25 The function, $t(x)$, is shown in the table below.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$t(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>10</td>
</tr>
<tr>
<td>-1</td>
<td>7.5</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Determine whether $t(x)$ is linear or exponential. Explain your answer.

Linear because it has a constant rate of change.

Score 2: The student has a complete and correct response.
25 The function, \( t(x) \), is shown in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( t(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>10</td>
</tr>
<tr>
<td>-1</td>
<td>7.5</td>
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<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Determine whether \( t(x) \) is linear or exponential. Explain your answer.

**Linear because it goes in a straight line**

**Score 2:** The student has a complete and correct response.
25 The function, \( t(x) \), is shown in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( t(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>10</td>
</tr>
<tr>
<td>-1</td>
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<tr>
<td>1</td>
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</tr>
<tr>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Determine whether \( t(x) \) is linear or exponential. Explain your answer.

\( t(x) \) is linear because they have a pattern going on.

Score 1: The student stated linear, but gave an incomplete explanation.
The function, \( t(x) \), is shown in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( t(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>10</td>
</tr>
<tr>
<td>-1</td>
<td>7.5</td>
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<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Determine whether \( t(x) \) is linear or exponential. Explain your answer.

From my calculator I found

\[
y = -1.25x + 6.25
\]

and

\[ r = -1 \]

Score 1: The student did not state linear.
The function, \( t(x) \), is shown in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( t(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>10</td>
</tr>
<tr>
<td>-1</td>
<td>7.5</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Determine whether \( t(x) \) is linear or exponential. Explain your answer.

**Exponential. There is no pattern.**

**Score 0:** The student gave a completely incorrect response.
26 Marcel claims that the graph below represents a function.

No, Marcel is not correct because for it to be a function there can only be one y for every x value, but this is not the case.

Score 2: The student has a complete and correct response.
26 Marcel claims that the graph below represents a function.

State whether Marcel is correct. Justify your answer.

No, it doesn’t pass the vertical line test.

Score 2: The student has a complete and correct response.
26 Marcel claims that the graph below represents a function.

State whether Marcel is correct. Justify your answer.

No

Score 2: The student has a complete and correct response.
Question 26

26 Marcel claims that the graph below represents a function.

![Graph showing absolute function and exponential function]

State whether Marcel is correct. Justify your answer.

```
yes this represents a function. X value's don't repeat.
```

Score 1: The student treated the original graph as two separate functions.
26 Marcel claims that the graph below represents a function.

State whether Marcel is correct. Justify your answer.

Marcel is not correct, because one of them doesn’t have a y-intercept. And the other one starts at (3,2), descends to (1,0), then goes back up to (-4,3). So neither of these graphs are a function.

Score 0: The student gave an incorrect justification.
Question 27

27 Solve the equation for $y$.

$$(y - 3)^2 = 4y - 12$$

$y^2 - 6y + 9 = 4y - 12$

$y^2 - 6y + 9 = 4y - 12$

$4y$

$y^2 - 10y + 21 = 0$

$(y - 3)(y - 7) = 0$

$\{3, 7, 3\}$

**Score 2:** The student has a complete and correct response.
27 Solve the equation for $y$.

$$(y - 3)^2 = 4y - 12$$

**Score 2:** The student has a complete and correct response.
27 Solve the equation for $y$.

\[
(y - 3)^2 = 4y - 12
\]

\[
(y - 3)^2 = 4(y - 3)
\]

\[
y - 3 = 4
\]

\[
y = 7
\]

Score 1: The student divided each side of the equation by $(y - 3)$, which resulted in finding only one solution.
Question 27

27 Solve the equation for $y$.

$$(y - 3)^2 = 4y - 12$$

\[ y^2 - 9 = 4y - 12 \]
\[ y^2 - 4y + 3 = 0 \]
\[ (y - 3)(y - 1) = 0 \]
\[ y = 3 \quad y = 1 \]

**Score 1:** The student squared the binomial incorrectly.
27 Solve the equation for \( y \).

\[
(y - 3)^2 = 4y - 12
\]

\[
y^2 - 6y + 9 = 4y - 12
\]

\[
-4y + 12 = -4y + 12
\]

\[
y^2 - 10y + 21 = 0
\]

\[
(y - 3)(y - 7) = 0
\]

Score 1: The student did not state the solution.
27 Solve the equation for $y$.

$$ (y - 3)^2 = 4y - 12 $$

$$ y^2 - 6y + 9 = 4y - 12 $$

$$ -10y + 21 = 0 $$
27 Solve the equation for \( y \).

\[(y - 3)^2 = 4y - 12\]

\[(y - 3)(y - 3) = 4y - 12\]

\[y^2 - 8y + 9 = 4y - 12\]

\[y^2 - 12y + 9 = 0\]

\[y = \frac{12 \pm \sqrt{144 - 36}}{2}\]

\[y = 6 \pm 3\sqrt{3}\]

\[y = 6 + 3\sqrt{3}\]

\[y = 6 - 3\sqrt{3}\]

**Score 0:** The student made multiple errors.
28 The graph below shows the variation in the average temperature of Earth’s surface from 1950–2000, according to one source.

During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

Between 1960–1965 because in the 5 year they decrease by 0.15 and the other are increase or decrease by 0.1 or less.

Score 2: The student has a complete and correct response.
28 The graph below shows the variation in the average temperature of Earth’s surface from 1950–2000, according to one source.

During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

From 1980 to 1985

The graph has the steepest slope.

Score 2: The student has a complete and correct response.
28 The graph below shows the variation in the average temperature of Earth’s surface from 1950–2000, according to one source.

During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

The temperature changed the most from 1960 to 1965. I know this change is the biggest because the temperature goes from 0°C to 0.15°C.

Score 1: The student gave an explanation that is not completely correct. The rate of change of the interval was not compared to other intervals’ rates of change.
Question 28

The graph below shows the variation in the average temperature of Earth’s surface from 1950–2000, according to one source.

During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

1960–1965, I determined my answer by using the slope of the line.

Score 1: The student did not indicate how the slope was used in comparison with other intervals.
28 The graph below shows the variation in the average temperature of Earth’s surface from 1950–2000, according to one source.

During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

\[
\frac{\Delta y}{\Delta x} = \frac{1.5 - 0}{1985 - 1965} = \frac{1.5}{20} = 0.075
\]

\[
\frac{\Delta y}{\Delta x} = \frac{-1 - (-0.5)}{1970 - 1965} = \frac{-0.5}{5} = -0.1
\]

\[
\frac{\Delta y}{\Delta x} = \frac{-0.5 - 0}{1990 - 1985} = \frac{-0.5}{5} = -0.1
\]

Changes the most in 10 years

Score 0: The student gave a completely incorrect response.
29 The cost of belonging to a gym can be modeled by \( C(m) = 50m + 79.50 \), where \( C(m) \) is the total cost for \( m \) months of membership.

State the meaning of the slope and \( y \)-intercept of this function with respect to the costs associated with the gym membership.

**Score 2:** The student has a complete and correct response.
Question 29

The cost of belonging to a gym can be modeled by \( C(m) = 50m + 79.50 \), where \( C(m) \) is the total cost for \( m \) months of membership.

State the meaning of the slope and \( y \)-intercept of this function with respect to the costs associated with the gym membership.

\[
\text{Slope} = \text{How much the prices kept on increasing}
\]
\[
\text{y-int} = \text{Is where the starting cost of the health club membership was.}
\]

Score 1: The student correctly stated the meaning of the \( y \)-intercept.
29 The cost of belonging to a gym can be modeled by \( C(m) = 50m + 79.50 \), where \( C(m) \) is the total cost for \( m \) months of membership.

State the meaning of the slope and \( y \)-intercept of this function with respect to the costs associated with the gym membership.

The slope is the rate of change at which the function either increases or decreases depending on whether it is positive or negative. The slope is 50 which basically means 50, so you go up your graph 50 and move to the right 1 spot.

The \( y \)-intercept is where you start your slope at, the \( y \)-intercept of this function is 79.50 so you would start here from start on your function.

**Score 1:** The student defined slope and \( y \)-intercept correctly, but not with respect to the cost of the gym membership.
The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for $m$ months of membership.

State the meaning of the slope and $y$-intercept of this function with respect to the costs associated with the gym membership.

Score 0: The student only stated the slope and the $y$-intercept.
30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

<table>
<thead>
<tr>
<th>Programming Preferences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>

Based on the sample, predict how many of the school’s 351 males would prefer comedy. Justify your answer.

\[
\frac{x}{351} = \frac{70}{105} \Rightarrow 105x = 24570 \Rightarrow x = 234 \text{ males}
\]

**Score 2:** The student has a complete and correct response.
A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

<table>
<thead>
<tr>
<th>Programming Preferences</th>
<th>Comedy</th>
<th>Drama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>Female</td>
<td>48</td>
<td>42</td>
</tr>
</tbody>
</table>

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

\[ \frac{70 + 35}{105} = \frac{70}{105} \]

Score 1: The student found the correct ratio.
A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

<table>
<thead>
<tr>
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</tr>
<tr>
<td>Female</td>
<td>48</td>
<td>42</td>
</tr>
</tbody>
</table>

Based on the sample, predict how many of the school’s 351 males would prefer comedy. Justify your answer.

\[
\frac{70}{195} = \frac{x}{351}
\]

\[x = 126\]

Score 1: The student used an incorrect proportion.
Question 30

30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

<table>
<thead>
<tr>
<th>Programming Preferences</th>
<th>Comedy</th>
<th>Drama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>Female</td>
<td>48</td>
<td>42</td>
</tr>
</tbody>
</table>

Based on the sample, predict how many of the school’s 351 males would prefer comedy. Justify your answer.

Score 0: The student gave a completely incorrect response.
31 Given that $a > b$, solve for $x$ in terms of $a$ and $b$:

$$b(x - 3) \geq ax + 7b$$

Work:

$$b(x - 3) \geq ax + 7b$$

$$b(x - 3) \geq ax + 7b$$

$$b(x - 3) \geq ax + 7b$$

$$b(x - 3) \geq ax + 7b$$

$$\frac{bx - 3b}{a} \geq \frac{ax + 7b}{a}$$

$$\frac{bx}{a} - \frac{3b}{a} \geq \frac{ax}{a} + \frac{7b}{a}$$

$$\frac{x(b - 3)}{(b - a)} \geq \frac{10b}{b - a}$$

$$x \leq \frac{10b}{b - a}$$

Score 2: The student has a complete and correct response.
31 Given that $a > b$, solve for $x$ in terms of $a$ and $b$:

$$b(x - 3) \geq ax + 7b$$

\[
\begin{align*}
6x - 3b & \geq ax + 7b \\
-6x & \geq ax + 7b \\
-10b & \geq ax - 6x \\
\frac{-10b}{a - 6} & \geq x
\end{align*}
\]

**Score 2:** The student has a complete and correct response.
31 Given that $a > b$, solve for $x$ in terms of $a$ and $b$:

\[ b(x - 3) \geq ax + 7b \]

\[
\begin{align*}
   bx - 3b & \geq ax + 7b \\
   +3b & +3b \\
   bx & \geq ax + 10b \\
   -ax & -ax \\
   bx - ax & \geq 10b \\
   b-a & \quad b-a \\
   x & \geq \frac{10b}{b-a}
\end{align*}
\]

Score 1: The student did not reverse the inequality symbol when dividing each side of the inequality by a negative number.
31 Given that $a > b$, solve for $x$ in terms of $a$ and $b$:

\[ b(x - 3) \geq ax + 7b \]

\[
\begin{align*}
7b - 2b & \geq ax + 7b \\
6b & \geq ax + 7b \\
x(b + a) & \geq 10b \\
x & \geq \frac{10b}{b + a}
\end{align*}
\]

**Score 1:** The student made an error by writing $bx + ax$ instead of $bx - ax$. 
31 Given that \( a > b \), solve for \( x \) in terms of \( a \) and \( b \):

\[
\frac{b(x - 3)}{b} \geq \frac{a(x + 7)}{b}n
\]

\[
\frac{x - 3}{x} \geq \frac{a(x + 7)}{b}
\]

\[
x \left( \frac{\frac{x - 3}{x} - \frac{a(x + 7)}{b}}{x} \right)
\]

\[
\frac{-3x - 5x + 7}{x}
\]

\[
\frac{-8x + 7}{x}
\]

\[
-8 \geq \frac{7}{x}
\]

\[
x \geq \frac{7}{8}
\]

Score 0: The student gave a completely incorrect response.
32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over \( t \) weeks can be defined by the function \( f(t) = (8) \cdot 2^t \). Jessica finds that the growth function over \( t \) weeks is \( g(t) = 2^t + 3 \).

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

Based on the growth from both functions, explain the relationship between \( f(t) \) and \( g(t) \).

They are both the same thing. No matter how many weeks you plug in for \( t \), \( f(t) \) and \( g(t) \) are always going to be equal.

Score 2: The student has a complete and correct response.
32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over \( t \) weeks can be defined by the function \( f(t) = (8) \cdot 2^t \). Jessica finds that the growth function over \( t \) weeks is \( g(t) = 2^t + 3 \).

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

\[
\begin{align*}
\text{f}(5) &= (8) \cdot 2^5 \\
&= (8) \cdot 32 \\
&= 256.
\end{align*}
\[
\begin{align*}
\text{g}(5) &= 2^5 + 3 \\
&= 32 + 3 \\
&= 35.
\end{align*}
\]

Both Jacob and Jessica will have 256 dandelions.

Based on the growth from both functions, explain the relationship between \( f(t) \) and \( g(t) \).

The relationship between \( f(t) \) and \( g(t) \) is positive because they continue to increase also at a certain point the number of dandelions are the same for both Jessica and Jacob.

Score 1: The student gave an incomplete explanation.
32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over $t$ weeks can be defined by the function $f(t) = (8) \cdot 2^t$. Jessica finds that the growth function over $t$ weeks is $g(t) = 2^t + 3$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

**Jacob:** There would be 256 dandelions in 5 weeks.

**Jessica:** There would be also 256 dandelions in 5 weeks.

Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

The relationship between Jessica and Jacob is there will be 256 dandelions growing in both their field.

**Score 1:** The student gave an incorrect explanation.
32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over $t$ weeks can be defined by the function $f(t) = (8) \cdot 2^t$. Jessica finds that the growth function over $t$ weeks is $g(t) = 2^t + 3$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

\[
\begin{align*}
\hat{f}(t) &= 8 \cdot 2^5 \\
&= 8 \times 32 \\
&= 256 \\
Jacob &= 256
\end{align*}
\]

\[
\begin{align*}
\hat{g}(t) &= 2^5 + 2^3 \\
&= 32 + 8 \\
&= 40 \\
Jessica &= 40
\end{align*}
\]

Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

Jacob’s growth faster

Score 1: The student gave an appropriate explanation based upon the error made in finding $g(t)$. 
Question 32

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over \( t \) weeks can be defined by the function \( f(t) = (8) \cdot 2^t \). Jessica finds that the growth function over \( t \) weeks is \( g(t) = 2^t + 3 \).

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

\[
\begin{align*}
\text{Jacob:} & \quad f(5) = (8) \cdot 2^5 \\
& = (8) \cdot 32 \\
& = 256 \\
\text{Jessica:} & \quad g(5) = 2^5 + 3 \\
& = 32 + 3 \\
& = 35
\end{align*}
\]

Based on the growth from both functions, explain the relationship between \( f(t) \) and \( g(t) \).

The relationship between \( f(t) \) and \( g(t) \) is that they both rise on a graph and \( f(t) \) determines the number of dandelions gradually, while \( g(t) \) determines the number of dandelions over longer periods.

Score 0: The student made an error in calculating \( f(t) \) and gave an incorrect explanation.
Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after $t$ seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

$$a = -16, \ b = 64, \ c = 80$$

\[
t = \frac{-b}{2a} = \frac{-64}{2(-16)} = 2
\]

It reaches its maximum weight at 2 seconds.

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

<table>
<thead>
<tr>
<th>$t$</th>
<th>$\Delta h$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>-2</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>144</td>
</tr>
<tr>
<td>4</td>
<td>128</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

The height of the object decreases for $2 < t < 5$, because it reaches its maximum height at 2 seconds and decreases in height until it hits the ground at 5 seconds.

**Score 4:** The student has a complete and correct response.
Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

At \( 2 \) seconds, it reaches its peak at 144 ft.

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

It decreases when \( 2 \leq x \leq 5 \).

It goes from 144 ft to 0 ft.

Score 4: The student has a complete and correct response.
33 Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

The time interval in which the height decreases is between 2 and 5. I know this because according to the table of this equation, the points go \((1, 28), (2, 144), (3, 128), (4, 80), \) and \((5, 0)\), showing that that is when the object's object is going down.

Score 4: The student included a correct set of values for time and distance in their explanation for the second part. These values justify their answer in the first part.
33 Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

\[
\begin{align*}
&y = -16x^2 + 64x + 80 \\
&d(0) = 80 \\
&d(1) = 128 \\
&d(2) = 144 \\
&d(3) = 128
\end{align*}
\]

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

(2, 5)

Score 3: The student did not explain how the interval was determined.
Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

\[
\begin{array}{c|c}
\text{Seconds} & \text{Distance off ground} \\
\hline
-2 & 80 \\
-1 & 128 \\
0 & 144 \\
1 & 128 \\
2 & 80 \\
3 & 0 \\
\end{array}
\]

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

After 2 seconds because at 2 seconds the object is as high as it can go, so it’s distance above the ground decreases, as the ball starts to fall.

Score 3: The student did not state the complete time interval.
33 Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

\[
\frac{-b}{2a} = \frac{-64}{2(-16)} = \frac{-64}{-32} = 2
\]

The maximum height is at 2 seconds.

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

2 seconds is when it is at maximum height, so anything after that is decreasing.

**Score 3:** The student did not state the complete time interval.
Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

\[
(2, 144)
\]

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

To find the time it hits the ground, you use \( h(t) = 0 \) and solve:

\[
-16t^2 + 64t + 80 = 0
\]

\[
-16(t^2 - 4t - 5) = 0
\]

\[
-16(t + 1)(t - 5) = 0
\]

\[
t + 1 = 0 \quad t = -1
\]

\[
t - 5 = 0 \quad t = 5 \leftarrow \text{time it hits ground}
\]

It's decreasing from \( t = -1 \) to \( t = 5 \).

**Score 2:** The student showed no work to find \((2, 144)\) and did not state a time.
33 Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

Score 2: The student determined and justified the time it took to reach the maximum height.
33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after $t$ seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

The ball decreases between this time which is 2 seconds and 5 seconds.

Score 1: The student wrote the correct interval in words.
33 Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

\[
\begin{align*}
\text{It reaches maximum height at 140}
\end{align*}
\]

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

Score 1: The student showed appropriate work to determine the time, but stated the maximum height.
Question 33

33 Let \( h(t) = -16t^2 + 64t + 80 \) represent the height of an object above the ground after \( t \) seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

\((2, 144)\)

144 seconds

State the time interval, in seconds, during which the height of the object decreases. Explain your reasoning.

Score 0: The student gave an incorrect response.
34 Fred's teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

He could complete the square or he could use the quadratic formula.

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
4x^2 + 16x + 9 = 0 \\
4x^2 + 16x + 16 = -9 + 16 \\
(2x + 4)^2 = 7 \\
2x + 4 = \pm \sqrt{7} \\
2x = -4 \pm \sqrt{7} \\
x = -2 \pm \frac{\sqrt{7}}{2}
\]

\[
x = -2 + \frac{\sqrt{7}}{2} \\
x = -2 - \frac{\sqrt{7}}{2}
\]

\[
x = -2.7 \\
x = -3.3
\]

**Score 4:** The student has a complete and correct response.
34 Fred's teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

Fred could use the quadratic formula \( x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \) where you insert \( a, b, \) and \( c \) from the quadratic function.

He could also use completing the square (quadratic), first find \((\frac{b}{2})^2\), add it to both sides and solve.

\[
O = 4x^2 + 16x + 9
\]

\[
O = 4x^2 + 16x + 9
\]

\[
a = 4
\]

\[
b = 16
\]

\[
c = 9
\]

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

\[
-16 \pm 10.6
\]

\[
\frac{-16 \pm 10.6}{8}
\]

\[
x = \{-3.3, -0.7\}
\]

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
O = 4x^2 + 16x + 9
\]

\[
O = 4x^2 + 16x + 9
\]

\[
a = 4
\]

\[
b = 16
\]

\[
c = 9
\]

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

\[
-16 \pm 10.6
\]

\[
\frac{-16 \pm 10.6}{8}
\]

\[
x = \{-3.3, -0.7\}
\]

\[
-3.3
\]

Score 4: The student has a complete and correct response.
34 Fred’s teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

algebraically or graphically

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

I graphed the parabola and used the \( \text{Trace} \) keys to calc \( \rightarrow \) zero where \( f(x) = 0 \)

\[
\begin{array}{c|c}
-4 & 9 \\
-3 & -3 \\
-2 & -7 \\
\text{X} & \text{Y} \\
-1 & -3 \\
\text{X} & \text{Y} \\
-3 & 9 \\
\end{array}
\]

\( x = -3.3 \)

\( x = -0.7 \)

Score 4: The student has a complete and correct response.
Fred’s teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

Fred could use the quadratic formula which is $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ or he could factor by grouping.

b) Using one of the methods stated in part a, solve $f(x) = 0$ for $x$, to the nearest tenth.

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

\[
x = \frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)}
\]

\[
x = \frac{-16 \pm \sqrt{256 - 144}}{8}
\]

\[
x = \frac{-16 \pm \sqrt{112}}{8}
\]

\[
x = \frac{-16 \pm 4\sqrt{7}}{8}
\]

\[
x = \frac{8 - 4\sqrt{7}}{8} \quad x = \frac{-16 + 4\sqrt{7}}{8} = -0.7
\]

\[
x = \frac{8 + 4\sqrt{7}}{8} \quad x = \frac{-16 - 4\sqrt{7}}{8} = -3.3
\]

**Score 4:** The student has a complete and correct response.
Fred’s teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

Using quadratic equation or completing the square.

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
\begin{align*}
4x^2 + 16x + 9 &= 0 \\
-16 \pm \sqrt{184} &= x \\
\frac{-16 \pm \sqrt{184}}{8} &= x \\
\frac{-16 \pm 13.6}{8} &= x \\
\frac{-16 - 13.6}{8} &= x \\
-3.7 &= x
\end{align*}
\]

Score 3: The student made an error in calculating \( 4ac \), but found appropriate solutions to the nearest tenth.
34 Fred’s teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

\[
\text{quadratic formula} \quad \text{complete the square}
\]

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
\begin{align*}
4x^2 + 16x + 9 &= 0 \\
\frac{4}{4} \quad \frac{16}{4} \quad \frac{9}{4} &= 4 \\
x^2 + 4x + \frac{9}{4} &= 0 \\
x^2 + 4x + 4 &= -\frac{9}{4} + 4 \\
(x + 2)^2 &= \frac{-9}{4} + 4 \\
(x + 2)^2 &= 1.75 \\
(x + 2) &= \sqrt{1.75} \\
x + 2 &= 2 + \sqrt{1.75} \\
x &= -2 + \sqrt{1.75} \\
x &= -7
\end{align*}
\]

Score 3: The student only used the positive root of \( \sqrt{1.75} \) when solving for \( x \).
Fred’s teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

1. $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
2. Factor the trinomial $ac$ then find the factors that equal $b$ when you add them.

b) Using one of the methods stated in part a, solve $f(x) = 0$ for $x$, to the nearest tenth.

\[0 = 4x^2 + 16x + 9\]
\[\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\]
\[\frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)}\]
\[\frac{-16 \pm \sqrt{112}}{8}\]
\[\frac{-16 + \sqrt{112}}{8} \approx 0.68\]
\[\frac{-16 - \sqrt{112}}{8} \approx -3.32\]

Score 3: The student made a rounding error.
Question 34

34 Fred’s teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

The two different methods Fred could use to solve the equation \( f(x) = 0 \) is by completing the square, and using the quadratic formula.

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
0 = 4x^2 + 16x + 9
\]

\[
-9 -9
\]

\[
65 = 4x^2 + 16x + 64
\]

\[
55 = (2x+8)(2x+8)
\]

\[
\sqrt{55} = 2x+8
\]

\[
7.4 = 2x+8
\]

\[
-8 - 8
\]

\[
2^2 - .6 = x^2 + .2
\]

\[
- .3 = x
\]

Score 2: The student made an error in completing the square and only used the positive root of \( \sqrt{55} \).
34 Fred's teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

\[
\text{complete the square,}
\]
\[
\text{Use the quadratic formula}
\]

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
4x^2 + 16x + 9 = 0
\]

\[
20x^2 + 9 = 0
\]

\[
\frac{20x^2}{20} = -\frac{9}{20}
\]

\[
x^2 = -\frac{9}{20}
\]

\[
x = -0.45
\]

Score 2: The student stated two methods.
34 Fred’s teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

b) Using one of the methods stated in part a, solve $f(x) = 0$ for $x$, to the nearest tenth.

$$f(x) = 4x^2 + 16x + 9$$

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

$$x = \frac{-16 \pm \sqrt{(16)^2 - 4(4)(9)}}{2(4)}$$

$$x = \frac{-16 \pm \sqrt{256 - 144}}{8}$$

$$x = \frac{-16 \pm \sqrt{112}}{8}$$

$$x = \frac{-16 \pm 4\sqrt{7}}{8}$$

$$x = \frac{-2 \pm \frac{1}{2}\sqrt{7}}{2}$$

Score 1: The student did not express the solution to the nearest tenth.
34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

b) Using one of the methods stated in part a, solve $f(x) = 0$ for $x$, to the nearest tenth.

\[
\frac{-16 \pm \sqrt{16^2 - 4 \cdot 4 \cdot 9}}{8} \quad \frac{-16 \pm \sqrt{400}}{8} \quad \frac{-16 \pm 20}{8} \quad \frac{-36}{8} \quad \frac{4}{8}
\]

Score 1: The student stated one method.
Fred’s teacher gave the class the quadratic function \( f(x) = 4x^2 + 16x + 9 \).

a) State two different methods Fred could use to solve the equation \( f(x) = 0 \).

b) Using one of the methods stated in part a, solve \( f(x) = 0 \) for \( x \), to the nearest tenth.

\[
\begin{align*}
a &= 4 \\
b &= 16 \\
c &= 9
\end{align*}
\]

\[
\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-16 \pm \sqrt{16^2 - 4 \times 4 \times 9}}{2 
\]

\[
\frac{-16 \pm \sqrt{112}}{2} = \frac{-16 \pm 10.583}{2}
\]

\[
\frac{-16 + 10.58}{2} = -2.71 \\
\frac{-16 - 10.58}{2} = -14.65
\]

Score 0: The student made an error in substituting into the quadratic formula and made a rounding error.
Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
<th>Day 8</th>
<th>Day 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Temperature, t</td>
<td>54</td>
<td>50</td>
<td>62</td>
<td>67</td>
<td>70</td>
<td>58</td>
<td>52</td>
<td>46</td>
</tr>
<tr>
<td>Coffee Sales, f(t)</td>
<td>$2900</td>
<td>$3080</td>
<td>$2500</td>
<td>$2380</td>
<td>$2200</td>
<td>$2700</td>
<td>$3000</td>
<td>$3620</td>
</tr>
</tbody>
</table>

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of $t$. Round all values to the nearest integer.

$$f(t) = -58t + 6182$$

State the correlation coefficient, $r$, of the data to the nearest hundredth. Does $r$ indicate a strong linear relationship between the variables? Explain your reasoning.

-94

This shows a strong linear relationship because the number is very close to -1.

Score 4: The student has a complete and correct response.
35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
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<th>Day 6</th>
<th>Day 7</th>
<th>Day 8</th>
<th>Day 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Temperature, ( t )</td>
<td>54</td>
<td>50</td>
<td>62</td>
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<td>70</td>
<td>58</td>
<td>52</td>
<td>46</td>
</tr>
<tr>
<td>Coffee Sales, ( f(t) )</td>
<td>$2900</td>
<td>$3080</td>
<td>$2500</td>
<td>$2380</td>
<td>$2200</td>
<td>$2700</td>
<td>$3000</td>
<td>$3620</td>
</tr>
</tbody>
</table>

State the linear regression function, \( f(t) \), that estimates the day’s coffee sales with a high temperature of \( t \). Round all values to the nearest integer.

\[
f(t) = -58x + 6182
\]

State the correlation coefficient, \( r \), of the data to the nearest hundredth. Does \( r \) indicate a strong linear relationship between the variables? Explain your reasoning.

\[ r = -0.94 \quad \text{yes it is close to -1} \]

Score 3: The student did not write the regression equation in terms of \( t \).
35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

<table>
<thead>
<tr>
<th>Day</th>
<th>Day 1</th>
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<th>Day 3</th>
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<th>Day 6</th>
<th>Day 7</th>
<th>Day 8</th>
<th>Day 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Temperature, $t$</td>
<td>54</td>
<td>50</td>
<td>62</td>
<td>67</td>
<td>70</td>
<td>58</td>
<td>52</td>
<td>46</td>
<td>48</td>
</tr>
<tr>
<td>Coffee Sales, $f(t)$</td>
<td>$2900$</td>
<td>$3080$</td>
<td>$2500$</td>
<td>$2380$</td>
<td>$2200$</td>
<td>$2700$</td>
<td>$3000$</td>
<td>$3620$</td>
<td>$3720$</td>
</tr>
</tbody>
</table>

State the linear regression function, $f(t)$, that estimates the day’s coffee sales with a high temperature of $t$. Round all values to the nearest integer.

$$f(t) = -58t + 6182$$

State the correlation coefficient, $r$, of the data to the nearest hundredth. Does $r$ indicate a strong linear relationship between the variables? Explain your reasoning.

$$r = -0.94$$

$r$ indicates a strong negative correlation between the variables.

Score 3: The student gave no explanation.
Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

<table>
<thead>
<tr>
<th>Day</th>
<th>High Temperature, t</th>
<th>Coffee Sales, f(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54</td>
<td>$2900</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>$3080</td>
</tr>
<tr>
<td>3</td>
<td>62</td>
<td>$2500</td>
</tr>
<tr>
<td>4</td>
<td>67</td>
<td>$2380</td>
</tr>
<tr>
<td>5</td>
<td>70</td>
<td>$2200</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
<td>$2700</td>
</tr>
<tr>
<td>7</td>
<td>52</td>
<td>$3000</td>
</tr>
<tr>
<td>8</td>
<td>46</td>
<td>$3620</td>
</tr>
<tr>
<td>9</td>
<td>48</td>
<td>$3720</td>
</tr>
</tbody>
</table>

State the linear regression function, \( f(t) \), that estimates the day's coffee sales with a high temperature of \( t \). Round all values to the nearest integer.

\[
y = ax + b \quad \quad f(t) = -58x + 6182 \\
y = -58x + 6182 \\
\]

State the correlation coefficient, \( r \), of the data to the nearest hundredth. Does \( r \) indicate a strong linear relationship between the variables? Explain your reasoning.

\[
r = -0.94 \\
\text{\( r \) does indicate a weak linear relationship between the variables because \( r \) is not close to 1, which means it is not a strong relationship.}
\]

Score 2: The student did not write the regression equation in terms of \( t \), but wrote the correct \( r \) value.
35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

<table>
<thead>
<tr>
<th>Day</th>
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</tbody>
</table>

State the linear regression function, \( f(t) \), that estimates the day’s coffee sales with a high temperature of \( t \). Round all values to the nearest integer.

\[
f(t) = -58x + 6182
\]

State the correlation coefficient, \( r \), of the data to the nearest hundredth. Does \( r \) indicate a strong linear relationship between the variables? Explain your reasoning.

0.94 The relationship is very strong between the variables because the correlation coefficient is close to one.

Score 2: The student did not write the regression equation in terms of \( t \), and wrote an incorrect correlation coefficient, but wrote an appropriate explanation.
35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

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</table>

State the linear regression function, \( f(t) \), that estimates the day's coffee sales with a high temperature of \( t \). Round all values to the nearest integer.

\[ f(t) = 6182.22 + (-58.2632t) + \]

State the correlation coefficient, \( r \), of the data to the nearest hundredth. Does \( r \) indicate a strong linear relationship between the variables? Explain your reasoning.

-58.26; No, Given it is a negative coefficient

Score 1: The student rounded the regression equation incorrectly, and no further correct work is shown.
35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

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State the linear regression function, \( f(t) \), that estimates the day’s coffee sales with a high temperature of \( t \). Round all values to the nearest integer.

State the correlation coefficient, \( r \), of the data to the nearest hundredth. Does \( r \) indicate a strong linear relationship between the variables? Explain your reasoning.

\[-0.94, \text{ strong linear relationship because it's above 0.70 and close to -1.}\]

Score 1: The student wrote a correct correlation coefficient, but wrote an incorrect explanation.
Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

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</tr>
</tbody>
</table>

State the linear regression function, \( f(t) \), that estimates the day’s coffee sales with a high temperature of \( t \). Round all values to the nearest integer.

\[
\begin{align*}
   f(t) & = -58.19 \cdot t + 6182.199074 \\
\end{align*}
\]

State the correlation coefficient, \( r \), of the data to the nearest hundredth. Does \( r \) indicate a strong linear relationship between the variables? Explain your reasoning.

No it does not because it dont come out =

Score 0: The student made multiple errors.
A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by \( x \), and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[
\begin{align*}
\rho &= 48 \\
A &= 108 \\
\omega &= x \\
\ell &= \frac{48 - 2x}{2} = 24 - x
\end{align*}
\]

\[A = \ell \omega.\]

\[
108 = x(24 - x)
\]

\[
108 = 24x - x^2
\]

\[
x^2 - 24x + 108 = 0
\]

\[(x - 6)(x - 18) = 0
\]

\[x = 6 \text{ or } x = 18
\]

The dimensions are 6 and 18

**Score 4:** The student has a complete and correct response.
36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by \( x \), and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[
\begin{align*}
\frac{48}{2} &= 24 \\
24 - x &= \text{width} \\
(24-x)x &= 108 \\
24x - x^2 &= 108 \\
-24x + x^2 &= -108 \\
x^2 - 24x + 144 &= -108 + 144 \\
(x-12)^2 &= 36 \\
x - 12 &= \pm \sqrt{36} \\
x &= 12 \pm \sqrt{36} \\
x &= 12 + \sqrt{36} \quad x = 12 - \sqrt{36} \\
24 - x &= 12 - \sqrt{36} \quad 24 - x = 12 + \sqrt{36}
\end{align*}
\]

Score 4: The student has a complete and correct response.
A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by \( x \), and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[
\begin{align*}
\text{P} & \quad 2x + 2y = 48 \\
\text{A} & \quad (x)(y) = 108 \\
\text{\( x \)} & \quad (-x + 24) = 108 \\
\text{} & \quad -x^2 + 24x = 108 \\
\text{} & \quad -x^2 + 24x - 108 = 0
\end{align*}
\]

**Score 3:** The student found only one dimension.
A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by $x$, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[
\begin{align*}
\text{Area: } & y \times x = 108 \\
\text{Perimeter: } & 2x + 2y = 48 \\
\text{Solve for } y: & y = \frac{108}{x} \\
\text{Substitute into perimeter equation: } & 2x + 2\left(\frac{108}{x}\right) = 48 \\
\text{Simplify: } & 2x + \frac{216}{x} = 48 \\
\text{Multiply by } x: & 2x^2 + 216 = 48x \\
\text{Rearrange: } & 2x^2 - 48x + 216 = 0 \\
\text{Use the quadratic formula: } & x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
\text{Where } a = 2, b = -48, c = 216 \\
\text{Solve for } x, y \\
\end{align*}
\]

Score 2: The student wrote a correct quadratic equation in standard form.
Question 36

A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by \( x \), and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[
\begin{align*}
\text{Perimeter } & \quad x + y = 48 \\
\text{Area: } & \quad \frac{xy}{x} = \frac{108}{x} \\
(x)(x + \frac{108}{x}) & = 48 (x) \\
x^2 + 108 & = 48x \\
x^2 - 48x + 108 & = 0
\end{align*}
\]

Score 2: The student made a conceptual error when expressing the perimeter.
A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by $x$, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[ xy = 108 \]
\[ y = \frac{108}{x} \]
\[ 2y = \frac{216}{x} \]
\[ 2x + 2y = 48 \]
\[ 2x + 12 = 48 \]
\[ 2x + 216 = 48x \]
\[ x^2 + 216 = 24x \]
\[ x^2 - 24x + 216 = 0 \]

**Score 1:** The student wrote a correct system of equations, but did not write a correct quadratic equation in standard form.
A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by $x$, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[ xy = 108 \]
\[ x + y = 48 \]

\[ x + \frac{108}{x} = 48 \]
\[ x^2 + 108 = 48x \]
\[ x^2 - 48x + 108 = 0 \]

**Score 1:** The student made a conceptual error when expressing the perimeter, but wrote an appropriate quadratic equation in standard form.
36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by $x$, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

\[
\begin{align*}
6 \cdot 8 &= 48 \\
\frac{108}{6} &= 18 \\
\frac{108}{8} &= 13.5
\end{align*}
\]

\[w = 6 \quad \text{and} \quad l = 18\]

**Score 0:** The student has a correct response based on an incorrect procedure.
Question 37

The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, $x$, and child tickets, $y$, that would satisfy the cinema’s goal.

\[
x + y \leq 200 \\
12.5x + 6.25y \geq 1500
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an $S$.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

No, she is incorrect. The reason she isn’t right is that both of the coordinates aren’t from the solution area.

Score 6: The student has a complete and correct response.
Question 37

The diagram shows a graph with the equation $x + y \leq 200$. The region below and Including the line $x + y = 200$ is shaded, and the area labeled $S$. The axes range from 0 to 250 on the x-axis and from 0 to 250 on the y-axis. The x-axis and y-axis are labeled with numerical values from 0 to 250 with increments of 10.
37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, $x$, and child tickets, $y$, that would satisfy the cinema's goal.

\[
x + y \leq 200
\]

\[
12.5x + 6.25y \geq 1500
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an S.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

She's wrong because the point is not in S on the graph.

Score 6: The student has a complete and correct response.
The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, $x$, and child tickets, $y$, that would satisfy the cinema’s goal.

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an $S$.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

Score 5: The student did not label either inequality on the graph.
The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, \( x \), and child tickets, \( y \), that would satisfy the cinema’s goal.

\[
\begin{align*}
x + y & \leq 200 \\
12.50x + 6.25y & \geq 1500
\end{align*}
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an \( S \).

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

\[
\text{No, she is incorrect because the point does not lie in } S. \]

Score 5: The student did not shade the solution to the system of inequalities.
37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, \( x \), and child tickets, \( y \), that would satisfy the cinema’s goal.

\[
\begin{align*}
12.5x + 6.25y &\geq 1500 \\
x + y &\leq 200
\end{align*}
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an \( S \).

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

\[\text{No. They have to sell 40 adult and 160 child}\]

Score 4: The student made a conceptual error by writing equations instead of inequalities.
Question 37

\[ y = 240 - 2x \]
\[ y = 200 - x \]
The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, \( x \), and child tickets, \( y \), that would satisfy the cinema’s goal.

\[
12.50x + 6.25y \geq 1500 \\
\]

\[
x + y \leq 200
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an \( S \).

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

no, the coordinate (30, 80) is not in the solution set.

**Score 4:** The student made multiple graphing and labeling errors.
The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, \( x \), and child tickets, \( y \), that would satisfy the cinema’s goal.

\[ 12.50x + 6.25y \geq 1500 \]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an \( S \).

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

\[ \begin{align*}
6.25y + 12.50x & = 800 \quad y = 80; \quad x = 30 \\
(6.25)(80) + (12.50)(30) & = 500 + 375 \quad \text{No because their goal is} \\
& = 875 \quad \text{they are$625 short.}
\end{align*} \]

Score 3: The student wrote and graphed one inequality correctly, but the explanation was not based on the graph.
Question 37
37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, $x$, and child tickets, $y$, that would satisfy the cinema’s goal.

\[
12.5x + 6.25y \geq 1500 \quad x + y \leq 200
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an $S$.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

Score 2: The student wrote a correct system of inequalities, but made multiple graphing or labeling errors, and wrote an incorrect explanation based on the graph.
Question 37

\[ y = \frac{1}{2}x + 100 \]

\[ 1.5x + 6.25y = 1500 \]

\[ x + y \leq 1000 \]

\[ \frac{y}{2} \leq x - \frac{1}{4} \]

\[ y \leq -x + 200 \]
37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, $x$, and child tickets, $y$, that would satisfy the cinema’s goal.

\[12.50x + 6.25y \geq 1500\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an $S$.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

\[12.50(30) + 6.25(80) = 875\]

\[\text{No She is incorrect}\]

Score 1: The student wrote one inequality correctly, but no explanation was written.
Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, \( x \), and child tickets, \( y \), that would satisfy the cinema’s goal.

\[
(12.50 \times x) + (6.25 \times y) = 1500
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an \( S \).

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

\[\text{No, she is incorrect because that would only add up to $875}\]

Score 1: The student gave an explanation not based on the graph.
The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema’s goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, \( x \), and child tickets, \( y \), that would satisfy the cinema’s goal.

\[
\begin{align*}
1500 \geq 6.25y + 12.50x \\
y > \frac{12.50x - 6.25}{6.25}
\end{align*}
\]

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an \( S \).

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema’s goal. Explain whether she is correct or incorrect, based on the graph drawn.

Marta’s claim is correct.

**Score 0:** The student did not state or graph either inequality correctly and no explanation was given.