The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA 2/ TRIGONOMETRY

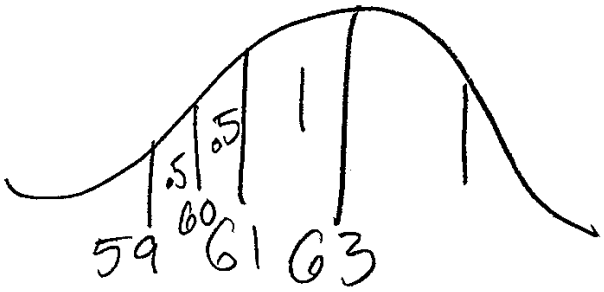
Wednesday, June 18, 2014 — 1:15 – 4:15 p.m.

SAMPLE RESPONSE SET

Table of Contents

Question 28

28 In a certain school, the heights of the population of girls are normally distributed, with a mean of 63 inches and a standard deviation of 2 inches. If there are 450 girls in the school, determine how many of the girls are *shorter than* 60 inches. Round the answer to the *nearest integer*.



30

4.4+1.7 +0.5 +0.1
.6

2.03
6.7%

0.067 x 450

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

Question 28

28 In a certain school, the heights of the population of girls are normally distributed, with a mean of 63 inches and a standard deviation of 2 inches. If there are 450 girls in the school, determine how many of the girls are *shorter than* 60 inches. Round the answer to the *nearest integer*.

normCdf(9E-99, 60, 63, 2) = 0.0668

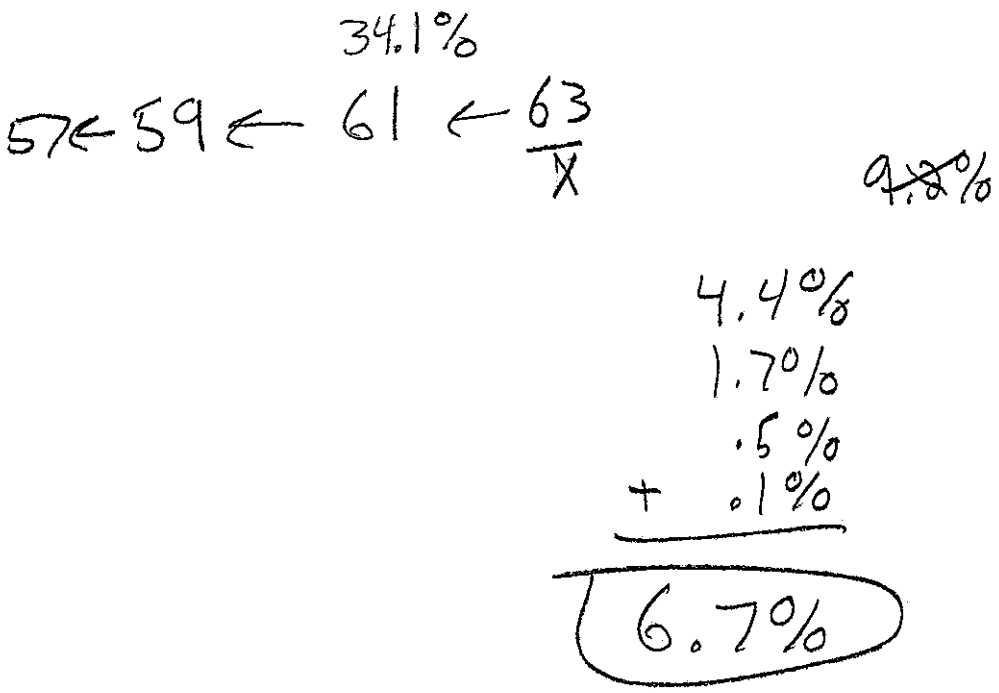
(0.0668)(450) = 30.06

≈ 30

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

Question 28

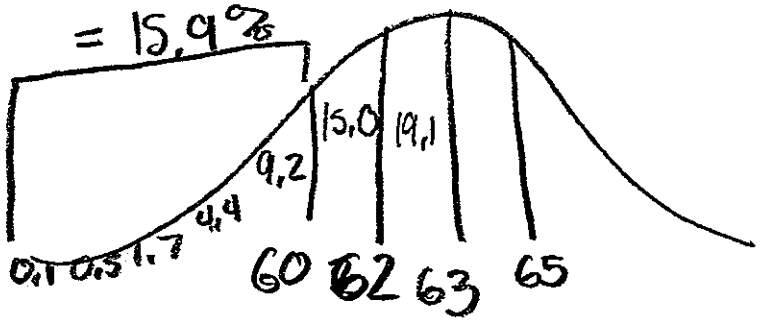
28 In a certain school, the heights of the population of girls are normally distributed, with a mean of 63 inches and a standard deviation of 2 inches. If there are 450 girls in the school, determine how many of the girls are *shorter than* 60 inches. Round the answer to the *nearest integer*.



Score 1: The student made one conceptual error by finding the percentage of girls shorter than 60 inches, but not how many girls.

Question 28

28 In a certain school, the heights of the population of girls are normally distributed, with a mean of 63 inches and a standard deviation of 2 inches. If there are 450 girls in the school, determine how many of the girls are *shorter than* 60 inches. Round the answer to the *nearest integer*.



15.9% of 450

$\frac{x}{450} = \frac{15.9}{100}$

$100x = 6930$

$x = 69.30$

$\approx$ 69 girls

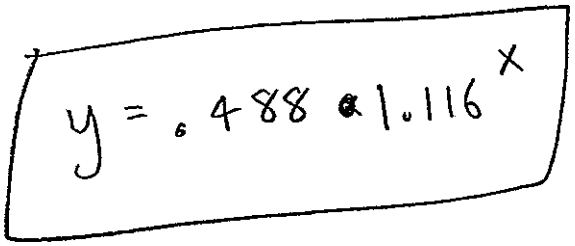
Score 0: The student made one conceptual error and one computational error.

Question 29

29 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

Altitude (x)	**Ozone Units** (y)
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9



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

Question 29

29 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

Altitude (*x*)	**Ozone Units** (*y*)
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9

$y = a \cdot b^x$

$a = .488156016$

$b = 1.116306161$

$r^2 = .891184207$

$r = .944025566$

$y = a \cdot b^x$

$y = .488 \cdot 1.116^x$

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

Question 29

29 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

Altitude (*x*)	**Ozone Units** (*y*)
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9

a=.49
b=1.12
r^2=.89
r=.94

y=(a)(b)^x

Score 1: The student made one rounding error.

Question 29

29 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

Altitude (x)	**Ozone Units** (y)
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9

$a = .488156\,0152$

$b = 1.116306\,6161$

$.488 \cdot 1.116^{x}$

Score 1: The student wrote an exponential regression expression.

Question 29

29 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

Altitude (x)	**Ozone Units** (y)
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9

$a = .49$

$b = 1.12$

$r^2 = .89$

$r = .94$

Score 0: The student made one rounding error and did not write an exponential regression equation.

Question 30

30 Solve $|2x - 3| > 5$ algebraically.

$2x - 3 > 5$ $\quad$ $2x - 3 < -5$

$2x > 8$ $\quad$ $2x < -2$

$x > 4$ or $x < -1$

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

Question 30

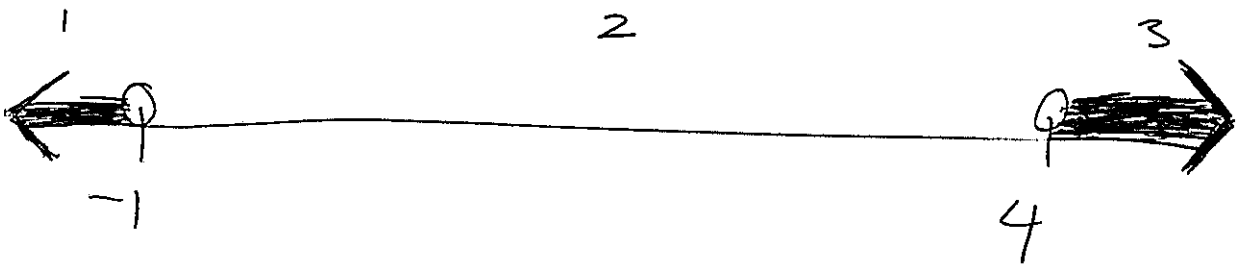
30 Solve $|2x - 3| > 5$ algebraically.

$2x-3=5$ $\quad -2x+3=5$

$+3 \quad +3 \qquad -3 \quad -3$

$\frac{2x}{2} = \frac{8}{2} \qquad \frac{-2x}{-2} = \frac{2}{-2}$

$x=4 \qquad x=-1$



1: -2 T

2: 0 F

3: 5 T

$\{x \mid (x<-1) \vee (x>4)\}$

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

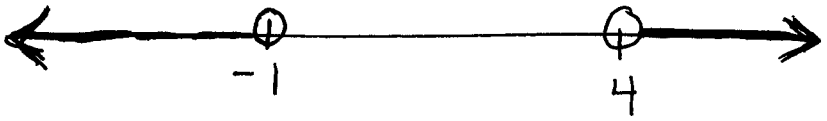
Question 30

30 Solve $|2x - 3| > 5$ algebraically.

$2x - 3 > 5$ $\qquad$ $2x - 3 < -5$

$2x > 8$ $\qquad$ $2x < -2$

$x > 4$ $\qquad$ $x < -1$



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

Question 30

30 Solve $|2x - 3| > 5$ algebraically.

$2x - 3 > 5$ $\qquad$ $2x - 3 < -5$

$2x > 8$ $\qquad$ $2x < -2$

$x > 4$ $\qquad$ $x < -1$

Score 1: The student did not express the answer as a disjunction.

Question 30

30 Solve $|2x - 3| > 5$ algebraically.

$2x - 3 > 5$ $\quad$ $2x + 3 < -5$

$+3 \quad +3$ $\quad$ $-3 \quad -3$

$\frac{2x}{2} > \frac{8}{2}$ $\quad$ or $\quad$ $\frac{2x}{2} < \frac{-8}{2}$

$x > 4$ $\quad$ $x < -4$

Score 1: The student made one computational (copy) error.

Question 30

30 Solve $|2x - 3| > 5$ algebraically.

$-2x+3>5$

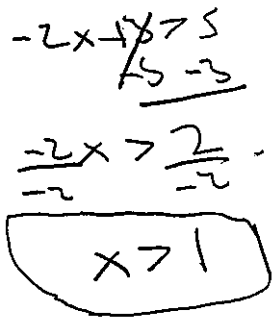
$-2x>2$

$x<-1$

Score 1: The student showed appropriate work to find $x < -1$, only.

Question 30

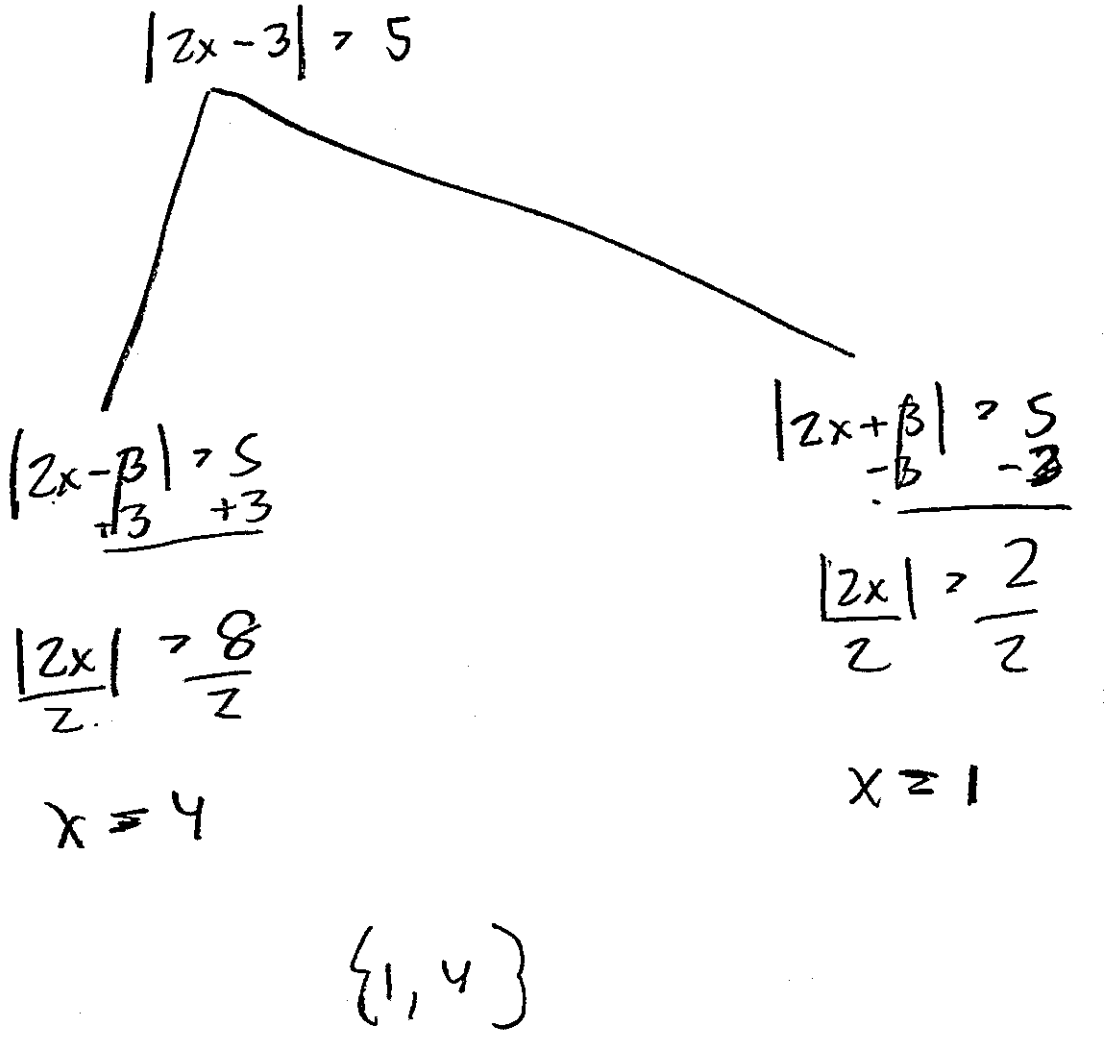
30 Solve $|2x - 3| > 5$ algebraically.



Score 0: The student made one conceptual error and one computational error.

Question 30

30 Solve $|2x - 3| > 5$ algebraically.



Score 0: The student made multiple conceptual errors.

Question 31

31 Convert 2.5 radians to degrees, and express the answer to the *nearest minute*.

$$\frac{2.5}{1} \cdot \frac{180}{\pi} = \frac{450}{\pi}$$

$143^\circ 14'$

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

Question 31

31 Convert 2.5 radians to degrees, and express the answer to the *nearest minute*.

$2.5\left(\frac{180}{\pi}\right) = 143.2394488 = 143^{\circ}$

Score 1: The student made one conceptual error by not expressing the answer to the nearest minute.

Question 31

31 Convert 2.5 radians to degrees, and express the answer to the *nearest minute*.

$2.5\pi \cdot \frac{180}{\pi}$ $1.5 \cdot 180 = 270$

Score 0: The student made one conceptual error and one computational error.

Question 32

32 Multiply $x + yi$ by its conjugate, and express the product in simplest form.

$(x+yi)(x-yi)$

$x^2 - xyi + xyi - y^2 i^2$

$+i$
-1
$-i$
$+1$

$x^2 - [illegible]$

$x^2 - y^2(-1)$

$x^2 + y^2$

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

Question 32

32 Multiply $x + yi$ by its conjugate, and express the product in simplest form.

$(x+yi)(x-yi)$

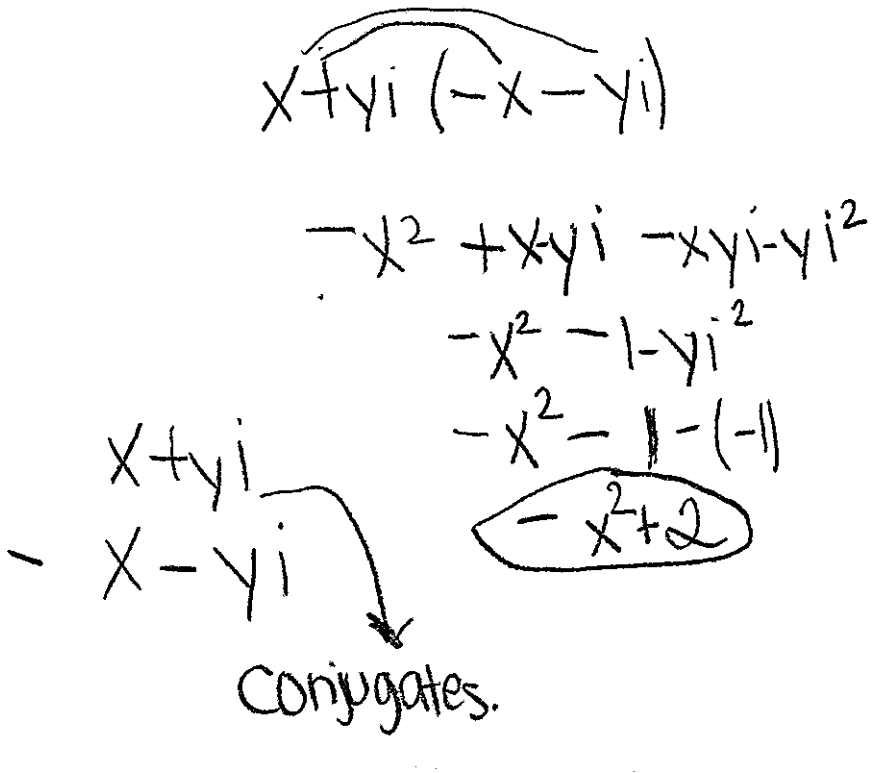
$x^2 - xyi + xyi - y^2 i^2$

$x^2 - y^2 i^2$

Score 1: The student made one conceptual error by not substituting for i^2.

Question 32

32 Multiply $x + yi$ by its conjugate, and express the product in simplest form.



Score 0: The student made one conceptual error in writing the conjugate and multiple computational errors.

Question 33

33 Solve algebraically for x:

$$\log_{5x-1} 4 = \frac{1}{3}$$

$(5x-1)^{\frac{1}{3}} = 4$

$5x-1 = 4^3$

$5x-1 = 64$

$5x = 65$

$x = 13$

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

Question 33

33 Solve algebraically for x:

$$\log_{5x-1} 4 = \frac{1}{3}$$

$$\frac{\log 4}{\log 5x-1} = \frac{1}{3}$$

$$3\log 4 = \log 5x-1$$

$$\log 64 = \log 5x-1$$

$$64 = 5x-1$$

$$65 = 5x$$

$$13 = x$$

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

Question 33

33 Solve algebraically for x:

$$\log_{5x-1} 4 = \frac{1}{3}$$

$(5x-1)^{\frac{1}{3}} = 4$

$5x^{1/3} - 1^{1/3} = 4$

$+ .333333 = 4$

$+ .37$

$5x^{1/3} = 4 + 1^{1/3}$ $(3/1)$ $(3/1)$

$5x = 4^{(3)} + 1^{(1/3 \cdot 3/1)}$

$5x = 64 + 1$

$\frac{5x}{5} = \frac{65}{5}$

$X = 13$

Score 1: The equation $(5x-1)^{\frac{1}{3}} = 4$ is written, but no further correct work is shown.

Question 33

33 Solve algebraically for x:

$\log_{5x-1} 4 = \frac{1}{3}$

$5x - 1^{\frac{1}{3}} = 4$

$5x - 1 = 4$

$+1 \quad +1$

$\frac{5x}{5} = \frac{5}{5}$

$x = 1$

Score 1: The student made one conceptual error.

Question 33

33 Solve algebraically for x:

$$\log_{5x-1} 4 = \frac{1}{3}$$

$(5x-1)^3 = 4$

$5x-1 = 4^{\frac{1}{3}}$

$5x-1 = 1.58$

$x = .516$

Score 0: The student made one conceptual error and one rounding error.

Question 34

34 Solve $\sec x - \sqrt{2} = 0$ algebraically for all values of x in $0° \leq x < 360°$.

$\sec x - \sqrt{2} = 0$

$\sec x = \sqrt{2}$

Q 1, IV

R 45°

S 45°,

360 − 45 = 315

$\{45°, 315°\}$

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

Question 34

34 Solve $\sec x - \sqrt{2} = 0$ algebraically for all values of x in $0° \leq x < 360°$.

$\sec(x) = \sqrt{2}$

$x = 45°$

$45°, 135°, 225°, 315°$

$45 + 90 = 135$

$45 + 180 = 225$

$45 + 270 = 315$

Score 1: The student found one solution, but no further correct work is shown.

Question 34

34 Solve $\sec x - \sqrt{2} = 0$ algebraically for all values of x in $0° \leq x < 360°$.

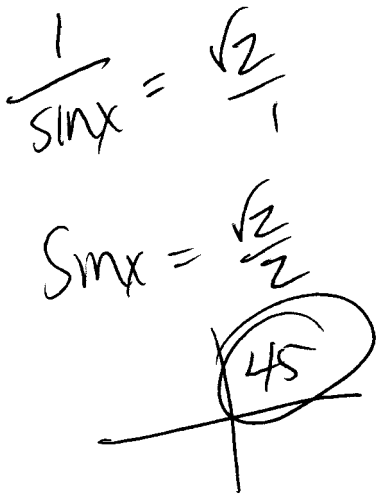
$\frac{1}{\cos x} - \frac{\sqrt{2}}{+\sqrt{2}} = 0$

$\frac{1}{\cos x} = \sqrt{2}$

Score 0: The student did not find any solutions.

Question 34

34 Solve $\sec x - \sqrt{2} = 0$ algebraically for all values of x in $0° \leq x < 360°$.

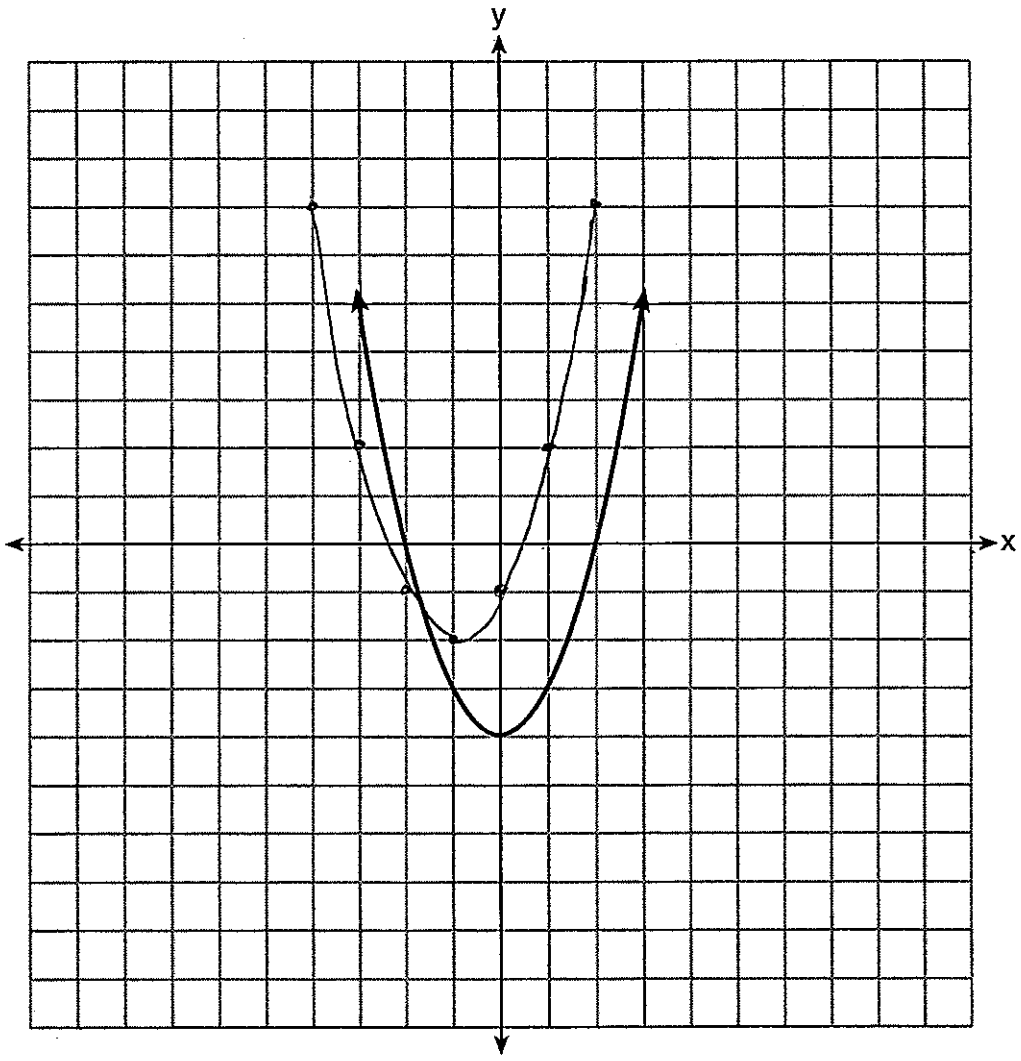


Score 0: The student made one conceptual error and then found only one solution.

Question 35

35 The function f(x) is graphed on the set of axes below.

On the same set of axes, graph f(x + 1) + 2.

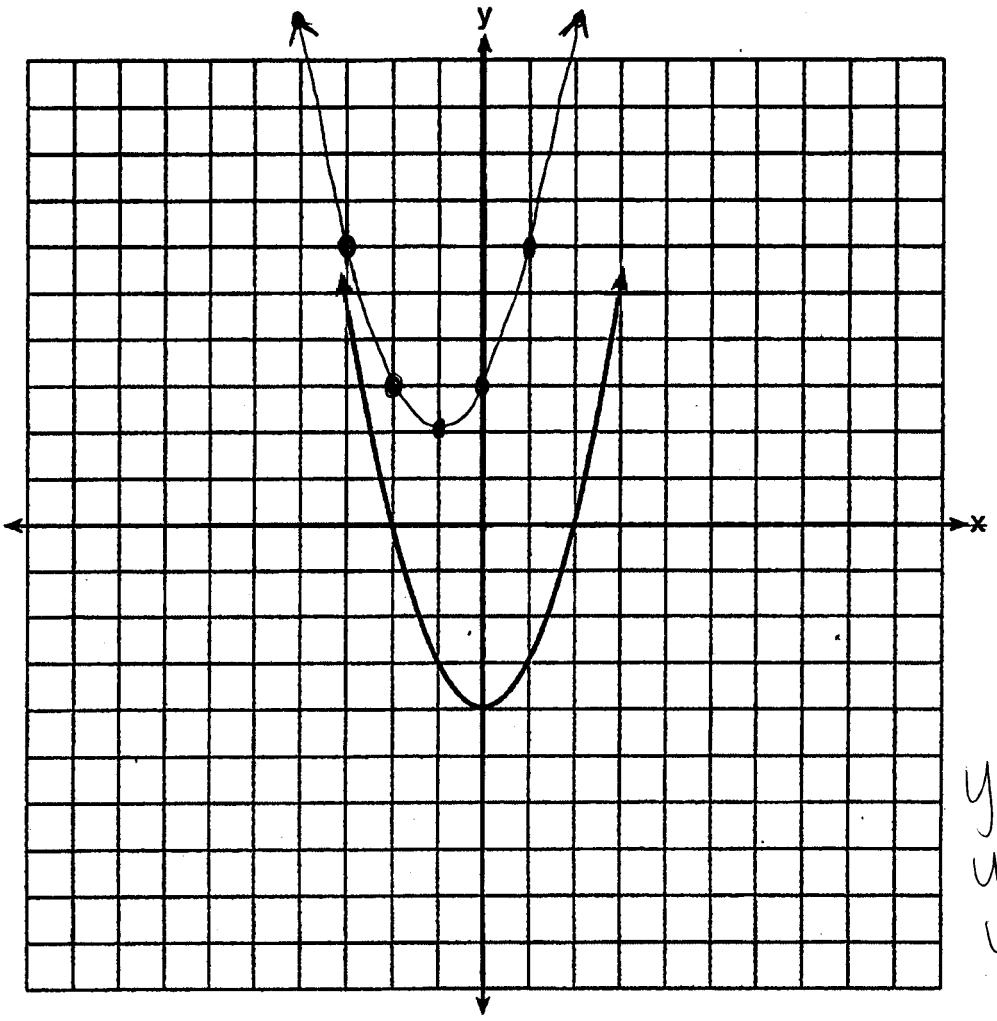


Score 2: The student has a complete and correct response.

Question 35

35 The function f(x) is graphed on the set of axes below.

On the same set of axes, graph f(x + 1) + 2.



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

$y = x^2 + 2x + 1 + 2$

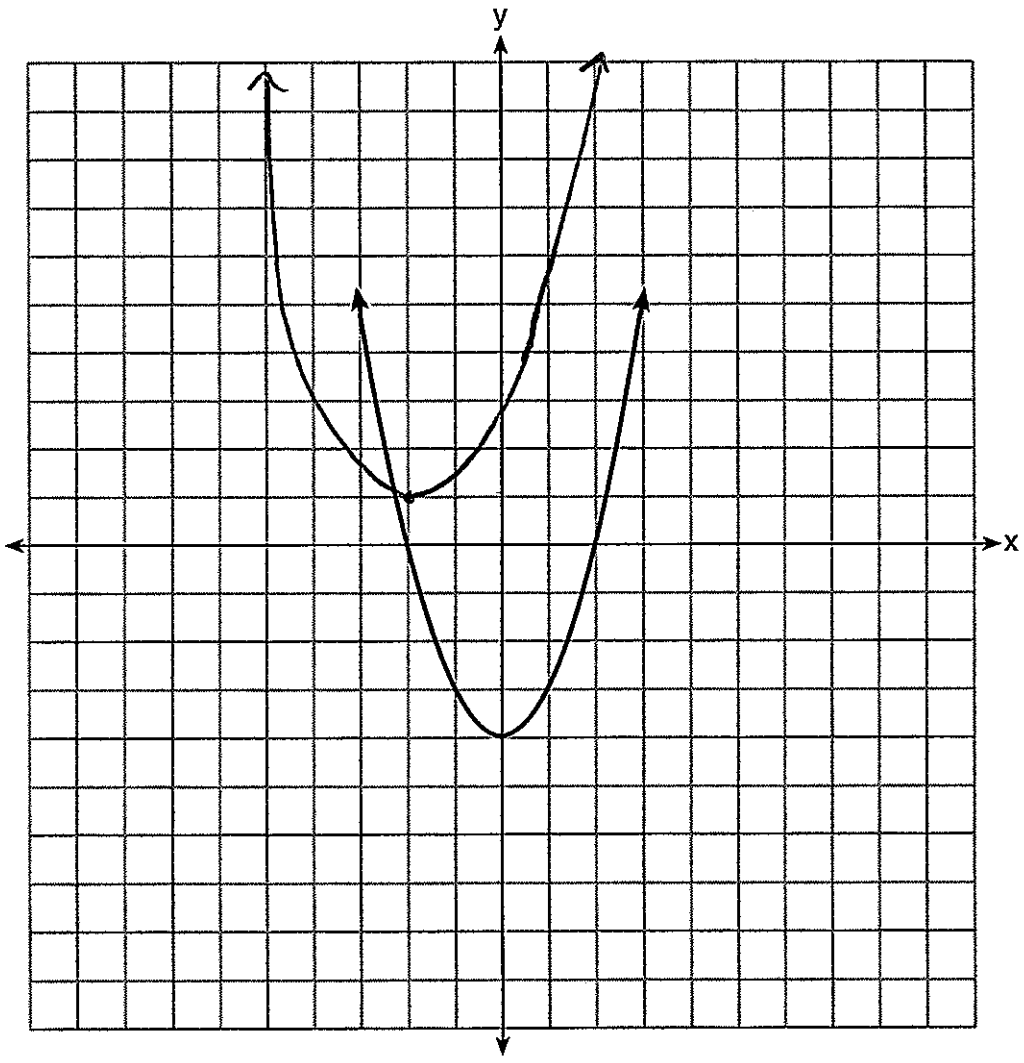
$y = x^2 + 2x + 3$

Score 1: The student made one conceptual error by applying the transformation to $y = x^2$.

Question 35

35 The function f(x) is graphed on the set of axes below.

On the same set of axes, graph f(x + 1) + 2.



Score 0: The student made multiple graphing errors.

Question 36

36 Express in simplest terms:

$$\frac{1+\frac{3}{x}}{1-\frac{5}{x}-\frac{24}{x^2}}$$

$$\frac{x^2+3x}{x^2-5x-24}$$

$$\frac{x(x+3)}{(x+3)(x-8)}$$

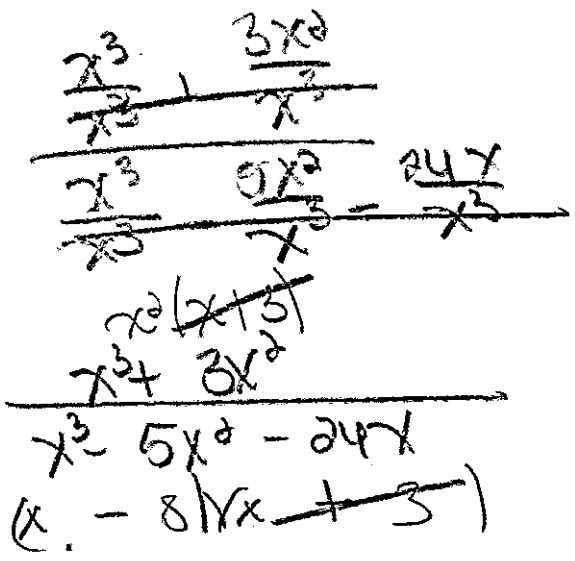
$$\frac{x}{x-8}$$

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

Question 36

36 Express in simplest terms:

$$\frac{1+\frac{3}{x}}{1-\frac{5}{x}+\frac{24}{x^2}}$$



$$\frac{x^2}{x-8}$$

Score 3: The student made one factoring error.

Question 36

36 Express in simplest terms:

$$\frac{\left(1+\frac{3}{x}\right)x}{\left(1-\frac{5}{x}-\frac{24}{x^2}\right)x^2}$$

$\rightarrow \frac{x+3}{x^2-5x-24}$

$(x-8)(x+3)$

$\frac{1}{x-8}$

$\left(\frac{5}{x}+\frac{24}{x^2}+1+\frac{3}{x}\right)(x^2)$

$5x+24+x^2+3x$

$x^2+8x+24$

Score 2: The student made one conceptual error.

Question 36

36 Express in simplest terms:

$$\frac{1+\frac{3}{x}}{1-\frac{5}{x}-\frac{24}{x^2}}$$

$\frac{(x)1}{(x)1} + \frac{3}{x} \quad \frac{x+3}{x}$

$\frac{(x)1}{(x)1} - \frac{5}{x}\frac{(x)}{x(x)}\frac{x-5}{} - \frac{24}{x^2}$

$\frac{x^2-5x-24}{x^2} \cdot \frac{x}{x+3}$

$\frac{(x-8)(\cancel{x+3})}{x^{\cancel{x}}} \cdot \frac{x}{\cancel{x+3}}$

$\frac{(x-8)x}{x^2}$ $\boxed{\frac{x^2-8x}{x^2}}$

Score 1: The student made one conceptual error and one simplification error.

Question 36

36 Express in simplest terms:

$$\frac{(x)1+\frac{3}{x}}{(x^2)1-\frac{5}{x(x)}-\frac{24}{x^2}} = \frac{x+3}{x} \cdot \frac{x^2-5x-24}{x^2}$$

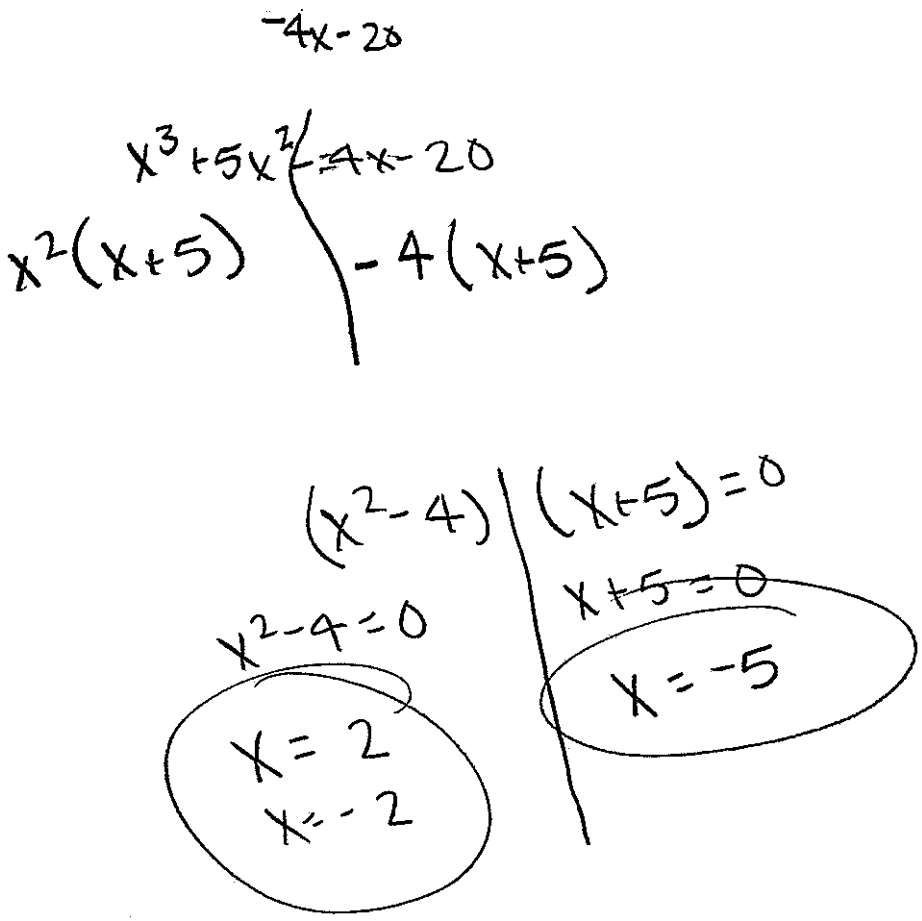
$$\frac{\cancel{x+3}}{\cancel{x}} \cdot \frac{(x-8)\cancel{(x+3)}}{\cancel{x^2}\,x}$$

$$\frac{x-8}{x}$$

Score 0: The student made two conceptual errors.

Question 37

37 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.



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

Question 37

37 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.

$x^3 + 5x^2 - 4x - 20 = 0$

$x^2(x + 5) - 4(x + 5) = 0$

$(x^2 - 4)(x + 5) = 0$

$(x - 4)(x + 4)(x + 5) = 0$

$x - 4 = 0$	$x + 4 = 0$	$x + 5 = 0$
$+4 \quad +4$	$-4 \quad -4$	$-5 \quad -5$
$x = 4$	$x = -4$	$x = -5$

$\{-4, 4, -5\}$

Score 3: The student made one factoring error.

Question 37

37 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.

$x^3+5x^2-4x-20=0$

$x^2(x+5)-4(x+5)=0$

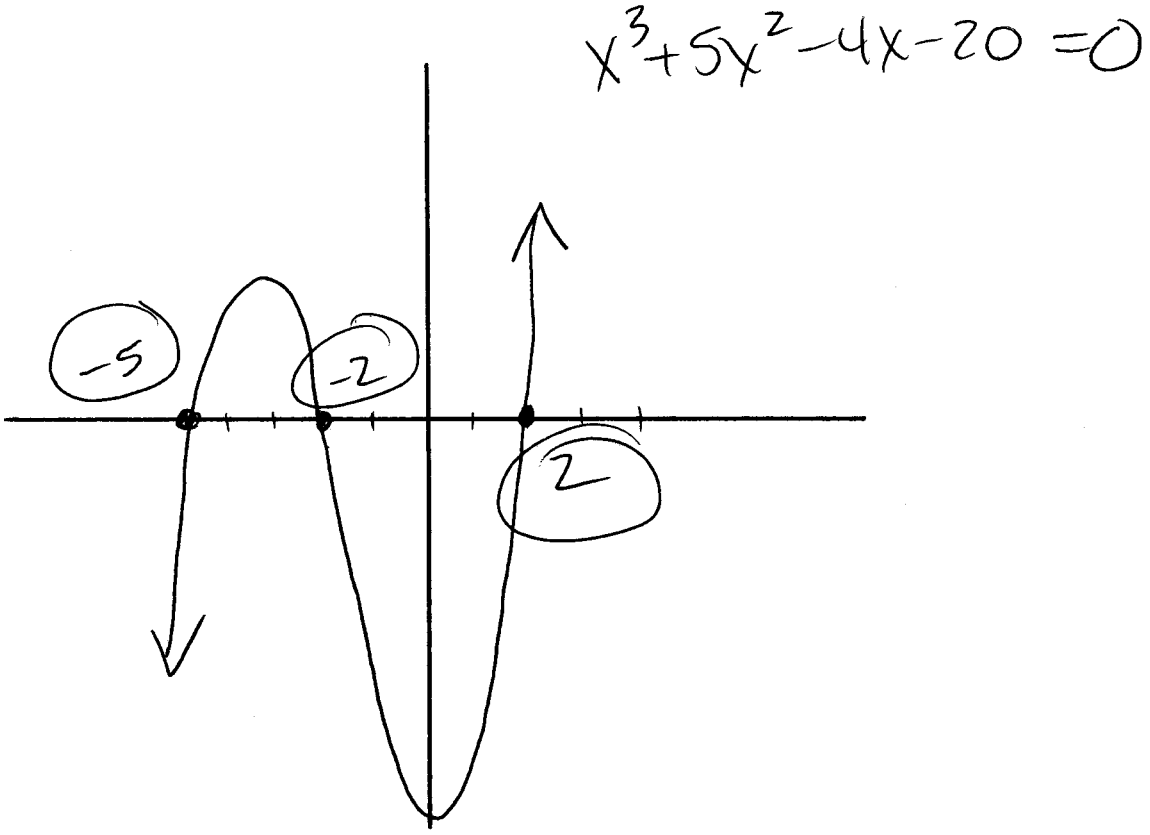
$(x^2-4)(x+5)=0$

$(x+2)(x-2)(x+5)=0$

Score 2: The student wrote $(x^2 - 4)(x + 5) = 0$, but did not complete the solution.

Question 37

37 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.



Score 2: The student used a method other than algebraic to solve the equation.

Question 37

37 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.

$X^3 + 5x^2 = 4x + 20$

$X^3 + 5x^2 - 4x - 20 = 0$

$X(x^2 + 5x - 4 - 20) = 0$

~~$X = 0$~~ $(x^2 + 5x - 24) = 0$

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

$X = 3$ $X = -8$

Score 1: The student made one conceptual error by misidentifying the GCF as x and then rejected $x = 0$ as part of the solution.

Question 37

37 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.

$x^2(x+5) = 4(x+5)$

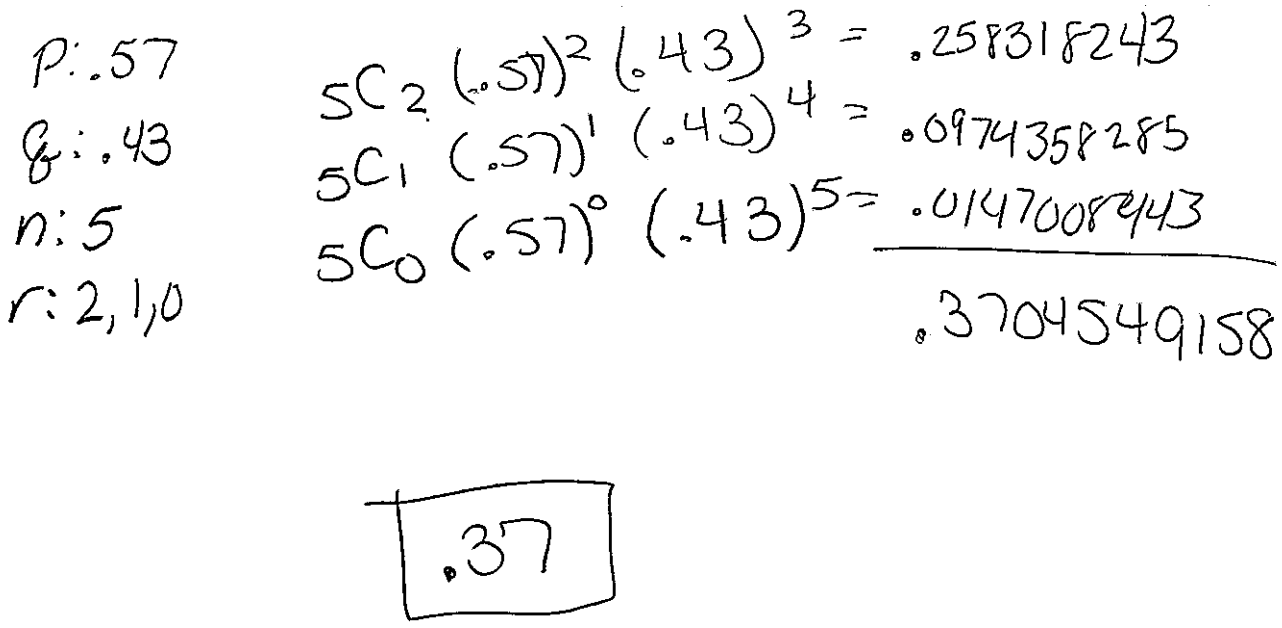
$\sqrt{x^2} = \sqrt{4}$

$x = 2$

Score 0: The student made two conceptual errors.

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.



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

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.

binomialpdf(5, .57, 0) + binomialpdf(5, .57, 1) + binomialpdf(5, .57, 2) = .3704549158

.37

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

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.

$_5C_0 (.57)^0(.43)^5 = 0.01470008443$

$_5C_1 (.57)^1(.43)^4 = 0.09743582855$

$_5C_2 (.57)^2(.43)^3 = 0.3583182243$

Score 3: The student did not find the sum.

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.

P: .57
Q: .43
n: 5
r: 1, 2

$_5C_1 \times .57^1 \cdot .43^4$
+
$_5C_2 \times .57^2 \times .43^3$

~~.4440768~~

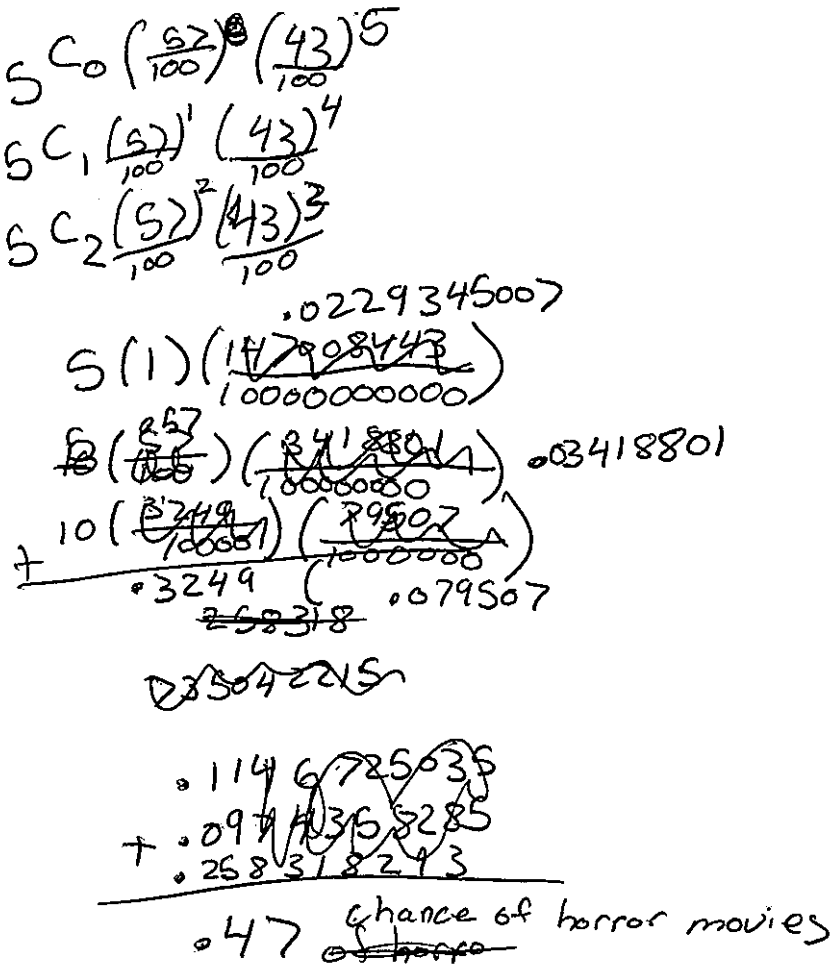
.09743583 + .258318 = 0.36

= 36%

Score 2: The student made one conceptual error by not finding the probability of $_5C_0$.

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.



Score 2: The student made two computational errors when evaluating ${}_5C_0\left(\frac{57}{100}\right)^0\left(\frac{43}{100}\right)^5$.

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.

57%.

$5C_2 (.57)^2 (.43)^3 = .26$

Score 1: The student found the probability of exactly two movies.

Question 38

38 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.

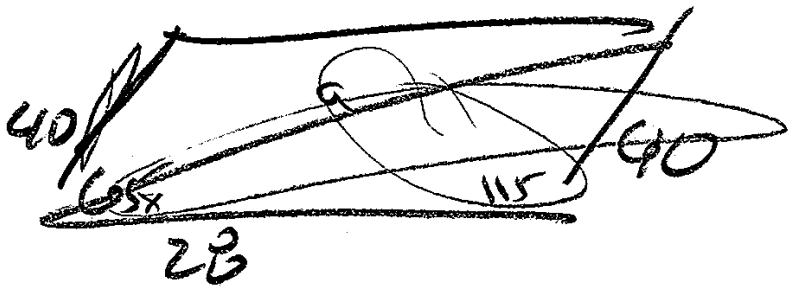
$${}_5C_2\left(\frac{57}{100}\right)^2\left(\frac{43}{100}\right)^3 =$$

.32

Score 0: The student did not correctly evaluate the probability of exactly two movies.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



$a^2 = 28^2 + 40^2 - 2(28)(40)\cos 115$

$a^2 = 3330.6649$

$a = 57.7119$

58 lb

$\frac{40}{\sin x} = \frac{58}{\sin 115}$

$40 \sin 115 = 58 \sin x$

$.6250 = \sin x$

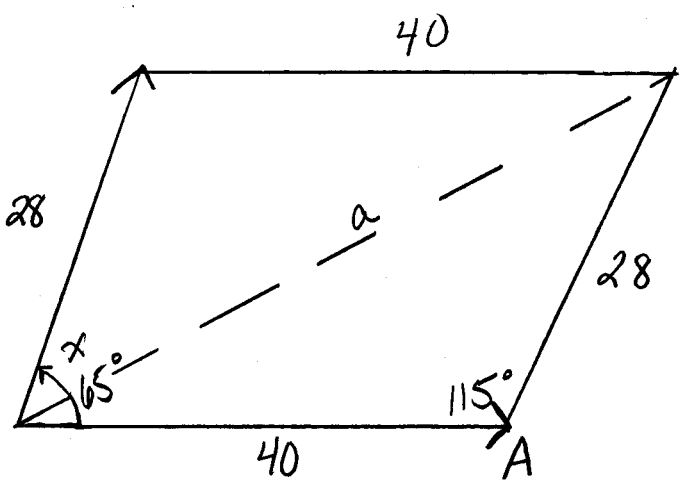
$38.6851 = x$

39°

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

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



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

$a^2 = 28^2 + 40^2 - 2(28)(40)\cos 115$

$a^2 = 3330.664906$

$a = 57.7119$

$\boxed{a = 58}$

$40^2 = 28^2 + 58^2 - 2(28)(58)\cos x$

$1600 = 784 + 3364 - 3248\cos x$

$1600 = 4148 - 3248\cos x$

$-2548 = -3248\cos x$

$0.784482759 = \cos x$

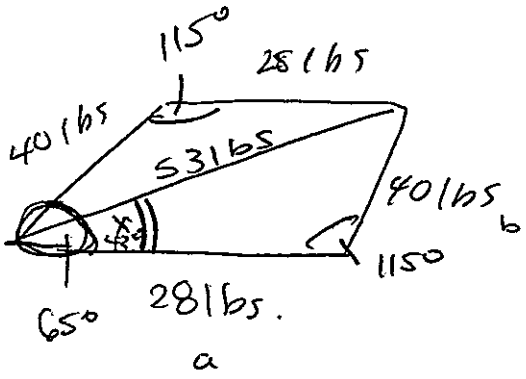
$x = 38.327$

$x = 38°$

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

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



180 − 65° = 115°.

$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = 28^2 + 40^2 - 28(40)\cos 115°$

$c \approx 53$ lbs

magnitude of resultant

$\frac{\sin 115°}{53 \text{ lbs}} = \frac{\sin x}{40 \text{ lbs}}$

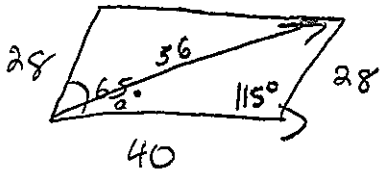
$\sin 115°(40) = \sin x(53)$

$x \approx 43°$

Score 5: The student made one computational error by dropping the 2 in the equation $c^2 = 28^2 + 40^2 - 28(40)\cos 115°$.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



$x^2 = 40^2 + 28^2 - 2(40)(28)\cos 115°$

$\approx 5\,5.8 \approx$ 56 pounds

$28^2 = 56^2 + 40^2 - 2(56)(40)\cos A$

$784 = 4736 - 4480\cos A$

$-3952 = -4480\cos A$

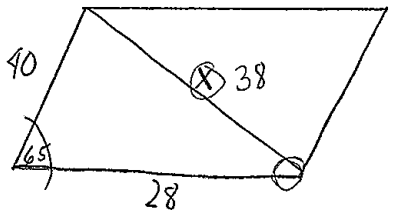
$\cos A \approx 0.88214$

$A \approx 28°$

Score 5: The student found the magnitude of the resultant incorrectly by using radians instead of degrees, but then correctly found the angle, in degrees, based on their magnitude.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



law of cosines

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

$a^2 = (40)^2 + (28)^2 - 2(40)(28)\cos(65)$

$a^2 = 2384 - 964.6649063$

$\sqrt{a^2} = \sqrt{1437.335094}$

$a = 37.91220244$

magnitude of resultant = 38 lb

law of sines

$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{38}{\sin 65} = \frac{40}{\sin B}$

$\frac{38\sin B}{38} = \frac{40\sin 65}{38}$

$\sin B = \frac{40\sin 65}{38}$

$\sin B = .95400081969$

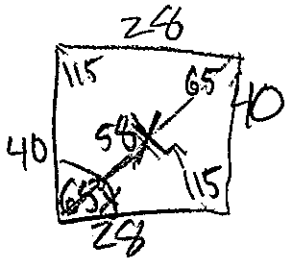
$B = 72.555557886$

$\angle = 73°$

Score 4: The student made one conceptual error.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



$X^2 = 28^2 + 40^2 - 2(28)(40)\cos 115$

$X^2 = 3330.664908$

$X = 58$

$\frac{X}{\sin 40} = \frac{58}{\sin 115}$

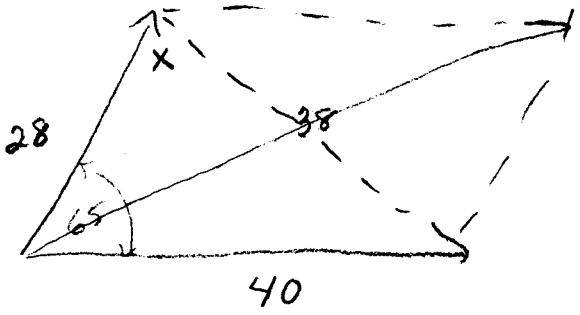
$\frac{58 \sin 40}{\sin 115} = \frac{X \sin 115}{\sin 115}$

$X = 41°$

Score 4: The student made one conceptual error in using the Law of Sines.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = 28^2 + 40^2 - 2(28)(40)\cos 65$

$c^2 = 784 + 1600 - 2240\cos 65$

$c^2 = 2384 - 2240\cos 65$

$c^2 = 1437$

$c = 38$

$\frac{\sin 65}{38} = \frac{\sin x}{40}$

$36 = 38\sin x$

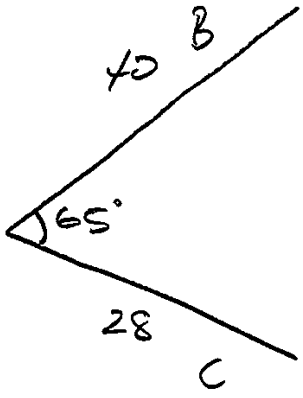
$x = 72$

Score 3: The student made one conceptual error and one rounding error.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.

resultant force = 38 pounds



$a^2 = 40^2 + 28^2 - 2(40)(28)\cos 65$

$a^2 = 2384 - 946.6649063$

$a^2 = 1437.335094$

$a = 37.91$

$a = 38$

$\frac{38}{65} = \frac{40}{x}$

$38x = 2600$

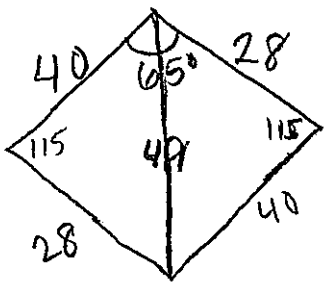
$x = 68.42$

$\measuredangle = 68°$

Score 2: The student made two conceptual errors.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



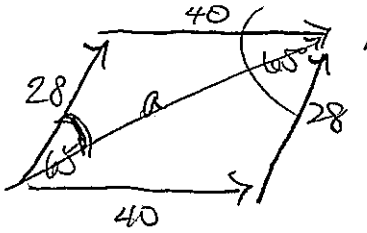
$28^2 + 40^2 = c^2$
$\sqrt{2384} = \sqrt{c^2}$
$49 = c$

$\frac{49}{\sin 115} = \frac{40}{\sin x}$
$49 \sin x = 36$
$\sin x = .7425$
$x = 47.9$
$x = 48°$

Score 2: The student made one conceptual error in finding the resultant, followed by one rounding error and one computational error in using the Law of Sines.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.

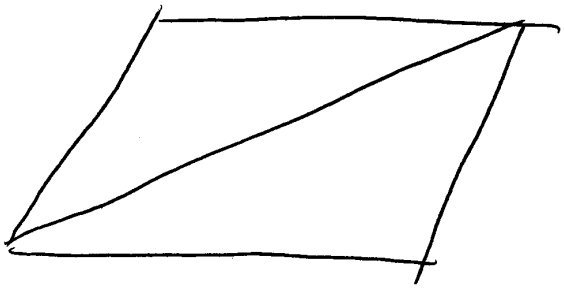


$a^2 = 28^2 + 40^2 - 2(28)(40)\cos 50$
$2384 - 2240(\cos 50)$
$\sqrt{a^2} = \sqrt{2161.5}$
$a = 46.5$ lbs → 47 lbs

Score 1: The student correctly drew and labeled the diagram, but no further correct work is shown.

Question 39

39 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*.
Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.



$a^2+b^2=c^2$
$28^2+40^2=c^2$
$784+1600=c^2$
$\sqrt{2384}=c^2$
$48.8=c$
$48=c$

$c^2=a^2+b^2-2(ab)\sin C$
$48^2=40^2+28^2-2(40)(28)\cos C$
$2304=1600+784-2(1120)\cos C$
$2304=1600+784-2240\cos C$
$2304=2384-2240\cos C$
$\frac{2304}{144}=\frac{144\cos C}{144}$
$16=\cos$

Score 0: The student did not label the diagram, made two conceptual errors and one rounding error, and did not state the angle.