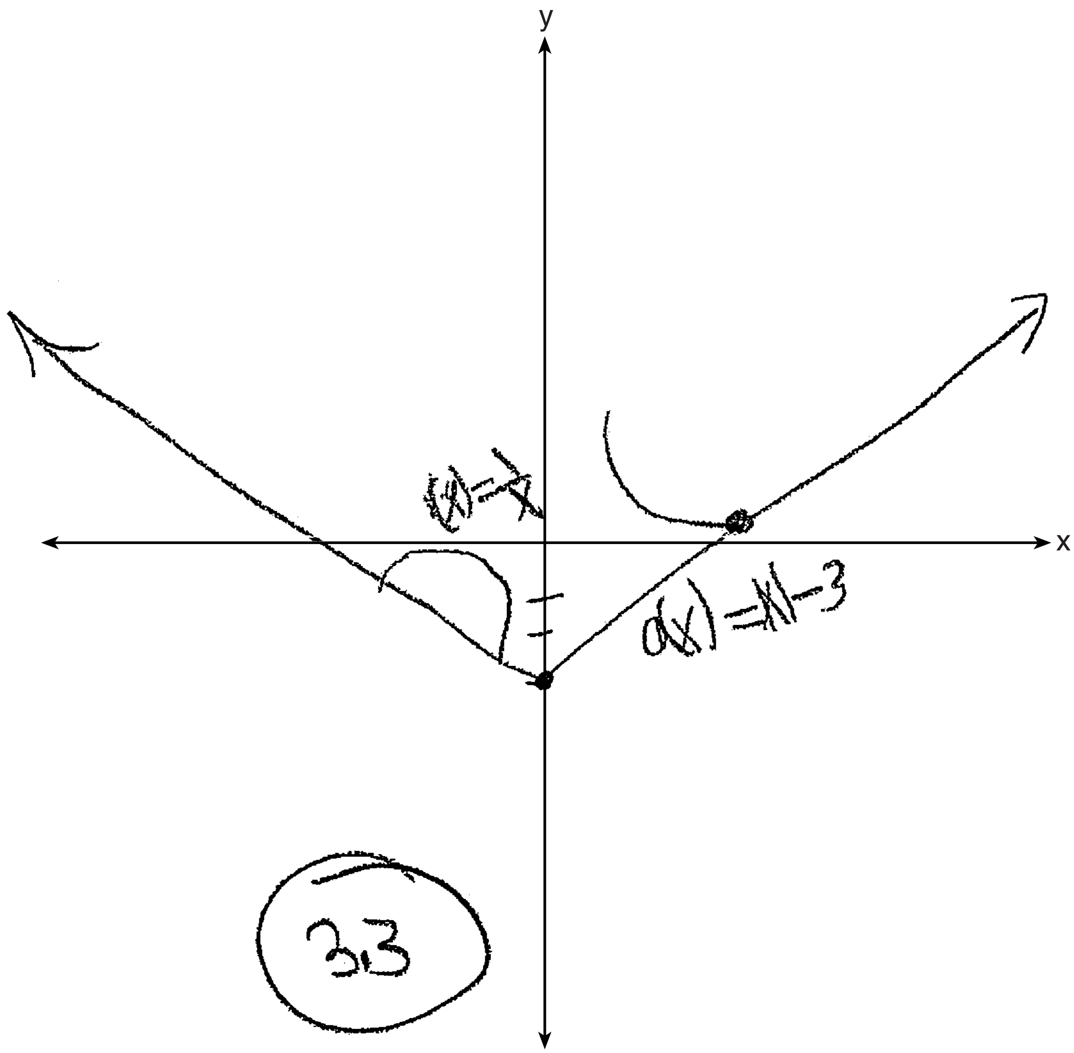
32 Sketch the graphs of $r(x) = \frac{1}{x}$ and $a(x) = |x| - 3$ on the set of axes below. Determine, to the *nearest tenth*, the positive solution of $r(x) = a(x)$.



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

Question 32

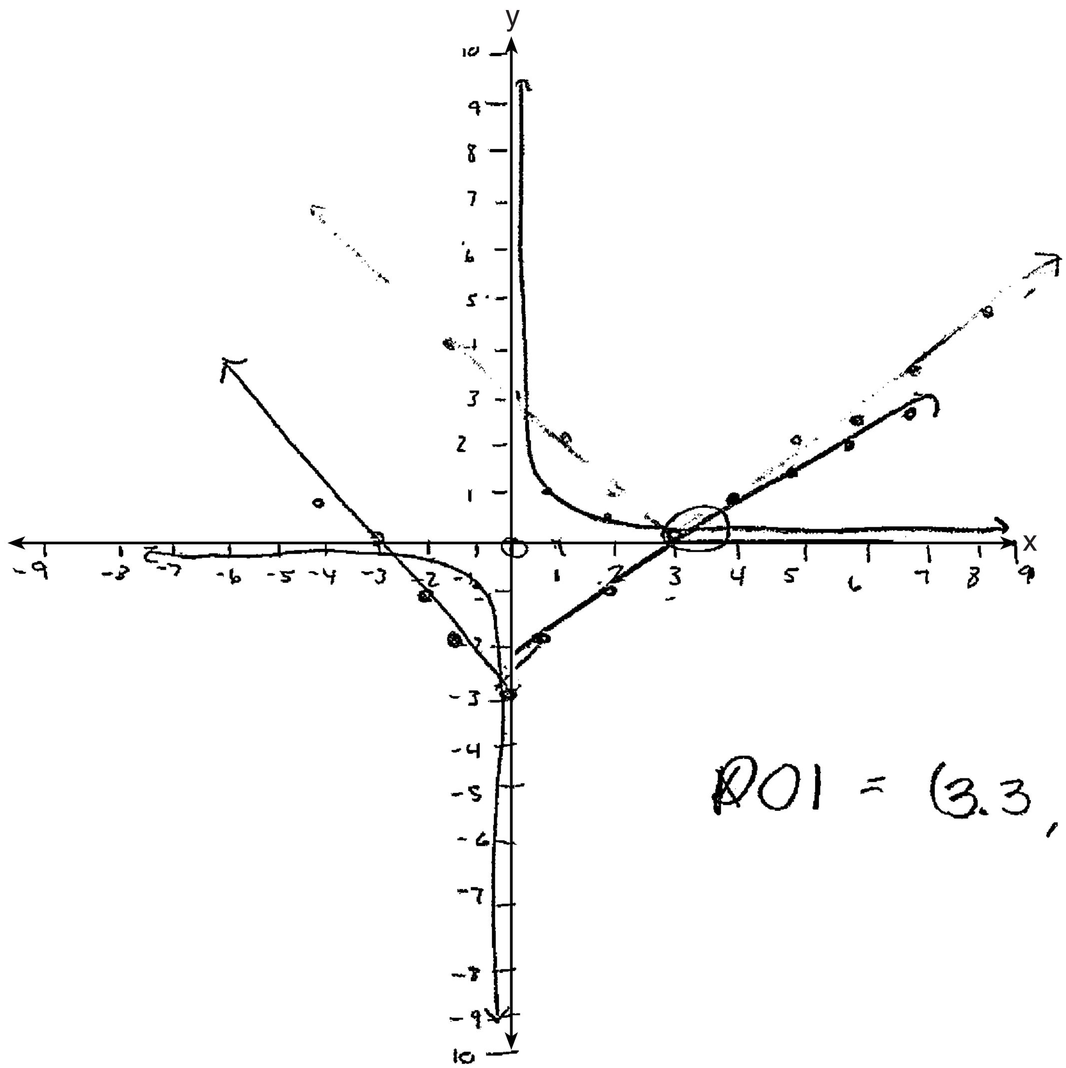
32 Sketch the graphs of $r(x) = \frac{1}{x}$ and $a(x) = |x| - 3$ on the set of axes below. Determine, to the *nearest tenth*, the positive solution of $r(x) = a(x)$.



Score 1: The student made an error when sketching $r(x)$.

Question 32

32 Sketch the graphs of $r(x) = \frac{1}{x}$ and $a(x) = |x| - 3$ on the set of axes below. Determine, to the *nearest tenth*, the positive solution of $r(x) = a(x)$.

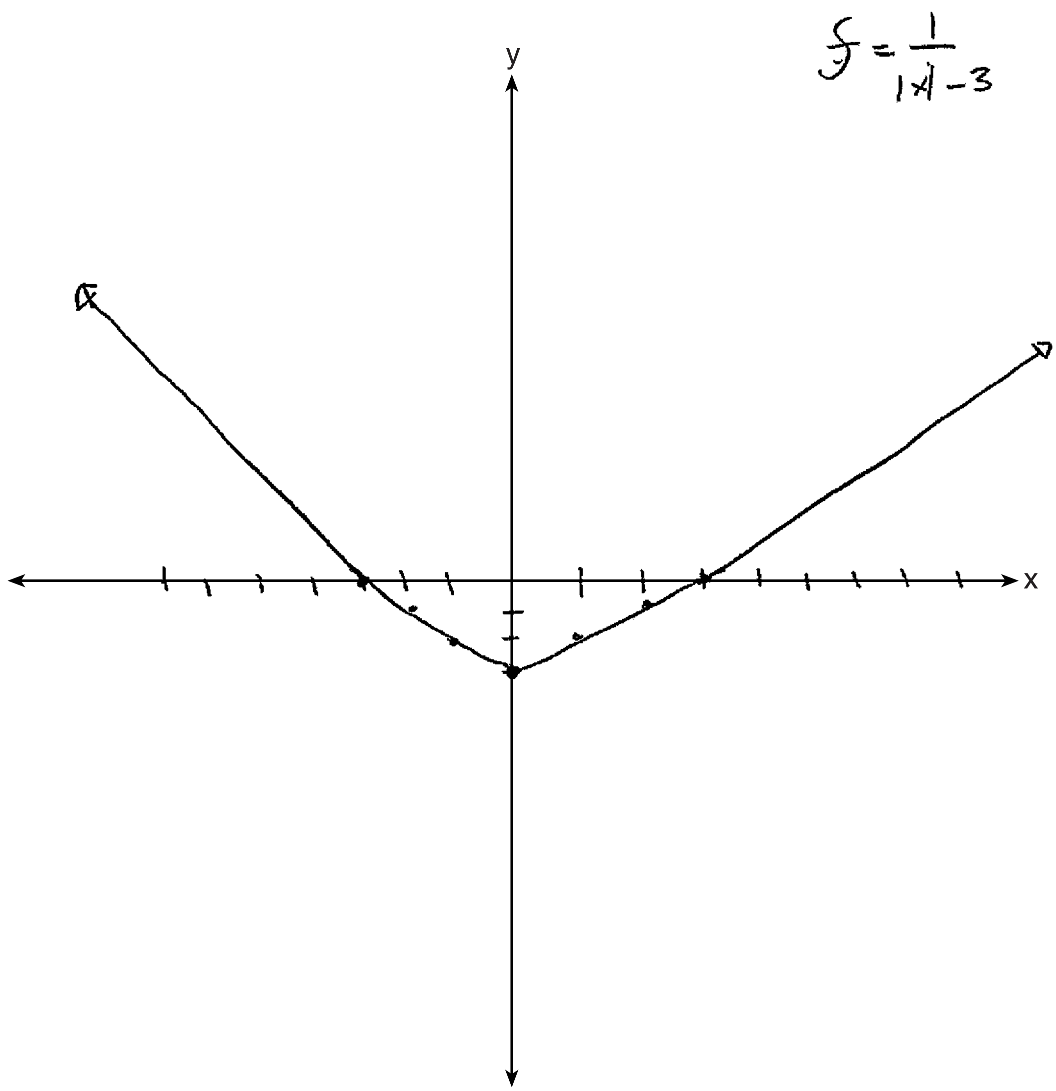


POI = (3.3, .3)

Score 1: The student did not state the solution of $r(x) = a(x)$.

Question 32

32 Sketch the graphs of $r(x) = \frac{1}{x}$ and $a(x) = |x| - 3$ on the set of axes below. Determine, to the *nearest tenth*, the positive solution of $r(x) = a(x)$.



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

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day.

Pe^{rt}

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

$N(t) = 950e^{.0475 \cdot t}$

The ~~ca~~ bacteria grows continously

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

$N(t) = 950e^{.0475\left(\frac{36}{24}\right)}$

$N(t) = 1020$

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

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day.

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

$A = 950e^{.0475t}$

I chose this because it best explains exponential growth how the bacterium grows 4.75% over t-days.

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

$A = 950e^{.0475(1.5)} = 950e \wedge .07125$

$A = 950(1.073849655) = \boxed{1020 \text{ bacterium}}$

Score 3: The student gave an incomplete explanation for the choice of the base.

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day.

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

P

$N(t) = 950e^{0.0475t}$

e because continously

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

5225.513404

~~5223.~~

$\approx$ 5226 baterim

Score 2: The student received full credit for the first part.

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day.

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

$A = Pe^{rt}$

$N(t) = (950)e^{.0475t}$

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

$N(t) = 950e^{.0475(1.5)}$

$N(t) = 950e^{.07125}$

$N(t) = 1020.157172$

Score 2: The student gave no explanation and made a rounding error in the second part.

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day.

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

$N(t) = 950\, e^{0.4175t}$

950 → initial.

e → function increases continuously, (e) must be used

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

$N(36) = 950(e)^{0.4175(36)}$

$N(36) = 3252.5$

$N(36) = 5253$

Score 1: The student gave a correct explanation for the choice of base.

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day. .02

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

D←P 4.~~75~~ .04.75 Pe^{rt}

$N(t) = 950(e)^{.0475t}$

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

$N(t) = 950(e)^{475.0(36)}$

$N(t) = 950(5.528961478)$

$N(t) = 5252.513404$

$N(t) \approx 5253$

Score 1: The student created a correct equation.

Question 33

33 A population of 950 bacteria grows continuously at a rate of 4.75% per day.

Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base.

$N(t) = 950(.0475)^t$

The starting value of the strain is 950 bacteria, the rate is 4.75% growth/day.

Determine the bacterial population after 36 hours, to the *nearest bacterium*.

$N(36) = 950(.0475)^{36}$

$= 950(.0475)^{36}$

$= 45.125^{36}$

$= 3E59$

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

34 Write an equation for a sine function with an amplitude of 2 and a period of $\frac{\pi}{2}$.

$y = 2\sin 4x$

$\frac{2\pi}{4} = \frac{2\pi}{1} \cdot \frac{1}{4} = \frac{2\pi}{4} = \frac{\pi}{2}$

On the grid below, sketch the graph of the equation in the interval 0 to 2π.

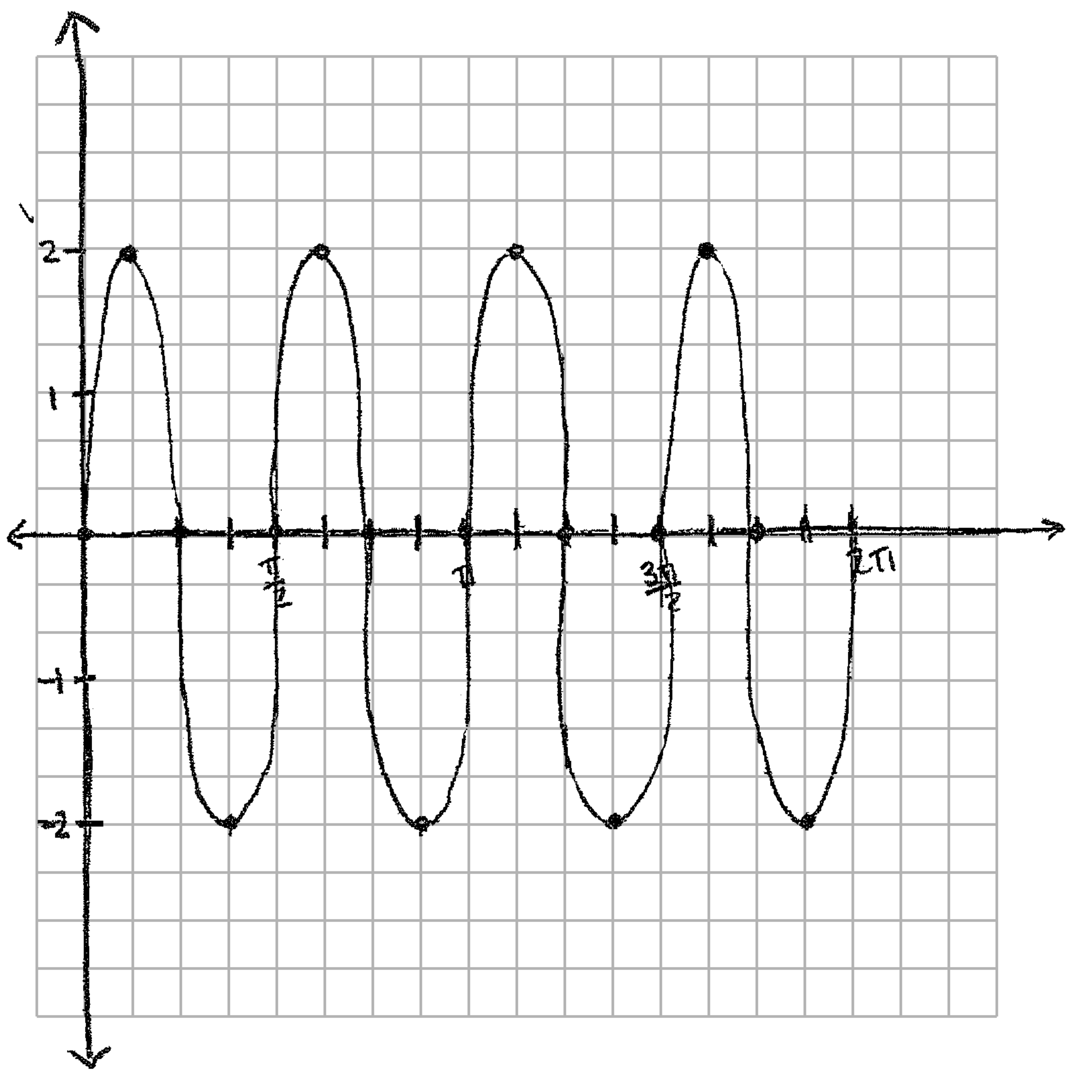
0,1,0-1,0

0,2,0,-2,0

$\frac{\pi}{2}$

$\frac{\pi}{2} \cdot \frac{2}{1} = \frac{2\pi}{2}$

$\frac{\pi}{2} \cdot \frac{3}{1} = \frac{3\pi}{2}$



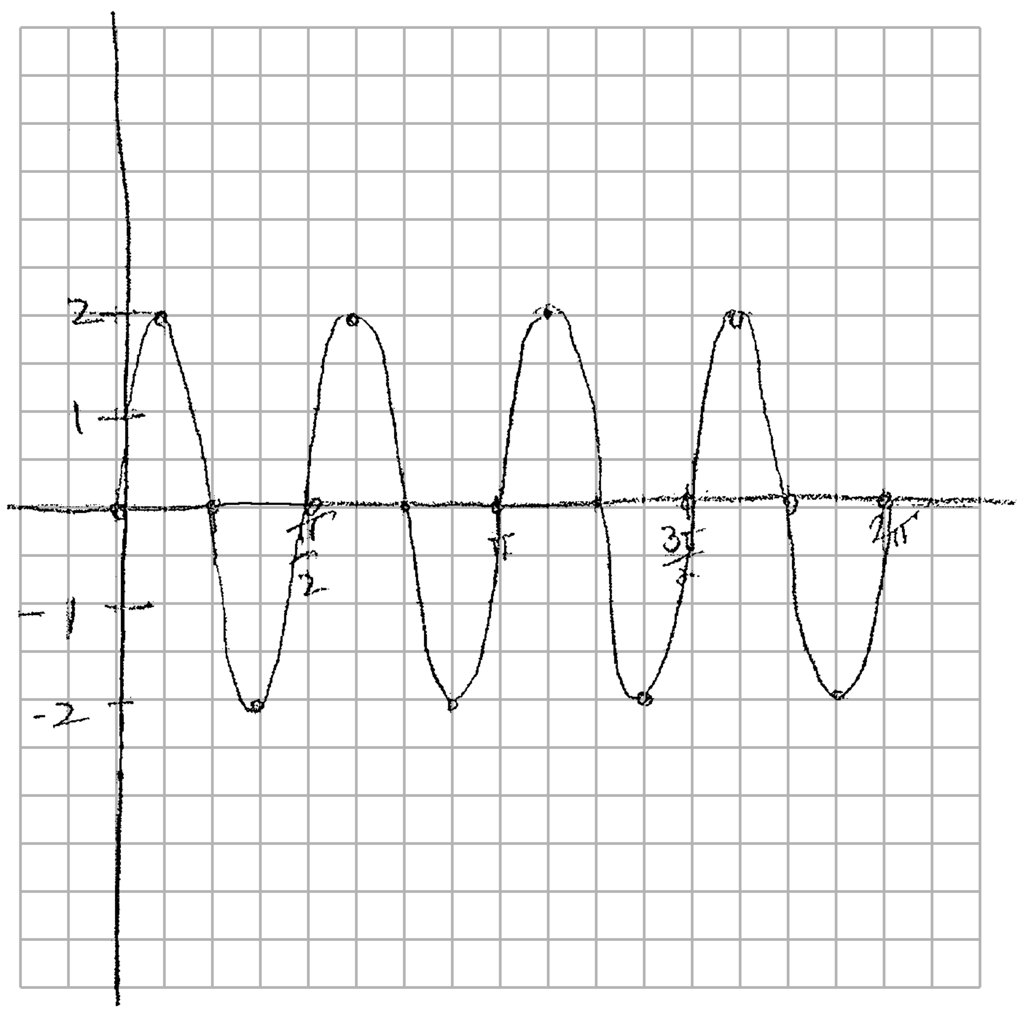
Score 4: The student gave a complete and correct response.

Question 34

34 Write an equation for a sine function with an amplitude of 2 and a period of $\frac{\pi}{2}$.

$2\sin 4x$

On the grid below, sketch the graph of the equation in the interval 0 to 2π.



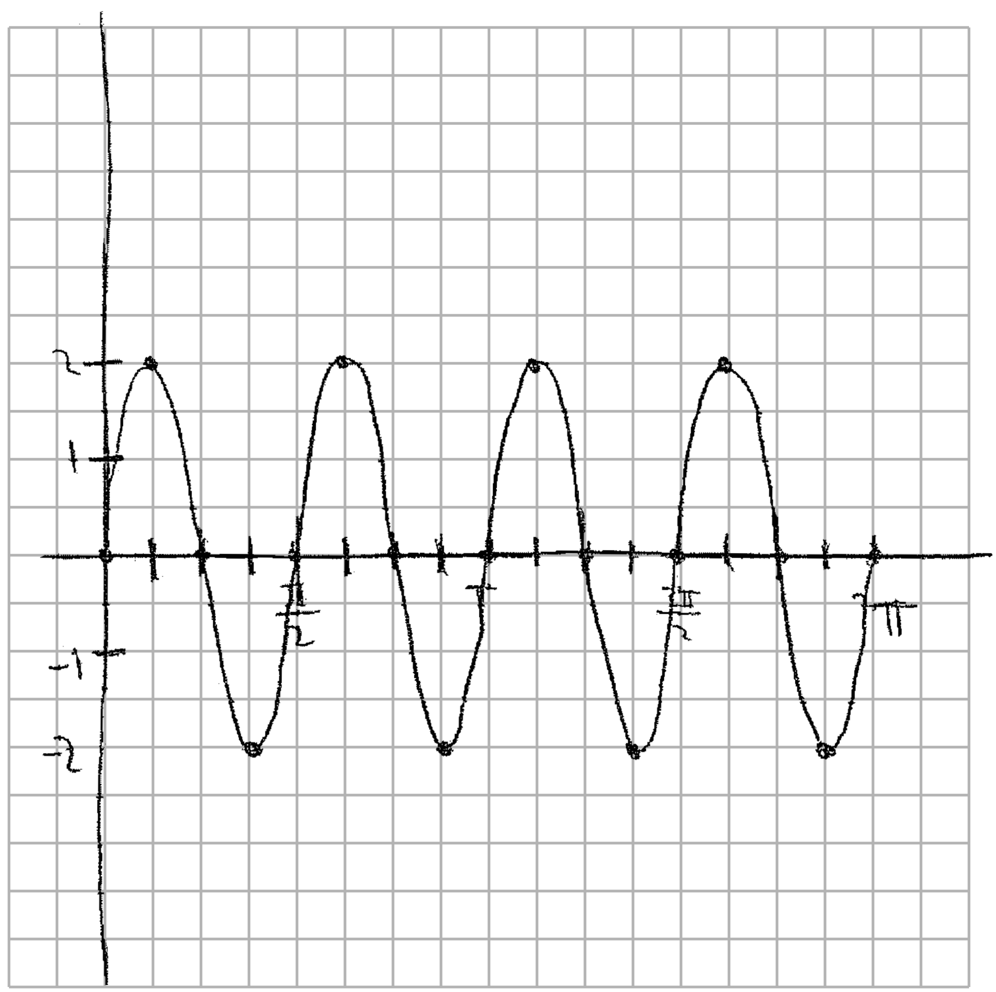
Score 3: The student made a notation error writing the equation.

Question 34

34 Write an equation for a sine function with an amplitude of 2 and a period of $\frac{\pi}{2}$.

0, 1, 0, −1, 0   0, 2, 0, −2, 0 $\frac{\pi}{2}$

On the grid below, sketch the graph of the equation in the interval 0 to 2π.



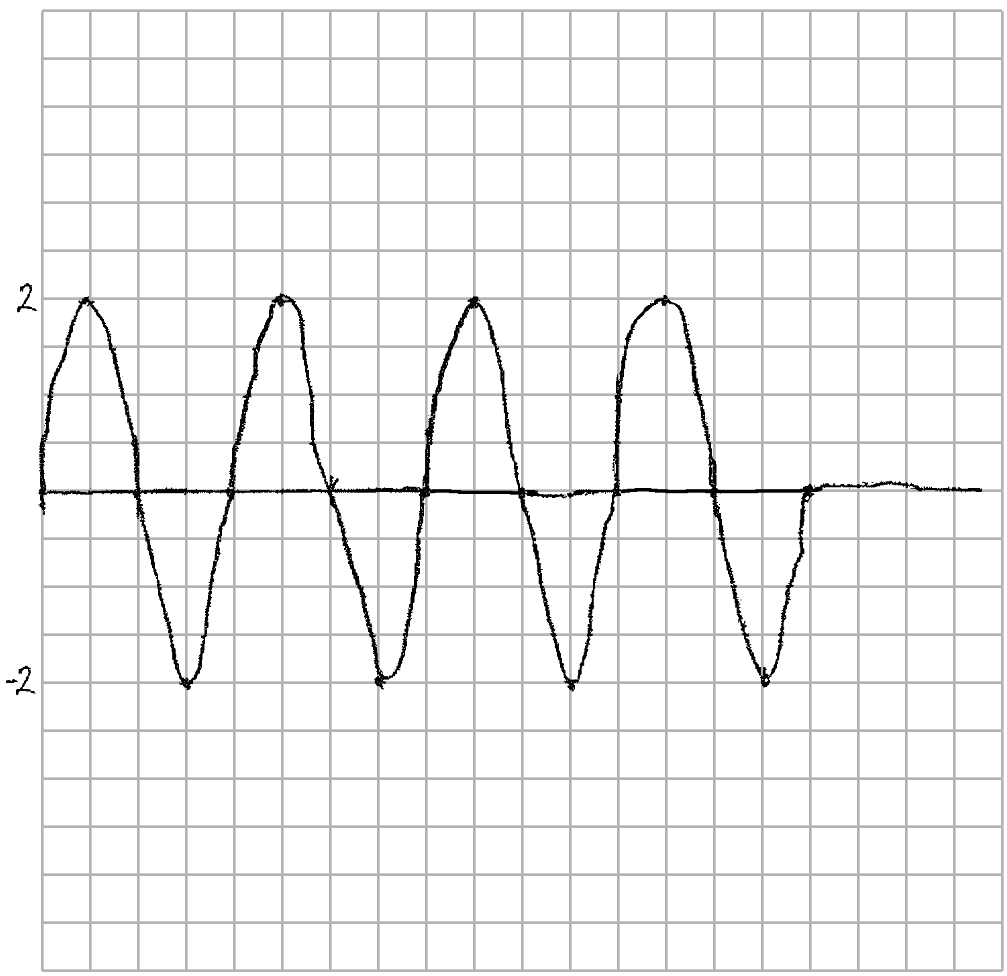
Score 2: The student sketched a correct graph.

Question 34

34 Write an equation for a sine function with an amplitude of 2 and a period of $\frac{\pi}{2}$.

$y = 2\sin\left(\frac{\pi}{2}\right)$

On the grid below, sketch the graph of the equation in the interval 0 to 2π.

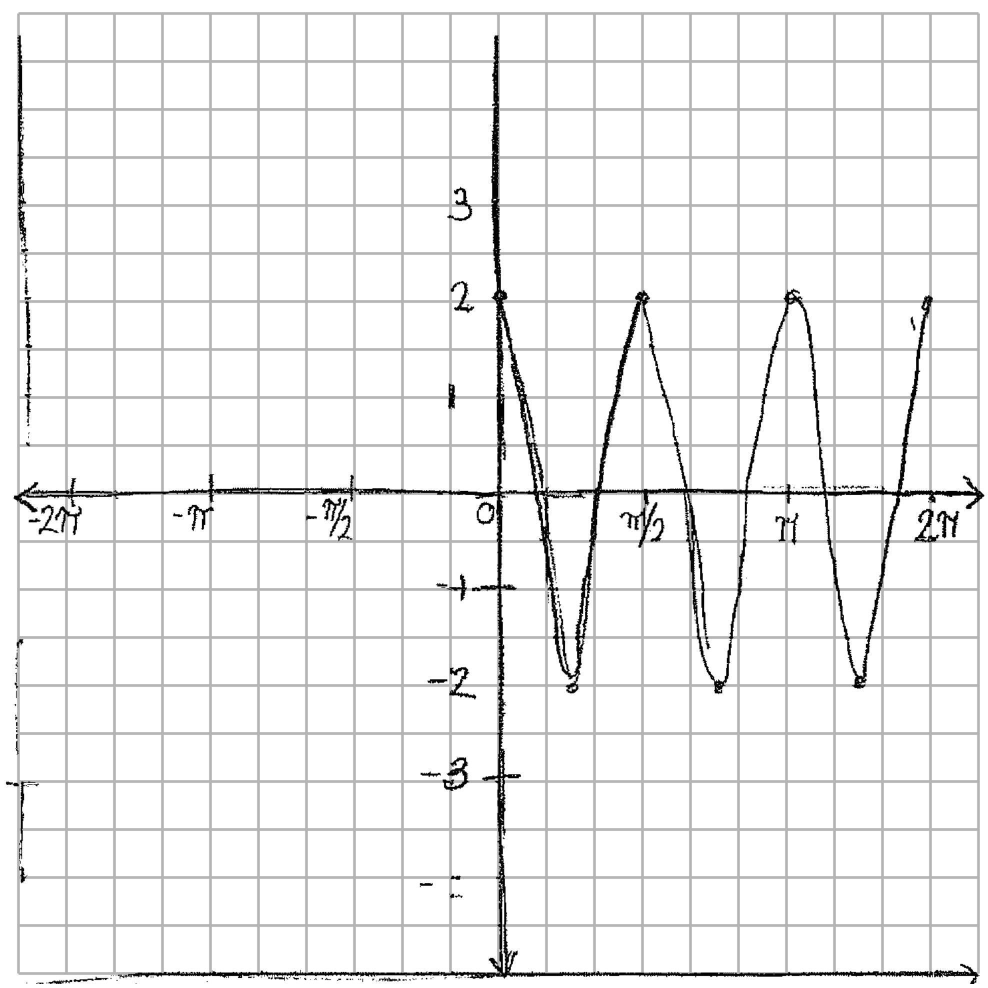


Score 1: The student received one credit for the sketch.

Question 34

34 Write an equation for a sine function with an amplitude of 2 and a period of $\frac{\pi}{2}$.

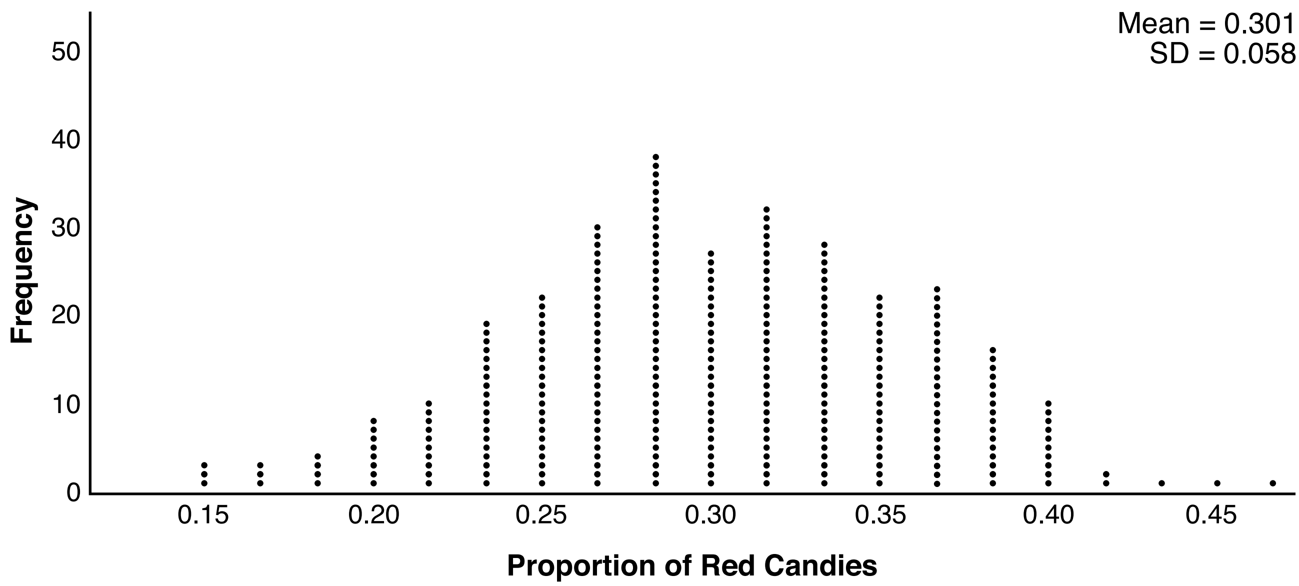
On the grid below, sketch the graph of the equation in the interval 0 to 2π.



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

Question 35

35 Mary bought a pack of candy. The manufacturer claims that 30% of the candies manufactured are red. In her pack, 14 of the 60 candies are red. She ran a simulation of 300 samples, assuming the manufacturer is correct. The results are shown below.



Based on the simulation, determine the middle 95% of plausible values that the proportion of red candies in a pack is within.

$$0.301 - 2(.058) < \mu < 0.301 + 2(.058)$$

$$.185 < \mu < .417$$

Based on the simulation, is it unusual that Mary's pack had 14 red candies out of a total of 60? Explain.

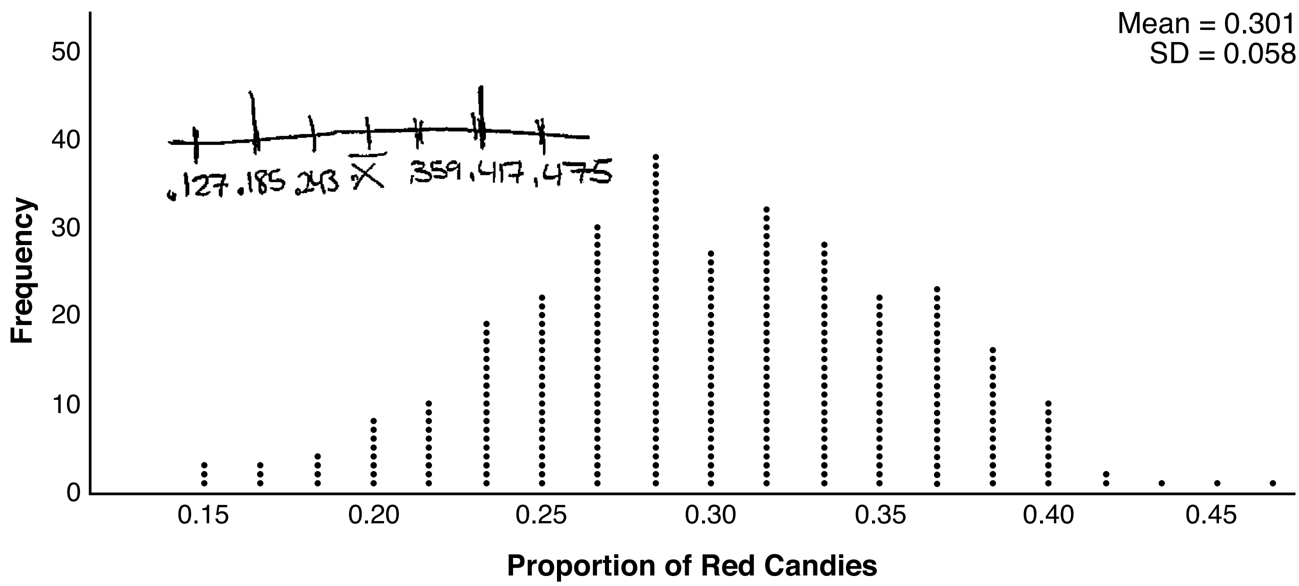
$$\frac{14}{60} = 0.2\overline{3}$$

No, it is not unusual that Marys pack had 14 out of 60 because that proportion lies with the middle 95% plausible values.

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

Question 35

35 Mary bought a pack of candy. The manufacturer claims that 30% of the candies manufactured are red. In her pack, 14 of the 60 candies are red. She ran a simulation of 300 samples, assuming the manufacturer is correct. The results are shown below.



Based on the simulation, determine the middle 95% of plausible values that the proportion of red candies in a pack is within.

$.185 \leq x \leq .417$

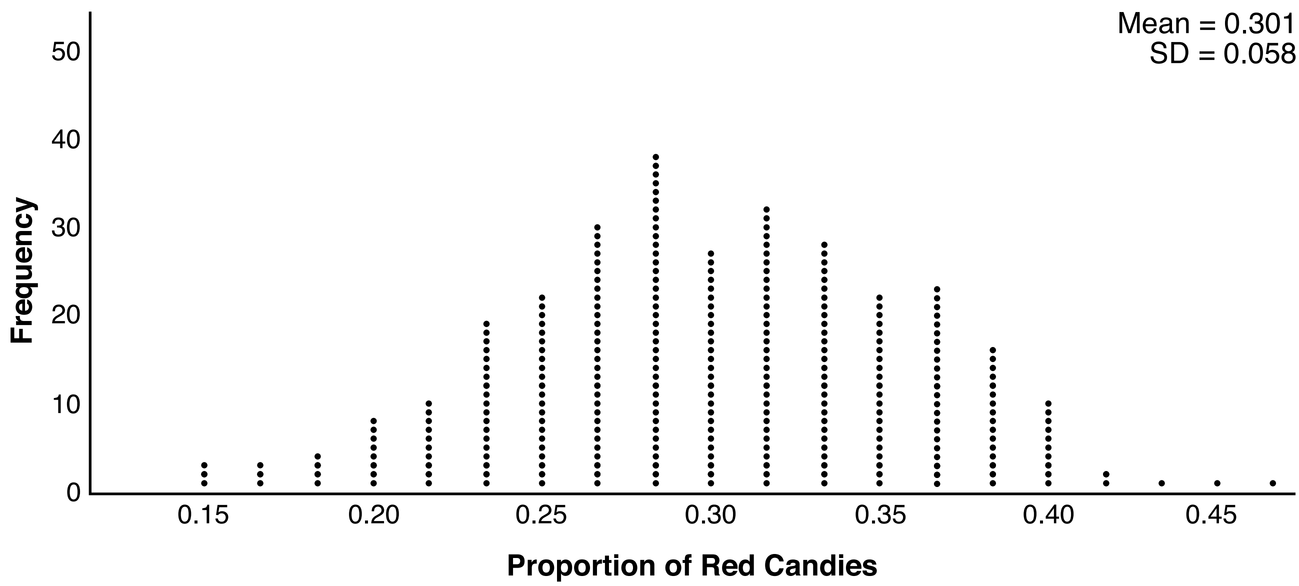
Based on the simulation, is it unusual that Mary's pack had 14 red candies out of a total of 60? Explain.

No because the proportion of red candies ~~to~~ the ~~total~~ would equal .233 which falls in the 99% range of plausible values.

Score 3: The student made a transcription error.

Question 35

35 Mary bought a pack of candy. The manufacturer claims that 30% of the candies manufactured are red. In her pack, 14 of the 60 candies are red. She ran a simulation of 300 samples, assuming the manufacturer is correct. The results are shown below.



Based on the simulation, determine the middle 95% of plausible values that the proportion of red candies in a pack is within.

.185 .243 .301 .359 .417

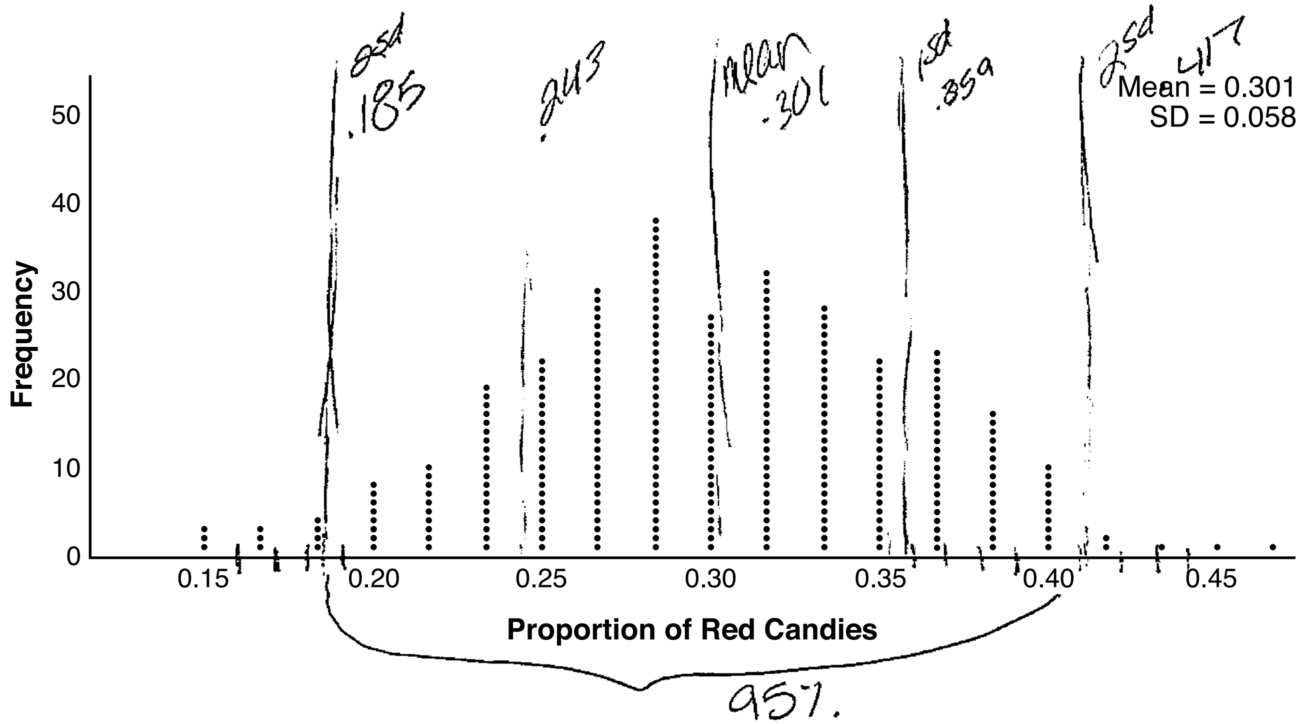
291 candies

Based on the simulation, is it unusual that Mary's pack had 14 red candies out of a total of 60? Explain.

No it isnt because .233 falls in the 95% of plausible values.

Score 3: The student did not explicitly state an interval.

35 Mary bought a pack of candy. The manufacturer claims that 30% of the candies manufactured are red. In her pack, 14 of the 60 candies are red. She ran a simulation of 300 samples, assuming the manufacturer is correct. The results are shown below.



Based on the simulation, determine the middle 95% of plausible values that the proportion of red candies in a pack is within.

within .185 to .417
95%

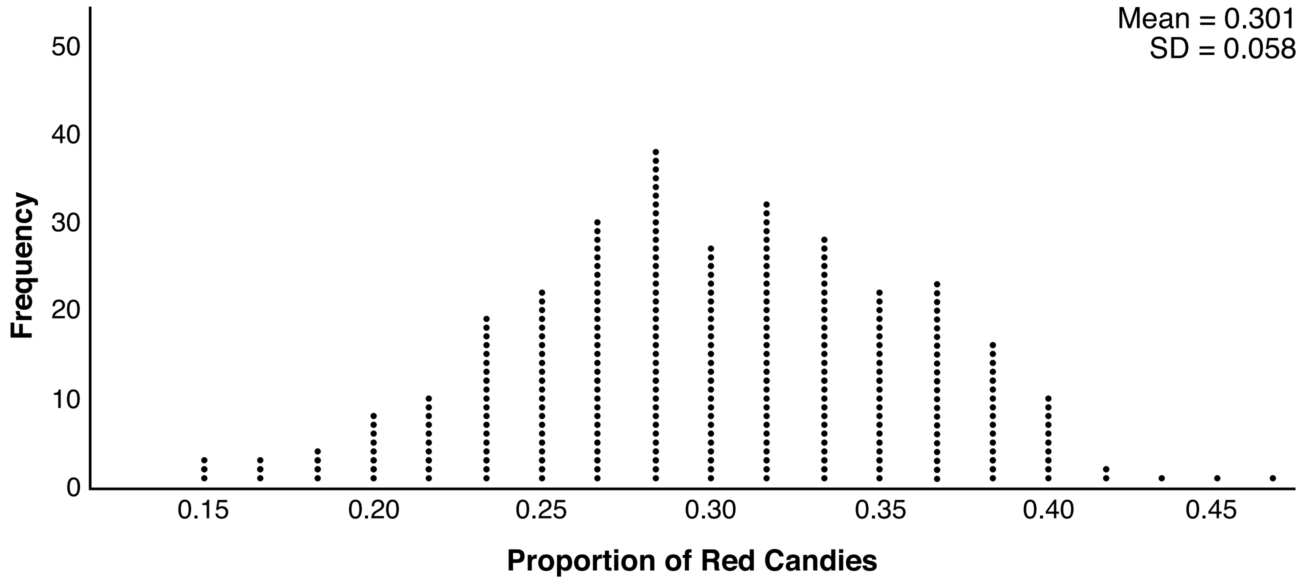
Based on the simulation, is it unusual that Mary's pack had 14 red candies out of a total of 60? Explain.

Yes, it is within the 95%.

Score 2: The student answered the first part correctly.

Question 35

35 Mary bought a pack of candy. The manufacturer claims that 30% of the candies manufactured are red. In her pack, 14 of the 60 candies are red. She ran a simulation of 300 samples, assuming the manufacturer is correct. The results are shown below.



Based on the simulation, determine the middle 95% of plausible values that the proportion of red candies in a pack is within.

$\frac{14}{60} = 0.233$

$0.301 + 0.058 = 0.089$

$0.301 - 0.058 = 0.243$

$\boxed{0.243 - 0.089}$

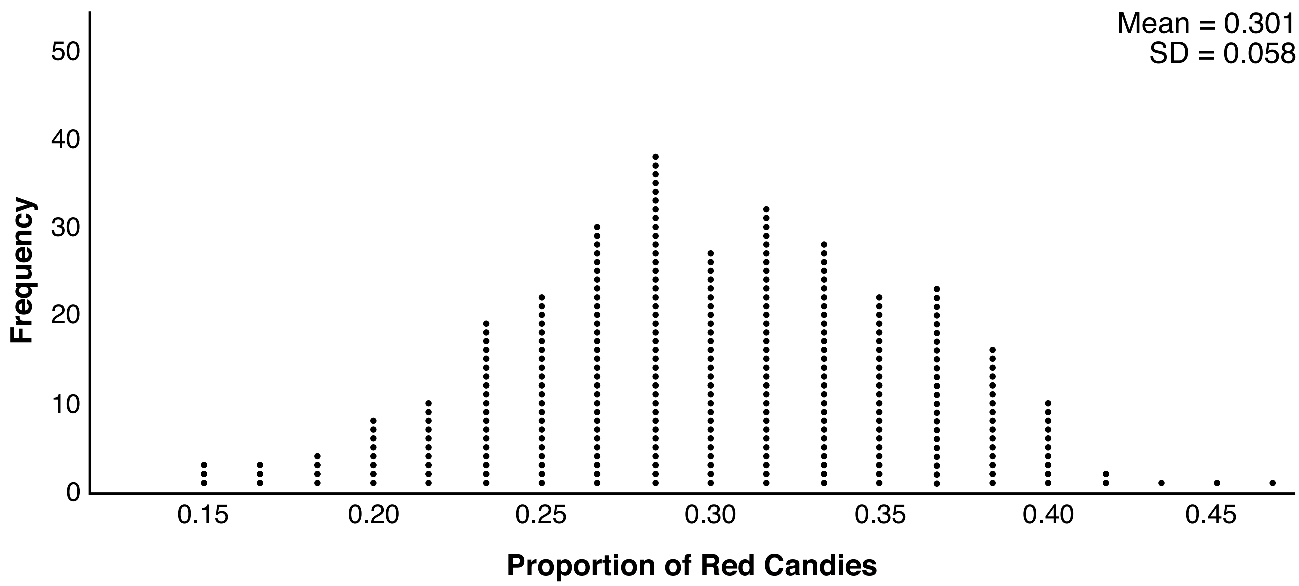
Based on the simulation, is it unusual that Mary's pack had 14 red candies out of a total of 60? Explain.

NO it is not unusual because around 0.23 was recorded many times

Score 1: The student found the correct proportion.

Question 35

35 Mary bought a pack of candy. The manufacturer claims that 30% of the candies manufactured are red. In her pack, 14 of the 60 candies are red. She ran a simulation of 300 samples, assuming the manufacturer is correct. The results are shown below.



Based on the simulation, determine the middle 95% of plausible values that the proportion of red candies in a pack is within.

0.26 - 0.32

Based on the simulation, is it unusual that Mary's pack had 14 red candies out of a total of 60? Explain.

yes because according to the graph the mean is 0.301.

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

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - 2x + 7 = 4x - 10$$

$x^2 - 6x + 17 = 0$

$\frac{6 \pm \sqrt{36 - 4(1)(17)}}{2(1)}$

$\frac{6 \pm \sqrt{-32}}{2}$

$\frac{6 \pm \sqrt{16} \cdot \sqrt{2} \cdot \sqrt{-1}}{2}$

$\frac{6 \pm 4i\sqrt{2}}{2}$

$\boxed{3 \pm 2i\sqrt{2}}$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

The equation can be concluded to have imaginary roots based on observing the graph because the system does not have any solutions; rather, the equations do not intersect. Because the system of the two equations has no solution, we can conclude that setting the two equations equal to each other will not yield any real roots.

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

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - 2x + 7 = 4x - 10$$

$X = 3 \pm 2i\sqrt{2}$

$x^2 - 2x + 7 = 4x - 10$
$\quad\quad\quad\quad -4x + 10$
$x^2 - 6x + 17$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{6 \pm \sqrt{6^2 - 4(1)(17)}}{2}$

$x = \frac{6 \pm \sqrt{-32}}{2}$

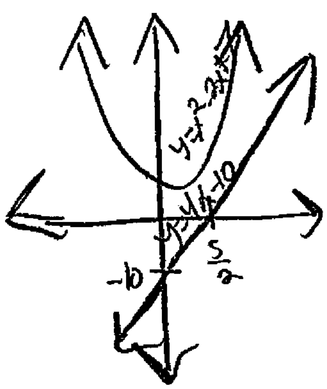
$x = \frac{6 \pm \sqrt{-16}\sqrt{2}}{2}$

$x = \frac{6 \pm 4i\sqrt{2}}{2}$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.



Not one value of x satisfies the equations because they do not intercept at a given point.

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

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - 2x + 7 = 4x - 10$$

$x^2 - 6x + 17$

$\frac{6 \pm \sqrt{36 - 4(17)(1)}}{2}$

$\frac{6 \pm \sqrt{-32}}{2}$

$\frac{6 \pm 4i\sqrt{2}}{2}$

$3 \pm 2i\frac{\sqrt{2}}{2}$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

Because when graphed, the parabola never crosses the line so it doesn't have any roots that are real, just imaginary.

Score 3: The student made a computational error.

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - 2x + 7 = 4x - 10$$

$x^2 - 6x + 17 = 0$

$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(17)}}{2(1)}$

$x = \frac{6 \pm \sqrt{-32}}{2}$

$x = \frac{6 \pm 4i\sqrt{2}}{2}$

$\boxed{x = 3 \pm 2i\sqrt{2}}$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

If the system does not intersect.

Score 3: The student gave an incomplete explanation.

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - 2x + 7 = \cancel{4x} - \cancel{10}$$

$$-4x + 10 \quad \cancel{-4x} \; \cancel{+10}$$

$$x^2 - 6x + 17 = 0$$

$$x = ?$$

$$x =$$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

It has imaginary roots because the graph shows a parabola and then a straight line for the linear equation, and at no point do they intersect, therefore, it has imaginary roots.

Score 2: The student gave a correct explanation.

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - 2x + 7 = 4x - 10$$

$-4x+10 \quad -4x+10$

$x^2 - 6x + 17 = 0$

$-17 \quad -17$

$x^2 - \underbrace{6x}_{(-3)^2} + 9 = -17$

$+9$

$\pm\sqrt{(x-3)^2} = \pm\sqrt{-8}$

$x - 3 = \pm\sqrt{-8}$

$+3$

$x = 3 \pm \sqrt{-8}$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

The equation from part a has imaginary roots because $\pm\sqrt{-8}$ is a non-real number, so it is imaginary making the equation have imaginary roots.

Score 1: The student completed the square correctly.

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

x intercepts, zeros

$$x^2 - 2x + 7 = 4x - 10$$

$x^2 - 6x + 17 = 0$

quadratic formula

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{6 \pm \sqrt{6^2 - 4(17)}}{2}$

$x = \frac{6 \pm \sqrt{-32}}{2}$

$\boxed{x = \frac{6 \pm 4i\sqrt{2}}{2}}$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

Because i is an imaginary # and it has i in it's solutions

Score 1: The student solved the quadratic equation, but did not simplify completely.

Question 36

36 a) Algebraically determine the roots, in simplest $a + bi$ form, to the equation below.

$$x^2 - \cancel{2}x + 7 = 4x - 10$$

$+\cancel{2}x \quad +2x$

$x^2+7 = 6x - 1\cancel{0}$

$+10 \quad +\cancel{1}0$

$\sqrt{x^2}+\frac{17}{6} = \frac{\cancel{6}x}{6}$

$$\boxed{x^2+2.8 = x}$$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$
$$y = 4x - 10$$

The graph of this system confirms the solution from part *a* is imaginary. Explain why.

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

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
0	Calm
1	Light air
2	Light breeze
3	Gentle breeze
4	Moderate breeze
5	Fresh breeze
6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$B = 1.69\sqrt{30 + 4.45} - 3.49$

$B = 6.429306679 \approx 6$

Steady breeze

Question 37 is continued on the next page.

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

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$15 = 1.69\sqrt{s+4.45} - 3.49$

$\boxed{\approx 115\text{mph}}$

$\frac{18.49}{1.69} = \frac{1.69\sqrt{s+4.45}}{1.69}$

$\left(\frac{18.49}{1.69}\right)^2 = \left(\sqrt{s+4.45}\right)^2$

$\left(\frac{18.49}{1.69}\right)^2 = s+4.45$

$-4.45 \qquad -4.45$

$s = 115.2517261$

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$10 = 1.69\sqrt{s+4.45} - 3.49$

$\frac{13.49}{1.69} = \frac{1.69\sqrt{s+4.45}}{1.69}$

$\left(\frac{13.49}{1.69}\right)^2 = \left(\sqrt{s+4.45}\right)^2$

$\left(\frac{13.49}{1.69}\right)^2 = s+4.45$

$-4.45 \qquad -4.45$

$s \approx 59.26629145$

$\boxed{55 \leq s \leq 64}$

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
0	Calm
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6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

6.429

Question 37 is continued on the next page.

Score 5: The student did not classify the force of wind.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$15 = 1.69\sqrt{s+4.45} - 3.49$

$18.49 = 1.69\sqrt{s+4.45}$

$10.94 = \sqrt{s+4.45}$

$119.702 = s+4.45$

115 mph

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$9.5 \leq x < 10.5$

55 mph to 64 mph

$9.5 = 1.69\sqrt{s+4.45} - 3.49$

$12.99 = 1.69\sqrt{s+4.45}$

$7.686 = \sqrt{s+4.45}$

$59.08 = s+4.45$

54.6 mph

$10.49 = 1.69\sqrt{s+4.45}$

$13.98 = 1.69\sqrt{s+4.45}$

$8.272 = \sqrt{s+4.45}$

$68.429 = s+4.45$

64 mph

Question 37

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
0	Calm
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5	Fresh breeze
6	Steady breeze
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8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$B = 1.69\sqrt{(30)+4.45} - 3.49$

$B = 6.429$ $\boxed{\text{Steady breeze}}$

Question 37 is continued on the next page.

Score 5: The student made an error when finding the interval.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$$15 = 1.69\sqrt{s+4.45} - 3.49$$

$$+3.49 \qquad\qquad +3.49$$

$$\frac{18.49}{1.69} = \frac{1.69\sqrt{s+4.45}}{1.69}$$

$$(10.9408284)^2 = (\sqrt{s+4.45})^2$$

$$119.7017261 = s+4.45$$

$$-4.45 \qquad -4.45$$

$$115.2517261 = s$$

$$\boxed{s = 115}$$

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$$B = 1.69\sqrt{55+4.45} - 3.49 \qquad B = 1.69\sqrt{63+4.45} - 3.49$$

$$B = 9.54 \qquad\qquad B = 10.389$$

$$B = 10 \qquad\qquad B = 10$$

$$\boxed{55 - 63\text{ mph}}$$

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
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4	Moderate breeze
5	Fresh breeze
6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

Steady breeze

Question 37 is continued on the next page.

Score 4: The student did not justify "steady breeze" and made an error when finding the interval.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$15 = 1.69\sqrt{s+4.45} - 3.49$
$+3.49$

$18.49 = 1.69\sqrt{s+4.45}$
1.69

$\frac{18.49}{1.69} = \sqrt{s+4.45}$

$\left(\frac{18.49}{1.69}\right)^2 = s + 4.45$
-4.45

$\left(\frac{18.49}{1.69}\right)^2 - 4.45 = s$

$s = 115$ mph

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$9.5 = 1.69\sqrt{s+4.45} - 3.49$

$\left(\frac{12.99}{1.69}\right)^2 = s + 4.45$

$s = \left(\frac{12.99}{1.69}\right)^2 - 4.45$

$s = 55$ mph

$10.4 = 1.69\sqrt{s+4.45} - 3.49$

$\left(\frac{13.89}{1.69}\right)^2 - 4.45 = s$

$s = 63$ mph

55 mph – 63 mph

Question 37

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
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4	Moderate breeze
5	Fresh breeze
6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$B = 1.69\sqrt{30+4.45} - 3.49 =$

$B = 6.4$ Steady Breeze

Question 37 is continued on the next page.

Score 4: The student made a computational error and did not state an interval.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$15 = 1.69\sqrt{S+4.45} - 3.49$
$+3.49 \qquad +3.49$

$\frac{18.49}{1.69} = \frac{1.69\sqrt{S+4.45}}{1.69}$

$(10.941)^2 = (\sqrt{S+4.45})^2$

$119.702 = S + 4.45$
$-4.45 \qquad -4.45$

115.252

115 mph

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$10 = 1.69\sqrt{S+4.45} - 3.49$
$-3.49 \qquad +3.49$

$\frac{6.51}{1.69} = \frac{1.69\sqrt{S+4.45}}{1.69}$

$(3.852)^2 = (\sqrt{S+4.45})^2$

$14.838 = S + 4.45$
$-4.45 \qquad -4.45$

$10.388 = S$

$10 \approx S$

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
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6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$B = 1.69\sqrt{s+4.45} - 3.49$ $s = 30$

$1.69\sqrt{s+4.45} - 3.49 \rightarrow 6.42$ $B=6$ moderate breeze

Question 37 is continued on the next page.

Score 3: The student gave an incorrect classification and did not state the correct interval.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$$15 = 1.69\sqrt{s+4.45} - 3.49$$

$$\left(\frac{18.49}{1.69}\right)^2 - 4.45 = s = 115 \text{ mph}$$

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$$10 = 1.69\sqrt{s+4.45} - 3.49$$

$$\left(\frac{13.49}{1.69}\right)^2 - 4.45 \rightarrow 59 \text{ mph}$$

(59.26...)

59 – 60 : range

Question 37

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
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5	Fresh breeze
6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

calm

Question 37 is continued on the next page.

Score 2: The student received credit for the second part.

Question 37 continued.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$13.49 = 1.69\sqrt{s+4.45}$

$10.9408^2 = \sqrt{s+4.45}^2$

$119.7017 = s+4$

$\boxed{115\text{mph}}$

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

10 13.49 = 7.98 63.71 =

$\boxed{59\text{mph} - 69\text{mph}}$

Question 37

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

Beaufort Wind Scale

Beaufort Number	Force of Wind
0	Calm
1	Light air
2	Light breeze
3	Gentle breeze
4	Moderate breeze
5	Fresh breeze
6	Steady breeze
7	Moderate gale
8	Fresh gale
9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

steady breeze

Question 37 is continued on the next page.

Score 2: The student received credit for "steady breeze" and 115 with no work shown.

Question 37 continued.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

115 mph

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

59 to 69

Question 37

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

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Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$B = 1.69\sqrt{30+4.45} - 3.49$

$B = 6.43$

Question 37 is continued on the next page.

Score 1: The student calculated an approximation of the Beaufort number correctly.

Question 37 continued.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$$15 = 1.69\sqrt{s+4.45} - 3.49$$

$$11.51 = 1.69\sqrt{s+4.45}$$

$$9.82 = \sqrt{s+4.45}$$

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

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9	Strong gale
10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$1.69\sqrt{30+4.45 - 3.49}$

$1.69\sqrt{30.96}$

Strong gale

Question 37 is continued on the next page.

Score 1: The student selected the correct category for a miscalculation of the Beaufort number.

Question 37 continued.

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

Question 37

37 The Beaufort Wind Scale was devised by British Rear Admiral Sir Francis Beaufort, in 1805 based upon observations of the effects of the wind. Beaufort numbers, B, are determined by the equation $B = 1.69\sqrt{s + 4.45} - 3.49$, where s is the speed of the wind in mph, and B is rounded to the nearest integer from 0 to 12.

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10	Whole gale
11	Storm
12	Hurricane

Using the table above, classify the force of wind at a speed of 30 mph. Justify your answer.

$1.69\sqrt{30+4.45} - 3.49$

$9.4 \rightarrow 10$ whole gale

Question 37 is continued on the next page.

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

In 1946, the scale was extended to accommodate strong hurricanes. A strong hurricane received a B value of exactly 15. Algebraically determine the value of s, to the *nearest mph*.

$15 = 1.69\sqrt{s+4.45} - 3.49$

$11.51 = 1.69\sqrt{s+4.45}$

$10.767 = \sqrt{s+4.45}$

$115.9398 = s + 4.45$

$s = 120$ mph

Any B values that round to 10 receive a Beaufort number of 10. Using technology, find an approximate range of wind speeds, to the *nearest mph*, associated with a Beaufort number of 10.

$10 = 1.69\sqrt{s+4.45} - 3.49$

$s = 59$ mph

59 - 60