The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA 2/ TRIGONOMETRY

Friday, June 17, 2016 — 9:15 a.m. – 12:15 p.m.

SAMPLE RESPONSE SET

Table of Contents

Question 28

28 Factor $6x^3 + 33x^2 - 63x$ completely.

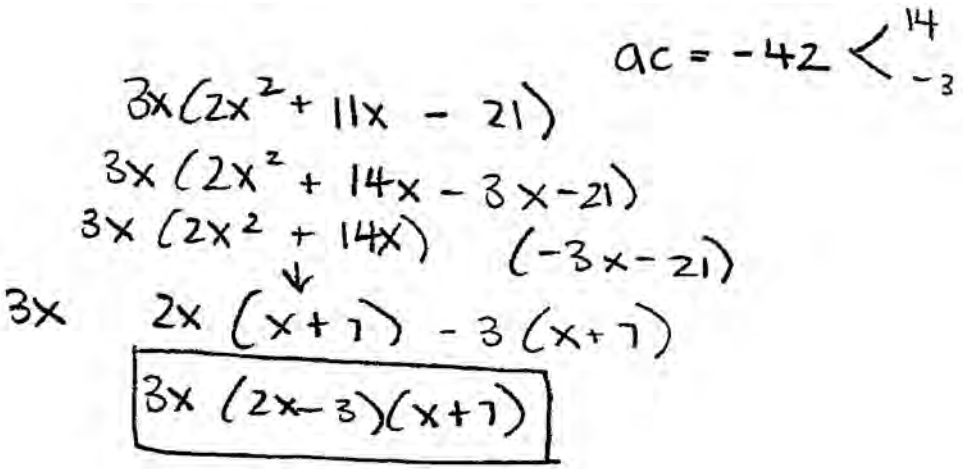
$3x(2x^2 + 11x - 21)$

$3x(2x - 3)(x + 7)$

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

Question 28

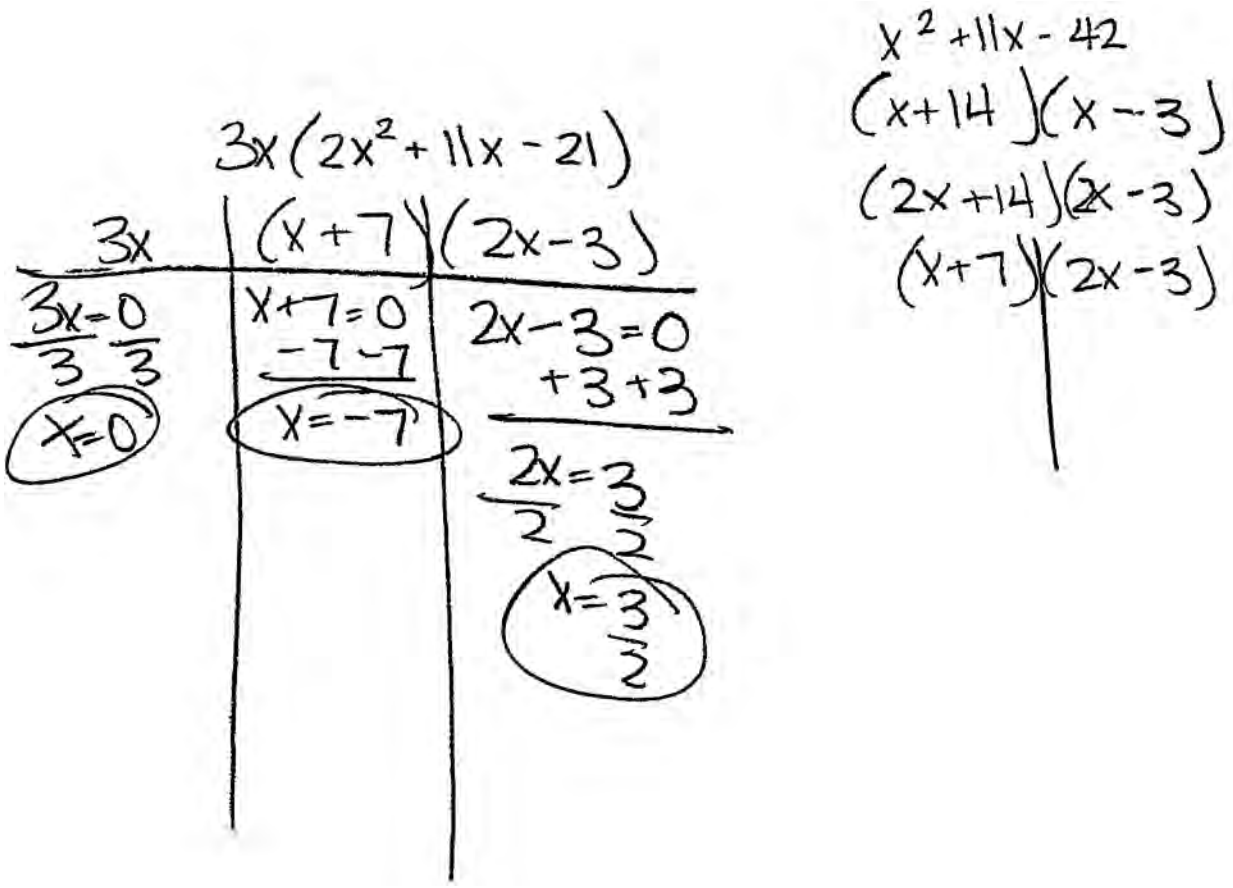
28 Factor $6x^3 + 33x^2 - 63x$ completely.



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

Question 28

28 Factor $6x^3 + 33x^2 - 63x$ completely.



Score: 1 The student made an error by treating the expression as an equation.

Question 28

28 Factor $6x^3 + 33x^2 - 63x$ completely.

$3x(2x^2 + 11x - 21)$

$3x(2x + 7)(x - 3)$

Score: 1 The student made one factoring error.

Question 28

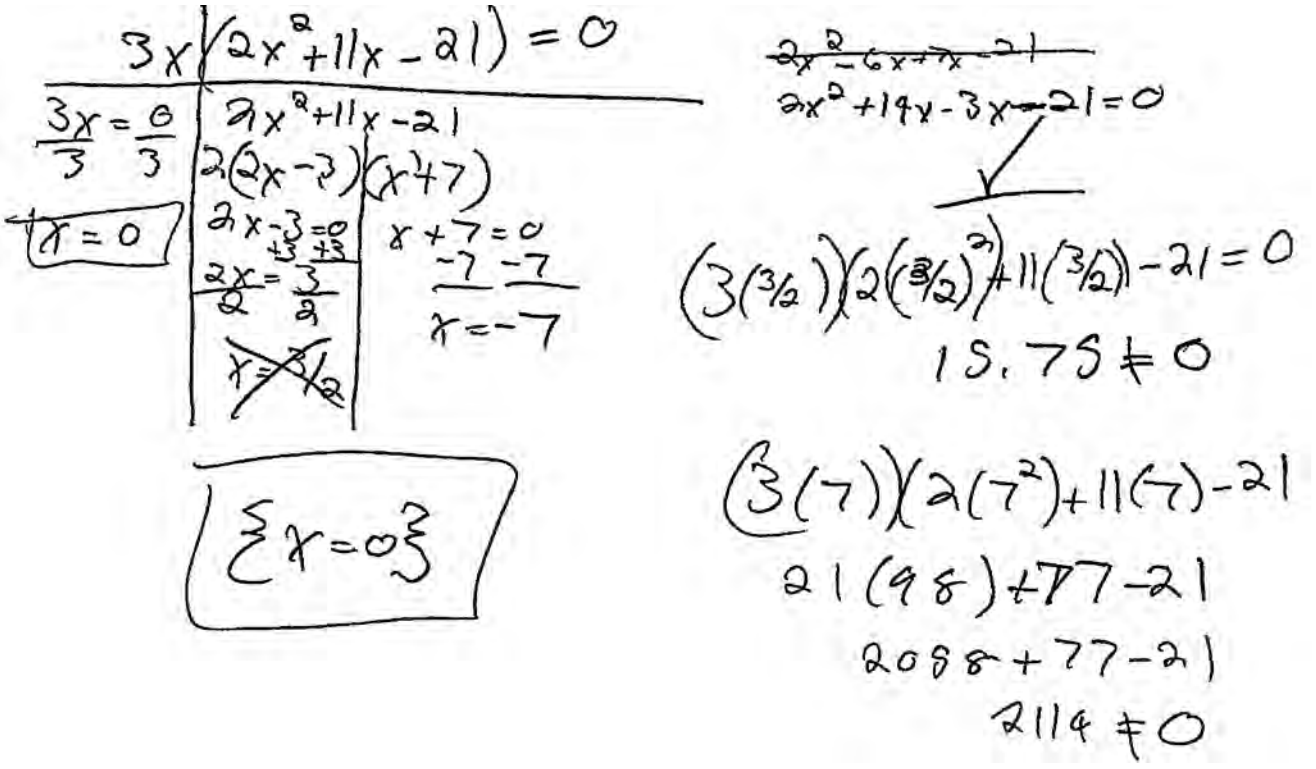
28 Factor $6x^3 + 33x^2 - 63x$ completely.

$3x(2x^2+11x-21)$

Score: 1 The student did not factor completely.

Question 28

28 Factor $6x^3 + 33x^2 - 63x$ completely.



Score: 0 The student factored incorrectly and treated the expression as an equation.

Question 29

29 Five thousand dollars is invested at an interest rate of 3.5% compounded quarterly. No money is deposited or withdrawn from the account. Using the formula below, determine, to the *nearest cent*, how much this investment will be worth in 18 years.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A = amount
P = principal
r = interest rate
n = number of times the interest rate compounded annually
t = time in years

$A = 5000\left(1 + \frac{.035}{4}\right)^{4 \cdot 18}$

$A = \$9362.36$

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

Question 29

29 Five thousand dollars is invested at an interest rate of 3.5% compounded quarterly. No money is deposited or withdrawn from the account. Using the formula below, determine, to the *nearest cent*, how much this investment will be worth in 18 years.

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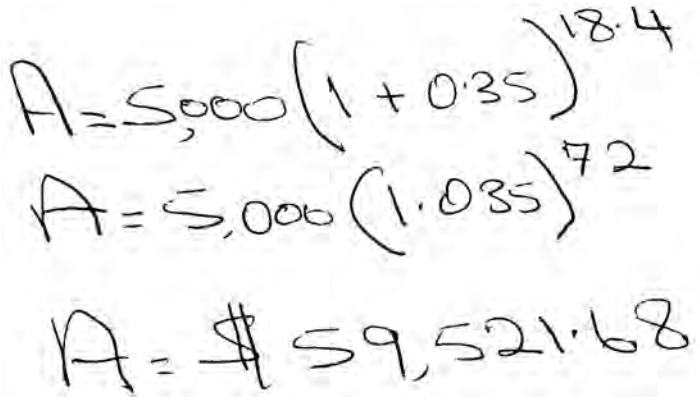

Score: 1 The student did not divide 0.035 by 4 to get the quarterly rate.

Question 29

29 Five thousand dollars is invested at an interest rate of 3.5% compounded quarterly. No money is deposited or withdrawn from the account. Using the formula below, determine, to the *nearest cent*, how much this investment will be worth in 18 years.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

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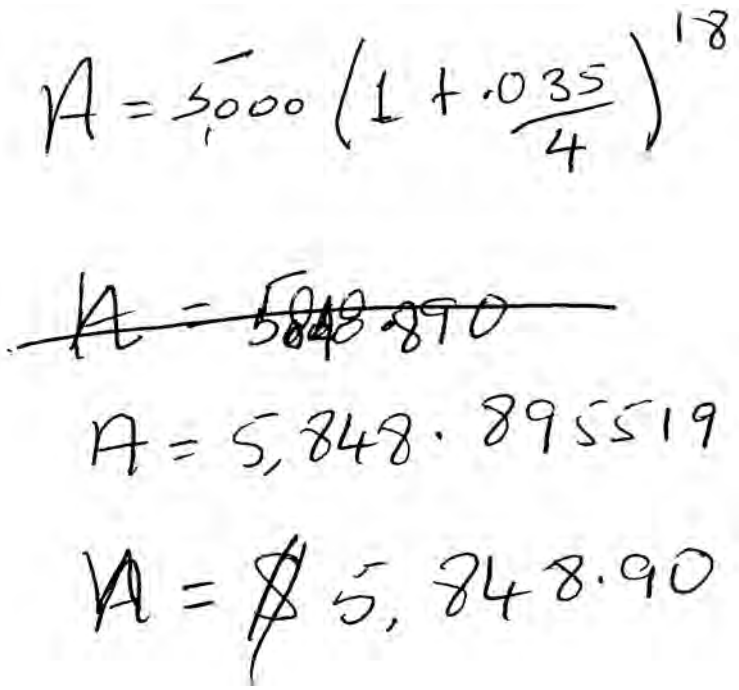

Score: 1 The student did not multiply the number of years by 4.

Question 29

29 Five thousand dollars is invested at an interest rate of 3.5% compounded quarterly. No money is deposited or withdrawn from the account. Using the formula below, determine, to the *nearest cent*, how much this investment will be worth in 18 years.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A = amount
P = principal
r = interest rate
n = number of times the interest rate compounded annually
t = time in years

$5000\left(1+\frac{3.5}{4}\right)^{18\cdot4}$

$5,069,883,615.22$

Score: 0 The student gave a completely incorrect response.

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
0	200
1	425
2	570
3	800
4	1035
5	1650
6	2600

State the exponential regression equation for the data, rounding all values to the *nearest hundredth*.

$a = 239.21$

$b = 1.48$

$y = 239.21(1.48)^x$

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

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
0	200
1	425
2	570
3	800
4	1035
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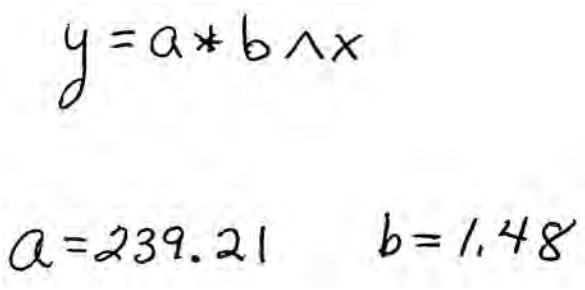
State the exponential regression equation for the data, rounding all values to the *nearest hundredth*.



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

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
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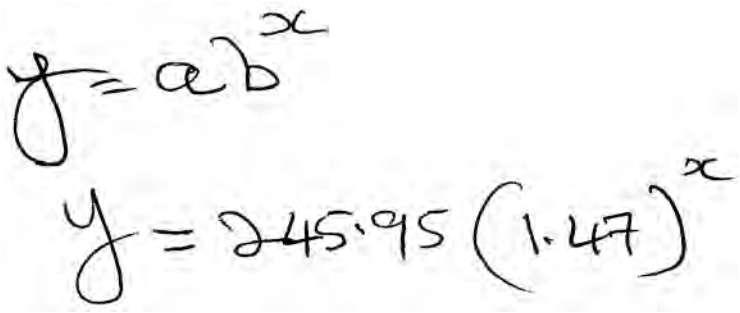


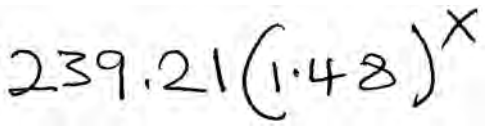
Score: 1 The student wrote an incorrect exponential regression equation. [The student may have not cleared the frequency on the exponential regression screen on the calculator after doing question number 25.]

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
0	200
1	425
2	570
3	800
4	1035
5	1650
6	2600

State the exponential regression equation for the data, rounding all values to the *nearest hundredth*.



Score: 1 The student wrote an expression instead of an equation.

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
0	200
1	425
2	570
3	800
4	1035
5	1650
6	2600

State the exponential regression equation for the data, rounding all values to the *nearest hundredth*.

$y = ab^x$

$a = 239.2$

$b = 1.5$

$y = [(239.2)(1.5)]^x$

Score: 0 The student rounded both values to the nearest tenth and made a conceptual error when writing the equation.

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
0	200
1	425
2	570
3	800
4	1035
5	1650
6	2600

State the exponential regression equation for the data, rounding all values to the *nearest hundredth*.

$a = 239.211$

$b = 1.481$

$239.211(1.481)^x$

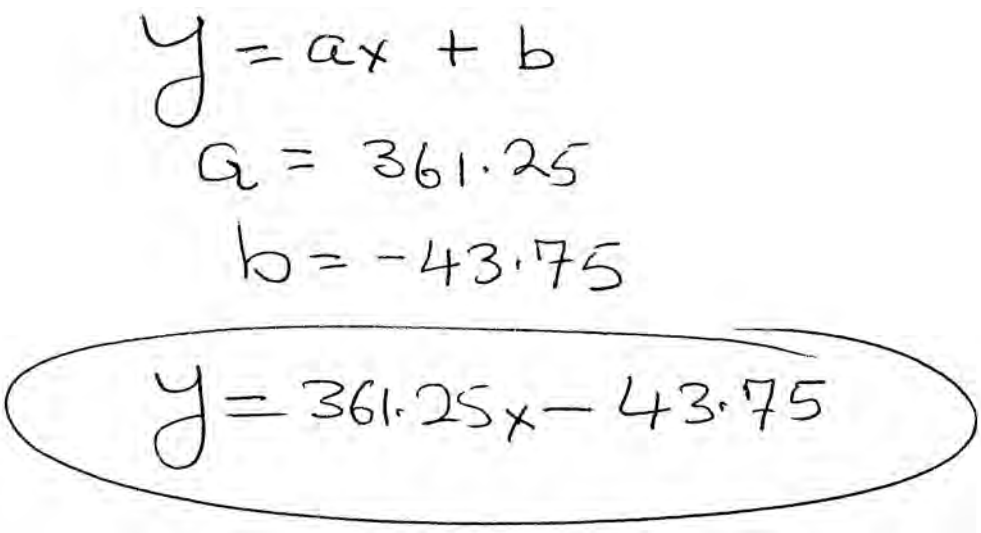
Score: 0 The student rounded incorrectly and wrote an expression instead of an equation.

Question 30

30 A colony of bacteria grows exponentially. The table below shows the data collected daily.

Day (x)	**Population** (y)
0	200
1	425
2	570
3	800
4	1035
5	1650
6	2600

State the exponential regression equation for the data, rounding all values to the *nearest hundredth*.



Score: 0 The student made an error by finding a linear regression.

Question 31

31 Express $\dfrac{2 + \dfrac{6}{x-3}}{\dfrac{x}{x-3}}$ in simplest form, when $x \neq 0$ and $x \neq 3$.

$\dfrac{2 + \dfrac{6}{x-3}}{\dfrac{x}{x-3}}\left(\dfrac{x-3}{x-3}\right) =$

$\dfrac{2x-6+6}{x} =$ 2

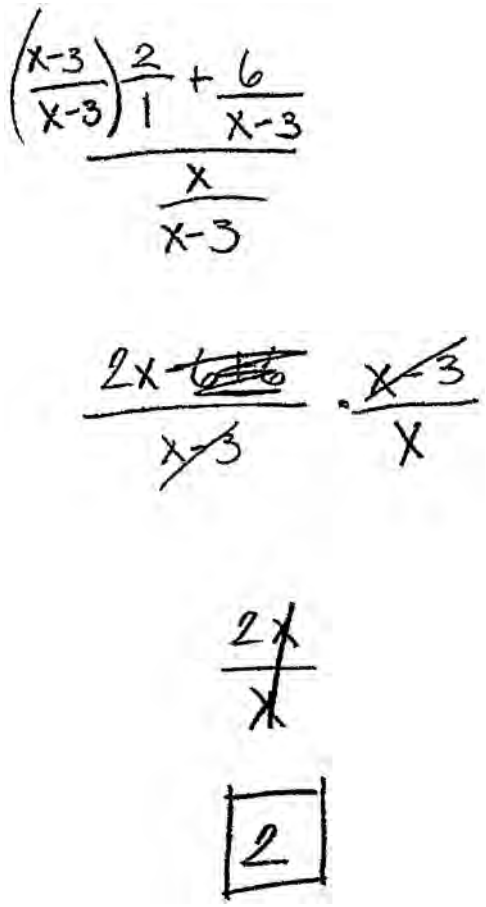
$\dfrac{2x}{x} =$

2

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

Question 31

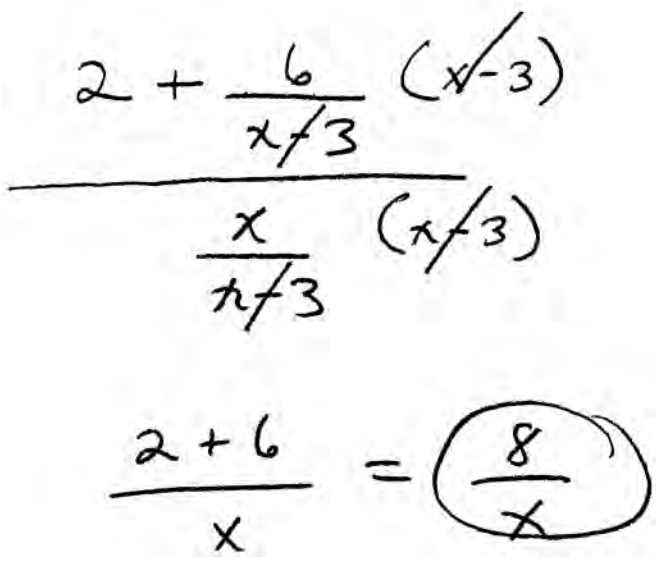
31 Express $\dfrac{2 + \dfrac{6}{x-3}}{\dfrac{x}{x-3}}$ in simplest form, when $x \neq 0$ and $x \neq 3$.



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

Question 31

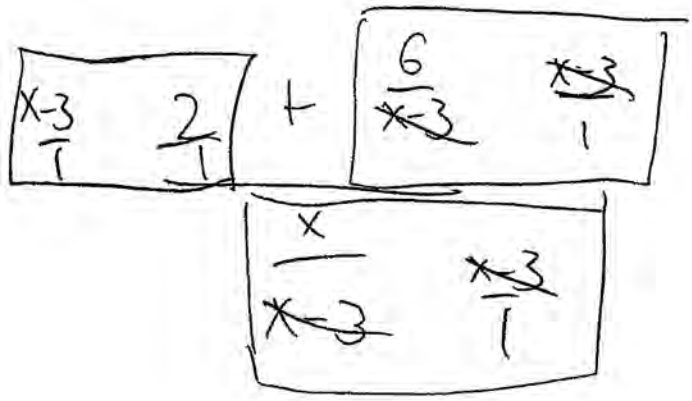
31 Express $\dfrac{2 + \dfrac{6}{x-3}}{\dfrac{x}{x-3}}$ in simplest form, when $x \neq 0$ and $x \neq 3$.



Score: 1 The student made an error by not multiplying both terms of the numerator by $(x - 3)$.

Question 31

31 Express $\dfrac{2 + \dfrac{6}{x-3}}{\dfrac{x}{x-3}}$ in simplest form, when $x \neq 0$ and $x \neq 3$.



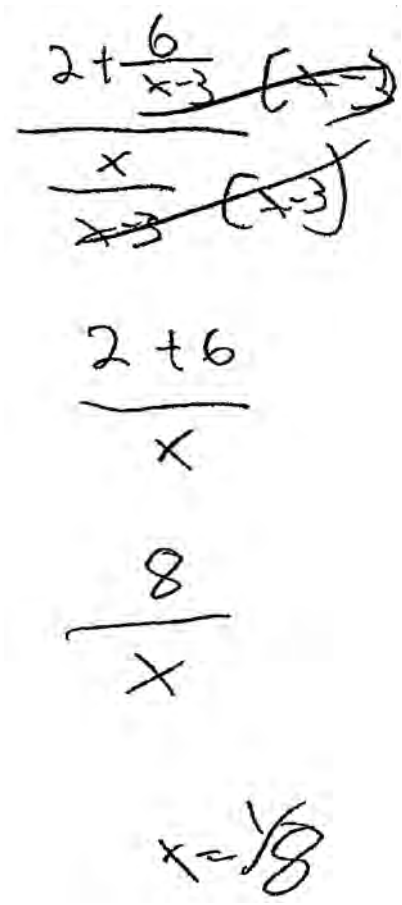
$$\frac{2x-6+6}{x}$$

$$\frac{2x}{x}$$

Score: 1 The student did not simplify completely.

Question 31

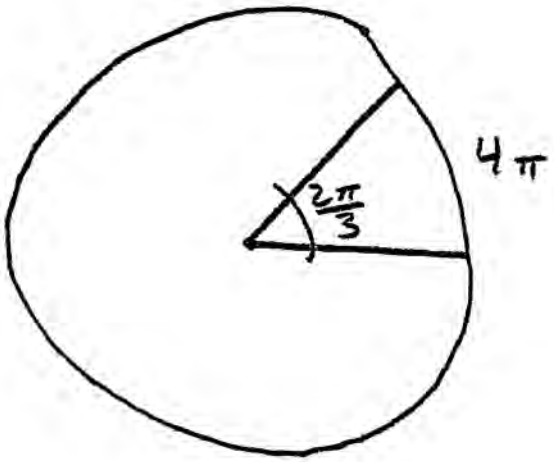
31 Express $\dfrac{2 + \dfrac{6}{x-3}}{\dfrac{x}{x-3}}$ in simplest form, when $x \neq 0$ and $x \neq 3$.



Score: 0 The student made an error by not multiplying both terms of the numerator by $(x - 3)$ and stated the final answer as an equation.

Question 32

32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.



$s = \theta r$

$s = 4\pi$

$\theta = \frac{2\pi}{3}$

$\frac{3}{1} \cdot \frac{2}{2\pi} \cdot 4\pi = \left(\frac{2\pi}{3}\right) r \cdot \frac{3}{2\pi}$

$6 = r$

6

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

Question 32

32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.

$\frac{2\pi}{3} \cdot r = 4\pi$

$\frac{r}{3} = 2$

$r = 6$

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

Question 32

32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.

$\frac{2(180)}{3} = 120$

$\frac{120}{360} = \frac{4\pi}{2\pi r}$

$\frac{1}{3} = \frac{2}{r}$

$r = 6$

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

Question 32

32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.

$$\frac{\frac{2\pi}{3}}{2\pi} = \frac{4\pi}{2\pi r}$$

$$8\pi^2 = \frac{4\pi^2 r}{3}$$

$$24\pi^2 = 4\pi^2 r$$

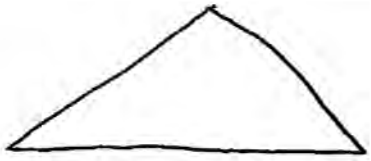
$$6 = r$$

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

Question 32

32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.

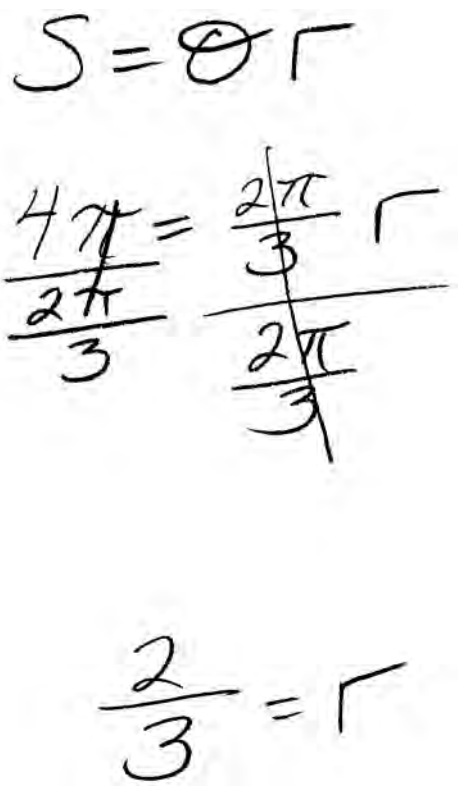
$\frac{2\pi}{3} \times \frac{1}{4\pi} = \frac{1}{6}$ (feet)



Score: 1 The student made an error by dividing $\frac{2\pi}{3}$ by 4π.

Question 32

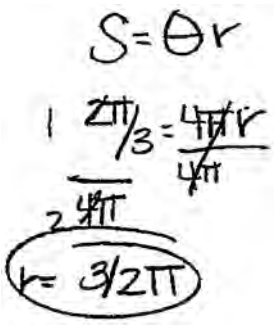
32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.



Score: 1 The student made an error when dividing by $\frac{2\pi}{3}$.

Question 32

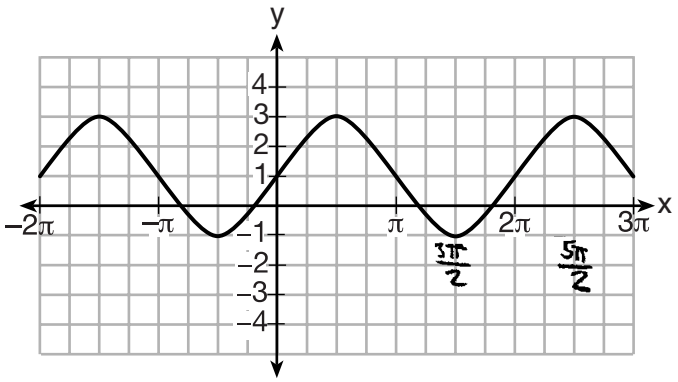
32 A central angle whose measure is $\frac{2\pi}{3}$ radians intercepts an arc with a length of 4π feet. Find the radius of the circle, *in feet*.



Score: 0 The student made an error by interchanging the arc length and angle measure, and then made an error when dividing by 4π.

Question 33

33 A sine function is graphed below.



$\frac{4\pi + \pi}{2} \frac{\pi}{2} = \frac{5\pi}{2}$

$\frac{4\pi}{2}$

Determine and state the amplitude and period of this function.

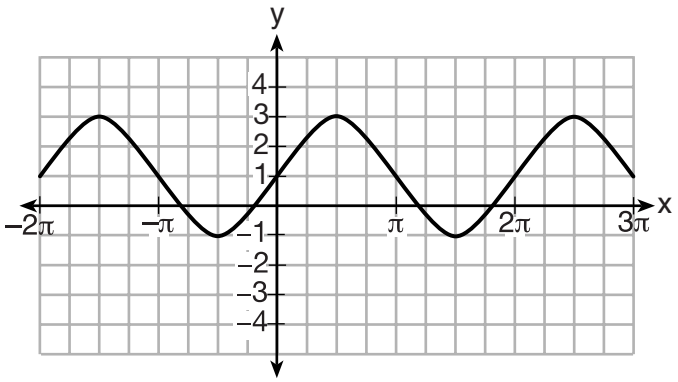
amplitude: 2

Period: 2π

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

Question 33

33 A sine function is graphed below.



Determine and state the amplitude and period of this function.

1.5

450

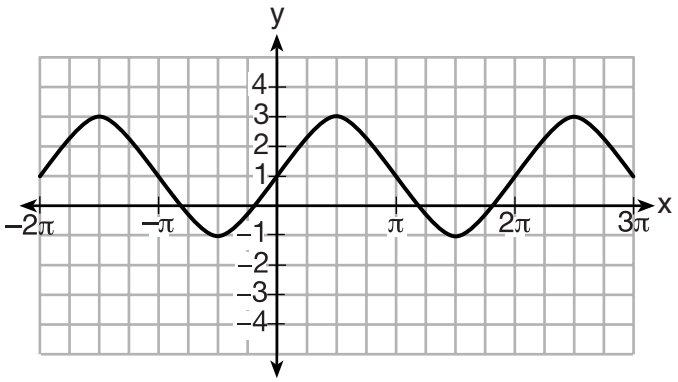
Amp = 2

per = 2.5π

Score: 1 The student stated an incorrect period.

Question 33

33 A sine function is graphed below.



Determine and state the amplitude and period of this function.

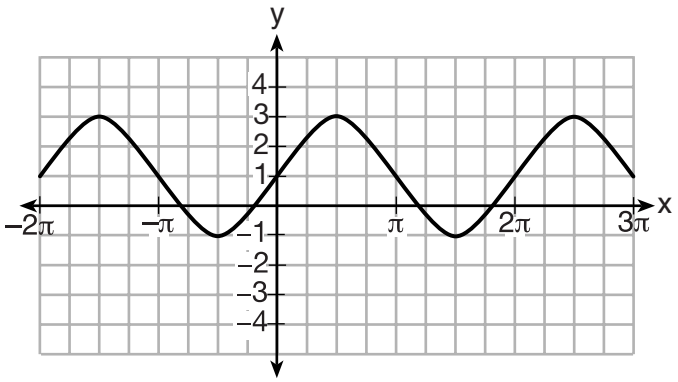
AMPLITUDE = 4

PERIOD = 2π

Score: 1 The student stated an incorrect amplitude.

Question 33

33 A sine function is graphed below.



Determine and state the amplitude and period of this function.

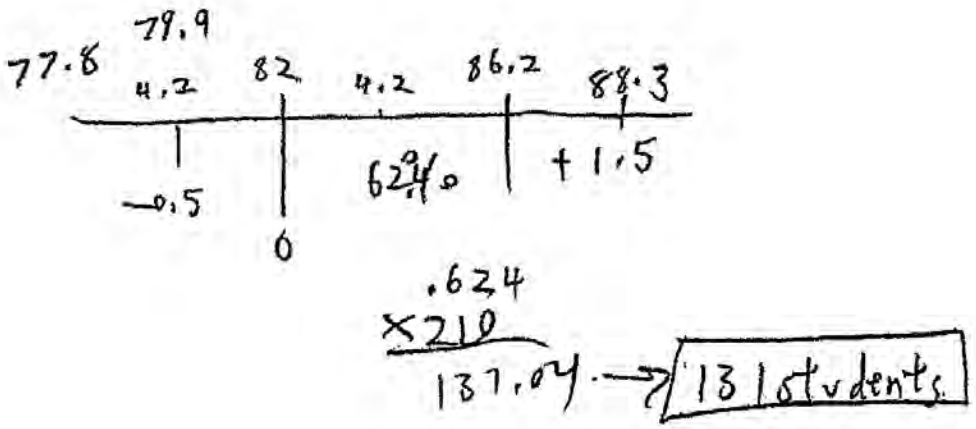
Amplitude - 2.3
Period - $\frac{1}{2\pi}$

Score: 0 The student stated an incorrect amplitude and period.

Question 34

34 On the Algebra 2/Trigonometry midterm at Champion High School, the scores of 210 students were normally distributed with a mean of 82 and a standard deviation of 4.2.

Determine how many students scored between 79.9 and 88.3.

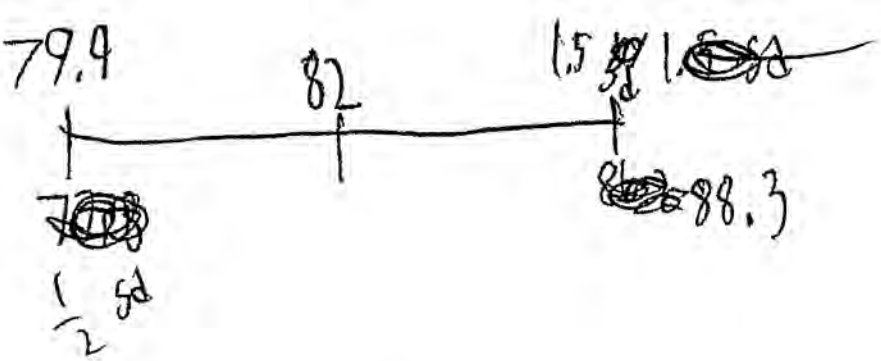


Score: 2 The student gave a complete and correct response.

Question 34

34 On the Algebra 2/Trigonometry midterm at Champion High School, the scores of 210 students were normally distributed with a mean of 82 and a standard deviation of 4.2.

Determine how many students scored between 79.9 and 88.3.



$$\frac{62.4}{100} = \frac{x}{210}$$

$$13{,}104 = 100x$$

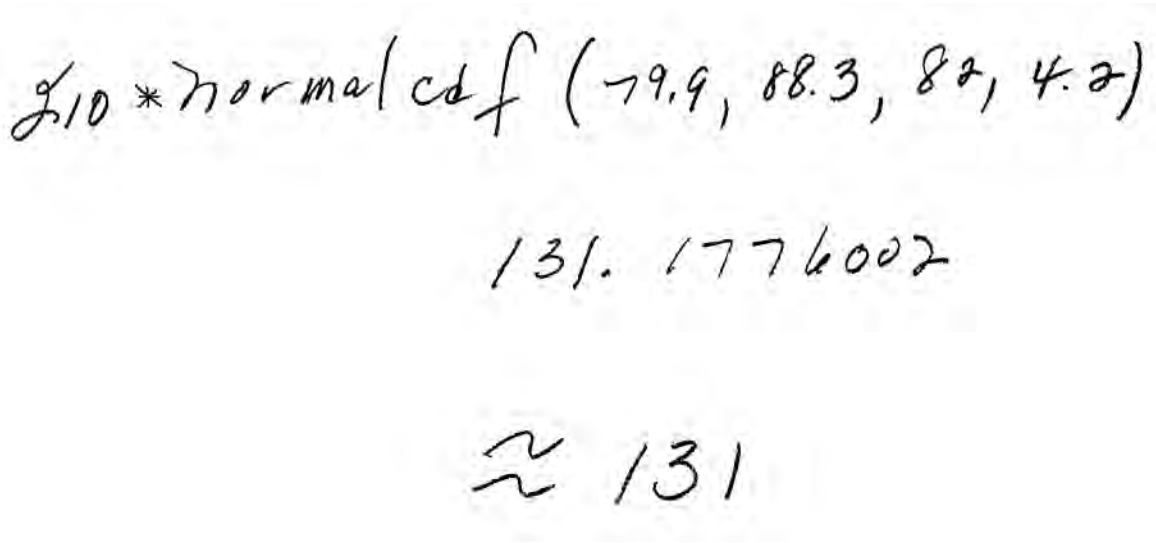
$$x = 131 \text{ students}$$

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

Question 34

34 On the Algebra 2/Trigonometry midterm at Champion High School, the scores of 210 students were normally distributed with a mean of 82 and a standard deviation of 4.2.

Determine how many students scored between 79.9 and 88.3.

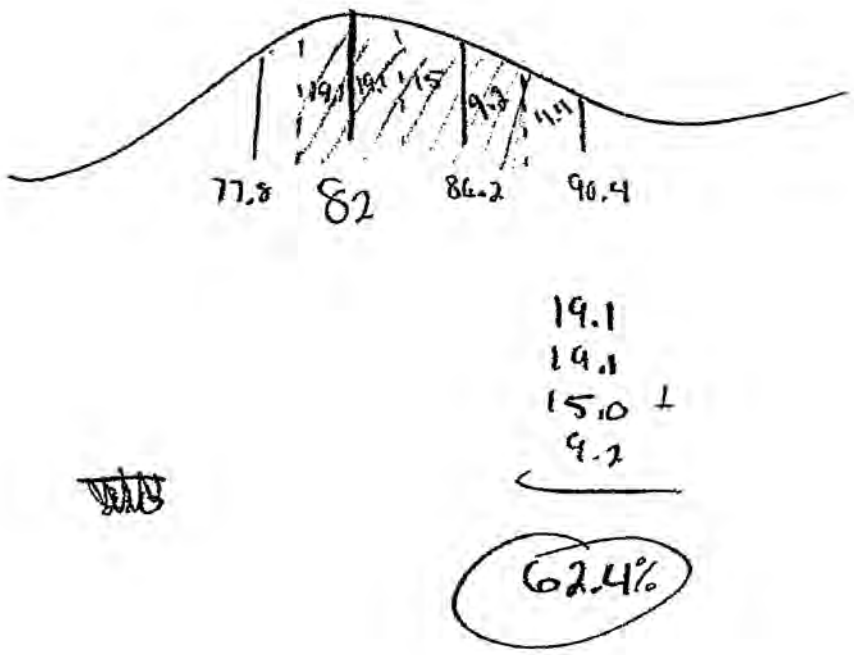


Score: 2 The student gave a complete and correct response.

Question 34

34 On the Algebra 2/Trigonometry midterm at Champion High School, the scores of 210 students were normally distributed with a mean of 82 and a standard deviation of 4.2.

Determine how many students scored between 79.9 and 88.3.

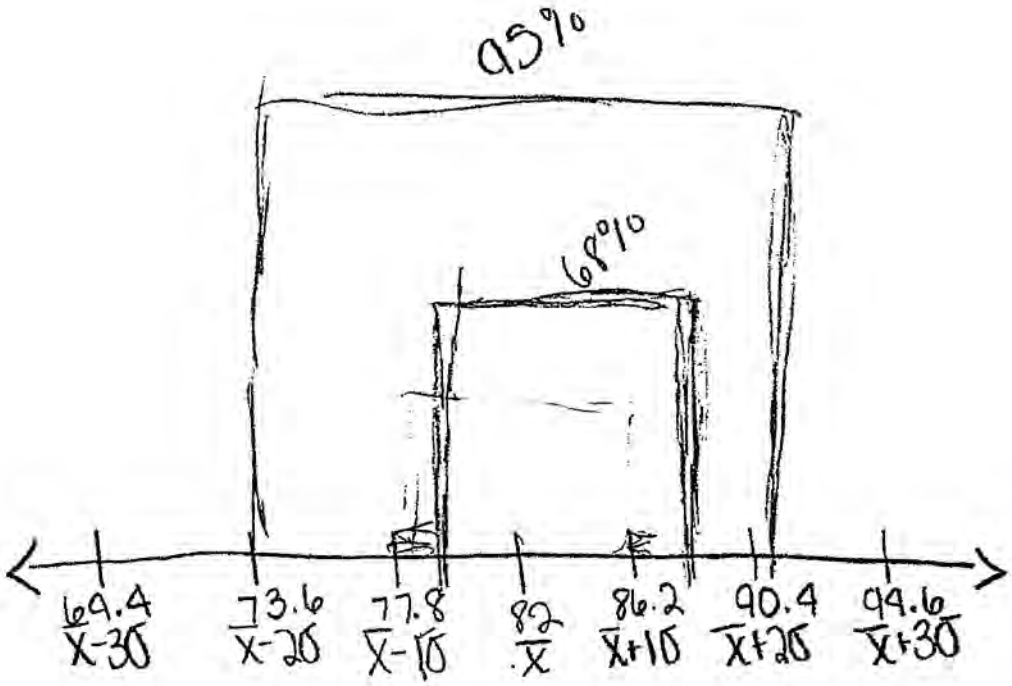


Score: 1 The student did not determine the number of students.

Question 34

34 On the Algebra 2/Trigonometry midterm at Champion High School, the scores of 210 students were normally distributed with a mean of 82 and a standard deviation of 4.2.

Determine how many students scored between 79.9 and 88.3.



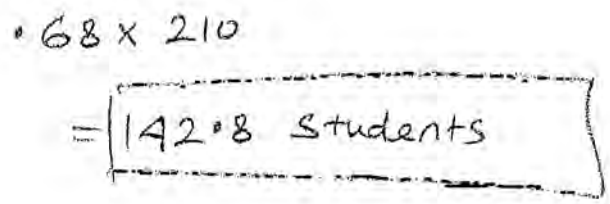
.68(210)
142 students

Score: 1 The student made an error in finding the percentage.

Question 34

34 On the Algebra 2/Trigonometry midterm at Champion High School, the scores of 210 students were normally distributed with a mean of 82 and a standard deviation of 4.2.

Determine how many students scored between 79.9 and 88.3.



Score: 0 The student made an error in calculating the percentage and did not round appropriately.

Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.

Soheandra

$\frac{\sin}{\cos} = -\frac{5}{12}$

$\sin\theta\left(\frac{\cos\theta}{\sin\theta}\right)$

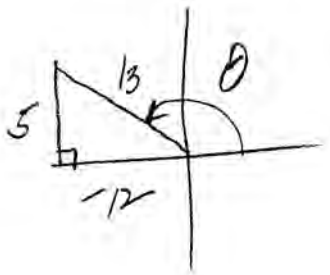
$\left(\frac{5}{13}\right)\frac{\frac{-12}{13}}{\frac{5}{13}}\left(\frac{13}{5}\right)$

$\left(\frac{5}{13}\right)\left(\frac{-12}{5}\right) = \boxed{\frac{-60}{65}}$

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

Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.



$\tan\theta = -\frac{5}{12}$

$\theta = \tan^{-1}\left(-\frac{5}{12}\right)$

$(\theta = 157.3801351)$

$\sin\theta \cot\theta = -0.9230769231$

$= -0.\overline{923076}$

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

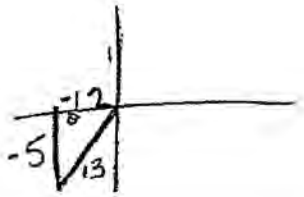
Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.

$\tan\theta = \frac{-5}{12}$ and $\frac{\pi}{2} < \theta < \pi$

S | A

T | C



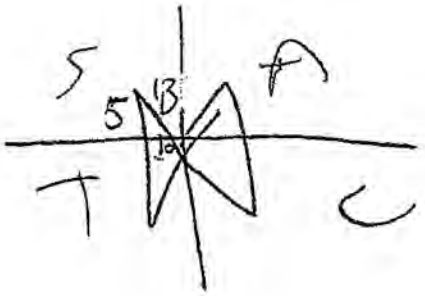
$\sin\theta \cot\theta$

$\left(\frac{-5}{13}\right)\left(\frac{-12}{-5}\right)$ $\frac{60}{-65}$

Score: 1 The student made an error by placing the angle in Quadrant III.

Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.



$\sin\theta = \frac{5}{13}$

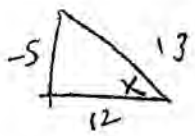
$\cot = -\frac{12}{5}$

Score: 1 The student made an error by not finding the product.

Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.

90 180



$\sin x = \frac{-5}{13}$

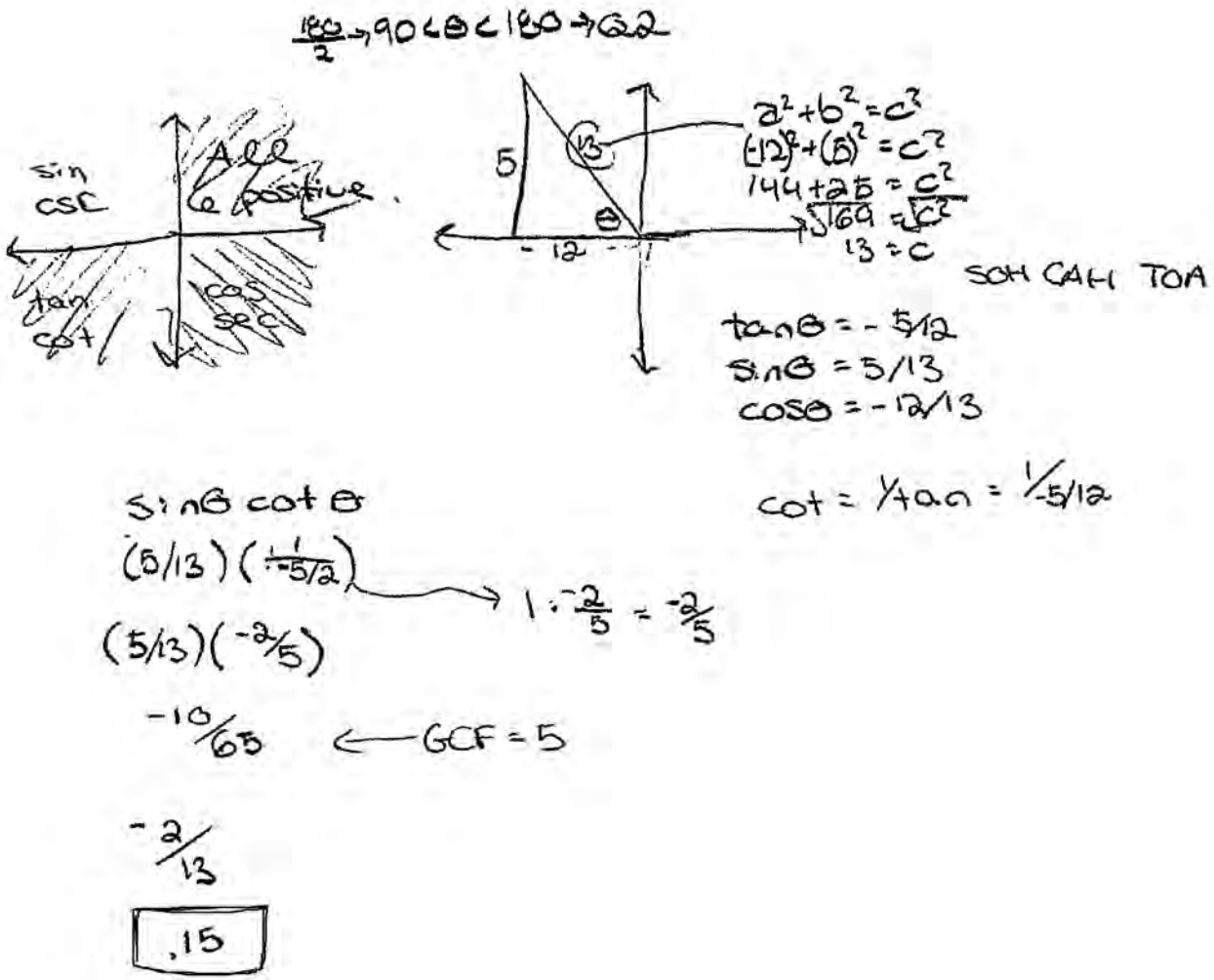
$\cot = -\frac{12}{5}$

$\left(-\frac{5}{13}\right)\left(-\frac{12}{5}\right) = \frac{60}{65}$

Score: 1 The student labeled the triangle incorrectly.

Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.



Score: 0 The student made a transcription error when expressing cot θ and did not express the exact value as the final answer.

Question 35

35 Given $\tan\theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin\theta \cot\theta$.

$\theta = \tan^{-1}(-5/12)$

$\theta = -22.61986495$

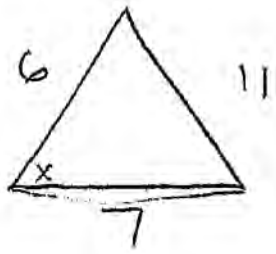
$(\sin(-22.619\ldots))\left(\frac{1}{\sin(-22.619\ldots)}\right)$

$\boxed{1}$

Score: 0 The student gave a completely incorrect response.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



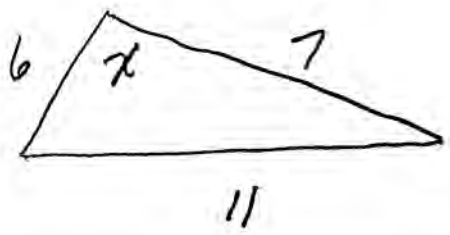
$11^2 = 6^2 + 7^2 - 2(6)(7)\cos A$

115.4°

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

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



$$x = \cos^{-1}\left(\frac{6^2 + 7^2 - 11^2}{2(6)(7)}\right)$$

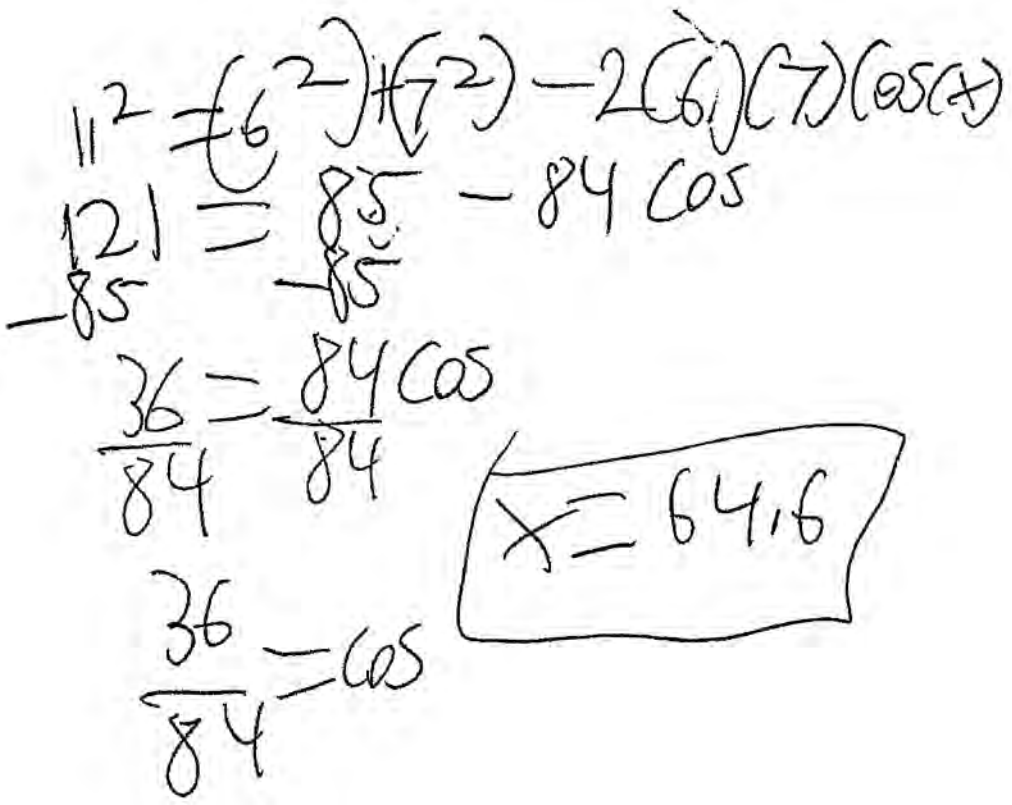
$$x = 115.3769335$$

$$x \approx 115.4$$

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

Question 36

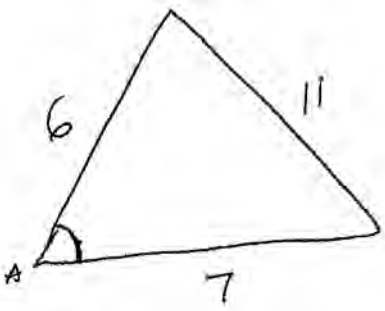
36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



Score: 3 The student made an error by dividing by 84 instead of −84.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



$11^2 = 6^2 + 7^2 - 2(6)(7)\cos A$

$121 = 85 - 84\cos A$

$-85 \quad -85$

$36 = -84\cos A$

$\frac{36}{-84} = \frac{-84\cos A}{-84}$

$\cos A = -.42857142\overline{86}$

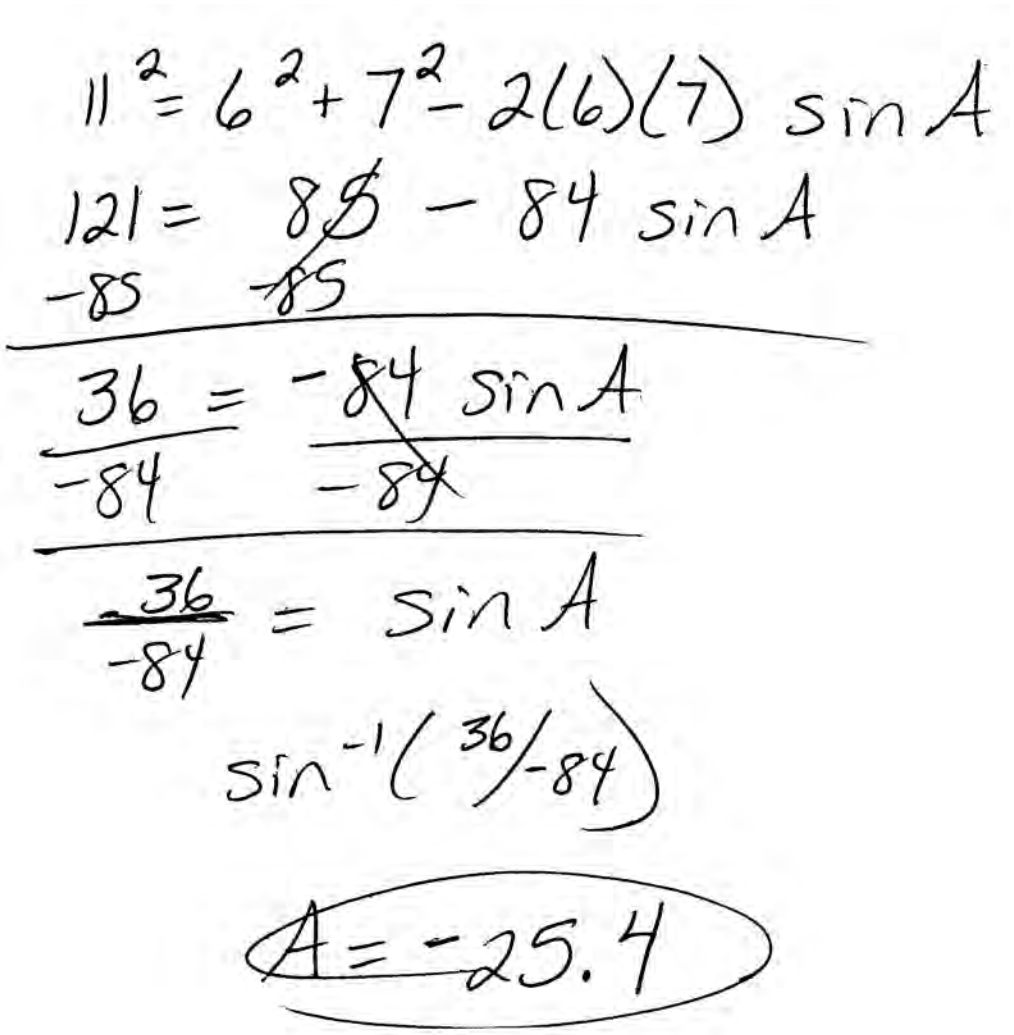
$A = 2.01$

$A = 2.0$

Score: 2 The student made an error by finding the measure of angle *A* in radians.

Question 36

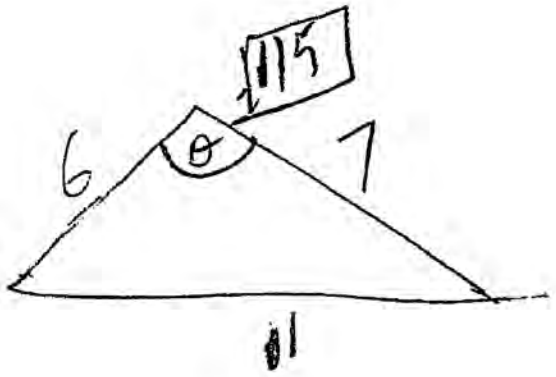
36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



Score: 2 The student made a transcription error by using sine instead of cosine, and did not recognize that −25.4 is not a viable solution.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



$11^2 = 6^2 + 7^2 - 2(6)(7)\cos\theta$

$121 = 85$

$-85 \quad -85$

$36 = -2(6)(7)\cos\theta$

$36 = -84\cos\theta$

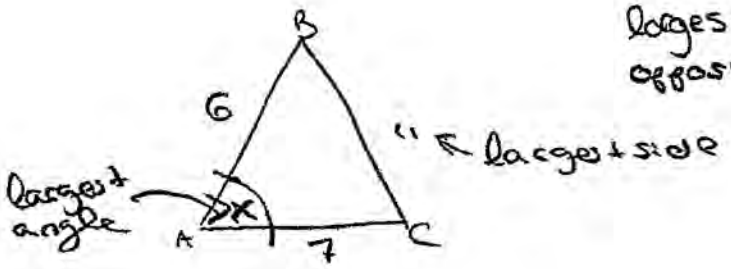
$\cos\theta = -.42857$

$\cos\theta = 115.3$

Score: 2 The student stated cos θ = 115.3 and did not round properly.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



Law of Cosine

$a^2 = b^2 + c^2 - 2bc\cos A$

$11^2 = 7^2 + 6^2 - 2(7)(6)\cos X$

$121 = 49 + 36 - 84\cos X$

$121 = 85 - 84\cos X$

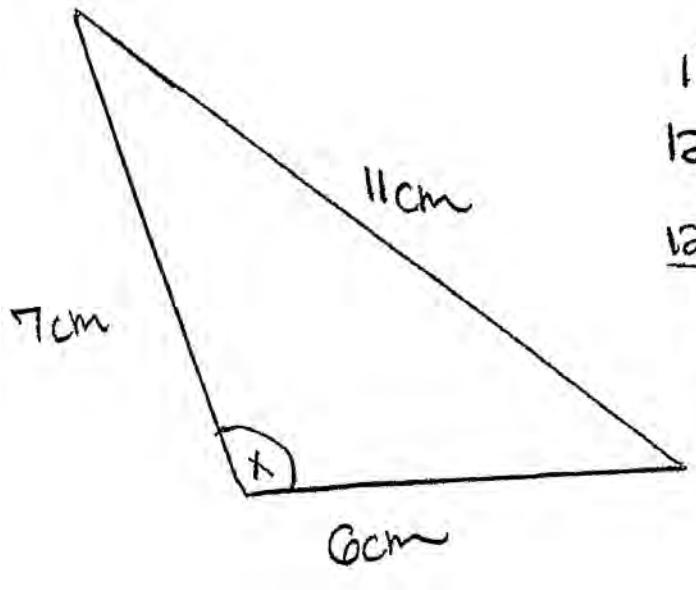
$36 = -84\cos X$

$-.43 = \cos X$

Score: 2 The student rounded prematurely and did not solve for x.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



$11^2 = 6^2 + 7^2 - 2(6)(7)\cos A$

$121 = 36 + 49 - 84\cos A$

$\frac{121}{1} = \frac{1\cos A}{1}$

$121 = \cos A$

121°

Score: 1 The student made a correct substitution into the Law of Cosines.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.

$6^2 = 7^2 + 11^2 - 2(7)(11)\cos x$

$36 = 49 + 121 - 154\cos x$

$36 = 170 - 154\cos x$

$-170 \quad -170$

$\frac{-134}{-154} = \frac{-154\cos x}{-154}$

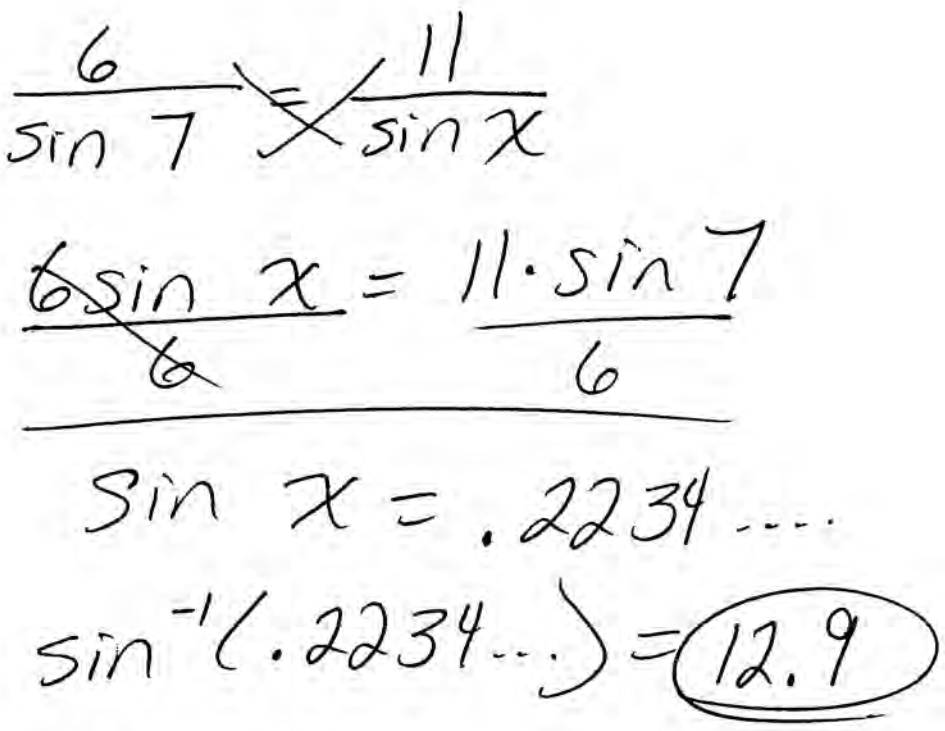
$\cos x = .8701298701$

$\measuredangle x = 29.53^\circ$

Score: 1 The student made an error by finding the smallest angle and rounding incorrectly.

Question 36

36 The lengths of the sides of a triangle are 6 cm, 11 cm, and 7 cm. Determine, to the *nearest tenth of a degree*, the measure of the largest angle of the triangle.



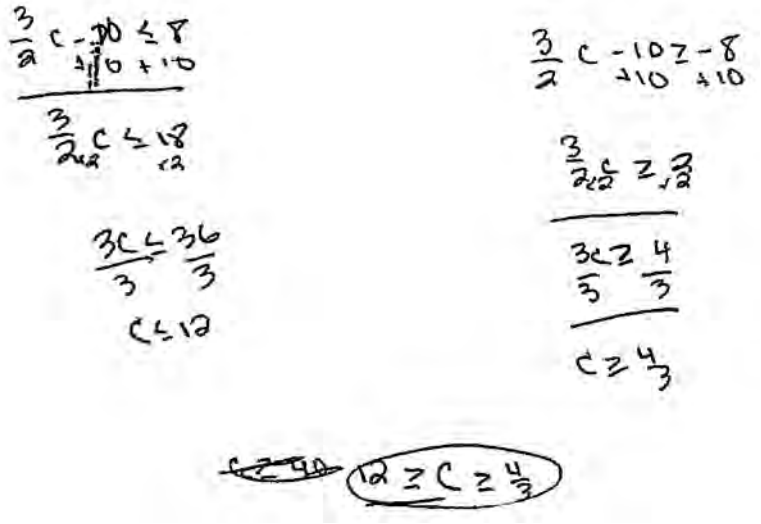
Score: 0 The student made an error by using the Law of Sines and treated the 7 as an angle.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

+9 +9



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

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

+9 +9

$\left|\frac{3}{2}c-10\right| \leq 8$

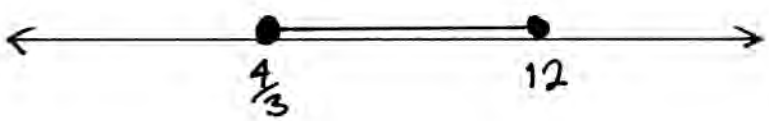
$\frac{3}{2}c-10 \leq 8$ $\quad -\left(\frac{3}{2}c-10\right) \leq 8$

$+10 \quad +10$ $\quad -\frac{3}{2}c+10 \leq 8$

$-10 \quad -10$

$\frac{2}{3}\left(\frac{3}{2}c\right) \leq (18)\frac{2}{3}$ $\quad -\frac{2}{3}\left(-\frac{3}{2}c\right) \leq (-2)\frac{-2}{3}$

$c \leq 12$ $\quad c \geq \frac{4}{3}$

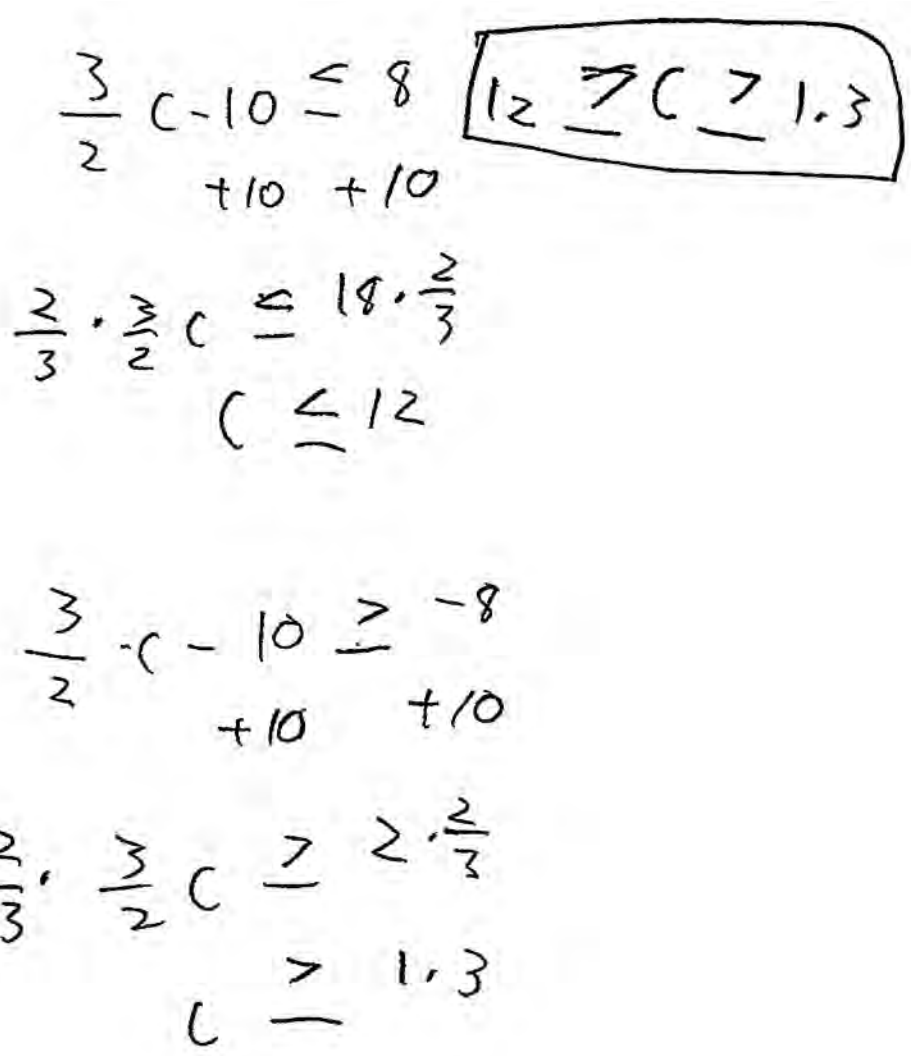


Score: 4 The student gave a complete and correct response.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$



Score: 3 The student made an error by expressing $\frac{4}{3}$ as 1.3 instead of $1.\overline{3}$.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

$\frac{3}{2}c - 10 - 9 \leq -1$

$\frac{3}{2}c - 19 \leq -1$

$\frac{3}{2}c \leq 18$

$c \leq 12$

$-\frac{3}{2}c + 10 - 9 \leq -1$

$-\frac{3}{2}c + 1 \leq -1$

$-\frac{3}{2}c \leq -2$

$\frac{3}{2}c \geq 2$

$c \geq 4/3$

$\{4/3, 12\}$

Score: 3 The student made an error by not stating the solution as a conjunction.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

$+9 \quad +9$

$\left|\frac{3}{2}c - 10\right| < 8$

$\frac{3}{2}c - 10 < 8$

$+10 \quad +10$

$\frac{3}{2}c < 18$

$\frac{\frac{3}{2}}{\frac{3}{2}}$

$c < 12$

$-\frac{3}{2}c + 10 < 8$

$-10 \quad -10$

$-\frac{3}{2}c < -2$

$-\frac{2}{2} < -\frac{3}{2}$

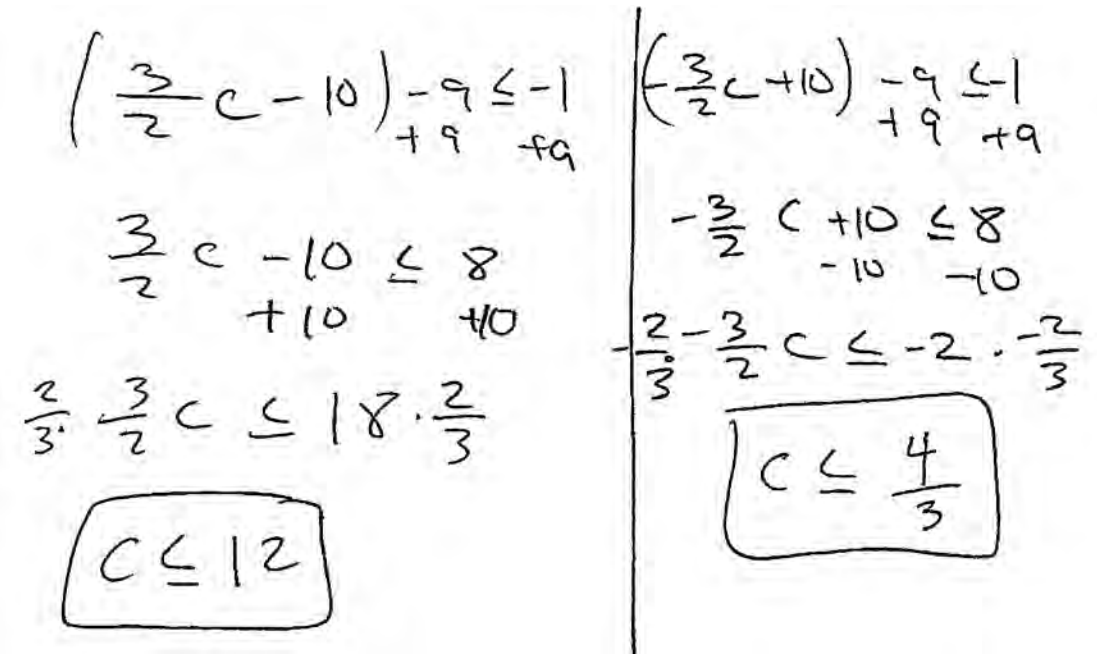
$< > 1.3\overline{3}$

Score: 2 The student made an error when writing the inequality symbol and did not write the solution as a conjunction.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$



Score: 2 The student did not reverse the inequality sign and did not write the solution as a conjunction.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

$+9 \quad +9$

$\frac{3}{2}c - 10 \leq 8$

$+10 \quad +10$

$\left(\frac{3}{2}\right)\frac{3}{2}c \leq 18\left(\frac{3}{2}\right)$

$c \leq 27$

$\frac{3}{2}c - 10 \geq -8$

$+10 \quad +10$

$\left(\frac{3}{2}\right)\frac{3}{2}c \geq 2\left(\frac{3}{2}\right)$

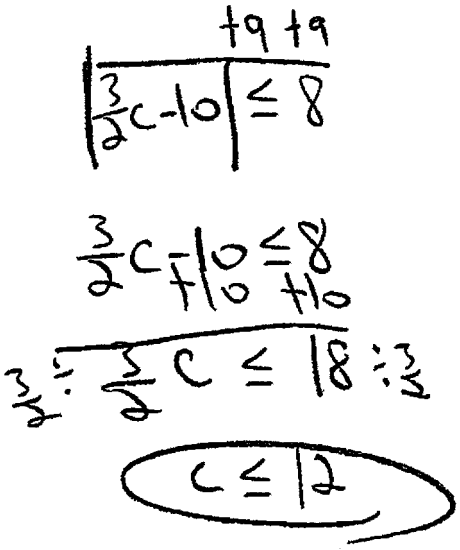
$c \geq 3$

Score: 1 The student made a conceptual error by multiplying by $\frac{3}{2}$ and then did not state the solution as a conjunction.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$



Score: 1 The student made an error by only solving for $c \leq 12$.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

$\frac{3}{2}c + 10 - 9 \leq -1$

$\frac{3}{2}c + 1 \leq -1$

$-1 \quad -1$

$\frac{3}{2}c \leq -2$

$\frac{3}{2}$

$c \leq -1.\overline{3}$

$-\frac{3}{2}c - 10 - 9 \leq -1$

$-\frac{3}{2}c - 19 \leq -1$

$+19 \quad +19$

$-\frac{3}{2}c \leq 18$

$-\frac{3}{2}$

$c \geq -12$

Score: 0 The student gave a completely incorrect response.

Question 37

37 Solve algebraically for c:

$$\left|\frac{3}{2}c - 10\right| - 9 \leq -1$$

$\left|\frac{3}{2}c - 10\right| \leq 8$

$\frac{3}{2}c - 10 \leq 8$

$\frac{\frac{3}{2}c}{3/2} \leq \frac{18}{3/2}$

$c \leq 8 \cdot \frac{2}{3}$

$c \leq \frac{16}{3}$

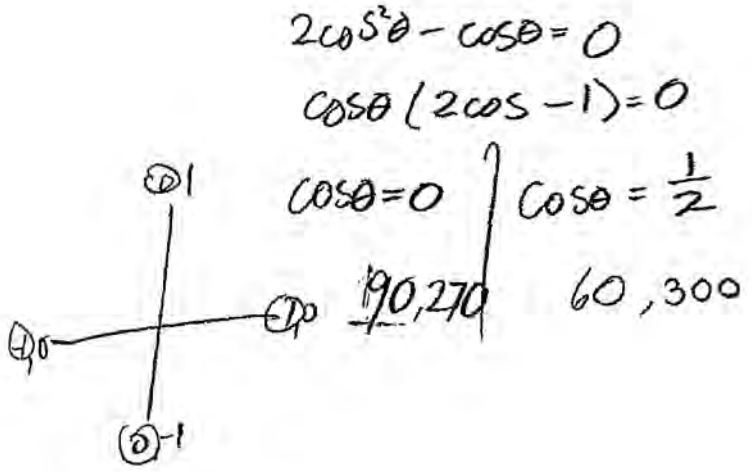
$c \leq 5.3$

$c \leq 5.3$

Score: 0 The student attempted to solve only one inequality and made a transcription error.

Question 38

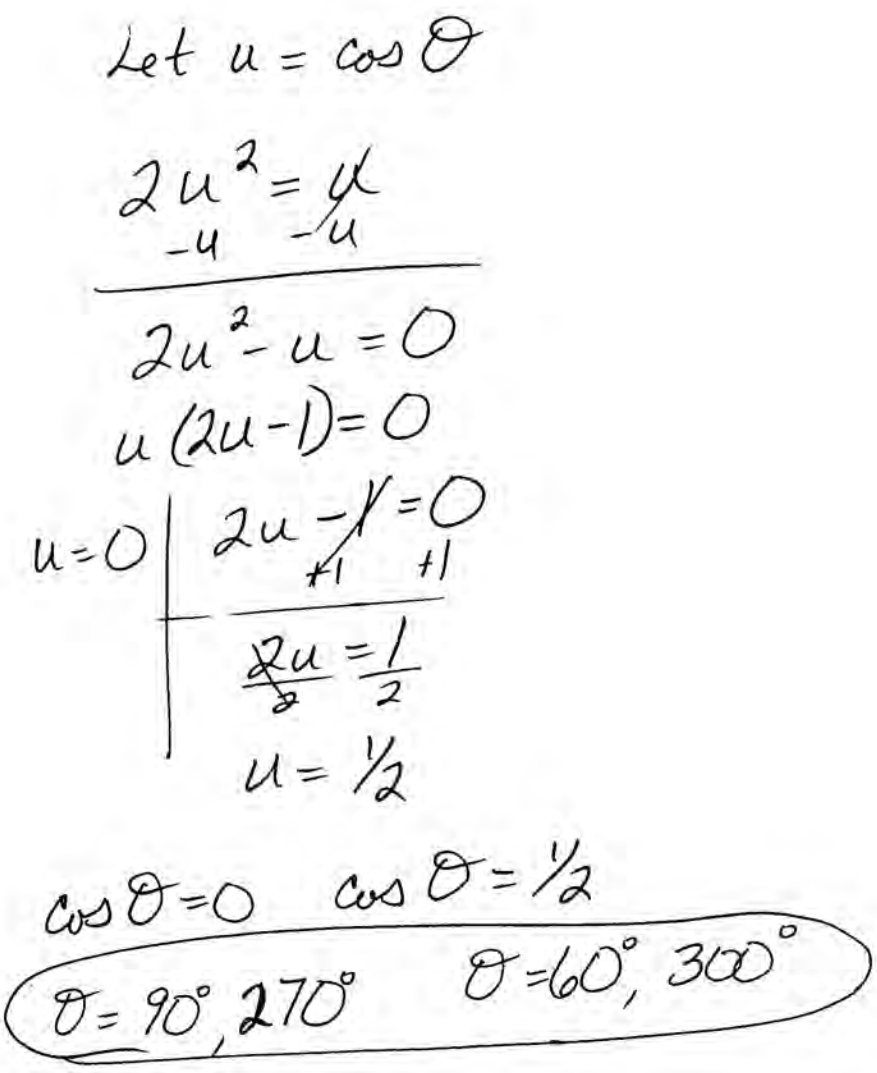
38 Solve $2\cos^2\theta = \cos\theta$ for all values of θ in the interval $0° \leq \theta < 360°$.



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

Question 38

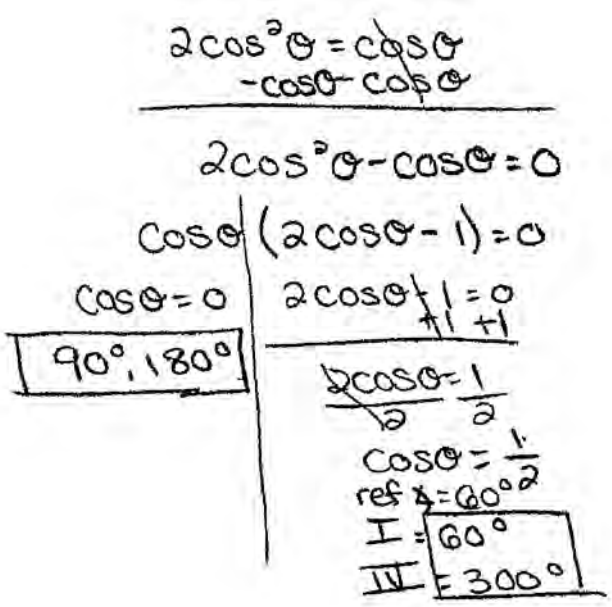
38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.



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

Question 38

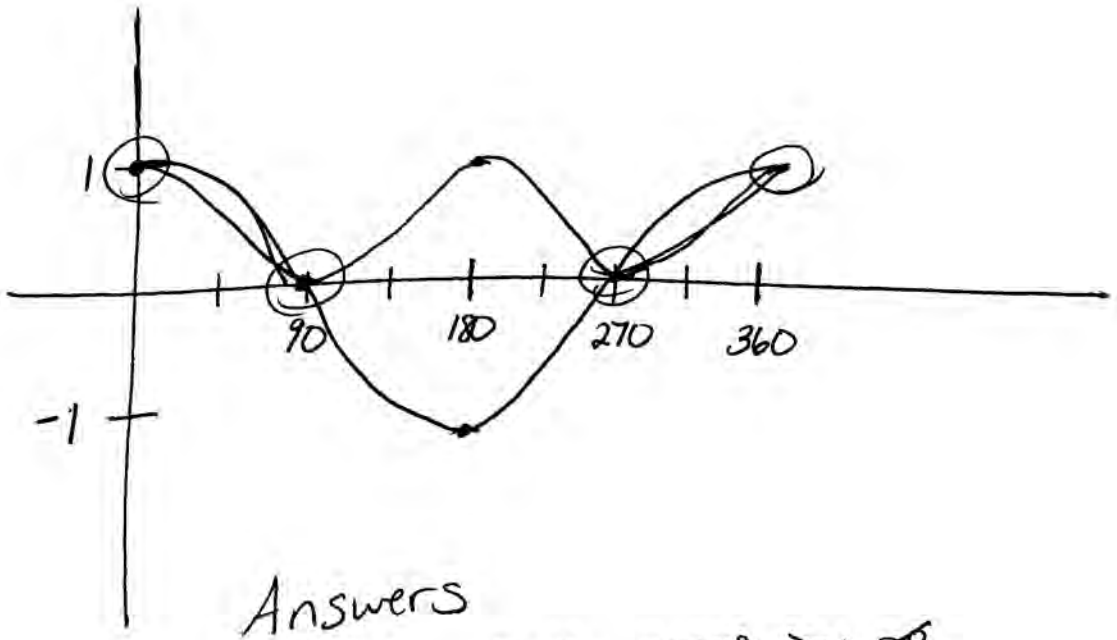
38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.



Score: 3 The student made an error by stating 180° instead of 270°.

Question 38

38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.



Answers

0°, 90°, 270°, ~~360°~~

Score: 3 The student made a graphing error by graphing $\cos^2 \theta$ instead of $2\cos^2 \theta$.

Question 38

38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.

$$\frac{2\cos^2\theta}{\cos\theta} = \frac{\cos\theta}{\cos\theta}$$

$$\frac{2\cos\theta}{2} = \frac{1}{2}$$

$$\cos\theta = \frac{1}{2}$$

$$\theta = 60° \text{ and } 300°$$

Score: 2 The student made a conceptual error by dividing both sides by cos θ.

Question 38

38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.

$\cos = a$

$2a^2 - a = 0$

$a(2a - 1) = 0$

$a = 0$ $\quad 2a - 1 = 0$

$+1 \quad +1$

$\frac{2a = 1}{2}$

$a = \frac{1}{2}$

S A
T C

$\cos \theta = \frac{1}{2}$

$\theta = 60°$

$Q_1 \quad Q_4$

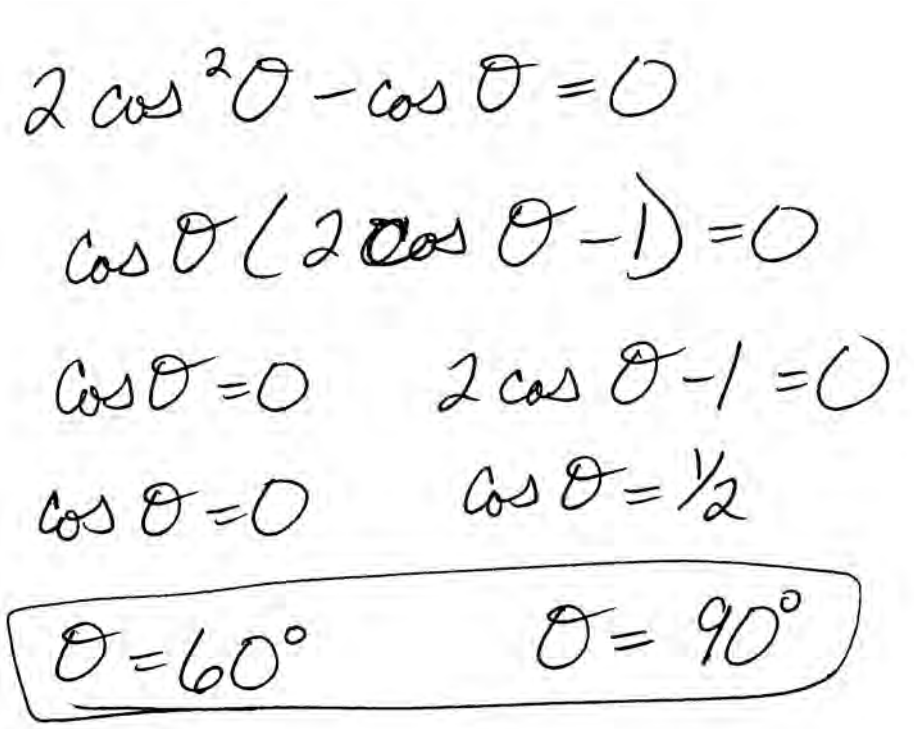
$60° \quad 300°$

(60° and 300°)

Score: 2 The student did not use $a = 0$.

Question 38

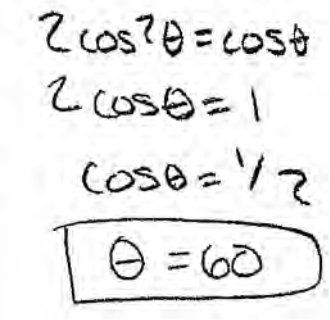
38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.



Score: 2 The student only found the two angles.

Question 38

38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.



Score: 1 The student made a conceptual error by dividing both sides by cos θ, and then only found the one angle.

Question 38

38 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0° \leq \theta < 360°$.

$2\cos^2\theta = \cos\theta$

$2\cos\theta = 1$

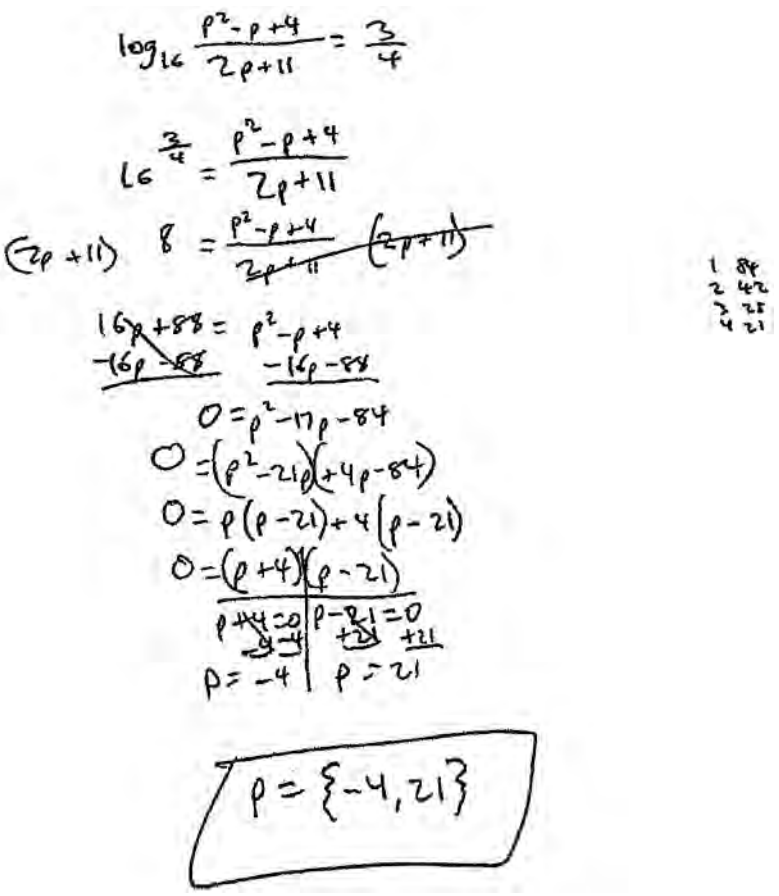
$\cos\theta = \frac{1}{2}$

$\cos\theta = 60°$

Score: 0 The student made a conceptual error by dividing by cos θ and then stated cos θ = 60, and did not find 300.

Question 39

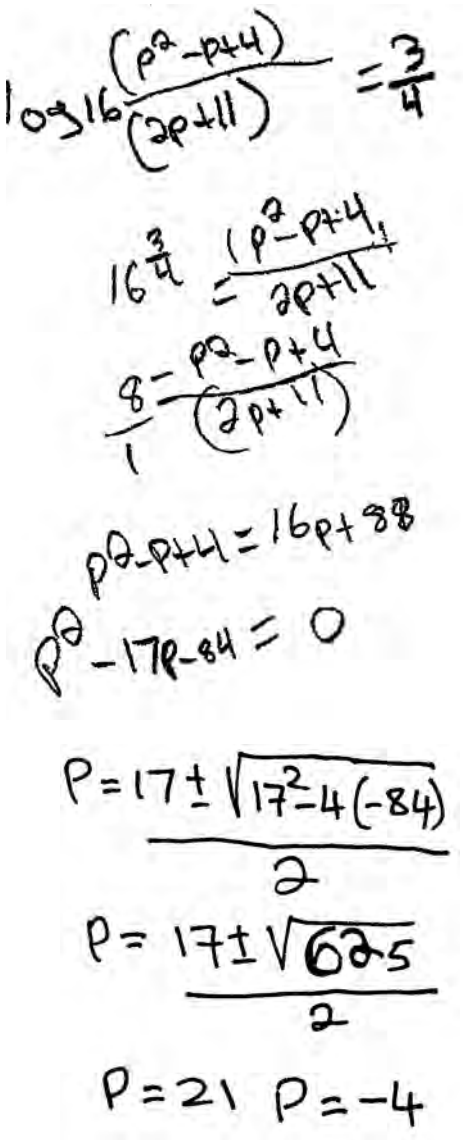
39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



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

Question 39

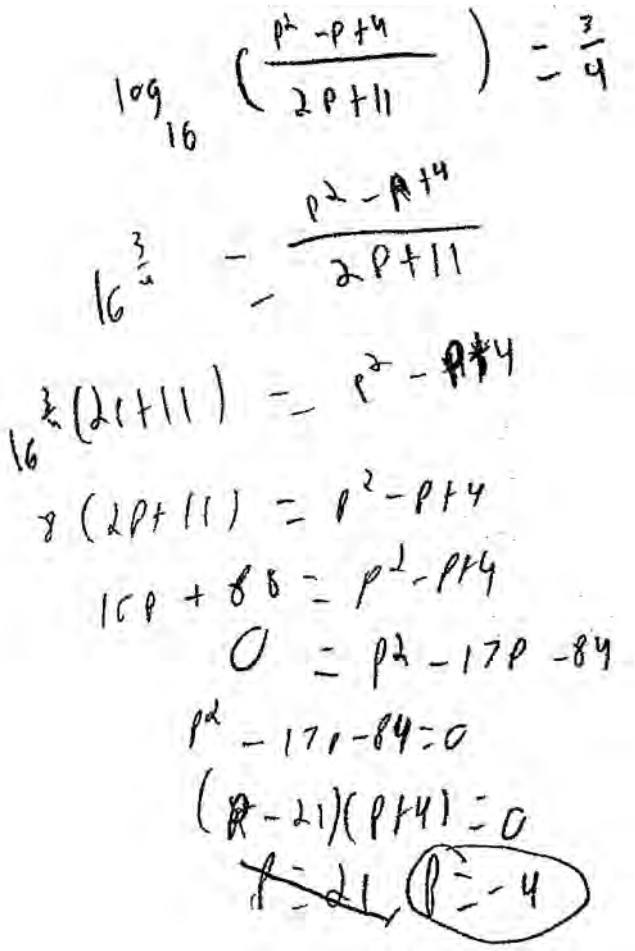
39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



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

Question 39

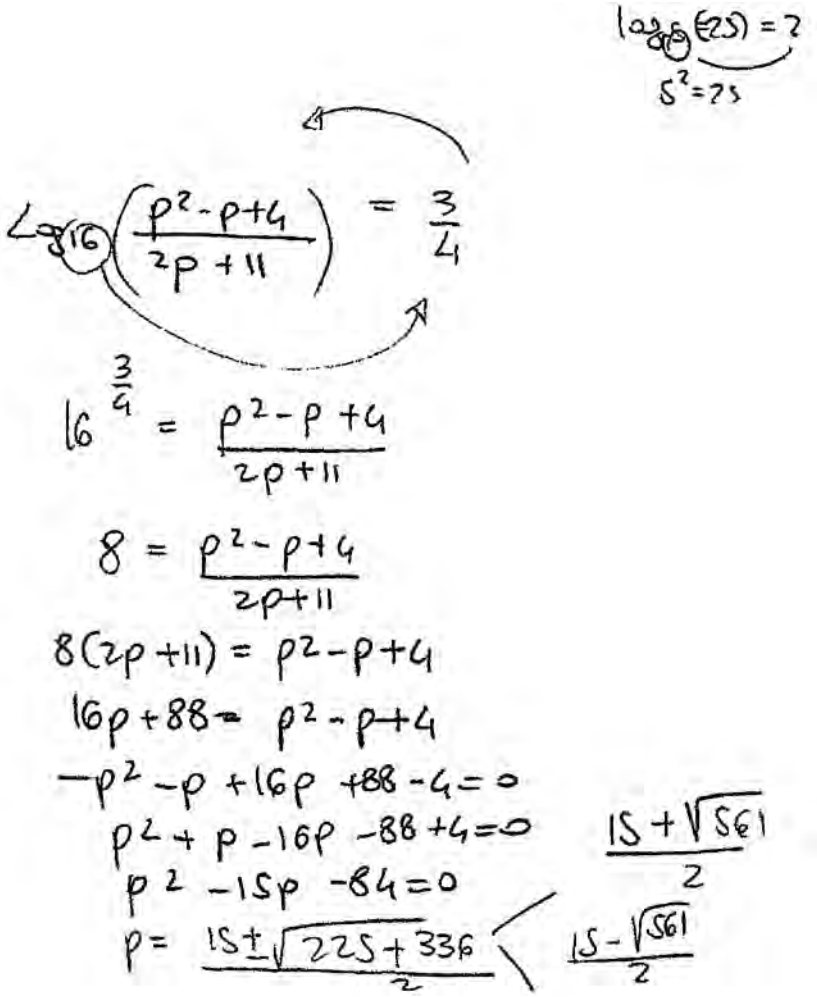
39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 5 The student made an error by rejecting $p = 21$.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 5 The student made a sign error when moving p to the other side of the equation.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$

$$\log_{16}\frac{p^2-p+4}{2p+11} = \frac{3}{4}$$

$$16^{3/4} = \frac{p^2-p+4}{2p+11}$$

$$(2p+11)8 = \frac{p^2-p+4}{2p+11}(2p+11)$$

$$2p+88 = p^2-p+4$$

$$0 = p^2-3p-84$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2-4(1)(-84)}}{2(1)}$$

$$x = \frac{3 \pm \sqrt{9+336}}{2}$$

$$x = \frac{3 \pm \sqrt{345}}{2}$$

$$x = \frac{3}{2} \pm \frac{\sqrt{345}}{2}$$

Score: 4 The student made an error using the distributive property and did not reject $\frac{3}{2} - \frac{\sqrt{345}}{2}$.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$

$\log_{16} \frac{p^2 - p + 4}{2p + 11} = \frac{3}{4}$

$\frac{p^2 - p + 4}{2p + 11} = 16^{3/4} = (\sqrt[4]{16})^3 = 2^3 = 8$

$p^2 - p + 4 = 16p + 88$

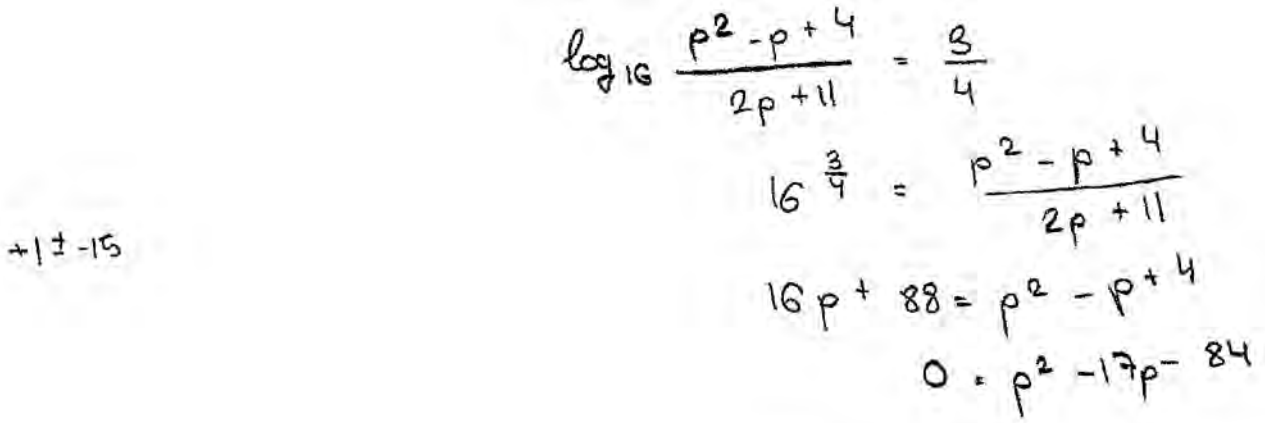
$p^2 - 17p - 84 = 0$

$p = \frac{17 \pm \sqrt{289 - (-336)}}{2}$

Score: 4 The student made a correct substitution into the quadratic formula, but showed no further work.

Question 39

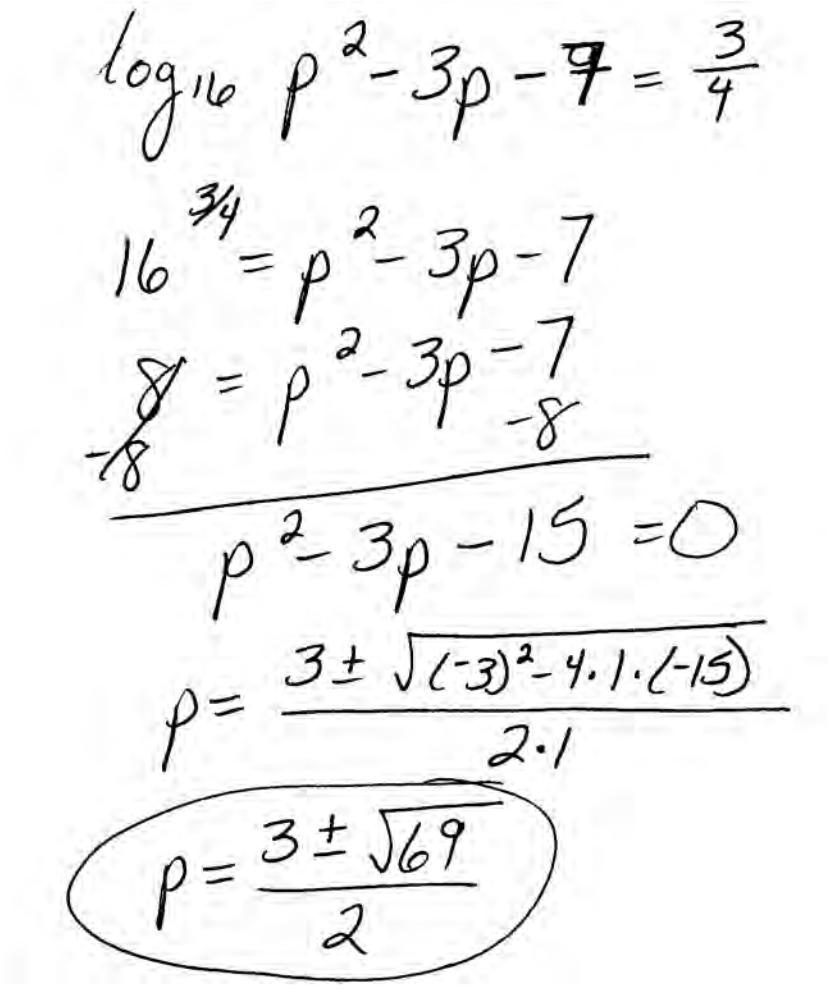
39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 3 The student wrote a correct quadratic equation.

Question 39

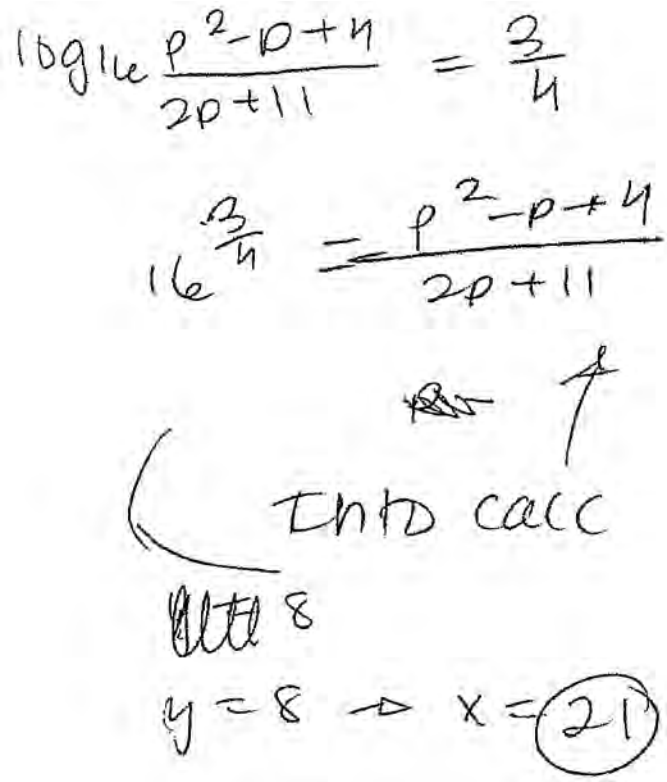
39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 3 The student made a conceptual error by subtracting the polynomials instead of dividing them.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 2 The student stated the equation in exponential form, but did not obtain 21 by an algebraic method.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$

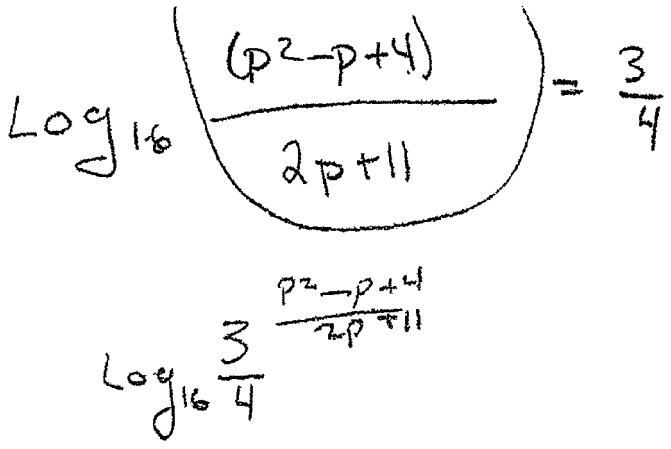
$$\log_{16}\frac{(p^2 - p + 4)}{2p + 11} = \frac{3}{4}$$

$$16^{\frac{3}{4}} = \frac{(p^2 - p + 4)}{(2p + 11)}$$

Score: 2 The student stated the equation correctly in exponential form.

Question 39

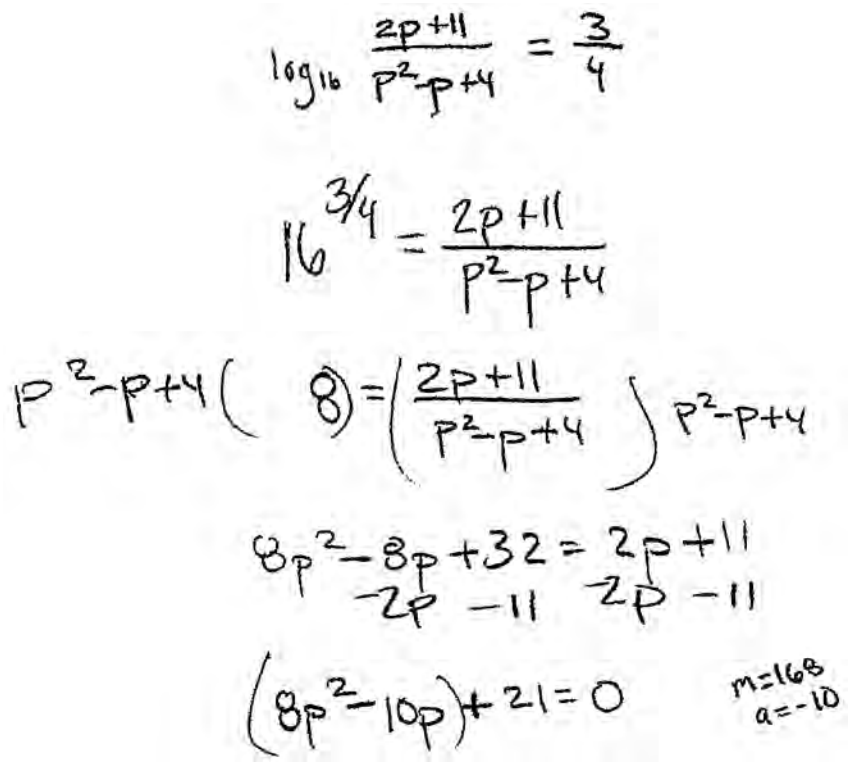
39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 1 The student rewrote the log equation correctly.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$



Score: 1 The student made a conceptual error in rewriting the log equation, but did write an appropriate exponential equation.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$

$\sqrt[4]{16} = 2^3 = 8$

$16^{\frac{3}{4}} = (p^2 - p + 4)(2p + 11)$

$16^{\frac{3}{4}} = 2p^3 + 11p^2 - 2p^2 - 11p + 8p + 44$

$8 = 2p^3 + 9p^2 - 3p + 44$

-8

$2p^3 + 9p^2 - 3p + 36 = 0$

$p^2(2p^2 + 9) - 3(p + 12) = 0$

$p(2p + 3)(p - 3)$

$(-3 + p) + (2p + 3)(p - 3)(p + 2) = 0$

Score: 0 The student wrote a completely incorrect response. No credit is given for finding 8.

Question 39

39 Solve for p algebraically: $\log_{16}(p^2 - p + 4) - \log_{16}(2p + 11) = \frac{3}{4}$

$$12 = \frac{p^2 - p + 4}{2p + 11}$$

$$24p + 132 = p^2 - p + 4$$

$$p^2 - 23p - 128 = 0$$

$$(p - 32)(p + 4) = 0$$

$p = -32$ or $p = -4$

Score: 0 The student made a conceptual error by evaluating $16\left(\frac{3}{4}\right)$ followed by several computational errors, a factoring error, and did not reject $p = -32$.