The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

# ÁLGEBRA INTEGRADA

**Viernes,** 20 de junio de 2014 — 9:15 a.m. a 12:15 p.m., solamente

Nombre del estudiante: _____

Nombre de la escuela: _____

La posesión o el uso de cualquier aparato destinado a la comunicación están estrictamente prohibidos mientras esté realizando el examen. Si usted tiene o utiliza cualquier aparato destinado a la comunicación, aunque sea brevemente, su examen será invalidado y no se calculará su calificación.

Escriba en letra de molde su nombre y el nombre de su escuela en las líneas de arriba.

Se le ha proporcionado una hoja de respuestas separada para la Parte I. Siga las instrucciones del supervisor para completar la información del estudiante en su hoja de respuestas.

Este examen tiene cuatro partes, con un total de 39 preguntas. Usted debe responder todas las preguntas de este examen. Escriba sus respuestas a las preguntas de selección múltiple de la Parte I en la hoja de respuestas separada. Escriba sus respuestas a las preguntas de las Partes II, III y IV directamente en este folleto. Todo el trabajo debe ser realizado con bolígrafo de tinta permanente, con excepción de los gráficos y los dibujos, que deben hacerse con lápiz grafito. Indique claramente los pasos necesarios, incluyendo apropiadamente las sustituciones de fórmulas, diagramas, gráficos, tablas, etc. Las fórmulas que podría necesitar para responder a ciertas preguntas se encuentran al final del examen. Esta hoja está perforada para que pueda desprenderla de este folleto.

No se permite el uso de papel de borrador para ninguna parte de este examen, pero puede usar los espacios en blanco en este folleto como papel de borrador. Una hoja perforada de papel cuadriculado de borrador está provista al final de este folleto para cualquier pregunta para la cual sea útil un gráfico, aunque no se requiere. Puede desprender esta hoja del folleto. Todo trabajo realizado en esta hoja de papel cuadriculado de borrador *no* será calificado.

Cuando haya terminado el examen, deberá firmar la declaración impresa al final de la hoja de respuestas, indicando que no tenía conocimiento ilegal previo de las preguntas o respuestas del examen y que no ha dado ni recibido asistencia alguna para responder a las preguntas durante el examen. Su hoja de respuestas no será aceptada si no firma dicha declaración.

Aviso...

Se le debe proporcionar una calculadora para hacer gráficos y una regla para que utilice mientras realiza el examen.

**NO ABRA ESTE FOLLETO DE EXAMEN HASTA QUE SE LE INDIQUE.**

**Parte I**

Responda las 30 preguntas de esta parte. Cada respuesta correcta recibirá 2 créditos. No se dará ningún crédito parcial. Para cada pregunta, escriba en la hoja de respuestas separada el número que precede a la palabra o expresión que mejor complete el enunciado o que mejor responda a la pregunta. [60]

**1** El producto de $6x^3y^3$ y $2x^2y$ es

(1) $3xy^2$

(3) $12x^5y^4$

(2) $8x^5y^4$

(4) $12x^6y^3$

**2** ¿Qué conjunto de datos es cualitativo?
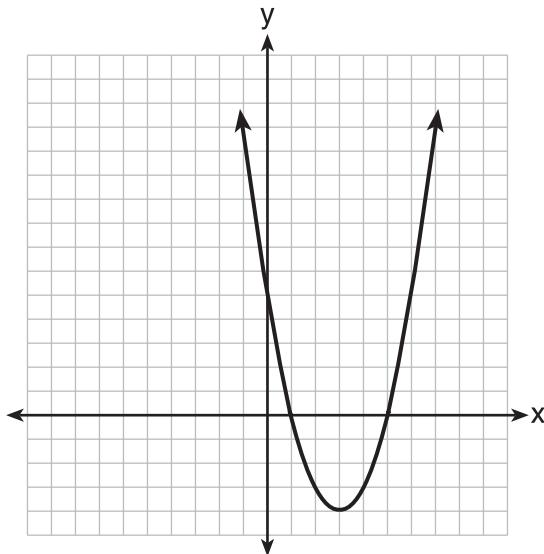
(1) las vueltas que se nadaron en una carrera

(2) la cantidad de nadadores en el equipo

(3) los colores favoritos de los trajes de baño de los nadadores

(4) la temperatura en grados Fahrenheit del agua de una piscina

**3** Un caracol tarda 500 horas en recorrer 15 millas. A esta velocidad, ¿cuántas horas tardará el caracol en recorrer 6 millas?

(1) 0.18

(3) 150

(2) 5.56

(4) 200

**4** La ecuación $y = ax^2 + bx + c$ está graficada en el conjunto de ejes que se muestra a continuación.



Basándose en el gráfico, ¿cuáles son las raíces de la ecuación $ax^2 + bx + c = 0$?

(1) 0 y 5          (3) 1 y 5

(2) 1 y 0          (4) 3 y −4

**5** Al resolver el valor de $x$ en la ecuación $4(x − 1) + 3 = 18$, Aaron escribió las siguientes líneas en la pizarra.

| | |
|---|---|
| [línea 1] | $4(x − 1) + 3 = 18$ |
| [línea 2] | $4(x − 1) = 15$ |
| [línea 3] | $4x − 1 = 15$ |
| [línea 4] | $4x = 16$ |
| [línea 5] | $x = 4$ |

¿Qué propiedad se usó *incorrectamente* al pasar de la línea 2 a la línea 3?

(1) distributiva          (3) asociativa

(2) conmutativa          (4) del inverso multiplicativo

**6** ¿Cuál es la solución de $4x - 30 \geq -3x + 12$?

(1) $x \geq 6$        (3) $x \geq -6$

(2) $x \leq 6$        (4) $x \leq -6$

**7** Un gobierno local planea aumentar la tarifa por el uso de un campamento. Si se realizara una encuesta, ¿qué grupo sería el más parcial (más sesgado) en su *oposición* al aumento?

(1) los maestros        (3) los empleados del correo postal

(2) los jugadores de fútbol        (4) los campistas

**8** Un ejemplo de una ecuación algebraica es

(1) $r^2 + 1$        (3) $5x = 7$

(2) $2a + (n - 1)d$        (4) $-25\pi + 100$

**9** ¿Cuál es el valor de $x$ en la solución del sistema de ecuaciones $3x + 2y = 12$ y $5x - 2y = 4$?

(1) 8        (3) 3

(2) 2        (4) 4

**10** ¿Cuál es la pendiente de una línea que pasa a través de los puntos $(-2,-7)$ y $(-6,-2)$?

(1) $-\dfrac{4}{5}$        (3) $\dfrac{8}{9}$

(2) $-\dfrac{5}{4}$        (4) $\dfrac{9}{8}$

**11** ¿Qué notación es equivalente a la desigualdad $-3 < x \leq 7$?

(1) $[-3,7]$          (3) $[-3,7)$

(2) $(-3,7]$         (4) $(-3,7)$

**12** ¿Cuál es el valor de la expresión $3a^2 - 4|a| + 6$ cuando $a = -3$?

(1) $-24$         (3) $21$

(2) $-9$         (4) $45$

**13** ¿Qué relación es una función?

(1) $\{(2,1), (3,1), (4,1), (5,1)\}$

(2) $\{(1,2), (1,3), (1,4), (1,5)\}$

(3) $\{(2,3), (3,2), (4,2), (2,4)\}$

(4) $\{(1,6), (2,8), (3,9), (3,12)\}$

**14** Cuando $6x^2 - 4x + 3$ se resta a $3x^2 - 2x + 3$, el resultado es

(1) $3x^2 - 2x$         (3) $3x^2 - 6x + 6$

(2) $-3x^2 + 2x$        (4) $-3x^2 - 6x + 6$

**15** Las longitudes de los lados de un triángulo rectángulo pueden ser
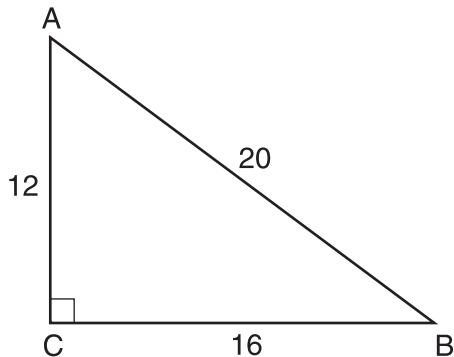
(1) 9, 12, 15         (3) 5, 5, 10

(2) 8, 10, 13         (4) 4, 5, 6

**16** ¿Qué ecuación representa una línea que es paralela al eje $y$?

(1) $x = 5$         (3) $y = 5$

(2) $x = 5y$        (4) $y = 5x$

**17** En el siguiente triángulo rectángulo $ABC$, $AC = 12$, $BC = 16$ y $AB = 20$.



¿Qué ecuación *no* es correcta?

(1) $\cos A = \dfrac{12}{20}$ \qquad (3) $\text{sen } B = \dfrac{12}{20}$

(2) $\tan A = \dfrac{16}{12}$ \qquad (4) $\tan B = \dfrac{16}{20}$

**18** Tres veces la suma de un número y cuatro es igual a cinco veces dicho número, menos dos. Si $x$ representa el número, ¿qué ecuación es una traducción correcta del enunciado?
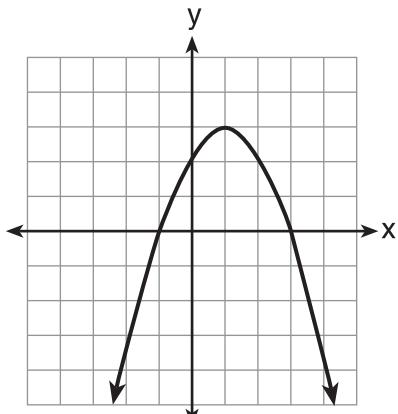
(1) $3(x + 4) = 5x - 2$ \qquad (3) $3x + 4 = 5x - 2$

(2) $3(x + 4) = 5(x - 2)$ \qquad (4) $3x + 4 = 5(x - 2)$

**19** ¿Cuál es la ecuación de la línea que pasa a través del punto $(3,-7)$ y tiene una pendiente de $-\dfrac{4}{3}$?
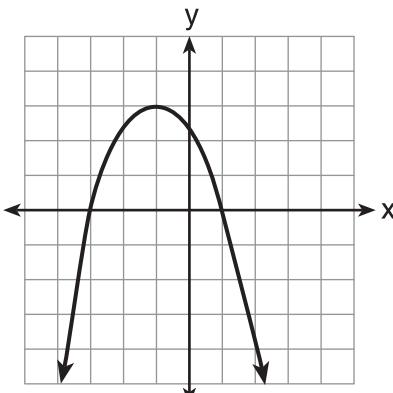
(1) $y = -\dfrac{4}{3}x + 3$ \qquad (3) $y = \dfrac{37}{3}x - \dfrac{4}{3}$

(2) $y = -\dfrac{4}{3}x - 3$ \qquad (4) $y = -\dfrac{59}{9}x - \dfrac{4}{3}$
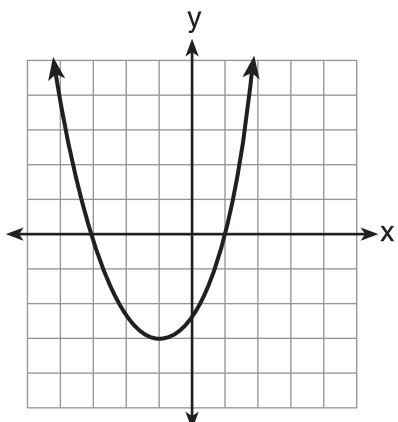
**20** ¿Qué parábola tiene un eje de simetría de $x = 1$?
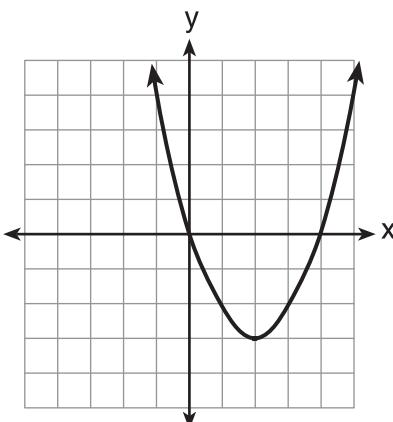


(1)



(3)



(2)



(4)

**21** Factorizada completamente, la expresión $3x^2 - 9x + 6$ es equivalente a
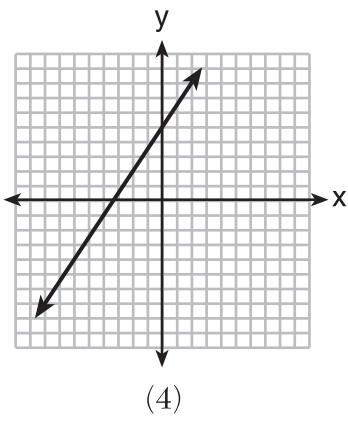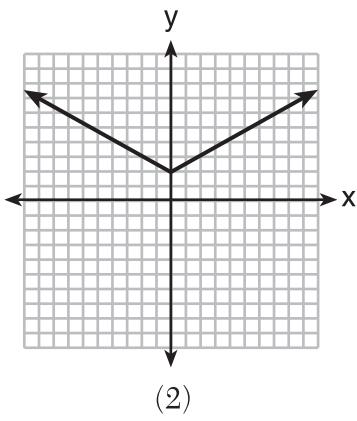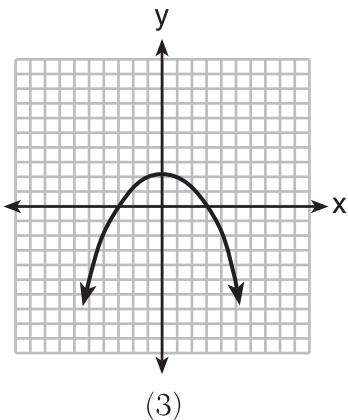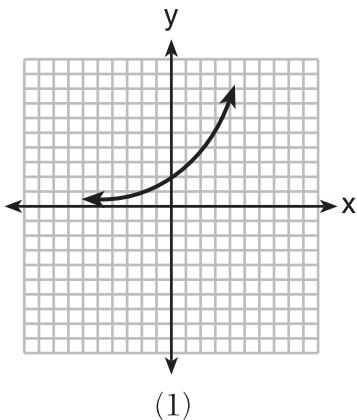
(1) $(3x - 3)(x - 2)$  
(2) $(3x + 3)(x - 2)$  

(3) $3(x + 1)(x - 2)$  
(4) $3(x - 1)(x - 2)$  

**22** La ecuación $P = 0.0089t^2 + 1.1149t + 78.4491$ representa la población de los Estados Unidos, $P$, en millones desde 1900. Si $t$ representa la cantidad de años después de 1900, ¿cuál es la población aproximada en 2025 a la *décima de un millón más cercana*?

(1) 217.8  
(2) 219.0  

(3) 343.9  
(4) 356.9

**23** ¿Qué gráfico representa una ecuación de valor absoluto?

(1)



(3)



(2)



(4)

**24** La expresión $\dfrac{a}{b} - \dfrac{1}{3}$ es equivalente a

(1) $\dfrac{a-1}{b-3}$

(3) $\dfrac{3a-b}{3b}$

(2) $\dfrac{a-1}{3b}$

(4) $\dfrac{3a-b}{b-3}$

**25** ¿Qué valor de $x$ es la solución de la ecuación $2(x - 4) + 7 = 3$?

(1) 1
(3) 6

(2) 2
(4) 0

**26** Dado:

$M$ = {verde, rojo, amarillo, negro}

$N$ = {azul, verde, amarillo}

¿Qué conjunto representa a $M \cup N$?

(1) {amarillo}                    (3) {azul, rojo, negro}

(2) {verde, amarillo}             (4) {verde, rojo, amarillo, azul, negro}

**27** ¿Qué situación describe una correlación que *no* es una relación causal?

(1) la cantidad de millas que se caminaron y el total de calorías que se quemaron

(2) la población de un país y el censo que se realiza cada diez años

(3) la cantidad de horas que un televisor está encendido y la cantidad de electricidad que se usa

(4) la velocidad de un automóvil y la cantidad de horas que tarda en viajar una distancia dada

**28** Una escuela ofrece tres clases de matemáticas y dos clases de ciencias, todas ellas en diferentes horarios. ¿Cuál es la cantidad total de formas en las que un estudiante puede tomar una clase de matemáticas y una clase de ciencias?

(1) 5                    (3) 8

(2) 6                    (4) 9

**29** La expresión $\frac{x-7}{9-x^2}$ es indefinida cuando $x$ es

(1) 3 y 7               (3) 3, solamente

(2) 3 y $-3$           (4) 9
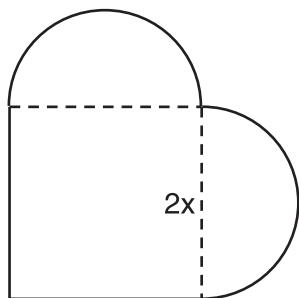
**30** ¿Cuál es el producto de $(1.5 \times 10^2)$ y $(8.4 \times 10^3)$ expresado en notación científica?

(1) $1.26 \times 10^5$         (3) $1.26 \times 10^6$

(2) $12.6 \times 10^5$         (4) $12.6 \times 10^6$

Responda las 3 preguntas de esta parte. Cada respuesta correcta recibirá 2 créditos. Indique claramente los pasos necesarios, incluyendo apropiadamente las sustituciones de fórmulas, diagramas, gráficos, tablas, etc. Para todas las preguntas en esta parte, una respuesta numérica correcta sin demostrar el trabajo recibirá solamente 1 crédito. Todas las respuestas deben escribirse con bolígrafo de tinta permanente, con excepción de los gráficos y los dibujos, que deben hacerse con lápiz grafito.   [6]
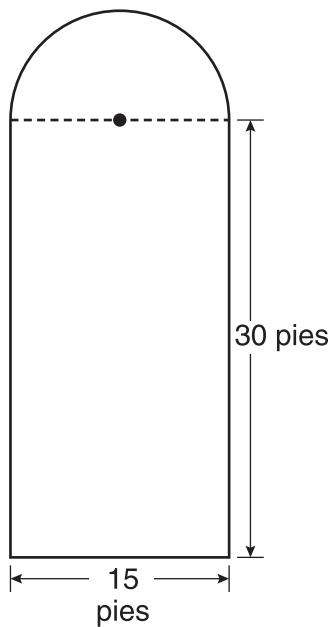
**31** Un patio compuesto por dos semicírculos y un cuadrado se muestra en el siguiente diagrama. La longitud de cada lado de la región del cuadrado está representada por $2x$. Escriba una expresión para el área de todo el patio, en términos de $x$ y $\pi$

**32** Clayton está haciendo unos experimentos de probabilidad que consisten en lanzar al aire tres monedas.

¿Cuál es la probabilidad de que cuando Clayton lance las tres monedas, dos caigan como cruz y una como cara?

**33** Ross está instalando bordes alrededor de su piscina, la cual consiste en un rectángulo y un semicírculo, como se muestra en el siguiente diagrama.



Determine la longitud del borde, a la *décima de un pie más cercana*, que Ross necesitará para dar la vuelta completa alrededor de la piscina.

Responda las 3 preguntas de esta parte. Cada respuesta correcta recibirá 3 créditos. Indique claramente los pasos necesarios, incluyendo apropiadamente las sustituciones de fórmulas, diagramas, gráficos, tablas, etc. Para todas las preguntas en esta parte, una respuesta numérica correcta sin demostrar el trabajo recibirá solamente 1 crédito. Todas las respuestas deben escribirse con bolígrafo de tinta permanente, con excepción de los gráficos y los dibujos, que deben hacerse con lápiz grafito. [9]

**34** Resuelva algebraicamente el siguiente sistema de ecuaciones para todos los valores de $x$ e $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

**35** Se mide un recipiente para almacenamiento con la forma de un prisma rectangular y las medidas tomadas son 12 pulgadas por 8 pulgadas por 4 pulgadas. Las medidas reales son 11.75 pulgadas por 7.75 pulgadas por 4 pulgadas. Encuentre el error relativo en el cálculo del volumen del recipiente, a la *milésima más cercana*.

**36** Realice las operaciones indicadas y exprese la respuesta en la forma radical más simple.

$$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$$

## Parte IV

**Responda las 3 preguntas de esta parte. Cada respuesta correcta recibirá 4 créditos. Indique claramente los pasos necesarios, incluyendo apropiadamente las sustituciones de fórmulas, diagramas, gráficos, tablas, etc. Para todas las preguntas en esta parte, una respuesta numérica correcta sin demostrar el trabajo recibirá solamente 1 crédito. Todas las respuestas deben escribirse con bolígrafo de tinta permanente, con excepción de los gráficos y los dibujos, que deben hacerse con lápiz grafito.** [12]

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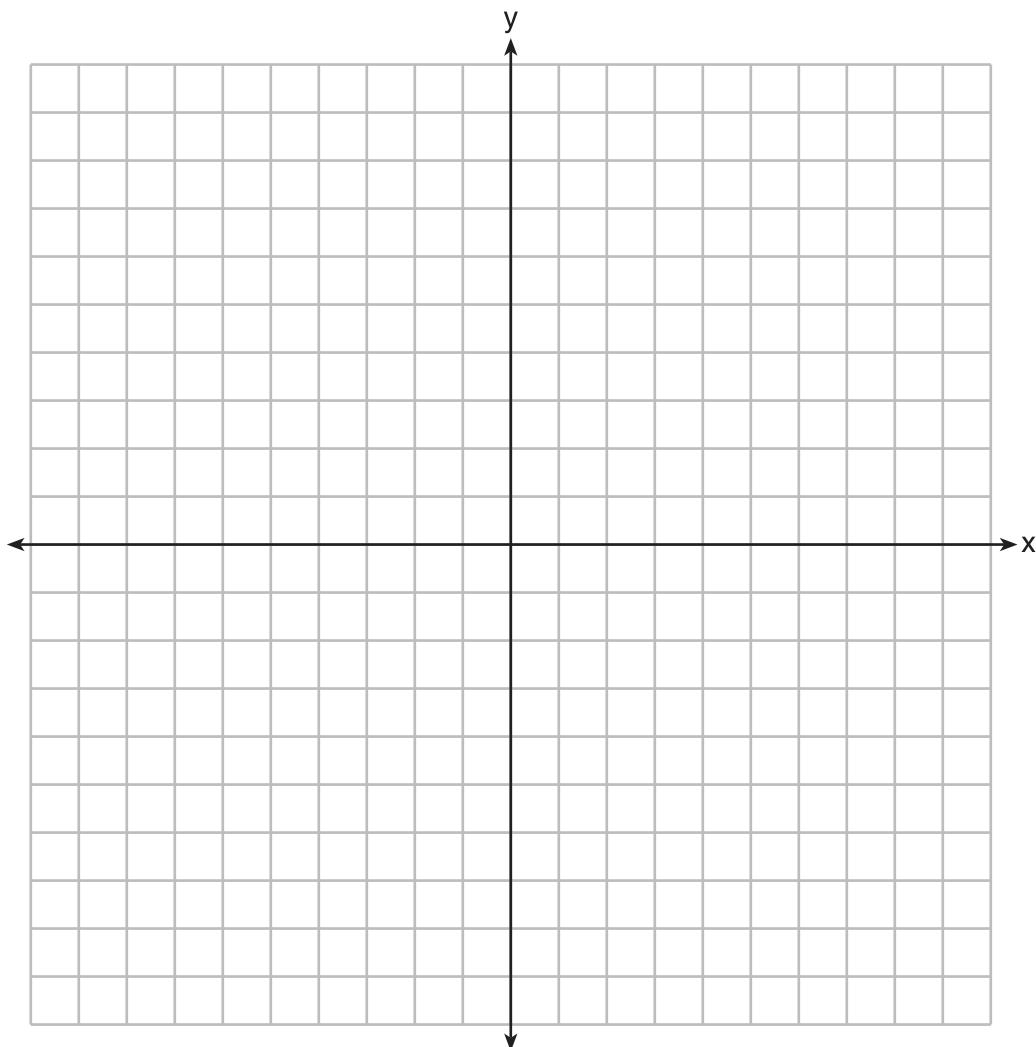
**37** Durante la primera semana de negocios, un mercado vendió un total de 108 manzanas y naranjas. La segunda semana, se vendieron cinco veces la cantidad de manzanas y tres veces la cantidad de naranjas. Se vendieron un total de 452 manzanas y naranjas durante la segunda semana. Determine cuántas manzanas y cuántas naranjas se vendieron durante la *primera* semana. [Solamente una solución algebraica puede recibir crédito completo].

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**38** En el conjunto de ejes a continuación, resuelva gráficamente el siguiente sistema de desigualdades.

Marque el conjunto de soluciones como $S$.

$$2x + 3y < -3$$
$$y - 4x \geq 2$$
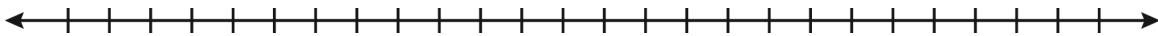
**39** Durante los últimos 15 años de su carrera de béisbol, Andrew bateó la siguiente cantidad de jonrones en cada temporada.

$$35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8$$

Enuncie y marque los valores de la mínima, el 1$^{er}$ cuartil, la mediana, el 3$^{er}$ cuartil y la máxima.
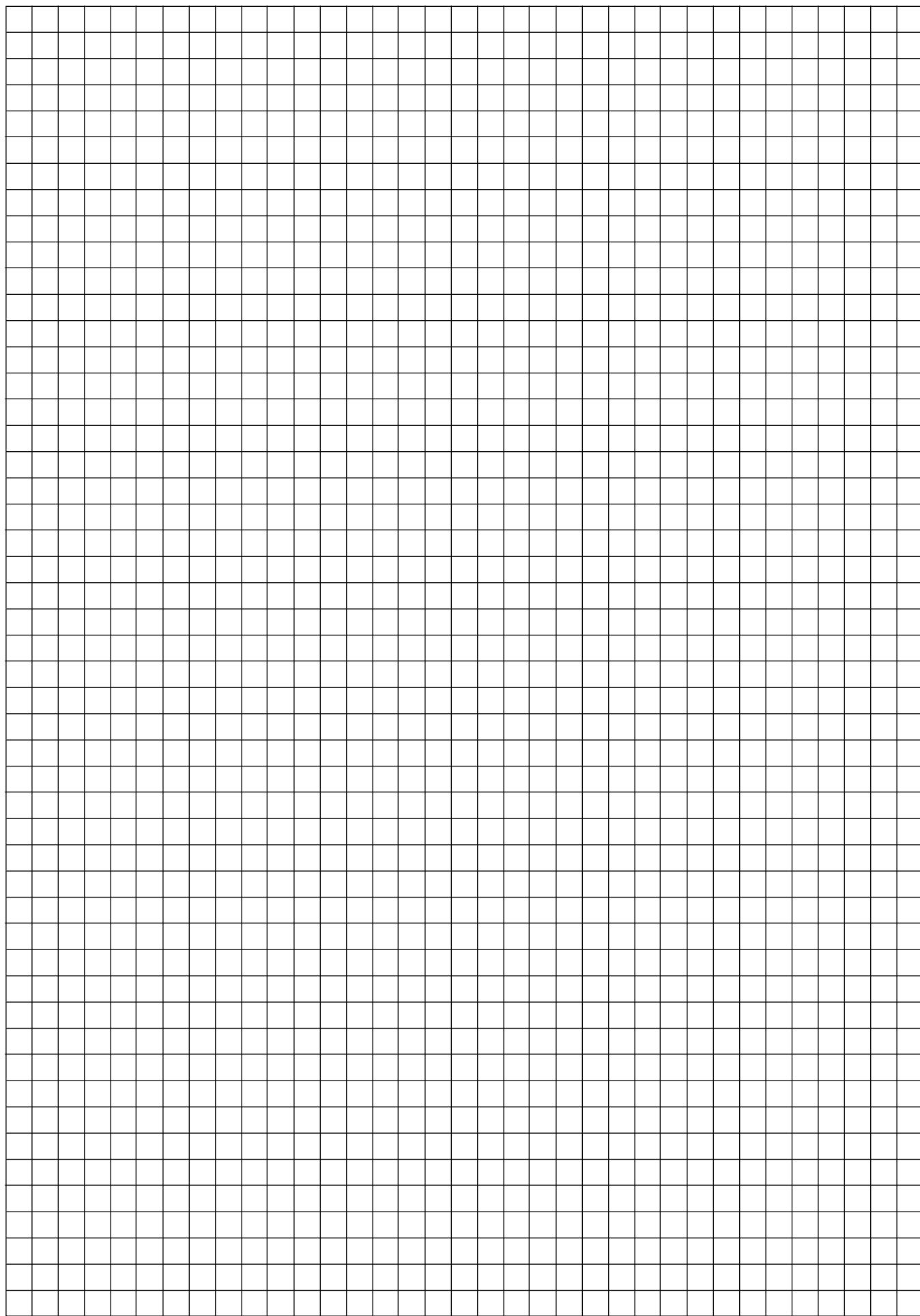
Usando la siguiente línea, construya un diagrama de caja y bigotes para este conjunto de datos.
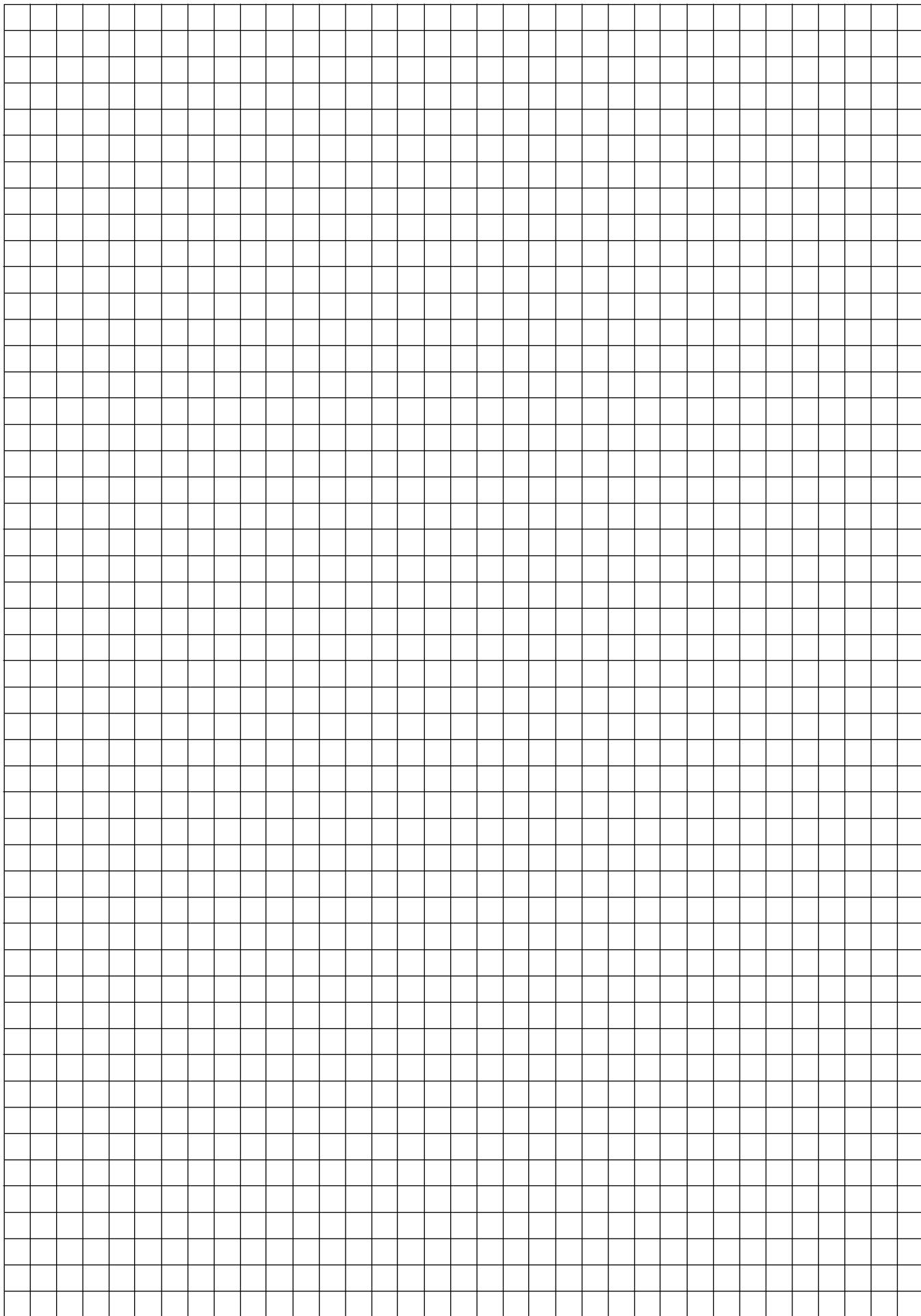
**Papel cuadriculado de borrador — Esta hoja *no* será calificada.**

# Hoja de referencia

Razones trigonométricas

$$\text{sen } A = \frac{opuesto}{hipotenusa}$$

$$\cos A = \frac{adyacente}{hipotenusa}$$

$$\tan A = \frac{opuesto}{adyacente}$$

Área     trapecio     $A = \frac{1}{2}h(b_1 + b_2)$

Volumen     cilindro     $V = \pi r^2 h$

Área de superficie     prisma rectangular     $SA = 2lw + 2hw + 2lh$

cilindro     $SA = 2\pi r^2 + 2\pi rh$

Geometría analítica     $m = \dfrac{\Delta y}{\Delta x} = \dfrac{y_2 - y_1}{x_2 - x_1}$

# INTEGRATED ALGEBRA SPANISH EDITION

# FOR TEACHERS ONLY

The University of the State of New York
**REGENTS HIGH SCHOOL EXAMINATION**

# INTEGRATED ALGEBRA

**Friday,** June 20, 2014 — 9:15 a.m. to 12:15 p.m., only

## SCORING KEY AND RATING GUIDE

### Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Regents Examination in Integrated Algebra. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examinations in Mathematics*.

Do *not* attempt to correct the student's work by making insertions or changes of any kind. In scoring the open-ended questions, use check marks to indicate student errors. Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

Each student's answer paper is to be scored by a minimum of three mathematics teachers. No one teacher is to score more than approximately one-third of the open-ended questions on a student's paper. Teachers may not score their own students' answer papers. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Friday, June 20, 2014. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

**If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.**

## Part I

Allow a total of 60 credits, 2 credits for each of the following.

| | | |
|---|---|---|
| (1) . . . . . 3 . . . . . | (11) . . . . . 2 . . . . . | (21) . . . . . 4 . . . . . |
| (2) . . . . . 3 . . . . . | (12) . . . . . 3 . . . . . | (22) . . . . . 4 . . . . . |
| (3) . . . . . 4 . . . . . | (13) . . . . . 1 . . . . . | (23) . . . . . 2 . . . . . |
| (4) . . . . . 3 . . . . . | (14) . . . . . 2 . . . . . | (24) . . . . . 3 . . . . . |
| (5) . . . . . 1 . . . . . | (15) . . . . . 1 . . . . . | (25) . . . . . 2 . . . . . |
| (6) . . . . . 1 . . . . . | (16) . . . . . 1 . . . . . | (26) . . . . . 4 . . . . . |
| (7) . . . . . 4 . . . . . | (17) . . . . . 4 . . . . . | (27) . . . . . 2 . . . . . |
| (8) . . . . . 3 . . . . . | (18) . . . . . 1 . . . . . | (28) . . . . . 2 . . . . . |
| (9) . . . . . 2 . . . . . | (19) . . . . . 2 . . . . . | (29) . . . . . 2 . . . . . |
| (10) . . . . . 2 . . . . . | (20) . . . . . 1 . . . . . | (30) . . . . . 3 . . . . . |

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.p12.nysed.gov/assessment/ and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

Beginning in January 2013, the Department is providing supplemental scoring guidance, the "Sample Response Set," for the Regents Examination in Integrated Algebra. This guidance is not required as part of the scorer training. It is at the school's discretion to incorporate it into the scorer training or to use it as supplemental information during scoring. While not reflective of all scenarios, the sample student responses selected for the Sample Response Set illustrate how less common student responses to open-ended questions may be scored. The Sample Response Set will be available on the Department's web site at http://www.nysedregents.org/IntegratedAlgebra/.

# General Rules for Applying Mathematics Rubrics

## I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Integrated Algebra are designed to provide a systematic, consistent method for awarding credit. The rubrics are not to be considered all-inclusive; it is impossible to anticipate all the different methods that students might use to solve a given problem. Each response must be rated carefully using the teacher's professional judgment and knowledge of mathematics; all calculations must be checked. The specific rubrics for each question must be applied consistently to all responses. In cases that are not specifically addressed in the rubrics, raters must follow the general rating guidelines in the publication *Information Booklet for Scoring the Regents Examinations in Mathematics*, use their own professional judgment, confer with other mathematics teachers, and/or contact the State Education Department for guidance. During each Regents Examination administration period, rating questions may be referred directly to the Education Department. The contact numbers are sent to all schools before each administration period.

## II. Full-Credit Responses

A full-credit response provides a complete and correct answer to all parts of the question. Sufficient work is shown to enable the rater to determine how the student arrived at the correct answer.

When the rubric for the full-credit response includes one or more examples of an acceptable method for solving the question (usually introduced by the phrase "such as"), it does not mean that there are no additional acceptable methods of arriving at the correct answer. Unless otherwise specified, mathematically correct alternative solutions should be awarded credit. The only exceptions are those questions that specify the type of solution that must be used; e.g., an algebraic solution or a graphic solution. A correct solution using a method other than the one specified is awarded half the credit of a correct solution using the specified method.

## III. Appropriate Work

*Full-Credit Responses:* The directions in the examination booklet for all the constructed-response questions state: "Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc." The student has the responsibility of providing the correct answer ***and*** showing how that answer was obtained. The student must "construct" the response; the teacher should not have to search through a group of seemingly random calculations scribbled on the student paper to ascertain what method the student may have used.

*Responses With Errors:* Rubrics that state "Appropriate work is shown, but…" are intended to be used with solutions that show an essentially complete response to the question but contain certain types of errors, whether computational, rounding, graphing, or conceptual. If the response is incomplete; i.e., an equation is written but not solved or an equation is solved but not all of the parts of the question are answered, appropriate work has ***not*** been shown. Other rubrics address incomplete responses.

## IV. Multiple Errors

*Computational Errors, Graphing Errors, and Rounding Errors:* Each of these types of errors results in a 1-credit deduction. Any combination of two of these types of errors results in a 2-credit deduction. No more than 2 credits should be deducted for such mechanical errors in any response. The teacher must carefully review the student's work to determine what errors were made and what type of errors they were.

*Conceptual Errors:* A conceptual error involves a more serious lack of knowledge or procedure. Examples of conceptual errors include using the incorrect formula for the area of a figure, choosing the incorrect trigonometric function, or multiplying the exponents instead of adding them when multiplying terms with exponents. A response with one conceptual error can receive no more than half credit.

If a response shows repeated occurrences of the same conceptual error, the student should not be penalized twice. If the same conceptual error is repeated in responses to other questions, credit should be deducted in each response.

If a response shows two (or more) different major conceptual errors, it should be considered completely incorrect and receive no credit.

If a response shows one conceptual error and one computational, graphing, or rounding error, the teacher must award credit that takes into account both errors; i.e., awarding half credit for the conceptual error and deducting 1 credit for each mechanical error (maximum of two deductions for mechanical errors).

# Part II

For each question, use the specific criteria to award a maximum of 2 credits. Unless other wise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(31) **[2]** $4x^2 + \pi x^2$ or an equivalent expression in terms of $\pi$, and correct work is shown.

**[1]** Appropriate work is shown, but one computational error is made.

*or*

**[1]** Appropriate work is shown, but one conceptual error is made.

*or*

**[1]** Appropriate work is shown, but the answer is expressed as a decimal.

*or*

**[1]** $4x^2 + \pi x^2$, but no work is shown.

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(32) **[2]** $\frac{3}{8}$ or an equivalent, and correct work is shown.

**[1]** Appropriate work is shown, but one computational error is made.

*or*

**[1]** Appropriate work is shown, but one conceptual error is made.

*or*

**[1]** $\frac{3}{8}$, but no work is shown.

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(33)　　**[2]** 98.6, and correct work is shown.

　　**[1]** Appropriate work is shown, but one computational or rounding error is made.

*or*

　　**[1]** Appropriate work is shown, but one conceptual error is made.

*or*

　　**[1]** Appropriate work is shown to find $75 + 7.5\pi$, but no further correct work is shown.

*or*

　　**[1]** 98.6, but no work is shown.

　　**[0]** 75, but no further correct work is shown.

*or*

　　**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

# Part III

For each question, use the specific criteria to award a maximum of 3 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(34) **[3]** $x = -3$, $y = -5$, and $x = 3$, $y = 7$ or an equivalent answer, and correct algebraic work is shown.

**[2]** Appropriate work is shown, but one computational or factoring error is made. Appropriate values of $x$ and $y$ are stated.

*or*

**[2]** Appropriate work is shown, but only one pair of values of $x$ and $y$ are stated.

*or*

**[2]** Appropriate work is shown, but only the $x$-values are found correctly.

**[1]** Appropriate work is shown, but two or more computational or factoring errors are made. Appropriate values are stated.

*or*

**[1]** Appropriate work is shown, but one conceptual error is made. Appropriate values are stated.

*or*

**[1]** $x = -3$, $y = -5$ and $x = 3$, $y = 7$, but a method other than algebraic is used.

*or*

**[1]** $x^2 - 9 = 0$ or $x^2 = 9$ is written, but no further correct work is shown.

*or*

**[1]** $x = -3$, $y = -5$ and $x = 3$, $y = 7$, but no work is shown.

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(35)  **[3]** 0.054, and correct work is shown.

**[2]** Appropriate work is shown, but one computational or rounding error is made. An appropriate relative error is stated.

*or*

**[2]** $\dfrac{384 - 364.25}{364.25}$ or an equivalent expression is written, but no further correct work is shown.

**[1]** Appropriate work is shown, but two or more computational or rounding errors are made. An appropriate relative error is stated.

*or*

**[1]** Appropriate work is shown, but one conceptual error is made, such as dividing by 384.

*or*

**[1]** Appropriate work is shown to find 384 and 364.25, but no further correct work is shown.

*or*

**[1]** 0.054, but no work is shown.

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(36)    **[3]** $189\sqrt{2}$, and correct work is shown.

**[2]** Appropriate work is shown, but one computational or simplification error is made. An appropriate answer is written in simplest radical form.

*or*

**[2]** Appropriate work is shown to find $21\sqrt{2} + 168\sqrt{2}$, or $27\sqrt{98}$, but not further correct work is shown.

**[1]** Appropriate work is shown, but two or more computational or simplification errors are made. An appropriate answer is written in simplest radical form.

*or*

**[1]** Appropriate work is shown, but one conceptual error is made. An appropriate answer is written in simplest radical form.

*or*

**[1]** $3\sqrt{98}$ and $12\sqrt{392}$, but no further correct work is shown.

*or*

**[1]** Appropriate work is shown to find $3\sqrt{7}\left(9\sqrt{14}\right)$, but no further correct work is shown.

*or*

**[1]** $189\sqrt{2}$, but no work is shown.

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

# Part IV

For each question, use the specific criteria to award a maximum of 4 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(37)   **[4]** 64 apples and 44 oranges, and correct algebraic work is shown.

**[3]** Appropriate work is shown, but one computational error is made. Appropriate numbers of apples and oranges are stated.

*or*

**[3]** Appropriate work is shown to find 64 and 44, but the answers are not labeled or are labeled incorrectly.

*or*

**[3]** Appropriate work is shown to find either 64 apples or 44 oranges, but no further correct work is shown.

**[2]** Appropriate work is shown, but two or more computational errors are made. Appropriate numbers of apples and oranges are stated.

*or*

**[2]** Appropriate work is shown, but one conceptual error is made. Appropriate numbers of apples and oranges are stated.

*or*

**[2]** 64 apples and 44 oranges, but a method other than algebraic is used.

**[1]** Appropriate work is shown, but one conceptual error and one computational error are made. Appropriate numbers of apples and oranges are stated.

*or*

**[1]** A correct equation in one variable or system of equations is written, but no further correct work is shown.

*or*

**[1]** 64 apples and 44 oranges, but no work is shown.

**[0]** 64 and 44, but the answers are not labeled or are labeled incorrectly, and no work is shown.

*or*

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(38) **[4]** Both inequalities are graphed and shaded correctly, and at least one is labeled. The solution set is labeled *S*.

**[3]** Appropriate work is shown, but one computational or graphing error is made, such as drawing a solid line for $y < -\frac{2}{3}x - 1$ or shading incorrectly. An appropriate solution set is labeled *S*.

*or*

**[3]** Both inequalities are graphed and shaded correctly, and the solution set is labeled *S*, but the graphs are not labeled or are labeled incorrectly.

*or*

**[3]** Both inequalities are graphed and shaded correctly, and at least one is labeled, but the solution set is not labeled or is labeled incorrectly.

**[2]** Appropriate work is shown, but two or more computational or graphing errors are made. An appropriate solution set is labeled *S*.

*or*

**[2]** Appropriate work is shown, but one conceptual error is made, such as graphing the lines $y = 4x + 2$ and $y = -\frac{2}{3}x - 1$, with at least one labeled, and labeling the point of intersection *S*.

*or*

**[2]** One of the inequalities is graphed, labeled, and shaded correctly, but no further correct work is shown.

**[1]** Appropriate work is shown, but one conceptual error and one computational or graphing error are made. An appropriate solution set is labeled *S*.

*or*

**[1]** The lines $y = 4x + 2$ and $y = -\frac{2}{3}x - 1$ are graphed correctly, and at least one is labeled, but no further correct work is shown.

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(39) **[4]** A correct box-and-whisker plot is drawn, and minimum = 8, Q1 = 20, median = 32, Q3 = 36, and maximum = 40 are stated.

**[3]** All five values are stated and labeled correctly, but the graph is missing or is incorrect.

*or*

**[3]** Four values are stated and labeled correctly, and an appropriate graph is drawn.

**[2]** A correct box-and-whisker plot is drawn, but the five values are not stated.

*or*

**[2]** Four values are stated and labeled correctly, but the graph is missing or is incorrect.

*or*

**[2]** Three values are stated and labeled correctly, and an appropriate graph is drawn.

**[1]** Three values are stated and labeled correctly, but the graph is missing or is incorrect.

*or*

**[1]** Two values are stated and labeled correctly, and an appropriate graph is drawn.

**[0]** Two values are stated and labeled correctly, but the graph is missing or is incorrect.

*or*

**[0]** A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

# Map to Core Curriculum

| Content Strands | Item Numbers |
|---|---|
| Number Sense and Operations | 5, 12, 30, 36 |
| Algebra | 1, 6, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 21, 22, 24, 25, 26, 29, 31, 34, 37 |
| Geometry | 4, 13, 20, 23, 32, 38 |
| Measurement | 3, 35 |
| Statistics and Probability | 2, 7, 27, 28, 33, 39 |

## Regents Examination in Integrated Algebra

## June 2014

## Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

The *Chart for Determining the Final Examination Score for the June 2014 Regents Examination in Integrated Algebra* will be posted on the Department's web site at: **http://www.p12.nysed.gov/assessment/** on Friday, June 20, 2014. Conversion charts provided for previous administrations of the Regents Examination in Integrated Algebra must NOT be used to determine students' final scores for this administration.

## Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.

2. Select the test title.

3. Complete the required demographic fields.

4. Complete each evaluation question and provide comments in the space provided.

5. Click the SUBMIT button at the bottom of the page to submit the completed form.

**The University of the State of New York**

**REGENTS HIGH SCHOOL EXAMINATION**

# INTEGRATED ALGEBRA

**Friday,** June 20, 2014 — 9:15 a.m. to 12:15 p.m.
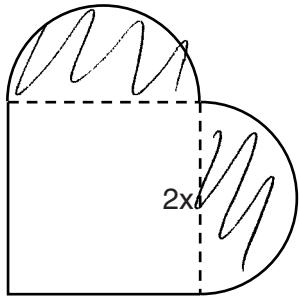
## SAMPLE RESPONSE SET

**Table of Contents**

**31** A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by $2x$. Write an expression for the area of the entire patio, in terms of $x$ and $\pi$.



$$(2x)(2x) = 4x^2$$
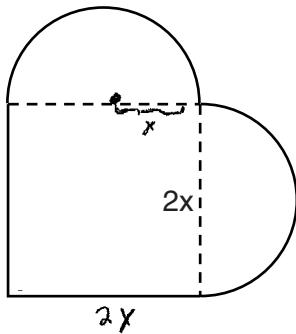
$$\pi(x)^2 = x^2\pi$$

$$Area = 4x^2 + x^2\pi$$

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

**31** A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by $2x$. Write an expression for the area of the entire patio, in terms of $x$ and $\pi$.



$\text{Area of } \odot = \pi r^2 = x^2 \pi$
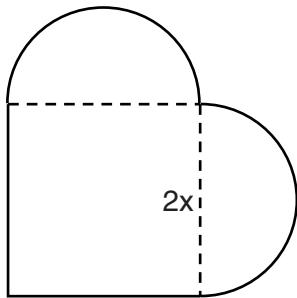
$\text{area of } \square = (2x)(2x) = 4x^2$

$\text{patio} = x^2 \pi + 4x^2 = x^2(\pi + 4)$

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

**31** A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by $2x$. Write an expression for the area of the entire patio, in terms of $x$ and $\pi$.



2x

$$2x + 2x = 4x^2 - \text{square area}$$
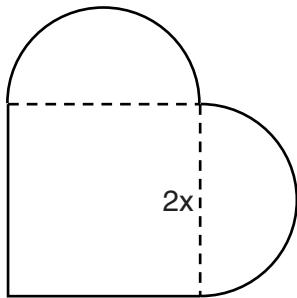
$$\pi x^2 = 2 \text{ semicircle area}$$

$$\pi 5x^2$$

**Score 1:** The student made one computational error when combining the areas.
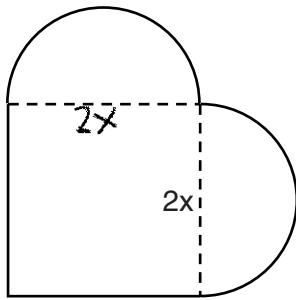
**31** A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by $2x$. Write an expression for the area of the entire patio, in terms of $x$ and $\pi$.



$$\pi(2x)^2 + (2x)^2$$

$$4x^2\pi + 4x^2$$

$$Area = 4x^2\pi + 4x^2$$

**Score 1:** The student made one conceptual error by using a radius of $2x$ for the area of the semicircles.

**31** A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by $2x$. Write an expression for the area of the entire patio, in terms of $x$ and $\pi$.



$$A = \pi r^2$$

$$\underline{2x} \div 2 = X$$

$$\pi x^2 + \pi x^2 + 4x$$
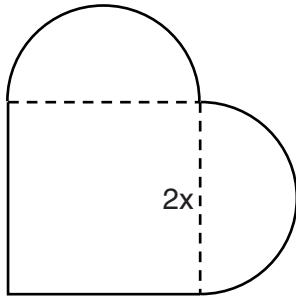
$$A = L \times W$$
$$4x \qquad\qquad 2\pi x^2 + 4x$$

**Score 0:** The student found the areas of two circles instead of two semicircles and then made one computational error when finding the area of the square.
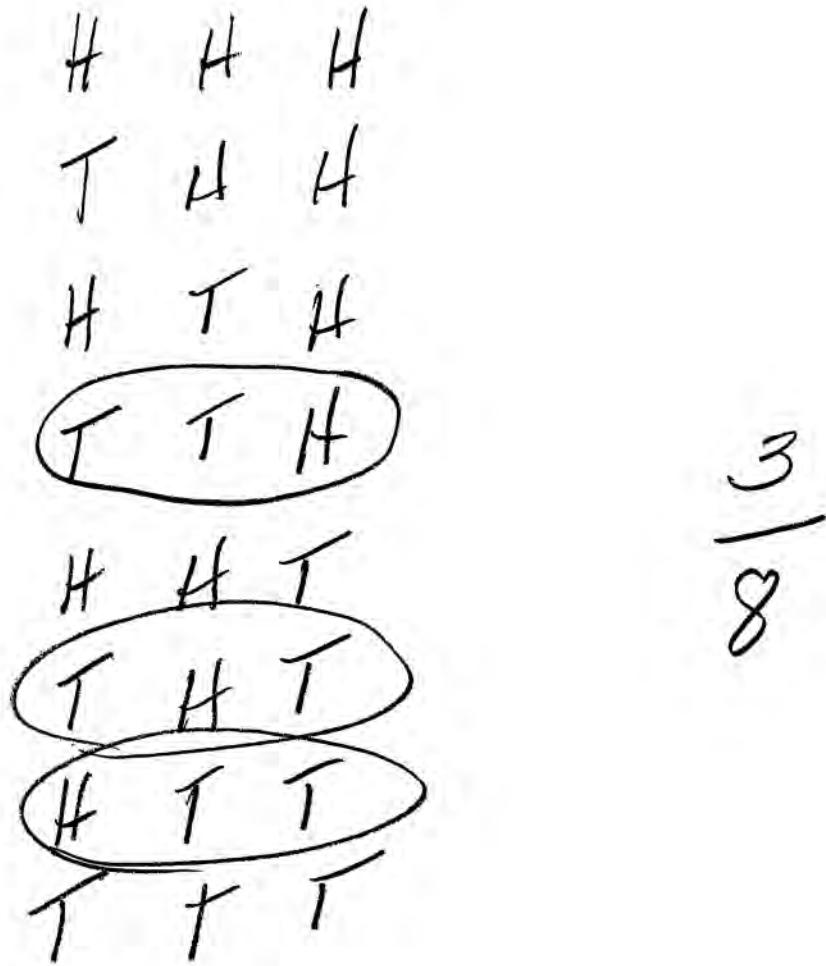
**31** A patio consisting of two semicircles and a square is shown in the diagram below. The length of each side of the square region is represented by $2x$. Write an expression for the area of the entire patio, in terms of $x$ and $\pi$.



$$A = l \cdot w + \pi d$$
$$(2x)(2x) + \pi(2x)$$
$$4x + 2x\pi$$
$$\boxed{6x\pi}$$

**Score 0:** The student made one conceptual error by finding the circumference of the semicircles and then made another conceptual error when squaring $2x$.

**32** Clayton is performing some probability experiments consisting of flipping three fair coins.

What is the probability that when Clayton flips the three coins, he gets two tails and one head?

H  H  H

T  H  H

H  T  H

(T  T  H)

$\dfrac{3}{8}$

H  H  T

(T  H  T)

(H  T  T)

T  T  T

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

**32** Clayton is performing some probability experiments consisting of flipping three fair coins.

What is the probability that when Clayton flips the three coins, he gets two tails and one head?

$$T \; T \; H \qquad H T T \qquad T H T$$

$$\frac{1}{2} \; \frac{1}{2} \; \frac{1}{2}$$

$$\frac{1}{8} \quad + \quad \frac{1}{8} \quad + \quad \frac{1}{8}$$

$$\boxed{\frac{3}{8}}$$

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

**32** Clayton is performing some probability experiments consisting of flipping three fair coins.

What is the probability that when Clayton flips the three coins, he gets two tails and one head?

T T H             H T T             T H T

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

$$\frac{3}{2} + \frac{3}{2} + \frac{3}{2} = \frac{9}{2}$$

**Score 1:** The student made one conceptual error by adding $\frac{1}{2}$ + $\frac{1}{2}$ + $\frac{1}{2}$ to get $\frac{3}{2}$. This conceptual error resulted in a probability greater than 1.

**32** Clayton is performing some probability experiments consisting of flipping three fair coins.

What is the probability that when Clayton flips the three coins, he gets two tails and one head?



**Score 1:** The student made one conceptual error by using each branch of the tree diagram as the denominator.

**32** Clayton is performing some probability experiments consisting of flipping three fair coins.
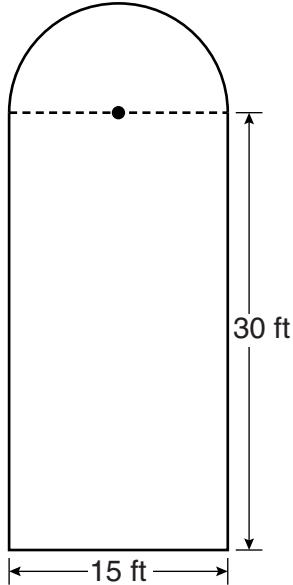
What is the probability that when Clayton flips the three coins, he gets two tails and one head?

$$T\ T\ H\ =\ \frac{2}{3}$$

**Score 0:** The student listed one correct outcome, but showed no work to support an incorrect answer.

**33** Ross is installing edging around his pool, which consists of a rectangle and a semicircle, as shown in the diagram below.



Determine the length of edging, to the *nearest tenth of a foot*, that Ross will need to go completely around the pool.

$$\frac{15 \pi}{2} = 23 ft$$

$$30 + 30 + 15 = 75$$
$$+ 23.6$$
$$\boxed{98.6}$$

$$\boxed{98.6 \ Ft}$$

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

33 Ross is installing edging around his pool, which consists of a rectangle and a semicircle, as shown in the diagram below.



30 ft

15 ft

Determine the length of edging, to the *nearest tenth of a foot*, that Ross will need to go completely around the pool.

$$30$$
$$+30$$
$$+15$$
$$\underline{471}$$
$$122.1$$

$$C = \pi d$$
$$C = \pi (15)$$
$$C = 47.1$$

**Score 1:** The student made one conceptual error by finding the circumference of the circle instead of the semicircle.

**33** Ross is installing edging around his pool, which consists of a rectangle and a semicircle, as shown in the diagram below.



30 ft

15 ft

Determine the length of edging, to the *nearest tenth of a foot*, that Ross will need to go completely around the pool.

$\square$ $P = (2\pi r)\frac{1}{2}$ ft

$\square$ $P = 2l + 2w$ ft

$\square$ $P = \pi 7.5$ ft        $\square$ $P = 23.5619449$ ft

        $D = 9$ oft

$\square$ $P = 2(30) + 2(15)$ ft

$\square$ $P = 60$ ft $30$ ft        $P = 113.5619449$ ft
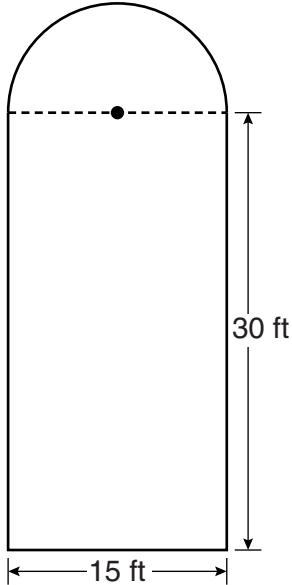
$\square$ $P = 90$ ft

$\boxed{113.6\text{ft}}$

**Score 1:**   The student made one conceptual error by finding the perimeter of the rectangle instead of the sum of just three sides.

33 Ross is installing edging around his pool, which consists of a rectangle and a semicircle, as shown in the diagram below.



30 ft

15 ft

Determine the length of edging, to the *nearest tenth of a foot*, that Ross will need to go completely around the pool.

$$30 \times 15 = 450$$

$$\pi (7 \cdot 5)^2$$

$$56 \cdot 25 \pi$$

$$176 \cdot 7$$
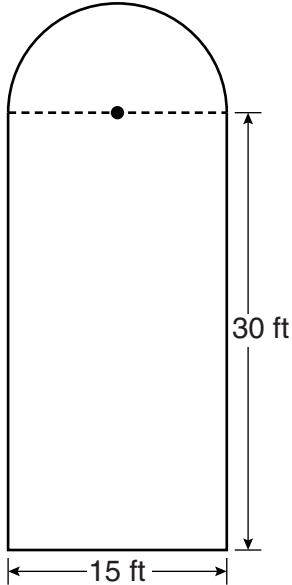
$$4200 - 176 \cdot 7$$

$$\boxed{273 \text{ feet}}$$

**Score 0:** The student made more than one conceptual error.

**33** Ross is installing edging around his pool, which consists of a rectangle and a semicircle, as shown in the diagram below.



Determine the length of edging, to the *nearest tenth of a foot*, that Ross will need to go completely around the pool.

$$30 + 30 + 15$$

$$\boxed{75 \ ft}$$

**Score 0:** The student found 75, but did no further work.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$$y = x^2 + 2x - 8 \qquad\qquad y = 2x + 1$$

$$x^2 + 2x - 8 = 2x + 1$$
$$-2x - 1 \qquad -2x - 1$$
$$\overline{x^2 - 9 = 0}$$
$$(x - 3)(x + 3)$$

$$\boxed{x = 3}, \quad \boxed{x = -3}$$

$$y = 2x + 1 \qquad\qquad y = 2x + 1$$
$$y = 2(3) + 1 \qquad\qquad y = 2(-3) + 1$$
$$y = 6 + 1 \qquad\qquad y = -6 + 1$$
$$\boxed{y = 7} \qquad\qquad \boxed{y = -5}$$

**Score 3:** The student has a complete and correct response.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$2x + 1 = x^2 + 2x - 8$
$-2x - 1 \qquad -2x - 1$

$x^2 - 9$

$(x - 3)(x + 3) = 0$

$x - 3 = 0 \qquad x + 3 = 0$

$x = 3 \qquad$ or $\quad x = -3$

$y = 2x + 1$
$y = 2(3) + 1 \qquad y = 2(-3) + 1$

$y = 7 \quad$ and $\quad y = -5$

$(3, 7)$ and $(-3, -5)$

**Score 3:** The student has a complete and correct response.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$$X^2 + 2x - 8 = 2x + 1$$

$$x^2 - 9 = 0$$

$$x^2 = 9$$

$$x = 3$$

$$\boxed{x = 3 \quad y = 2(3) + 1 = 7} \quad (3, 7)$$

**Score 2:** The student found only one pair of values for $x$ and $y$.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$$x^2 + 2x - 8 = 2x + 1$$
$$-2x - 1 = -2x - 1$$
$$= 0$$

$$x^2 - 9 = 0$$

$$x^2 = 9$$

$$x = \pm 3$$

**Score 2:** The student showed correct work, but only found the $x$-values.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$$x^2 + 2x - 8 = 2x + 1$$
$$-1 \qquad\qquad -1$$

$$x^2 + 2x - 9 = 2x$$
$$\qquad\qquad -2x \quad -2x$$
$$-2t$$
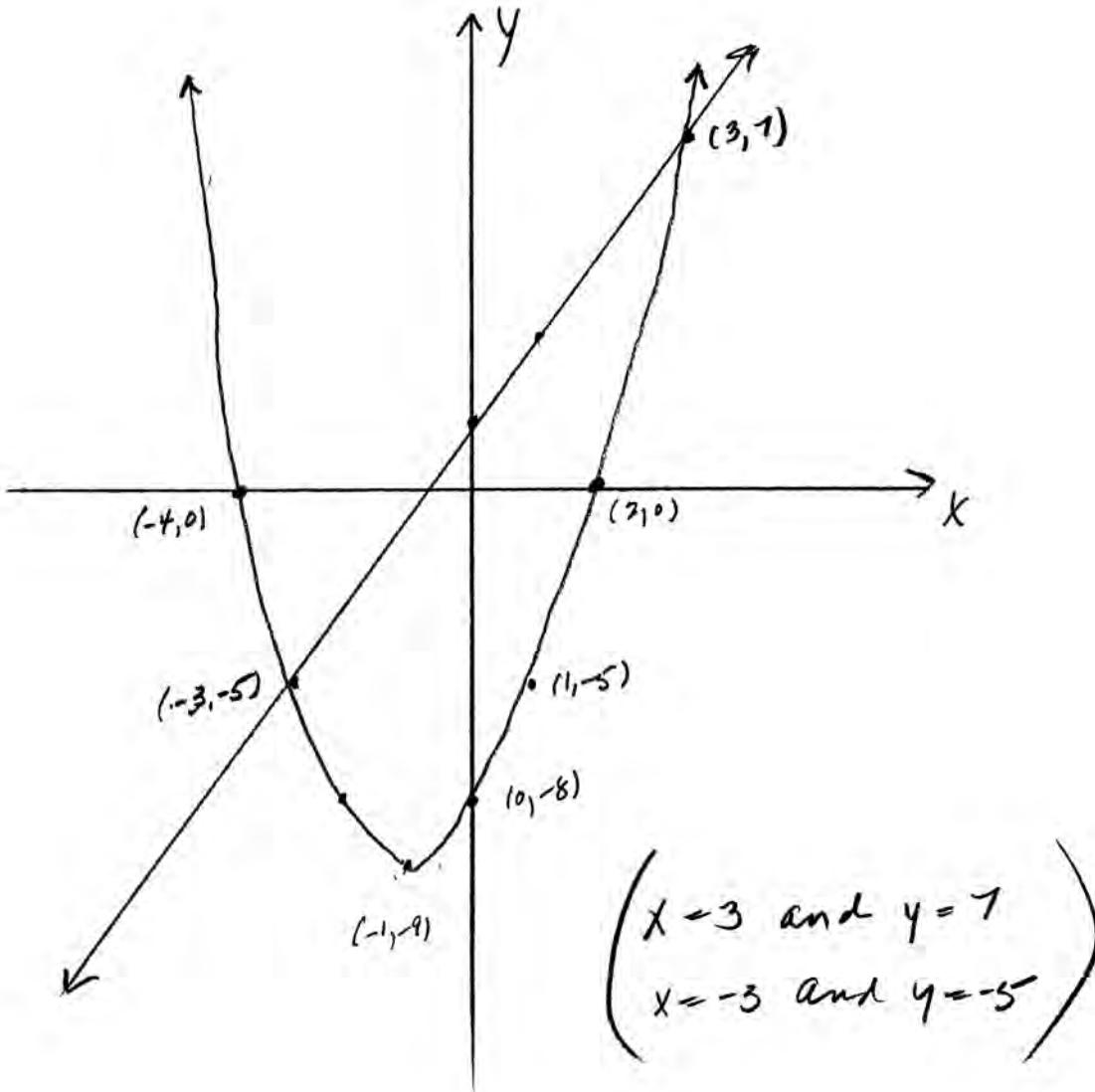
$$x^2 - 9 = 0$$

**Score 1:** The student showed correct work to find $x^2 - 9 = 0$, but showed no further correct work.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$



$(3,7)$

$(-4,0)$

$(2,0)$

$(-3,-5)$

$(1,-5)$

$(0,-8)$

$(-1,-9)$

$$\left( \begin{array}{l} x = 3 \text{ and } y = 7 \\ x = -3 \text{ and } y = -5 \end{array} \right)$$

**Score 1:** The student found the correct answer using a graphical method.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$$Y = x^2 + 2x - 8$$

$$Y = (x+4)(x-2)$$

$$Y = 2x - \cancel{2} \cancel{+2}$$

$$\underline{+2}$$

$$\frac{\cancel{2}y}{\cancel{2}} = \frac{\cancel{2}x}{\cancel{2}}$$

$$y = 2x + \cancel{y} \quad \boxed{Y = x}$$
$$\cancel{y}$$

$$-y = 2x$$

**Score 0:** The student wrote incorrect and irrelevant work.

**34** Solve the following system of equations algebraically for all values of $x$ and $y$.
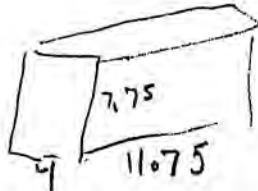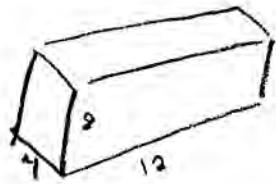
$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

$$X^2 + 2x - 8 = 2x + 1$$
$$+ 2x + 1 \qquad\qquad +2 \ +1$$

$$\overline{\phantom{X^2 + 4x - 7 = 0}}$$

$$X^2 + 4x - 7 = 0$$

**Score 0:** The student made one conceptual error and showed no further correct work to find the appropriate values.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$V = 4 \cdot 8 \cdot 12 = 384 \text{ cu.in}$$

$$V = 4 \cdot 7.5 \cdot 11.75 = 364.25$$
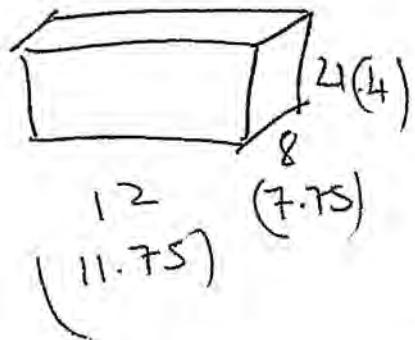
$$\frac{384 - 364.25}{364.25} = \frac{19.75}{364.25} = .05422100 21$$

.054

**Score 3:**  The student has a complete and correct response.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$\frac{(12 \cdot 8 \cdot 4) - (11.75 \cdot 7.75 \cdot 4)}{(11.75 \cdot 7.75 \cdot 4)} \approx$$

$$\approx 0.054$$

**Score 3:** The student has a complete and correct response.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$V = lwh$$
$$= 12 \cdot 8 \cdot 4$$
$$= 384$$

$$V = lwh$$
$$= 11.75 \cdot 7.75 \cdot 4$$
$$= 364$$

$$\frac{384 - 364}{364} = .055$$

**Score 2:** The student made one error by prematurely rounding when computing the actual volume.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$\frac{|Actual - calculated|}{Actual}$$

12
8
296
4
384

11.75
7.75
5875
82250
822500
91.0625
4.0000
364.250000000

19.75
364.25

384.00
364.25
19.75

0.0504
364.25⟌19.75800
182125
15.3750
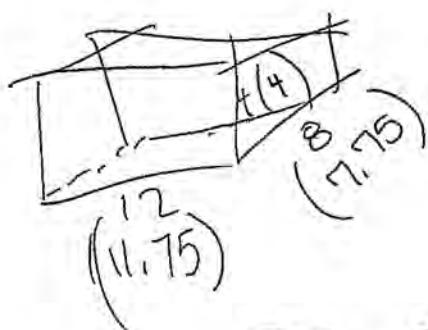
.6425
5
145700

36425
4

The relative error is 0.050.

**Score 2:** The student made one computational error.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.



$$V^1 = lwh \qquad V^2 = lwh$$
$$V^1 = 12 \cdot 8 \cdot 4 \qquad V^2 = 11.75 \cdot 7.75 \cdot 4$$
$$V^1 = 384 \qquad V^2 = 364.25$$

$$RE = \frac{384 - 364.25}{364.25} \times 100$$

$$RE = \frac{19.75}{364.25} \times 100$$

$$RE = 5.42 \, 2$$

**Score 2:** The student made one error by giving the answer as a percent by mutiplying by 100.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$V = 2lh + 2lw + 2wh$$

l = 12
h = 8
w = 4

$$2 \cdot 12 \cdot 8 + 2 \cdot 12 \cdot 4 + 2 \cdot 4 \cdot 8$$

$$352.000$$

$$V = 2lh + 2lw + 2wh$$

l = 11.75
h = 7.75
w = 4.00

$$2 \cdot 11.75 \cdot 7.75 + 2 \cdot 11.25 \cdot 4 + 2 \cdot 4 \cdot 7.75$$

$$338.125$$

$$RE = \frac{m-a}{a}$$

$$RE = \frac{352 - 338.125}{338.125}$$

$$RE = .041$$

**Score 1:**   The student made one conceptual error by finding the relative error of the surface area.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$V = lwh$$
$$= 12 \cdot 8 \cdot 4$$
$$= 384$$
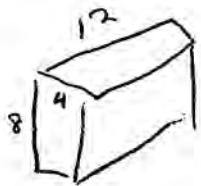
$$V = 11.75 \cdot 7.75 \cdot 4$$
$$= \text{~~~~~~~~~} 364$$

$$\frac{384 - 364}{384} = \frac{20}{384} = .052$$

**Score 0:** The student made one conceptual error by dividing by 384 and one error by prematurely rounding.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$2(4 \cdot 8) + 2(12 \cdot 4) + 2(12 \cdot 8) = 352$$

$$2(4 \cdot 7.75) + 2(4 \cdot 11.75) + 2(7.75 \cdot 11.75) = 338.125$$

$$\frac{352 - 338.125}{352}$$

$\approx .039$

**Score 0:** The student made two conceptual errors by using the surface area and dividing by 352.

**35** A storage container in the form of a rectangular prism is measured to be 12 inches by 8 inches by 4 inches. Its actual measurements are 11.75 inches by 7.75 inches by 4 inches. Find the relative error in calculating the volume of the container, to the *nearest thousandth*.

$$\frac{4-4}{4} \qquad \frac{8-7.75}{7.75} \qquad \frac{12-11.75}{11.75}$$

$$0 + 0.03225806 45 + 0.021276 5957 = 0.0535346603$$

$$\boxed{0.054}$$

**Score 0:** The student obtained a correct answer by an obviously incorrect procedure.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$$

$$3\sqrt{7}\left(\sqrt{14} + 8\sqrt{14}\right)$$

$$3\sqrt{7}\left(9\sqrt{14}\right)$$

$$189\sqrt{2}$$

**Score 3:** The student has a complete and correct response.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$$

$$3\sqrt{98} + 12\sqrt{392}$$

$$3\sqrt{16 \cdot 6} + 12\sqrt{4 \cdot 98}$$

$$12\sqrt{6} + 24\sqrt{98}$$

$$12\sqrt{6} + 24\sqrt{16 \cdot 6}$$

$$12\sqrt{6} + 96\sqrt{6}$$

$$108\sqrt{6}$$

**Score 2:**   The student made one computational error in factoring 98 as 6 • 16, but wrote an appropriate answer in simplest radical form.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14}+4\sqrt{56}\right)$$

$$3\sqrt{7}\left(\sqrt{14}+4\sqrt{56}\right)$$

$$3\sqrt{98}+12\sqrt{392}$$

$$3\sqrt{49\cdot2}+12\sqrt{49}\cdot\sqrt{8}$$

$$3\cdot7\sqrt{2}+12\cdot7\sqrt{8}$$

$$14\sqrt{2}+84\sqrt{4}\ \sqrt{2}$$

$$84\cdot2\sqrt{2}$$

$$14\sqrt{2}+168\sqrt{2}$$

$$\boxed{182\sqrt{2}}$$

**Score 2:** The student made one computational error, but wrote an appropriate answer in simplest radical form.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$$

$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$

$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{9}\sqrt{14}\right)$

$3\sqrt{7}\left(\sqrt{14} + 4(2)\sqrt{14}\right)$

$3\sqrt{7}\left(\sqrt{14} + 8\sqrt{14}\right)$

$3\sqrt{7}\left(9\sqrt{14}\right)$

$3\sqrt{7}\left(9\sqrt{7}\sqrt{2}\right)$

$27\sqrt{7}\left(\sqrt{2}\right)$

(worked margin notes: 56 branches to 4 and 14; 4 branches to 2 and 2; 14 branches to 7 and 2)

**Score 2:**   The student made one computational error when multiplying $\sqrt{7} \cdot \sqrt{7}$.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14}+4\sqrt{56}\right)$$

$$3\sqrt{7}\left(\sqrt{7\cdot 2}+4\sqrt{8\cdot 7}\right)$$

$$3\sqrt{7}\left(2\sqrt{7\cdot ②}+4\sqrt{②2\cdot 7}\right)$$

$$3\sqrt{7}\left(\sqrt{7\cdot 2}+8\sqrt{7\cdot 2}\right)$$

$$3\sqrt{7}\left(8\sqrt{7\cdot 2}\right)$$

$$3\sqrt{7}\left(8\sqrt{14}\right)$$

$$24\sqrt{98}$$

$$24\sqrt{2\cdot 49}$$

$$24\sqrt{2\cdot ⑦}$$

$$169\sqrt{2}$$

**Score 1:**   The student made two computational errors: $\sqrt{7\cdot 2}+8\sqrt{7\cdot 2}=8\sqrt{7\cdot 2}$ and then $7\cdot 24=169$.

36 Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14}+4\sqrt{56}\right)$$

$$3\sqrt{7}\left(\sqrt{14}+4\sqrt{56}\right)$$

$$3\sqrt{98}+12\sqrt{392}$$

can't be simplified anymore

$12\sqrt{392}$

$\downarrow$

$237.5878785$

$\downarrow$

$237.59$

$3\sqrt{98}$

$\downarrow$

$29.698484481$

$\downarrow$

$29.70$

**Score 1:** The student showed correct work to find $3\sqrt{98}$ and $12\sqrt{392}$, but showed no further correct work.

36 Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$$

7837253933

$$\boxed{26\ 7.28}$$

**Score 0:** The student expressed the answer as a decimal, only.

**36** Perform the indicated operations and express the answer in simplest radical form.

$$3\sqrt{7}\left(\sqrt{14} + 4\sqrt{56}\right)$$

$3\sqrt{21} + 12\sqrt{63}$

$3\sqrt{21} + 12 \cdot 3\sqrt{7}$

$3\sqrt{21} + 26\sqrt{7}$

$29\sqrt{28}$

$58\sqrt{7}$

**Score 0:** The student wrote a completely incorrect response.

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

$$apples = x = 64$$
$$oranges = y = 44$$

$$1x + y = 108 \qquad 5x + 3y = 452$$
$$-1x \qquad\qquad -1x \quad -5x$$
$$\qquad\qquad\qquad y = \frac{452 - 5x}{3}$$

$$\begin{array}{c} 108 \\ -64 \\ \hline 44 \end{array}$$

$$\frac{108 - x}{1} = \frac{452 - 5x}{3}$$

$$3(108 - x) = 452 - 5x$$

$$324 - 3x = 452 - 5x$$
$$-324 + 5x \qquad -324 + 5x$$

$$\frac{2x = 128}{2} \quad \frac{}{2}$$
$$x = 64$$

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

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

$5a =$ 2nd week apples
$3b =$ 2nd week oranges

$a + b = 108$

$5a + 3b = 452$
$(a + b = 108)3$

$64 + b = 108$
$-64 \quad -64$
$b = 44$

$5a + 3b = 452$
$-3a + 3b = 324$

$\dfrac{2a}{2} = \dfrac{128}{2}$

$a = 64$

They sold 64 apples and 44 oranges the first week.

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

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

let a = apples
let o = oranges

$$(a + o = 108)3$$
$$(5a + 3o = 452)\text{-}1$$
$$-5a - 3o = -452$$
$$+3a + 3o = 324$$
$$-2a = -128$$
$$\frac{-2}{-2} \qquad \frac{-128}{-2}$$

$$a = 64$$

$$64 + o = 108$$
$$-64 \qquad -64$$

$$o = 34$$

64 apples and 34 oranges were sold during the first week.

**Score 3:** The student made one computational error in subtracting 64 from 108.

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

$$108$$

$$54 \qquad 54$$

$$\begin{array}{r} 54 \\ \times\ 5 \\ \hline 270 \end{array} \qquad \begin{array}{r} 54 \\ \times\ 3 \\ \hline 162 \end{array}$$

$$\begin{array}{r} 270 \\ +162 \\ \hline 432 \end{array}$$

$$108$$

$$56 \qquad 52$$

$$\begin{array}{r} 56 \\ \times\ 5 \\ \hline 280 \end{array} \qquad \begin{array}{r} 52 \\ \times\ 3 \\ \hline 156 \end{array}$$

$$\begin{array}{r} 280 \\ +156 \\ \hline 436 \end{array}$$

$$108$$

$$64 \qquad 44$$

$$\begin{array}{r} 64 \\ \times\ 5 \\ \hline 320 \end{array} \qquad \begin{array}{r} 44 \\ \times\ 3 \\ \hline 132 \end{array}$$

oranges = 44

apples = 64

$$\begin{array}{r} 320 \\ +132 \\ \hline 452 \end{array}$$

**Score 2:**    The student used a method other than algebraic to find the number of apples and oranges.

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

$1^{st}$ week: total = 108

$2^{nd}$: 5a + 3x, total = 452

$5a + 3x = 452$

$+ 3(a + x = 108)$

$5a + 3x = 452$
$+ 3a + 3x = 324$
$8a = 776$
$8 \quad 8$
$a = 97$

$108$
$- 97$
$11 = x$

97 apples were sold and 11 oranges were sold.

**Score 2:** The student made one conceptual error in solving the system of equations.

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

let

$o$ = oranges
$a$ = apples

$-3a - 3o = -324$

44 oranges

$-3(o + a = 108)$

$5a + 3o = 452$

$-3a = -3o + a = 108$

$5a = 452$

$-8a - 56 = -540$

$-5(a + o = 108)$

$5a + 30 = 452$

$\dfrac{-5o}{-5} = \dfrac{-540}{-5}$

**Score 1:** The student wrote a correct system of equations, but showed no further correct work.

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

Let $x =$ apples

$y =$ oranges

$x + y = 108$

$5x + 3y = 452$

$6x + 4y = 560$

**Score 1:** The student wrote a correct system of equations.

**37** During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the *first* week. [Only an algebraic solution can receive full credit.]

$$5x + 3x + 108 = 452$$
$$8x + 108 = 452$$
$$\phantom{8x} -108 \quad -108$$
$$\overline{\phantom{8x+108=452}}$$
$$\frac{8x}{8} = \frac{344}{8}$$
$$\boxed{x = 43 \text{ apples}}$$

**Score 0:** The student wrote a completely incorrect response.

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.

$$2x + 3y < -3$$
$$y - 4x \geq 2$$

$2x + 3y < -3$

$-2x \quad \dfrac{3y}{3} < \dfrac{-2x}{3} - 3$

$y - 4x \geq 2$

$+4x$

$y \geq 4x + 2$

$y < \dfrac{-2x}{3} - 1$



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

## Question 38

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.

$2x + 3y < -3$

$$2x + 3y < -3$$
$$y - 4x \geq 2$$

$-2x$

$3y < -2x - 3$

$y - 4x \geq 2$
$+4x \quad +4x$
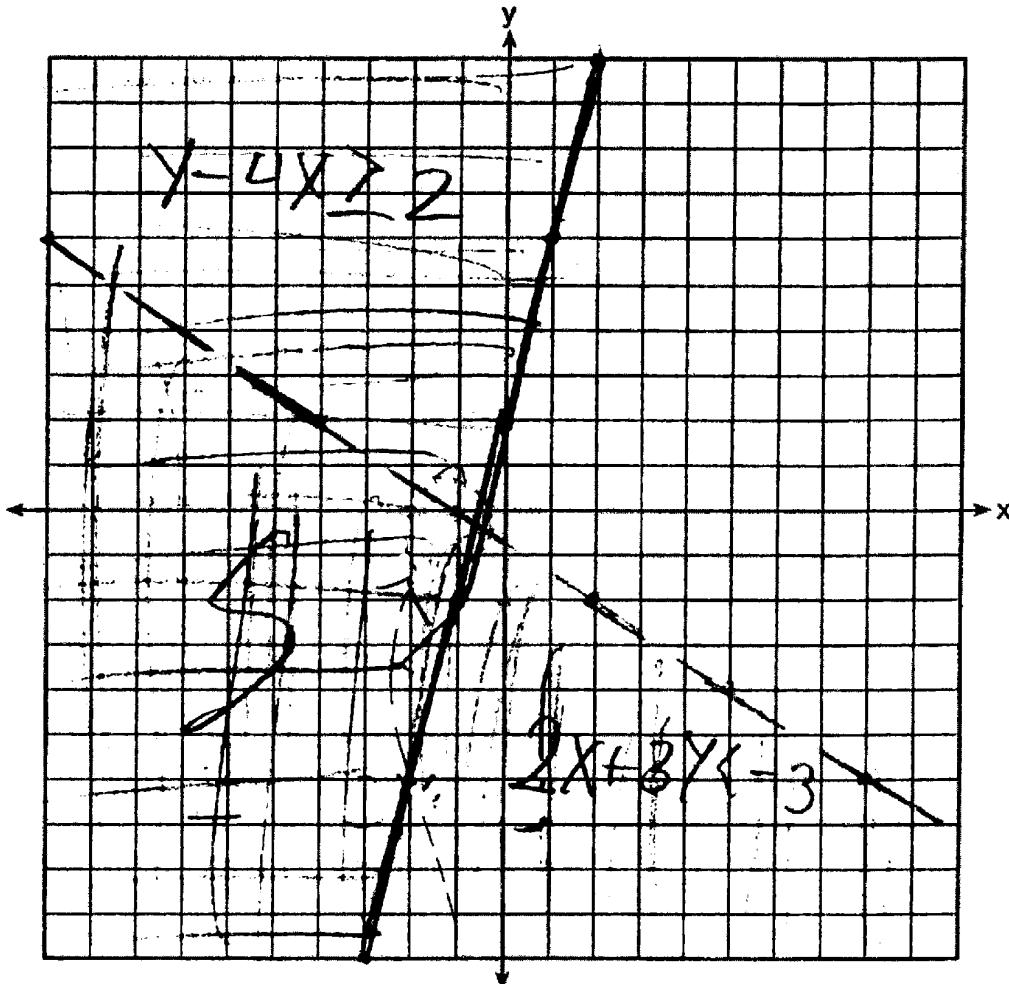
$y < \dfrac{-2}{3}x - 1$

$y \geq 4x + 2$



**Score 3:** The student did not label at least one graph.

## Question 38

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.

$$2x + 3y < -3 \quad = \quad \frac{3y}{3} < \frac{-2x}{3} - \frac{3}{3} \quad = \quad Y < -\frac{2}{3}x - 1$$

$$y - 4x \geq 2 \quad = \quad Y \geq 4X + 2$$



**Score 3:** The student made one graphing error in graphing the $y$-intercept on the $x$-axis.

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.

$$2x + 3y < -3$$
$$y - 4x \geq 2$$

Y-4x≥2

+4x +4x

Y ≥ 4x +2

m=4
b=2

2x+3y<-3
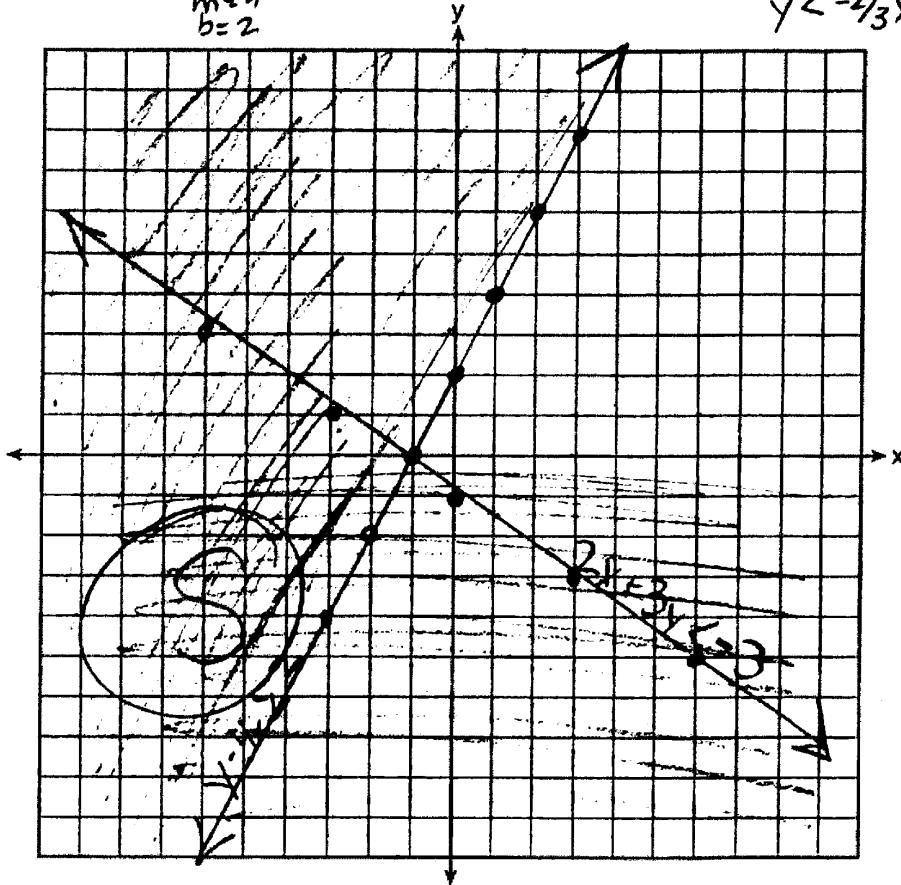
-2x     -2x

$\dfrac{3y}{3} < \dfrac{-2x}{3} - \dfrac{3}{3}$

y<-²/₃x-1

m=-2/3

b=-1



**Score 2:** The student made three graphing errors by drawing a solid line and shading incorrectly for $2x + 3y < -3$. The student graphed a slope of 2 instead of 4 for $4 - 4x > 2$.

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.
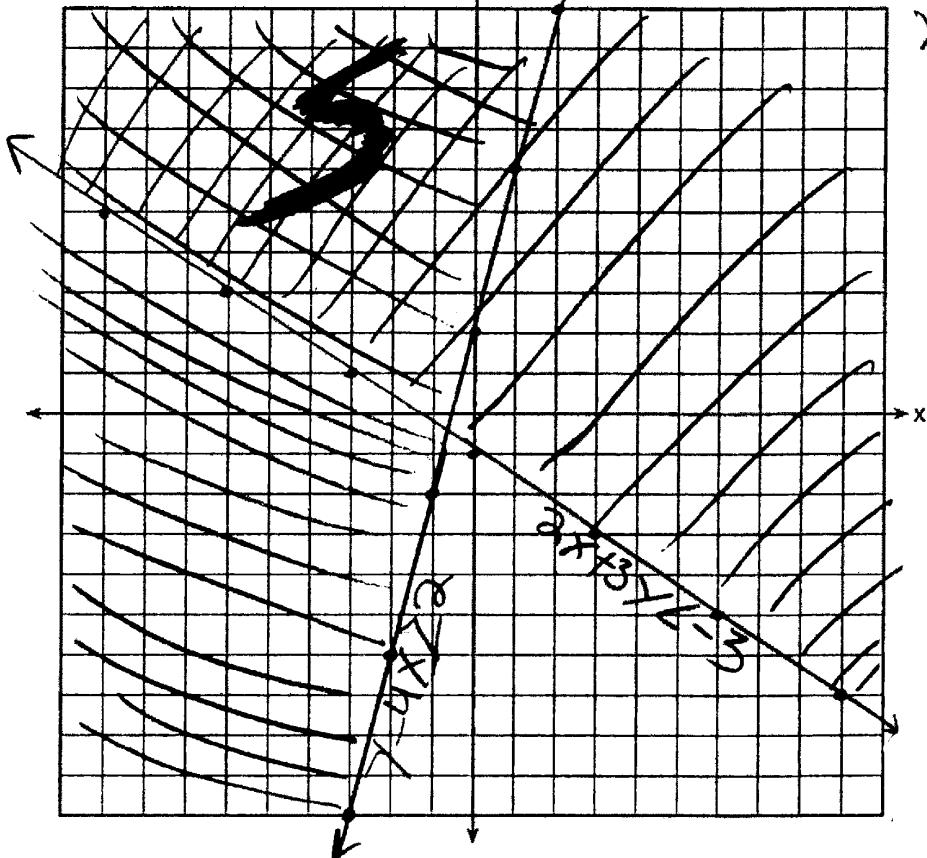
$$2x + 3y < -3$$
$$y - 4x \geq 2$$

$$2x + 3y < -3$$
$$-2x \qquad -2x$$
$$\frac{3y}{3} < \frac{-3-2x}{3}$$
$$y < -1 - \frac{2}{3}x$$
$$y < -\frac{2}{3}x - 1$$

$$y - 4x \geq 2$$
$$+4x \quad +4x$$
$$y \geq 4x + 2$$
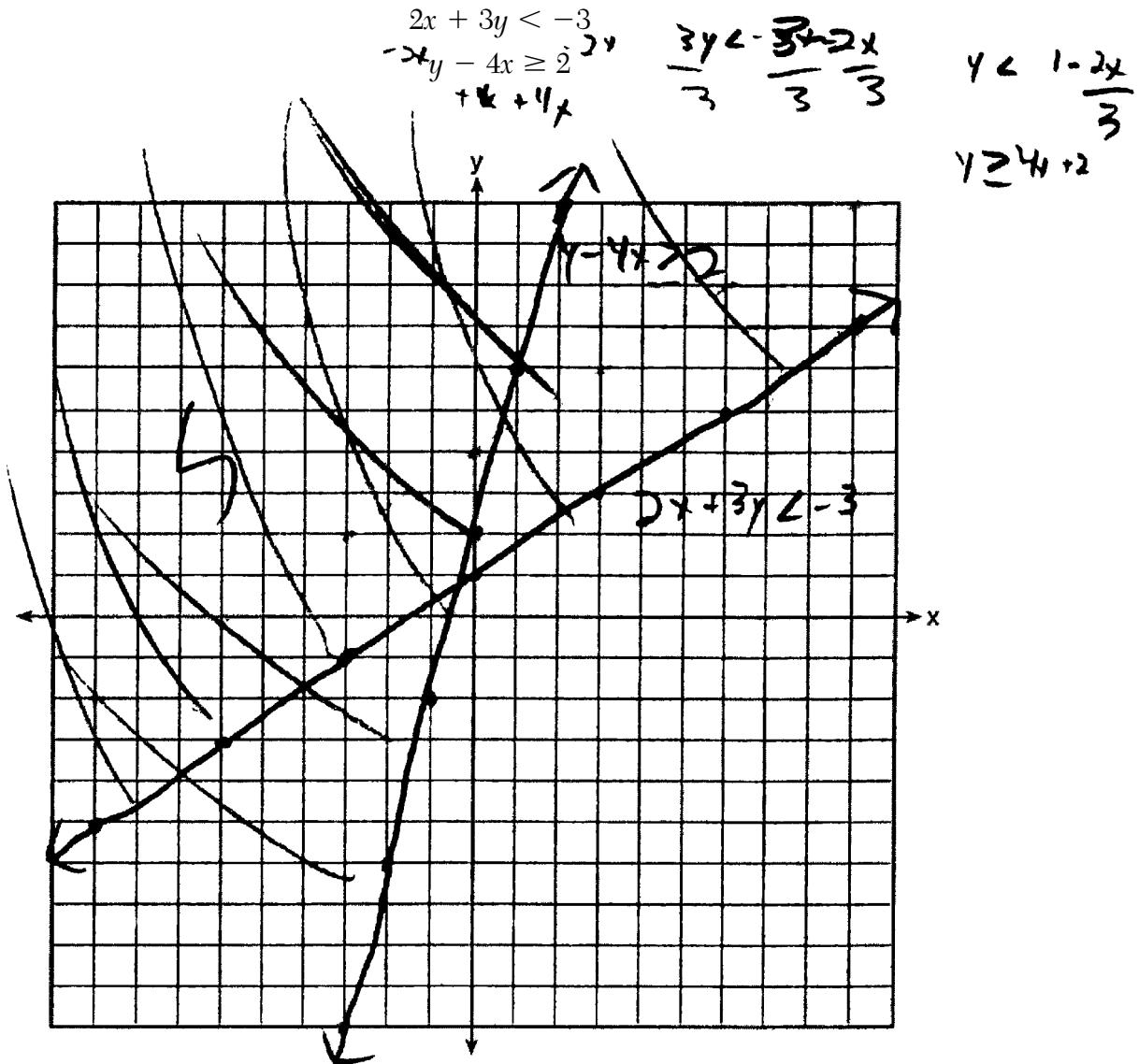


**Score 2:** The student made two graphing errors. The student used a solid line in graphing $2x + 3y < -3$ and also shaded incorrectly.

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set *S*.

$$2x + 3y < -3$$
$$y - 4x \geq 2$$

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

$$y < 1 - \frac{2x}{3}$$

$$y \geq 4x + 2$$



**Score 2:** The student graphed, labeled, and shaded one inequality correctly.

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.
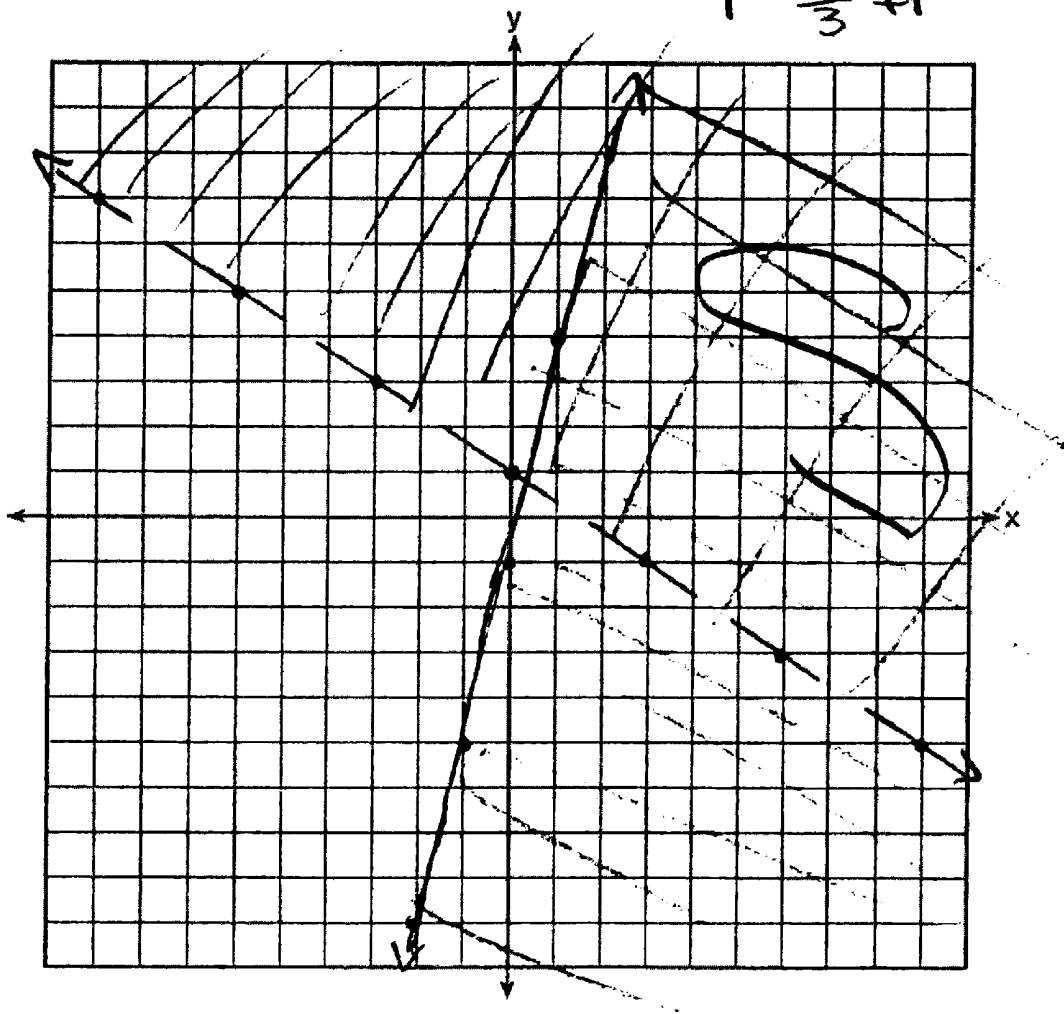
$$2x + 3y < -3$$
$$y - 4x \geq 2$$

$$\frac{-3y}{3} > \frac{-2x}{3} + \frac{3}{3}$$

$$y \leq 4x - 2$$

$$y > \frac{-2}{3}x + 1$$

**Score 0:** The student gave a completely incorrect and incoherent response.

## Question 38

**38** On the set of axes below, solve the following system of inequalities graphically.

Label the solution set $S$.

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

$$y < 2x - 3$$

$$2x + 3y < -3$$
$$-2x \qquad -2x$$
$$y - 4x \ge 2$$
$$+4x \quad +4x$$

$$4 \ge 4x + 2$$

**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8

State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

min: 8
1st quartile: 20
medium: 32
3rd quartile: 36
max: 40

Using the line below, construct a box-and-whisker plot for this set of data.



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

**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8

8, 11, 19, 20, 22, 24, 32, 32, 33, 35, 36, 36, 38, 40, 40

State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.
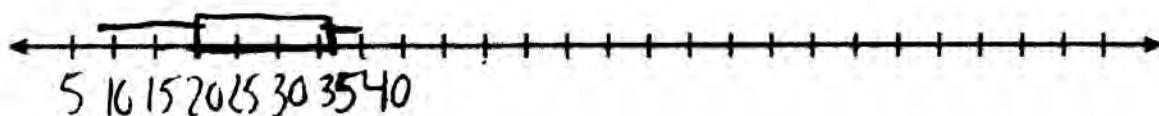
min 8
1  20
med. 32
3   36
max 40

Using the line below, construct a box-and-whisker plot for this set of data.

5 10 15 20 25 30 35 40
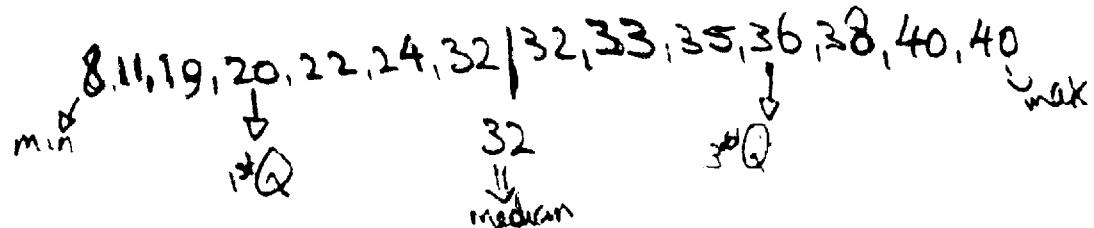
**Score 3:** The student did not correctly graph the median.
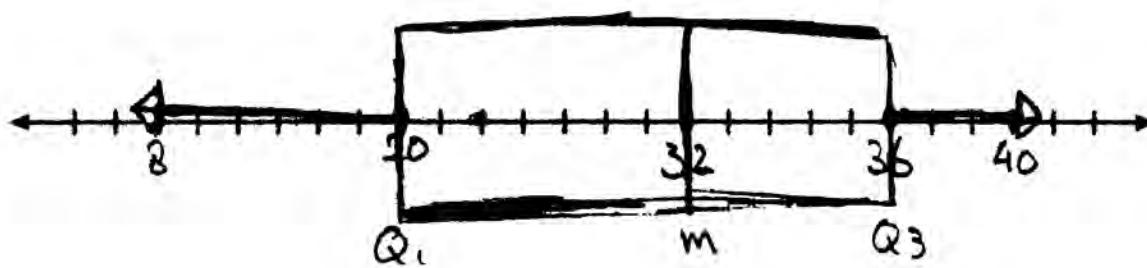
**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

$$35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8$$

State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

8,11,19,20,22,24,32 | 32,33,35,36,38,40,40

min        1ˢᵗQ           32          3ʳᵈQ    max

median

Using the line below, construct a box-and-whisker plot for this set of data.



**Score 2:** The student stated an appropriate five-number summary, but excluded one value from the data. The student also made an incorrect box-and-whisker plot.
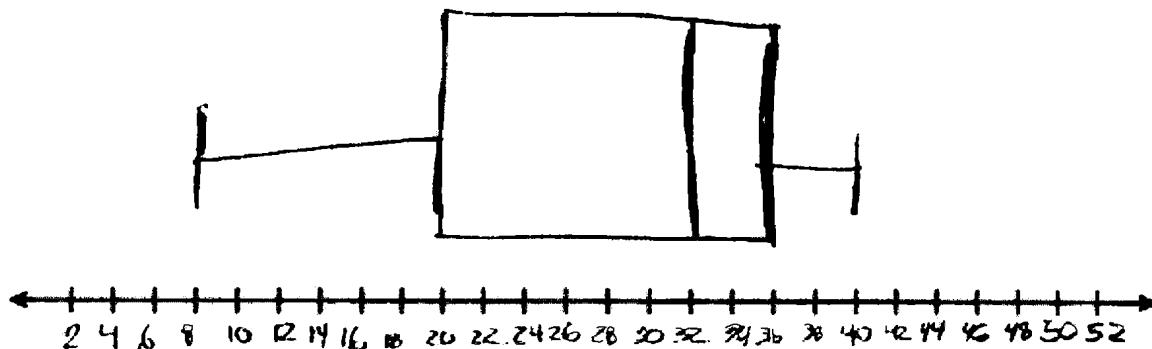
**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8

8, 11, 19 (20) 22, 24 36 (32) 33, 35, 36 (36, 38, 40, 40)

State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

Using the line below, construct a box-and-whisker plot for this set of data.



**Score 2:** The student drew a correct box-and-whisker plot, but did not state or label any values.
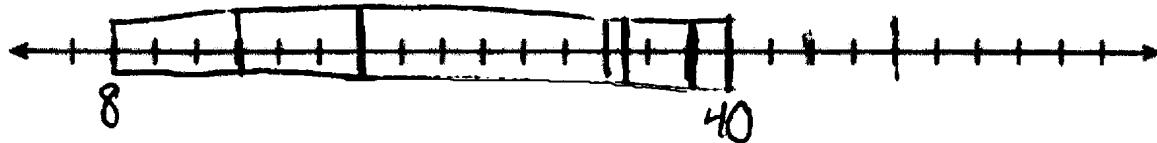
**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8

8,11,19,20,22,24,32,32,33,35,36,36,38,40

State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

minimum - 8
1st Quartile - 20
Median - 33
3rd Quartile - 38
Maximum - 40

Using the line below, construct a box-and-whisker plot for this set of data.



8    40
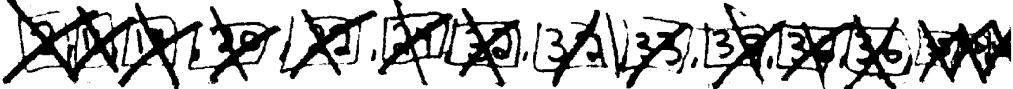
**Score 1:** The student stated and labeled three values and drew an incorrect box-and-whisker plot.

**39** During the last 15 years of his baseball career, Andrew hit the following number of home runs each season.

35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8

~~35, 24, 32, 36, 40, 32, 40, 38, 36, 33, 11, 20, 19, 22, 8~~
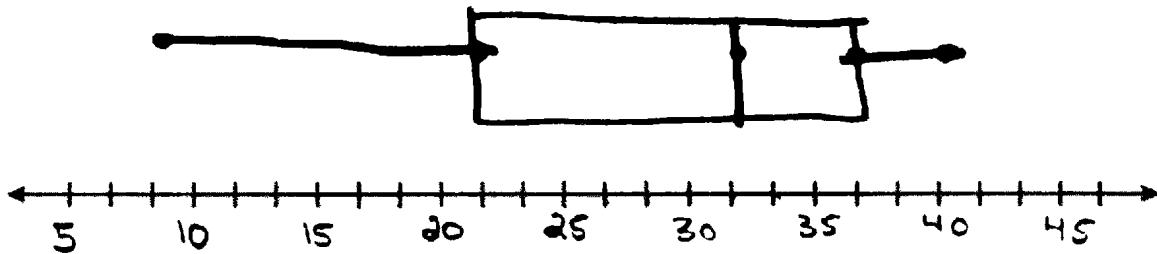
State and label the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

Mean - 32.5

Lower - 21

upper - 26

Using the line below, construct a box-and-whisker plot for this set of data.



**Score 0:** The student wrote a completely incorrect response.

# Regents Examination in Integrated Algebra – June 2014

Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

| Raw Score | Scale Score | Raw Score | Scale Score | Raw Score | Scale Score | Raw Score | Scale Score |
|---|---|---|---|---|---|---|---|
| 87 | 100 | 65 | 85 | 43 | 76 | 21 | 53 |
| 86 | 99 | 64 | 84 | 42 | 76 | 20 | 51 |
| 85 | 97 | 63 | 84 | 41 | 75 | 19 | 49 |
| 84 | 96 | 62 | 84 | 40 | 74 | 18 | 47 |
| 83 | 95 | 61 | 83 | 39 | 74 | 17 | 45 |
| 82 | 94 | 60 | 83 | 38 | 73 | 16 | 43 |
| 81 | 93 | 59 | 83 | 37 | 72 | 15 | 41 |
| 80 | 93 | 58 | 82 | 36 | 71 | 14 | 39 |
| 79 | 92 | 57 | 82 | 35 | 70 | 13 | 37 |
| 78 | 91 | 56 | 82 | 34 | 70 | 12 | 35 |
| 77 | 90 | 55 | 81 | 33 | 69 | 11 | 32 |
| 76 | 90 | 54 | 81 | 32 | 68 | 10 | 30 |
| 75 | 89 | 53 | 81 | 31 | 67 | 9 | 27 |
| 74 | 89 | 52 | 80 | 30 | 65 | 8 | 25 |
| 73 | 88 | 51 | 80 | 29 | 64 | 7 | 22 |
| 72 | 88 | 50 | 79 | 28 | 63 | 6 | 19 |
| 71 | 87 | 49 | 79 | 27 | 62 | 5 | 16 |
| 70 | 87 | 48 | 79 | 26 | 60 | 4 | 13 |
| 69 | 86 | 47 | 78 | 25 | 59 | 3 | 10 |
| 68 | 86 | 46 | 78 | 24 | 57 | 2 | 7 |
| 67 | 86 | 45 | 77 | 23 | 56 | 1 | 3 |
| 66 | 86 | 44 | 77 | 22 | 54 | 0 | 0 |

To determine the student's final examination score, find the student's total test raw score in the column labeled "Raw Score" and then locate the scale score that corresponds to that raw score. The scale score is the student's final examination score. Enter this score in the space labeled "Scale Score" on the student's answer sheet.

**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

Because scale scores corresponding to raw scores in the conversion chart change from one administration to another, it is crucial that for each administration the conversion chart provided for that administration be used to determine the student's final score. The chart above is usable only for this administration of the Regents Examination in Integrated Algebra.