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

Tuesday, January 22, 2013 — 9:15 a.m.

SAMPLE RESPONSE SET

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Revisions have been made to pages 5, 6, 26, 29, and 46.
Please print and replace these pages.

Thank you for your cooperation.
31 Express $4\sqrt{75}$ in simplest radical form.

\[
4\sqrt{75} = 4 \cdot \sqrt{25 \cdot 3} = 4 \cdot 5 \sqrt{3} = 20\sqrt{3}
\]

Score: 2

The student has a complete and correct response.

The student shows a breakdown of $\sqrt{75}$ in this work.
31 Express $4\sqrt{75}$ in simplest radical form.

\[
4\sqrt{25} \cdot \sqrt{3} = 20\sqrt{3}
\]

Score: 2

The student has a complete and correct response.

It is not necessary for the student to show that $\sqrt{25} = 5$. 
31 Express $4\sqrt{75}$ in simplest radical form.

\[ 4 \sqrt{75} \]
\[ = 4 \sqrt{25 \cdot 3} \]
\[ = 4 \cdot 5 \sqrt{3} \]
\[ = 20 \sqrt{15} \]

Score: 1

The student makes one conceptual error by writing $\sqrt{25}$ as $5\sqrt{5}$. 
31 Express $4\sqrt{75}$ in simplest radical form.

Score: 1

The student makes one conceptual error by adding 4 and 5 instead of multiplying them.
31 Express $4\sqrt{75}$ in simplest radical form.

Score: 0

The student makes two conceptual errors by writing $\sqrt{3} = 3$ and $\sqrt{25} = \sqrt{5}$. 
31 Express $4\sqrt{75}$ in simplest radical form.

$$4\sqrt{75} = 34.641$$

Score: 0

The student writes the answer as a decimal.
32 Factor completely: $5x^3 - 20x^2 - 60x$

\[
x(5x^2 - 20x - 60)
\]
\[
5x(x^2 - 4x - 12)
\]
\[
5x(x - 6)(x + 2)
\]

Score: 2

The student has a complete and correct response.
32 Factor completely: $5x^3 - 20x^2 - 60x$

$$x(5x^2 - 20x - 60)$$

$$5x(x^2 - 4x - 12)$$

$$\left[ x^2 + 2x - 6x - 12 \right]$$

$$\left[ (x + 2)(x - 6) \right]$$

$$5x(x + 2)(x - 6)$$

Score: 2

The student has a complete and correct response.

The student factors the trinomial by grouping.
32 Factor completely: $5x^3 - 20x^2 - 60x$

$$5x(x^2 - 4x - 12)$$

Score: 1

The student takes out the greatest common factor, but no further correct work is shown.
32 Factor completely: $5x^3 - 20x^2 - 60x$

\[5x(x^2 - 4x - 12)\]
\[-5x(x - 6)(x + 2)\]
\[x - 6 = 0 \quad x + 2 = 0\]
\[x = 6 \quad x = -2\]

Score: 1

The student takes out the greatest common factor correctly, but then attempts to solve for roots.
32 Factor completely: \(5x^3 - 20x^2 - 60x\)

\[
5\left(x^2 - 4x^2 + \frac{16}{5}x^2\right)
\]
\[
5x(x^2 - 4x - 12)
\]
\[
5x(x - 4)(x + 3)
\]

Score: 1

The student takes out greatest factor correctly, but then makes a factoring error.
32 Factor completely: \( 5x^3 - 20x^2 - 60x \)

\[
5x(x^2 - 4x - 60)
\]

\[
5x(x + 10)(x - 6)
\]

Score: 0

The student makes an error in taking out the greatest common factor and makes an error in factoring the trinomial.
32 Factor completely: $5x^3 - 20x^2 - 60x$

Score: 0

No correct work is shown.
33 On the set of axes below, graph \( y = 2|x + 3| \). Include the interval \(-7 \leq x \leq 1\).

Score: 2

The student has a complete and correct response.
33 On the set of axes below, graph $y = 2|x + 3|$. Include the interval $-7 \leq x \leq 1$.

Score: 2

The student has a complete and correct response.

Since a table of values is given, it is not necessary to deduct credit for lines that are not straight.
33 On the set of axes below, graph \( y = 2|x + 3| \). Include the interval \(-7 \leq x \leq 1\).

Score: 1

The student makes a conceptual error by taking the absolute value of each number in the absolute value symbol instead of combining them first.
33 On the set of axes below, graph \( y = 2|x + 3| \). Include the interval \(-7 \leq x \leq 1\).

Score: 1

The student makes a conceptual error by treating the absolute value symbol as parentheses.
33 On the set of axes below, graph $y = 2|x + 3|$. Include the interval $-7 \leq x \leq 1$.

Score: 1

The student makes one conceptual error. The student uses an incorrect interval in the table, but calculates those points correctly.
33 On the set of axes below, graph $y = 2|x + 3|$. Include the interval $-7 \leq x \leq 1$.

Score: 0

The student makes two conceptual errors.
34 In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes.

\[
\begin{align*}
C, 1 & \quad A, 1 & \quad B, 1 \\
C, 3 & \quad A, 3 & \quad B, 3 \\
C, 5 & \quad A, 5 & \quad B, 5 \\
C, 7 & \quad A, 7 & \quad B, 7 \\
A, 9 & \quad & \quad B, 9
\end{align*}
\]

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

\[
\begin{align*}
C, 3 & \quad A & \quad 3 \\
C, 5 & \quad & \quad 5 \\
C, 7 & \quad & \quad 7
\end{align*}
\]

Score: 3

The student has a complete and correct response.
34 In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes.

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Score: 3

The student has a complete and correct response.
In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes.

Determine the number of outcomes that consist of a prime number and a letter in the word "CAT."

Score: 2

The student has a correct tree diagram, but the number of outcomes is incorrect.
34 In a game, a player must spin each spinner shown in the diagram below once.

![Spinners diagram](image)

Draw a tree diagram or list a sample space showing all possible outcomes.

![Tree diagram](image)

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Score: 2

Although sloppy, the student’s tree diagram is correct, but no further correct work is shown.
34 In a game, a player must spin each spinner shown in the diagram below once.

![Spinners](image)

Draw a tree diagram or list a sample space showing all possible outcomes.

\[
\begin{align*}
(A, 1), & \quad (A, 3), (A, 5), (A, 7), (A, 9) \\
(B, 1), & \quad (B, 3), (B, 5), (B, 7), (B, 9) \\
(C, 1), & \quad (C, 3), (C, 5), (C, 7), (C, 9)
\end{align*}
\]

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Score: 2

The student has a correct sample space with no further correct work.
34 In a game, a player must spin each spinner shown in the diagram below once.

![Spinner Diagram]

Draw a tree diagram or list a sample space showing all possible outcomes.

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<th>Spinner 1</th>
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</table>

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Prime number = \( \frac{3}{5} \)

Score: 1

The student has a partially correct sample space (9A, 9B, and 9C are missing), but no further correct work is shown.
In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes.

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Score: 1

The student shows appropriate work to find 6.
In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes.

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Score: 0

The student has an incorrect tree diagram and incorrect work to find 6.
34 In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes.

Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”

Score: 0

The student has no correct tree diagram and no correct work to find the answer.
35 The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

[Only an algebraic solution can receive full credit.]

\[
\begin{align*}
3n + 4p &= 8.50 \\
5n + 8p &= 14.50 \\
3n + 4p &= 8.50 \\
3n + 4p &= 8.50 \\
15n + 20p &= 92.50 \\
-15n - 20p &= -97.50 \\
-4p &= -1 \\
p &= 0.25
\end{align*}
\]

\[
\begin{align*}
3n + 4(0.25) &= 8.50 \\
3n + 1 &= 8.50 \\
3n &= 7.50 \\
\frac{3n}{3} &= \frac{7.50}{3} \\
n &= 2.50
\end{align*}
\]

Score: 3

The student has a complete and correct response.
35 The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

\[3n + 4p = 8.50\]
\[5n + 8p = 14.50\]

[Only an algebraic solution can receive full credit.]

\[\begin{align*}
-6n - 8p &= -17 \\
+5n + 8p &= 14.50 \\
\hline
-n &= -2.5 \\
\hline
n &= 2.50
\end{align*}\]

\[\begin{align*}
5(2.50) + 8(.25) &= 14.50 \\
12.50 + 2 &= 14.50 \\
14.50 &= 14.50 \checkmark
\end{align*}\]

\[\begin{align*}
3(2.5) + 4p &= 8.50 \\
7.5 + 4p &= 8.50 \\
-7.5 &= -\hspace{1em} 8.5 \\
4p &= \frac{1}{4} \\
p &= .25
\end{align*}\]

Score: 3

The student has a complete and correct response.
35 The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

[Only an algebraic solution can receive full credit.]

\[ \begin{align*} 5n + 8p &= 14.50 \\ 2(-3n + 4p &= 8.50) \end{align*} \]

\[ \begin{align*} 6n + 8p &= 17.00 \\ -6n + 8p &= 14.50 \\ \hline \end{align*} \]

\[ \begin{align*} 1n &= 2.50 \\ n &= 2.50 \end{align*} \]

A notebook costs 2.50

\[ 5n + 8p = 14.50 \\ 3n + 4p = 8.50 \]

Score: 2

The student shows correct work to find only the cost of a notebook.
35 The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

[Only an algebraic solution can receive full credit.]

\[ \begin{align*}
3n + 4p &= 8.50 \\
5n + 8p &= 14.50 \\
\end{align*} \]

\[ \begin{align*}
1n + 1p &= \\
15n + 20p &= 43.5 \\
-15n - 20p &= -43.5 \\
-4p &= -1 \\
p &= \frac{1}{4}
\end{align*} \]

\[ \begin{align*}
n &= \text{notebook} \\
p &= \text{pencil}
\end{align*} \]

\[ \begin{align*}
1n + 1p &= \\
n &= 0.25 \\
p &= 0.25
\end{align*} \]

Score: 2

The student shows correct work to find only the cost of a pencil.
The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

[Only an algebraic solution can receive full credit.]

\[
\begin{align*}
-2(3n + 4p &= 8.50) \\
5n + 8p &= 14.50
\end{align*}
\]

\[
\begin{align*}
-6n - 8p &= -17.00 \\
5n + 8p &= 14.50
\end{align*}
\]

\[
\begin{align*}
-1n &= -2.50 \\
-1
\end{align*}
\]

Notebook $= 3.50$

\[
\begin{align*}
3(3.50) + 4p &= 8.50 \\
10.50 + 4p &= 8.50 \\
-10.50 &= -10.50
\end{align*}
\]

\[
-4p = 2.00
\]

\[
Pencil = \frac{50}{4}
\]

Score: 1

The student makes two computational errors.
The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

[Only an algebraic solution can receive full credit.]

\[
\begin{align*}
3n + 4p &= 8.50 \\
5n + 8p &= 14.50
\end{align*}
\]

\[
\begin{align*}
3n + 4p &= 8.50 \\
\underline{\underline{5n + 8p = 14.50}} \\
2n + 4p &= 6.00 \\
&\quad \text{Subtract equations} \\
\frac{4p}{4} &= \frac{6 - 2n}{4} \\
&\quad \text{Solve for } p \\
p &= 1.50
\end{align*}
\]

A pencil is $1.50.
A notebook is $3.00.

Score: 1

The student writes a correct system of equations, but no further correct work is shown.
35 The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil.

[Only an algebraic solution can receive full credit.]

\[
\begin{align*}
3.5 \times 3 &= 10.50 \\
3.5 \times 4 &= 14.00 \\
3.5 &\quad 0
\end{align*}
\]

\[
\begin{align*}
2.5 \times 5 &= 12.5 \\
2.5 \times 8 &= 20.0 \\
14.00
\end{align*}
\]

Score: 0

No correct work is shown.
Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[
\frac{24.2 \times 14.1}{24 \times 14} = \frac{341.22}{336} = 1.009
\]

Score: 3

The student has a complete and correct response.
Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[
\text{Error} = \frac{\text{Wrong} - \text{Real}}{\text{Real Answer}} = \frac{336 - 341.22}{341.22} = 0.015
\]

Score: 3

The student has a complete and correct response.
36 Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[
\frac{336 - 341.22}{341.22} \approx 0.02
\]

Score: 2

The student makes a rounding error.
36 Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[ \%E = \frac{A - A'}{A} \]

\[ \frac{341.22 - 336}{341.22} \]

Score: 2

The student does not express the answer as a decimal to the nearest thousandth.
36 Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[
\frac{(24.2)(14.1)}{(24.2)(14.1) - (24)(14)} = \frac{3411.22}{341.22 - 336} = \frac{3411.22}{5.22} \approx 653.68
\]

Score: 1

The student makes a conceptual error in writing the fraction.
Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[
\frac{334 - 341.22}{341} = 0.01
\]

Score: 1

The student makes multiple rounding errors.
36 Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

\[
\begin{align*}
24 \times 12 &= 288 \\
24.2 \times 14.1 &= 341.22 \\
341.22 - 288.00 &= 53.22
\end{align*}
\]

Difference in Error

Score: 0

The student finds only one area correctly.
Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet.

Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

26, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10

Determine the number of scores that lie above the 75th percentile.

Score: 4

The student has a correct response. The five statistics are correct and the box-and-whisker plot is correct. The student lists the three scores above the 75th percentile.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

\[
10, 16, 19, 21, 26, 36, 38, 42, 50, 57, 65, 70
\]

\[
\text{Max: 65} \\
\text{Min: 10} \\
\text{Median: 30}
\]

Determine the number of scores that lie above the 75th percentile.

3 numbers

Score: 3

The student’s scale is incorrect.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

26, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10

Determine the number of scores that lie above the 75th percentile.

Score: 3

The student constructs a correct box-and-whisker plot, but states an incorrect number of scores.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

26, 32, 19, 65, 57, 16, 28, 42, 46, 21, 38, 10

10, 16, 19, 21, 26, 28, 32, 3, 46, 42, 57

Determine the number of scores that lie above the 75th percentile.

2 scores above the 75th percentile

Score: 3

The student makes a computational error in finding the 3rd quartile, but the rest of the work is appropriate based upon the error.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

\[ 26, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10 \]

\[
\begin{align*}
28 & \quad 19 & \quad 38 & \quad 65 \\
+2 & \quad 12 & \quad 40 & \quad 21 \\
\frac{60}{40} & \quad \frac{+12}{40} & \quad \frac{40}{80} & \quad \frac{21}{80} \\
\end{align*}
\]

\[ 25\% = 20 \quad \text{median} = 30 \quad 75\% = 41 \]

\[ 25\% = 20 \quad 50\% = 30 \quad 75\% = 41 \]

Determine the number of scores that lie above the 75th percentile.

3 scores lie above the 75th percentile

Score: 2

The student makes two or more graphing errors (max and min are missing and the number line passes through the box), but an appropriate number is stated.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

\[26, 32, 19, 66, 21, 16, 38, 42, 40, 24, 26, 19\]

Determine the number of scores that lie above the 75th percentile.

3 scores lie above the 75th percentile

42, 57, and 65

Score: 2

The student does not draw in the line to indicate the median and incorrectly graphs 65 on the number line.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

26, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10

Determine the number of scores that lie above the 75th percentile.

41 - 65

Score: 1

The student finds the five statistical measures correctly, but no further correct work is shown.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

\[26, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10\]

\[10, 16, 19, 21, 26, 28, 32, 38, 40, 57, 65\]

Determine the number of scores that lie above the 75th percentile.

There are 2 scores that lies above the 75th percentile.

Score: 1

The student finds the first and third quartile incorrectly and has an incorrect scale on the number line, but an appropriate number of scores is found.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

Determine the number of scores that lie above the 75th percentile.

Score: 1

The student identifies the five statistical measures correctly but makes a conceptual error in making the graph, and the number of scores is incorrect.
37 Using the line provided, construct a box-and-whisker plot for the 12 scores below.

\[ \frac{36, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10}{mean} \]

Determine the number of scores that lie above the 75th percentile.

Score: 0

No correct work is shown.
A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\tan 48^\circ = \frac{9}{x}
\]

Determine, to the nearest foot, the length of the metal pipe.

\[
\begin{align*}
8^2 + 9^2 &= c^2 \\
64 + 81 &= c^2 \\
145 &= c^2 \\
\sqrt{145} &= c
\end{align*}
\]

\[
c = 12.44 	ext{ feet}
\]

Score: 4

The student uses trigonometric function/formula to find the solution and the Pythagoras Theorem to find the other.
38 A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\tan 48° = \frac{9}{x} \\
|o| = \frac{9}{x} \\
\frac{1}{x} = \frac{9}{1} \\
x = 9
\]

Determine, to the nearest foot, the length of the metal pipe.

\[
\sqrt{9^2 + x^2} = \sqrt{162} = 12.727\ldots
\]

Score: 3

The student writes a correct equation for the first part, but rounds the tangent to the nearest integer. The solutions are appropriate based on this error.
38 A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[ \tan 52° = \frac{x}{9} \]

\[ x = 11.5 \]

Determine, to the nearest foot, the length of the metal pipe.

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

\[ 81 + 144 = y^2 \]

\[ 225 = y^2 \]

\[ 15 = y \]

Score: 3

The student makes a computational error in finding the third angle of the triangle. The solutions are appropriate based on this error.
38 A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\tan \theta = \frac{9}{x} \\
x \tan 48^\circ = 9 \\
\frac{x}{1.11} = 9 \\
x = 9 \times 1.11 \\
x = 9.99 \\
x = 10
\]

Determine, to the nearest foot, the length of the metal pipe.

\[
\cos \theta = \frac{9}{x} \\
\cos 48^\circ = \frac{9}{x} \\
8 \cos 48^\circ = x \\
x = 5.35 \text{ ft} \\
x = 5.4 \text{ ft}
\]

Score: 2

The student writes a correct formula in each part but makes errors in the solution of the equations in each part.
38 A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\text{SOH CAH TOA} \\
(x) \tan(48°) = \frac{9}{x} \\
\tan(48°) = 1.11 \\
x = \frac{9}{1.11} \\
x \approx 8.1 \\
8 \text{ ft} \\
\]

Determine, to the nearest foot, the length of the metal pipe.

\[
c^2 = a^2 + b^2 \\
c^2 = 81 + 100 \\
c^2 = 181 \\
c \approx 13.45 \\
13 \text{ ft} \\
\]

Score: 2

The student’s work in the first part is completely incorrect, but the student uses a correct method in the second part to find an appropriate solution.
A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[ \tan 48^\circ = \frac{9}{x} \]

\[ \tan 48^\circ = \frac{9}{48} \approx 0.1875 \]

Determine, to the nearest foot, the length of the metal pipe.

\[ \frac{\tan 48^\circ}{48} = 5 \]

Score: 1

The student writes one correct trigonometric equation for the first part, but no further correct work is shown.
A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of $48^\circ$ with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\tan 48^\circ = \frac{9}{x} \quad \Rightarrow \quad x = \frac{9}{\tan 48^\circ} \approx 8.1
\]

Determine, to the nearest foot, the length of the metal pipe.

\[
\]

\[
9^2 + B^2 = 8.1^2
\]

\[
81 + B^2 = 65.61
\]

\[
B^2 = 15.89
\]

\[
B = 3.9\text{ or } 4.
\]

Score: 1

The student has one correct equation.
38 A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of $48^\circ$ with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\tan 48^\circ = \frac{9}{x}
\]

\[
(9) 1.201 = \frac{9}{x}
\]

\[x = 10.8\]

\[x = 11 \text{ feet}\]

Determine, to the nearest foot, the length of the metal pipe.

\[
\sin 48^\circ = \frac{9}{11}
\]

\[0.766 = 0.8181
\]

\[+ , 766 = + , 766\]

\[\sqrt{1.5863}\]

\[x = 2 \text{ ft}\]

Score: 1

In the first part, the student indicates that $\tan 48^\circ = \frac{9}{x}$. 

A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of $48^\circ$ with the ground.

Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence.

\[
\frac{9}{\sqrt{13}} \approx 2.18 \text{ feet}
\]

Determine, to the nearest foot, the length of the metal pipe.

\[
7 \text{ feet}
\]

Score: 0

The students work is incorrect. In order to receive 1 point, the student would need both correct answers with no work.
39 On the set of axes below, graph the following system of equations.

\begin{align*}
y + 2x &= x^2 + 4 \\
y - x &= 4 \\
y &= x^2 - 3y + 4
\end{align*}

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

\begin{align*}
(0, 4) & \quad (2, 1)
\end{align*}

Score: 4

The student has a complete and correct response.
39 On the set of axes below, graph the following system of equations.

\[ y + 2x = x^2 + 4 \]
\[ y - x = 4 \]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 4

The student has a complete and correct response.
39 On the set of axes below, graph the following system of equations.

\[
\begin{align*}
y + 2x &= x^2 + 4 \\
y - x &= 4
\end{align*}
\]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 3

The student graphs both equations correctly, but only states one solution.
39 On the set of axes below, graph the following system of equations.

\[ y + 2x = x^2 + 4 \]
\[ y - x = 4 \]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 2

The student makes an error graphing the parabola and only states one solution correctly.
39 On the set of axes below, graph the following system of equations.

\[
\begin{align*}
    y + \frac{3}{2}x &= x^2 + 4 - 2x \\
    y - x &= 4 + x \\
    y &= \frac{1}{2}x + 2
\end{align*}
\]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 2

The student makes a conceptual error when graphing the parabola, but appropriate solutions are found.
39 On the set of axes below, graph the following system of equations.

\[
\begin{align*}
y + 2x &= x^2 + 4 \\
y - x &= 4 \\
y &= x + 4
\end{align*}
\]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 2

The student graphs both equations correctly, but the solutions are not stated.
39 On the set of axes below, graph the following system of equations.

\[ y + 2x = x^2 + 4 \]
\[ y - x = 4 \]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 1

The student graphs one equation correctly.
39 On the set of axes below, graph the following system of equations.

\[
\begin{align*}
  y + 2x &= x^2 + 4 \\
  y - x &= 4
\end{align*}
\]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 1

The student graphs the parabola correctly.
39 On the set of axes below, graph the following system of equations.

\[
\begin{align*}
y + 2x &= x^2 + 4 \\
y - x &= 4 \\
\end{align*}
\]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

Score: 0

No correct work is shown.