

# INTEGRATED ALGEBRA

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

# INTEGRATED ALGEBRA

Thursday, January 30, 2014 — 9:15 a.m. to 12:15 p.m., only

Student Name: \_\_\_\_\_

School Name: \_\_\_\_\_

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

A separate answer sheet for Part I has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. All work should be written in pen, except graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice...

A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

## Part I

Answer all 30 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [60]

Use this space for computations.

1 An example of an equation is

(1)  $2x^2 - 4x + 12$

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

(2)  $|x - 6|$

(4)  $2x = x^2 + 3$

2 The greatest common factor of  $3m^2n + 12mn^2$  is

(1)  $3n$

(3)  $3mn$

(2)  $3m$

(4)  $3mn^2$

3 Jeremy is hosting a Halloween party for 80 children. He will give each child *at least* one candy bar. If each bag of candy contains 18 candy bars, which inequality can be used to determine how many bags,  $c$ , Jeremy will need to buy?

(1)  $18c \geq 80$

(3)  $\frac{c}{18} \geq 80$

(2)  $18c \leq 80$

(4)  $\frac{c}{18} \leq 80$

4 Which statement regarding biased sampling is *false*?

(1) Online sampling is biased because only the people who happen to visit the web site will take the survey.

(2) A radio call-in survey is biased because only people who feel strongly about the topic will respond.

(3) A survey handed to every third person leaving a library is biased because everyone leaving the library was not asked to participate.

(4) Asking for experts to take a survey is biased because they may have particular knowledge of the topic.

Use this space for  
computations.

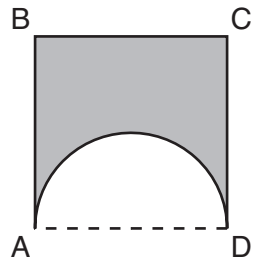
5 Which relation is *not* a function?

- (1)  $\{(2,4), (1,2), (0,0), (-1,2), (-2,4)\}$
- (2)  $\{(2,4), (1,1), (0,0), (-1,1), (-2,4)\}$
- (3)  $\{(2,2), (1,1), (0,0), (-1,1), (-2,2)\}$
- (4)  $\{(2,2), (1,1), (0,0), (1,-1), (2,-2)\}$

6 What is an equation of the line that passes through the point  $(-2, -8)$  and has a slope of 3?

- (1)  $y = 3x - 2$
- (2)  $y = 3x - 22$
- (3)  $y = 3x + 2$
- (4)  $y = 3x + 22$

7 A figure consists of a square and a semicircle, as shown in the diagram below.

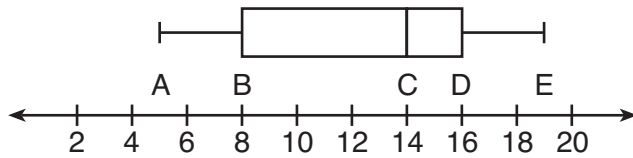


If the length of a side of the square is 6, what is the area of the shaded region?

- (1)  $36 - 3\pi$
- (2)  $36 - 4.5\pi$
- (3)  $36 - 6\pi$
- (4)  $36 - 9\pi$

**Use this space for computations.**

- 8 The box-and-whisker plot shown below represents the number of magazine subscriptions sold by members of a club.



Which statistical measures do points  $B$ ,  $D$ , and  $E$  represent, respectively?

- (1) minimum, median, maximum
  - (2) first quartile, median, third quartile
  - (3) first quartile, third quartile, maximum
  - (4) median, third quartile, maximum
- 9 What is the slope of a line represented by the equation  $2y = x - 4$ ?
- (1) 1
  - (2)  $\frac{1}{2}$
  - (3)  $-1$
  - (4)  $-\frac{1}{2}$
- 10 What is the solution of the system of equations below?

$$\begin{aligned}2x + 3y &= 7 \\ x + y &= 3\end{aligned}$$

- (1) (1,2)
- (2) (2,1)
- (3) (4,-1)
- (4) (4,1)



**Use this space for  
computations.**

**14** Which data can be classified as quantitative?

- (1) favorite stores at which you shop
- (2) U.S. Representatives and their home states
- (3) sales tax rate in each New York county
- (4) opinion of a freshman on the color of Paul's shirt

**15** Two cubes with sides numbered 1 through 6 were rolled 20 times. Their sums are recorded in the table below.

4	9	8	9	2
9	4	6	12	10
8	7	9	11	10
8	7	9	3	5

What is the empirical probability of rolling a sum of 9?

- (1)  $\frac{4}{20}$
- (2)  $\frac{5}{20}$
- (3)  $\frac{4}{36}$
- (4)  $\frac{5}{36}$

**16** What is the vertex of the graph of the equation  $y = 3x^2 + 6x + 1$ ?

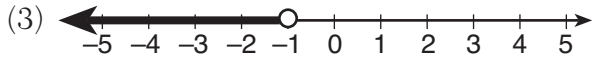
- (1)  $(-1, -2)$
- (2)  $(-1, 10)$
- (3)  $(1, -2)$
- (4)  $(1, 10)$

**17** The length and width of a rectangle are 48 inches and 40 inches. To the *nearest inch*, what is the length of its diagonal?

- (1) 27
- (2) 62
- (3) 88
- (4) 90

Use this space for  
computations.

18 Which graph represents the solution set of  $2x - 5 < 3$ ?



19 Jonathan drove to the airport to pick up his friend. A rainstorm forced him to drive at an average speed of 45 mph, reaching the airport in 3 hours. He drove back home at an average speed of 55 mph. How long, to the *nearest tenth of an hour*, did the trip home take him?

- (1) 2.0 hours                      (3) 2.8 hours  
(2) 2.5 hours                      (4) 3.7 hours

20 The expression  $\frac{2n}{5} + \frac{3n}{2}$  is equivalent to

- (1)  $\frac{5n}{7}$                               (3)  $\frac{19n}{10}$   
(2)  $\frac{6n^2}{10}$                             (4)  $\frac{7n}{10}$

Use this space for computations.

21 When  $x = 4$ , the value of  $2x^0 + x!$  is

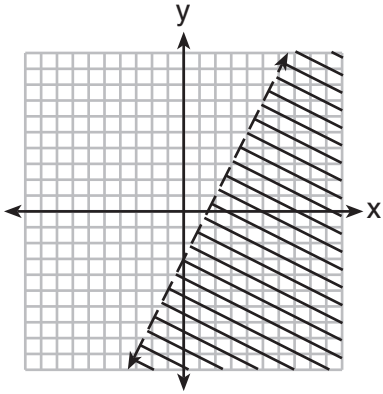
(1) 24

(3) 26

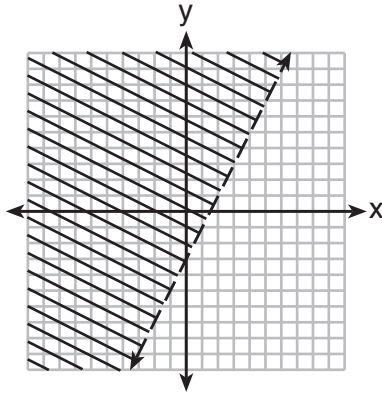
(2) 25

(4) 28

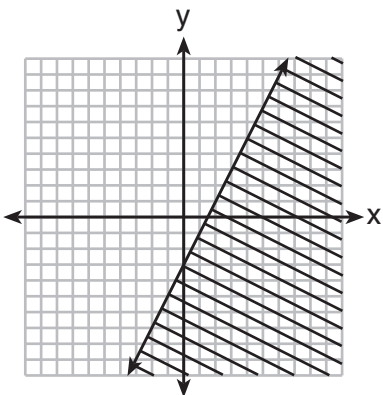
22 Which graph represents the solution of  $2y + 6 > 4x$ ?



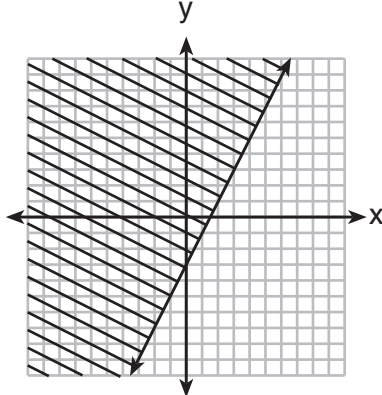
(1)



(3)



(2)

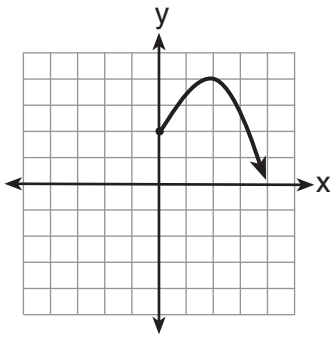


(4)

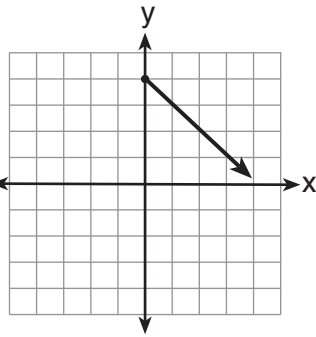


Use this space for computations.

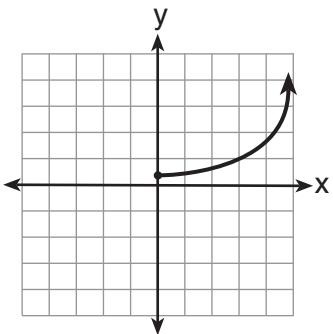
23 Which graph represents the exponential decay of a radioactive element?



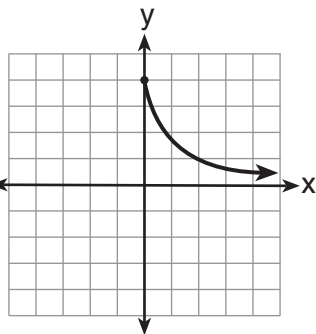
(1)



(3)



(2)



(4)

24 Which fraction represents  $\frac{x^2 - 25}{x^2 - x - 20}$  expressed in simplest form?

(1)  $\frac{5}{4}$

(3)  $\frac{x+5}{x+4}$

(2)  $\frac{x-5}{x-4}$

(4)  $\frac{25}{x+20}$

25 If  $abx - 5 = 0$ , what is  $x$  in terms of  $a$  and  $b$ ?

(1)  $x = \frac{5}{ab}$

(3)  $x = 5 - ab$

(2)  $x = -\frac{5}{ab}$

(4)  $x = ab - 5$

26 Given:

$$U = \{x | 0 < x < 10 \text{ and } x \text{ is an integer}\}$$

$$S = \{x | 0 < x < 10 \text{ and } x \text{ is an odd integer}\}$$

The complement of set S within the universal set U is

(1)  $\{0, 2, 4, 6, 8, 10\}$

(3)  $\{0, 2, 4, 6, 8\}$

(2)  $\{2, 4, 6, 8, 10\}$

(4)  $\{2, 4, 6, 8\}$

27 The roots of the equation  $2x^2 - 8x = 0$  are

(1)  $-2$  and  $2$

(3)  $0$  and  $-4$

(2)  $0$ ,  $-2$ , and  $2$

(4)  $0$  and  $4$

28 Which equation illustrates the multiplicative inverse property?

(1)  $a \cdot 1 = a$

(3)  $a\left(\frac{1}{a}\right) = 1$

(2)  $a \cdot 0 = 0$

(4)  $(-a)(-a) = a^2$

29 What is the result when  $4x^2 - 17x + 36$  is subtracted from  $2x^2 - 5x + 25$ ?

(1)  $6x^2 - 22x + 61$

(3)  $-2x^2 - 22x + 61$

(2)  $2x^2 - 12x + 11$

(4)  $-2x^2 + 12x - 11$

30 Julie has three children whose ages are consecutive odd integers. If  $x$  represents the youngest child's age, which expression represents the sum of her children's ages?

(1)  $3x + 3$

(3)  $3x + 5$

(2)  $3x + 4$

(4)  $3x + 6$

## Part II

Answer all 3 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

31 Express  $\frac{\sqrt{84}}{2\sqrt{3}}$  in simplest radical form.

**32** The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

<b>Text-Use Interval (minutes)</b>	<b>Cumulative Frequency</b>
41–50	2
41–60	5
41–70	10
41–80	19
41–90	31

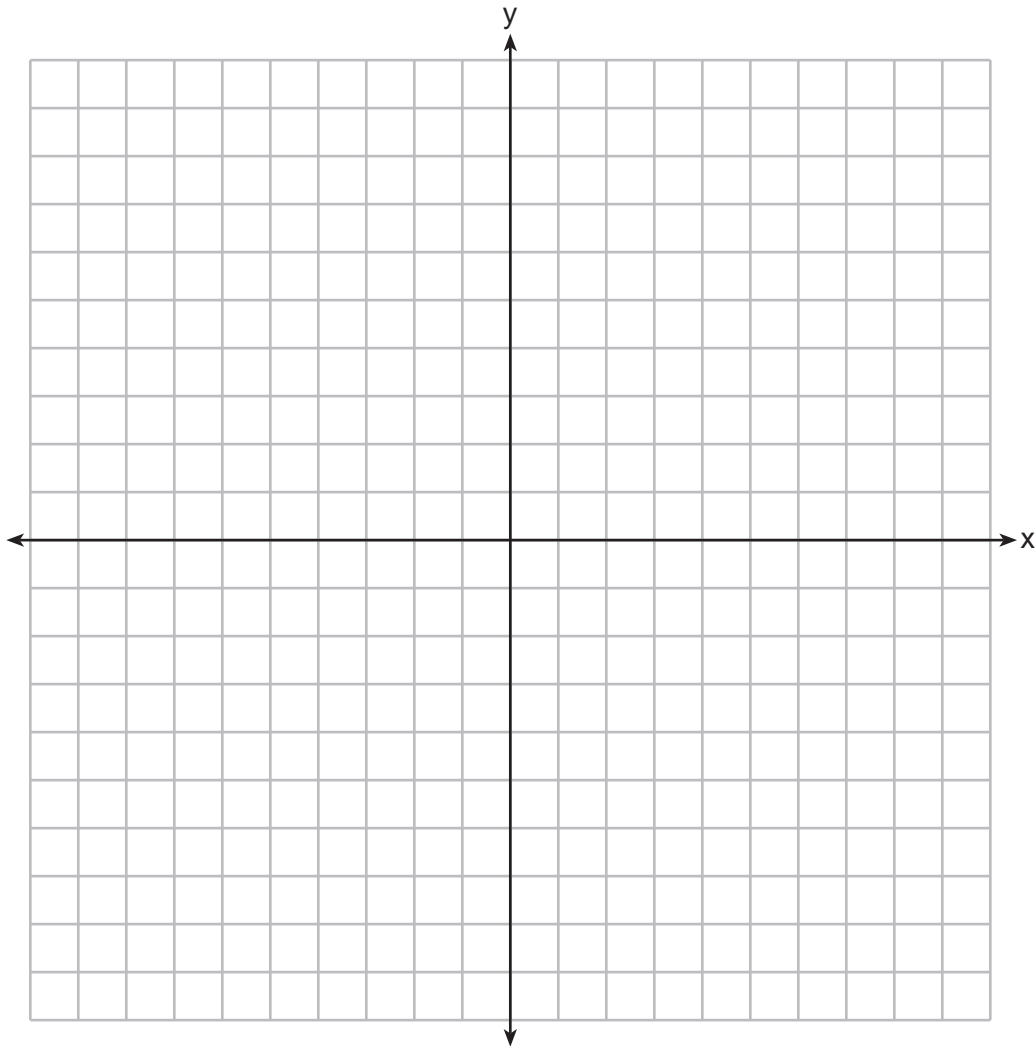
Determine which 10-minute interval contains the median. Justify your choice.

**33** Kirsten invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

### Part III

Answer all 3 questions in this part. Each correct answer will receive 3 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [9]

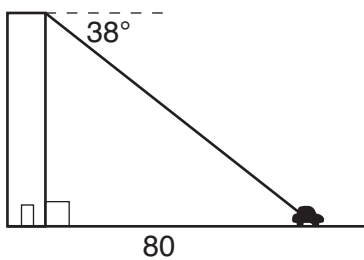
34 Graph and label the functions  $y = |x|$  and  $y = |2x|$  on the set of axes below.



Explain how increasing the coefficient of  $x$  affects the graph of  $y = |x|$ .

**35** Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the *nearest thousandth*.

**36** From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.



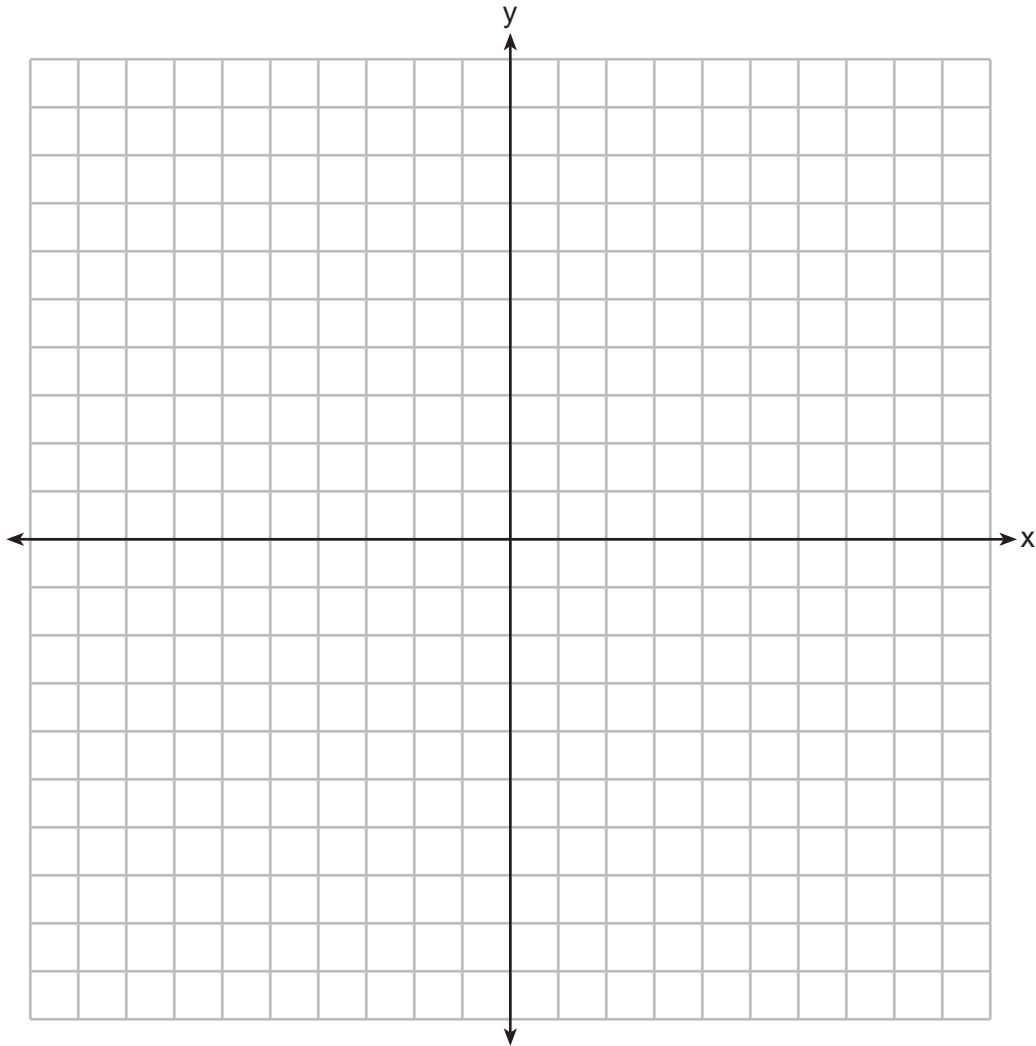


Part IV

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

$$y = x^2 + 4x - 5$$
$$y = 2x + 3$$



38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

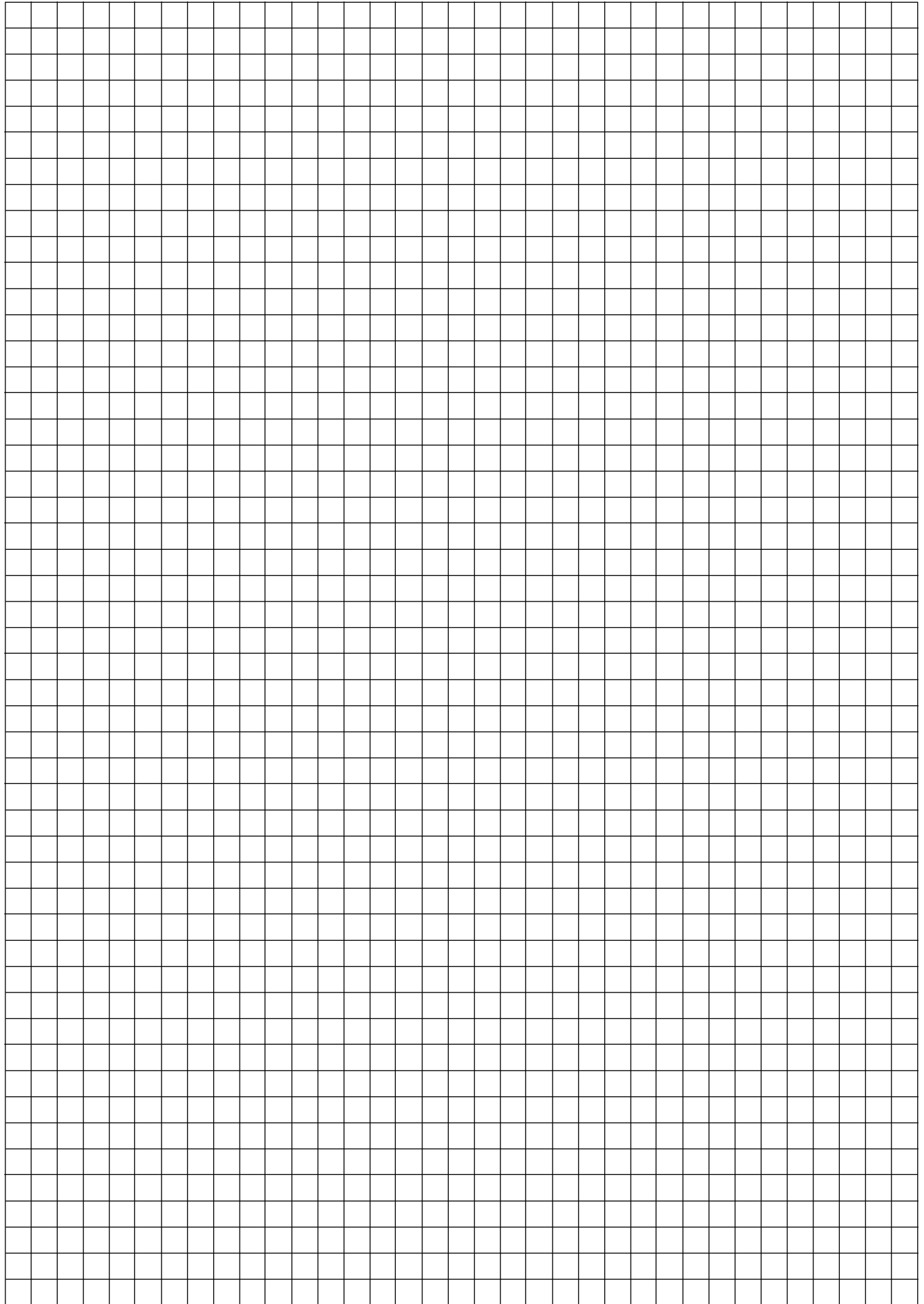
**39** Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.

Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.



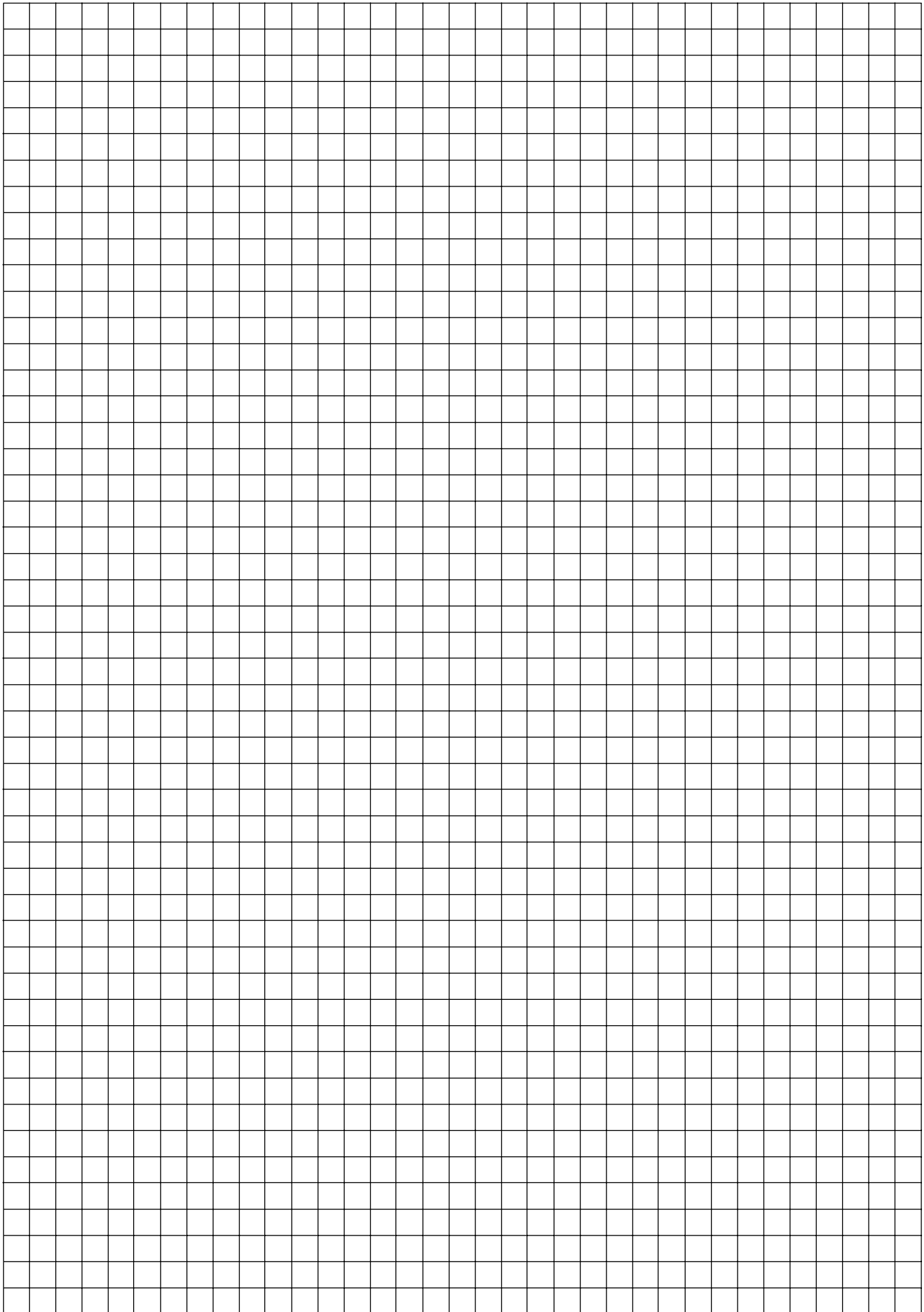
**Scrap Graph Paper — This sheet will *not* be scored.**



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**Scrap Graph Paper — This sheet will *not* be scored.**



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## Reference Sheet

Trigonometric Ratios

$$\sin A = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos A = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan A = \frac{\textit{opposite}}{\textit{adjacent}}$$

Area

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

Volume

cylinder  $V = \pi r^2 h$

Surface Area

rectangular prism  $SA = 2lw + 2hw + 2lh$

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

Coordinate Geometry

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

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# FOR TEACHERS ONLY

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REGENTS HIGH SCHOOL EXAMINATION

## INTEGRATED ALGEBRA

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

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]  $\sqrt{7}$ , and correct work is shown.
- [1] Appropriate work is shown, but one computational or simplification error is made. An appropriate answer is stated.
- or*
- [1] Appropriate work is shown, but one conceptual error is made. An appropriate answer is stated.
- or*
- [1] Appropriate work is shown, but the answer is not in simplest radical form. An appropriate answer is stated.
- or*
- [1]  $\sqrt{7}$ , but no work is shown.
- [0] The answer is expressed as a decimal, but 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.
- (32) [2] 71–80, and a correct justification is given.
- [1] One computational error is made, but an appropriate justification is given.
- or*
- [1] One conceptual error is made, such as stating 41–80 as the interval, but an appropriate justification is given.
- or*
- [1] 71–80, but the justification is missing.
- or*
- [1] 71–80, but the justification is incorrect.
- [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] 1159.27 and correct work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made. An appropriate monetary value is stated.

*or*

[1] Appropriate work is shown, but one conceptual error is made, such as using simple interest. An appropriate monetary value is stated.

*or*

[1]  $A = 1000(1 + .03)^5$  or an equivalent equation is written, but no further correct work is shown.

*or*

[1] 1159.27, 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 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] Both equations are graphed correctly, and at least one is labeled. A correct explanation is given.

[2] Appropriate work is shown, but one graphing or labeling error is made. An appropriate explanation is given.

*or*

[2] Both equations are graphed correctly and at least one is labeled, but no explanation or an incorrect explanation is given.

*or*

[2] Both equations are graphed correctly, but neither is labeled. An appropriate explanation is given.

*or*

[2] One equation is graphed and labeled correctly, and an appropriate explanation is given.

[1] One conceptual error is made, but appropriate graphs are drawn, and at least one is labeled. An appropriate explanation is given.

*or*

[1] One equation is graphed and labeled correctly, but no further correct work is shown.

*or*

[1] Appropriate work is shown, but one graphing or labeling error is made. No explanation or an incorrect explanation is given.

*or*

[1] Appropriate work is shown, but two or more graphing or labeling errors are made. An appropriate explanation is given.

*or*

[1] A correct explanation is given, but no graphs are drawn.

[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] 0.075, 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]  $\frac{162.24 - 150}{162.24}$  or equivalent, but the relative error is not found or is found incorrectly, such as expressing it as a percent.
- [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 150. An appropriate relative error is stated.
- or***
- [1] Appropriate work is shown to find 162.24 and 150, but the relative error is not found or is found incorrectly.
- or***
- [1] 0.075, 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] 62.5, and correct work is shown.

[2] Appropriate work is shown, but one computational or rounding error is made. An appropriate number of feet is stated.

***or***

[2]  $\tan 38 = \frac{x}{80}$  or  $\tan 52 = \frac{80}{x}$  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 number of feet is stated.

***or***

[1] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function. An appropriate number of feet is stated.

***or***

[1] 62.5, 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] Both equations are graphed correctly, and  $(-4, -5)$  and  $(2, 7)$  are stated.
- [3] Appropriate work is shown, but one computational or graphing error is made. Appropriate solutions are stated.
- or*
- [3] Both equations are graphed correctly, but only  $(-4, -5)$  or  $(2, 7)$  is stated.
- or*
- [3] Both equations are graphed correctly. The solutions are indicated, but the coordinates are not stated.
- [2] Appropriate work is shown, but two or more computational or graphing errors are made. Appropriate solutions are stated.
- or*
- [2] Appropriate work is shown, but one conceptual error is made. Appropriate solutions are stated.
- or*
- [2] Both equations are graphed correctly, but the points of intersection are not stated or are stated incorrectly.
- or*
- [2] One equation is graphed correctly and appropriate solution(s) are stated.
- or*
- [2]  $(-4, -5)$  and  $(2, 7)$  or equivalent answers are found, but a method other than graphic is used.
- [1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made. Appropriate solutions are stated.
- or*
- [1] One of the equations is graphed correctly, but no further correct work is shown.
- or*
- [1]  $(-4, -5)$  and  $(2, 7)$  are stated, but no work is shown.
- [0]  $(-4, -5)$  or  $(2, 7)$  is stated, but no work is shown or a method other than graphic is used.
- 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]  $-2$  and  $12$ , and correct algebraic work is shown.
- [3] Appropriate work is shown, but one computational or factoring error is made. Appropriate values are stated.
- or***
- [3] Appropriate work is shown to find either  $-2$  or  $12$ , but no further correct work is shown.
- [2] Appropriate work is shown, but two or more computational or factoring errors are made. Appropriate values are stated.
- or***
- [2] Appropriate work is shown, but one conceptual error is made. Appropriate values are stated.
- or***
- [2] A correct quadratic equation in standard form (set equal to zero) is written, but no further correct work is shown.
- or***
- [2]  $-2$  and  $12$ , but a method other than algebraic is used.
- [1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made. Appropriate values are stated.
- or***
- [1]  $3x^2 - 24 = 2x^2 + 10x$  is written, but no further correct work is shown.
- or***
- [1]  $-2$  and  $12$ , but no work is shown.
- [0]  $-2$  or  $12$ , but no work is shown or a method other than algebraic is used.
- or***
- [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 tree diagram or sample space is shown, and 10 and 6 are stated.
- [3] A partially correct tree diagram or sample space containing at least eight correct outcomes is shown. Appropriate solutions are stated.
- or*
- [3] A correct tree diagram or sample space is shown. Either 10 or 6 is stated.
- or*
- [3] A correct tree diagram or sample space is shown, but  $\frac{10}{12}$  and  $\frac{6}{12}$  are given for outfit selections.
- [2] A correct tree diagram or sample space is shown. No further correct work is shown.
- or*
- [2] Appropriate work is shown to find 10 and 6. A tree diagram or sample space of all possible outfits is not shown.
- or*
- [2] A partially correct tree diagram or sample space containing at least eight correct outcomes is shown. Only one appropriate solution is stated.
- [1] Appropriate work is shown to find 10 or 6. A tree diagram or sample space of all possible outfits is not shown.
- or*
- [1] A partially correct tree diagram or sample space containing at least eight correct outcomes is shown, but no appropriate solutions are stated.
- or*
- [1] 10 and 6, 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.
-

## Map to Core Curriculum

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

### Regents Examination in Integrated Algebra January 2014

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

**The *Chart for Determining the Final Examination Score for the January 2014 Regents Examination in Integrated Algebra* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Thursday, January 30, 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

Thursday, January 30, 2014 — 9:15 a.m.

## SAMPLE RESPONSE SET

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**Question 31**

---

31 Express  $\frac{\sqrt{84}}{2\sqrt{3}}$  in simplest radical form.

$$\frac{\sqrt{84}}{2\sqrt{3}} = \frac{1}{2}\sqrt{28} = \frac{1}{2} \cdot \sqrt{4}\sqrt{7} = \sqrt{7}$$

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

---

**Question 31**

---

31 Express  $\frac{\sqrt{84}}{2\sqrt{3}}$  in simplest radical form.

$$\begin{array}{l} \sqrt{84} \\ \sqrt{4} \sqrt{21} \\ \downarrow \\ 2 \sqrt{21} \end{array} \quad \frac{2\sqrt{21}}{2\sqrt{3}} = \sqrt{7}$$

---

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

---

**Question 31**

---

31 Express  $\frac{\sqrt{84}}{2\sqrt{3}}$  in simplest radical form.

$$\frac{\sqrt{84}}{2\sqrt{3}} = \frac{2\sqrt{28}}{2\sqrt{4}\sqrt{7}}$$
$$= \frac{2(2)\sqrt{7}}{4\sqrt{7}}$$

**Score 1:** The student made one conceptual error by moving the 2 from the denominator to the numerator.



---

**Question 31**

---

31 Express  $\frac{\sqrt{84}}{2\sqrt{3}}$  in simplest radical form.

$$84 \div 3 = 28$$

$$\frac{\sqrt{28}}{2}$$

$$2.645751311$$

---

**Score 1:** The student showed appropriate work, but did not express the answer in simplest radical form.

---

**Question 31**

---

31 Express  $\frac{\sqrt{84}}{2\sqrt{3}}$  in simplest radical form.

2.645751311

---

**Score 0:** The student expressed the answer as a decimal and showed no work.

**Question 32**

32 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

	Text-Use Interval (minutes)	Cumulative Frequency
A)	41-50	2
B)	41-60	5
C)	41-70	10
D)	41-80	19
E)	41-90	31

13  
 15  
 19  
 31

Determine which 10-minute interval contains the median. Justify your choice.

A, A, B, B, B, C, C, C, C, D, D, D, D, D, D, D, D, D  
 E, E, E, E, E, E, E, E, E, E, E, E, E, E

↑  
 Median.

The Answer: 71-80, because when you list all of them out using variables to substitute them, and you cross both sides out evenly until there is only one variable left, you can find letter D only surviving.

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

**Question 32**

32 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

Text-Use Interval (minutes)	Cumulative Frequency
41-50	2
41-60	5
41-70	10
41-80	19
41-90	31

32 total

6  
5  
10  
19  
31

Determine which 10-minute interval contains the median. Justify your choice.

71-80 contains median

because it contains ~~10-14~~ or  
the middle frequency  
~~12-27~~ frequencies

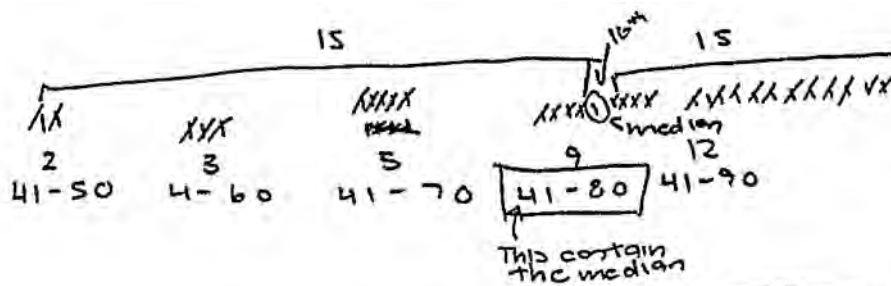
**Score 2:** The student has a complete and correct response.

**Question 32**

32 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

Text-Use Interval (minutes)	Cumulative Frequency
41-50	2
41-60	5
41-70	10
41-80	19
41-90	31

Determine which 10-minute interval contains the median. Justify your choice.



41-80 contains the median because the 16<sup>th</sup> number is the median. Since 31 can't divide evenly 16 becomes the next number. The interval 41-80 contains the 16<sup>th</sup> number

**Score 1:** The student made one conceptual error by stating 41-80.

**Question 32**

32 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

Text-Use Interval (minutes)	Cumulative Frequency
41–50	2 2
41–60	3 5
41–70	7 10
41–80	9 19
41–90	12 31

Determine which 10-minute interval contains the median. Justify your choice.

41-80 minutes has the median. Half of 31 is between 15 and 16, and this interval contains the data that is 15th and 16th in the list.

**Score 1:** The student made one conceptual error by stating 41-80 instead of 71-80. The student made a computational error in calculating the frequency of the 61-70 interval, but that value is not relevant to the answer.

**Question 32**

32 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

Text-Use Interval (minutes)	Cumulative Frequency
41-50	<del>2</del>
41-60	<del>5</del>
41-70	10
41-80	<del>19</del>
41-90	<del>31</del>

Determine which 10-minute interval contains the median. Justify your choice.

41-70 minutes which has cumulative frequency of 10 and it's the median because it's the middle number

**Score 0:** The student made two conceptual errors. The student gave the cumulative interval (41-70) and chose the median of the cumulative frequency instead of the median student.

---

**Question 33**

---

**33** Kirsten invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

$$A = 1,000(1 + .03)^5$$

\$1,159.27

---

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



---

**Question 33**

---

**33** Kirsten invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

$$1000 * 0.03 = 30$$

$$30 * 5 = 150$$

$$1150.00$$

**Score 1:** The student made a conceptual error by using simple interest. The student found an appropriate answer.

### Question 33

33 Kirsten invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

$$1 \quad (1000)(.3) = 300$$

$$2 \quad (1300)(.3) = 390$$

$$3 \quad (1690)(.3) = 507$$

656.1

$$4 \quad (2197)(.3) = 659.1$$

856.23

$$5 \quad (2856.1)(.3) = 856.83$$

3712.93

**Score 1:** The student made one conceptual error by using 30%, but found an appropriate answer.

### Question 33

33 Kirsten invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

1,000.00

3% \* 5 yrs = 15

10% 1,000 = \$10

5% 1,000 = \$5

15% 1,000 = \$15

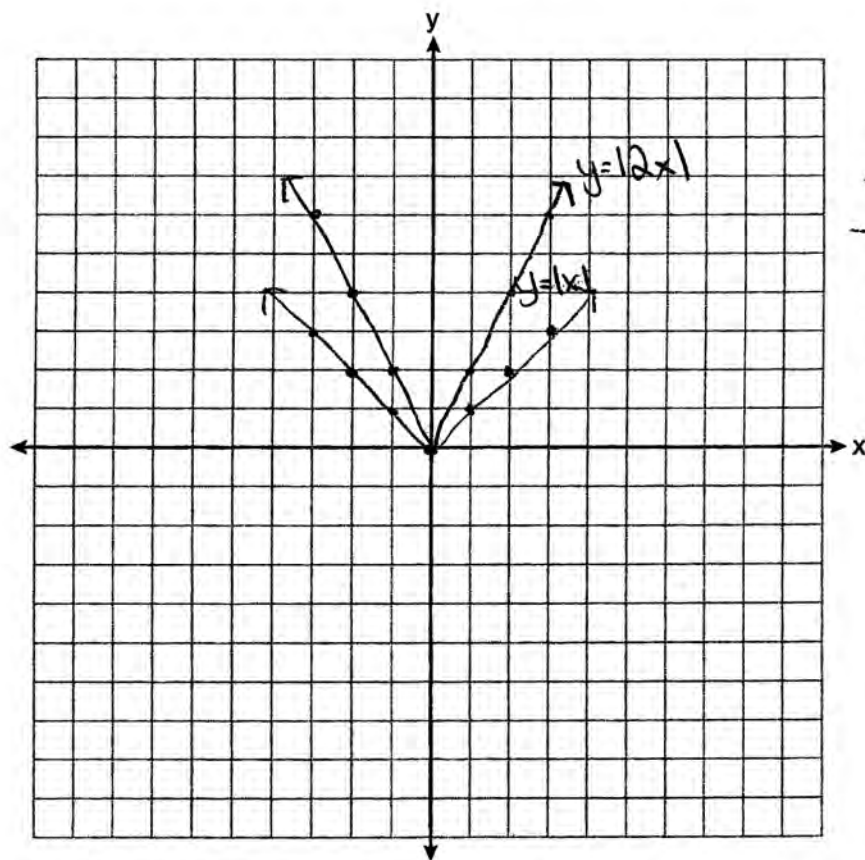
\$1,015 after five years

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

**Question 34**

34 Graph and label the functions  $y = |x|$  and  $y = |2x|$  on the set of axes below.

$x$	$y$
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3



$x$	$y$
-3	6
-2	4
-1	2
0	0
1	2
2	4
3	6

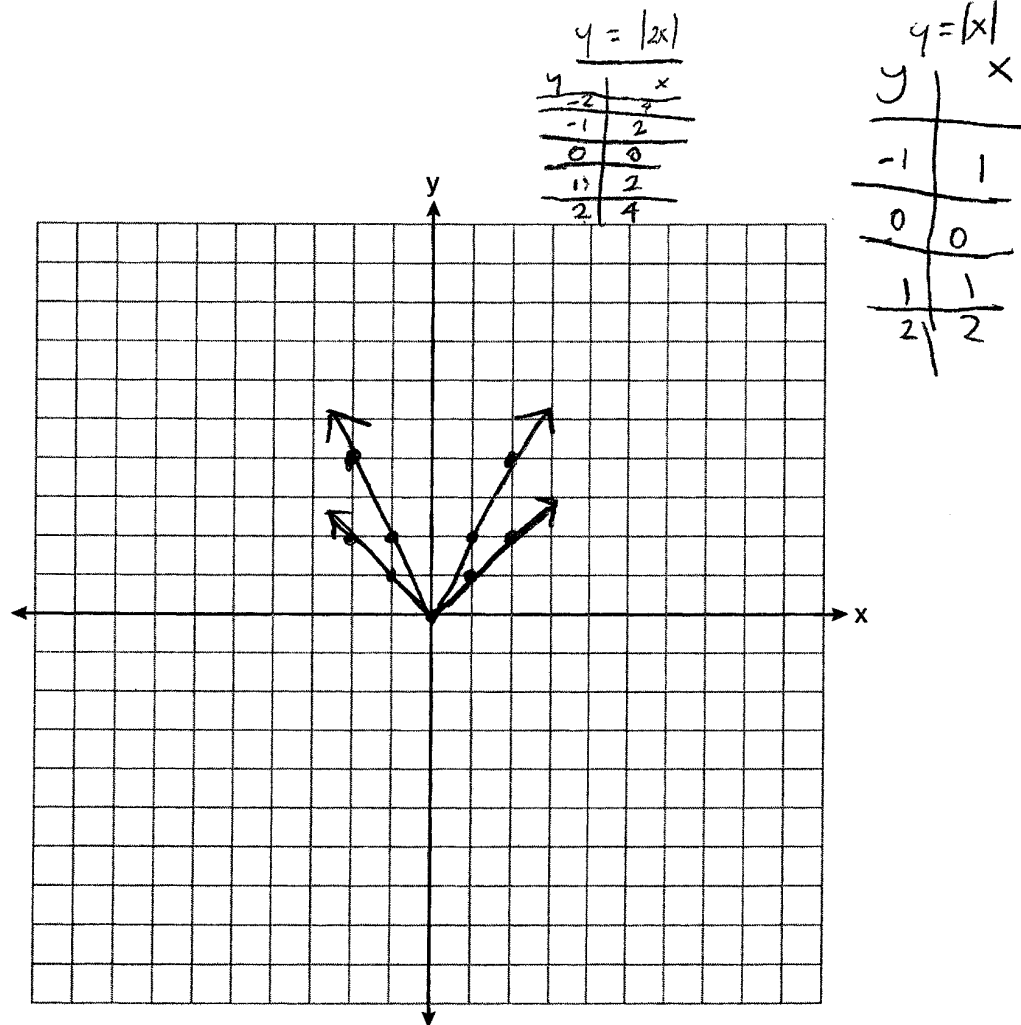
Explain how increasing the coefficient of  $x$  affects the graph of  $y = |x|$ .

The increasing coefficient makes the function more narrow.

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

**Question 34**

34 Graph and label the functions  $y = |x|$  and  $y = |2x|$  on the set of axes below.



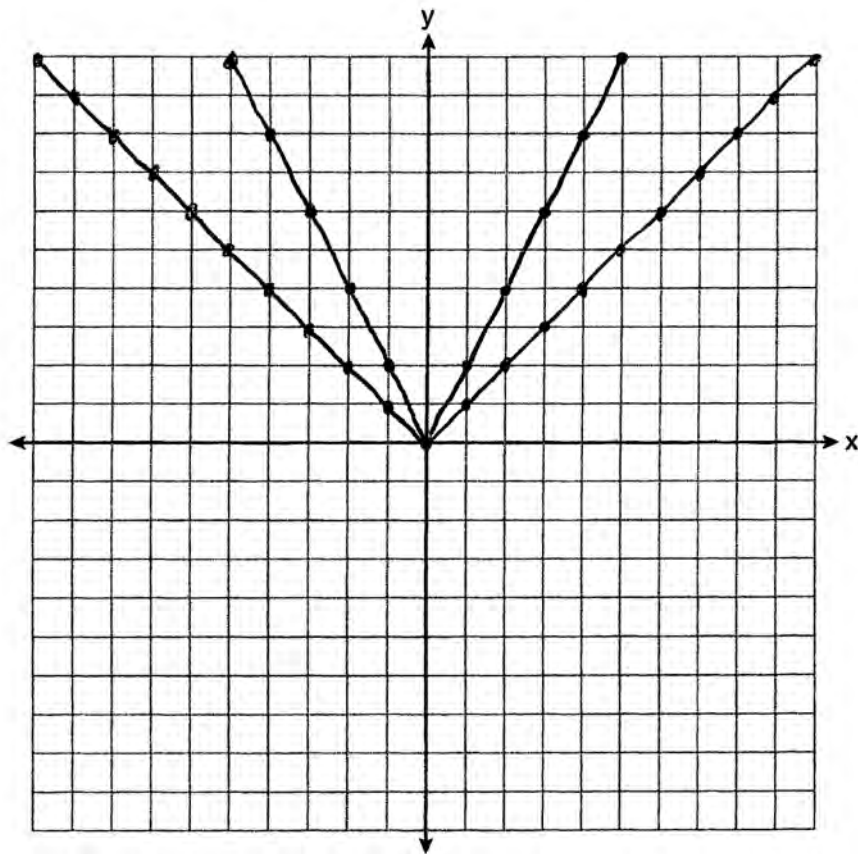
Explain how increasing the coefficient of  $x$  affects the graph of  $y = |x|$ .

Increasing the coefficient makes the result on the graph come out narrower.

**Score 2:** The student graphed both equations correctly and provided a correct explanation, but did not label either graph.

Question 34

34 Graph and label the functions  $y = |x|$  and  $y = |2x|$  on the set of axes below.



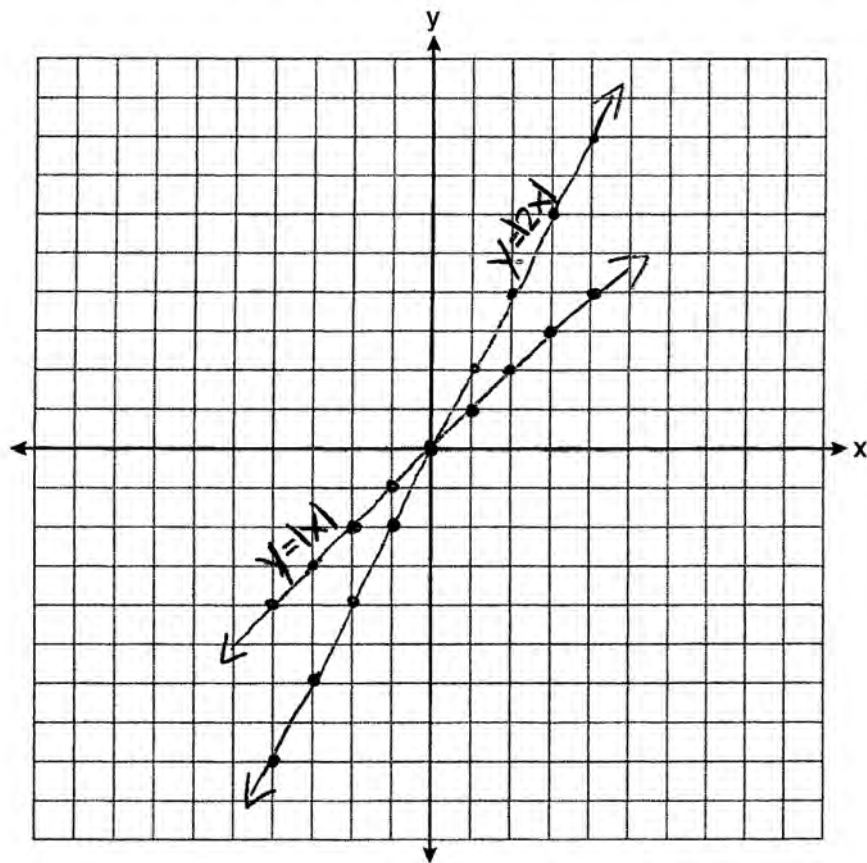
Explain how increasing the coefficient of  $x$  affects the graph of  $y = |x|$ .

*When the coefficient of  $x$  increases, the graph of  $y = |x|$  increases as well.*

**Score 1:** The student graphed both equations correctly, but neither graph was labeled. The student provided an insufficient explanation.

**Question 34**

**34** Graph and label the functions  $y = |x|$  and  $y = |2x|$  on the set of axes below.

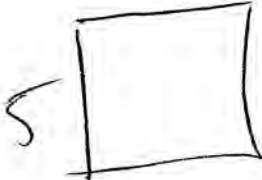


Explain how increasing the coefficient of  $x$  affects the graph of  $y = |x|$ .

**Score 0:** The student made one conceptual error in graphing lines instead of absolute value functions. The student appropriately labeled the graphs. The student provided no explanation.

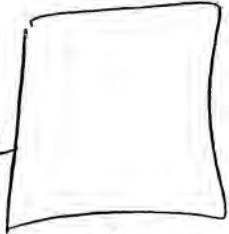
Question 35

35 Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the nearest thousandth.



5

$$SA = 6(5^2)$$
$$150$$



5.2

$$6(5.2)^2$$
$$162.24$$
$$\begin{array}{r} 162.24 \\ - 150 \\ \hline 12.24 \end{array}$$


$$\frac{12.24}{162.24} = .075444 \rightarrow .075$$


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



Question 35

35 Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the nearest thousandth.


$$\begin{array}{r} 5 \times 5 = 25 \\ \times 6 \\ \hline SA = 150 \end{array}$$


$$\begin{array}{r} 5.2 \times 5.2 = 27.04 \\ \times 6 \\ \hline 162.24 \end{array}$$

$$\frac{\text{Act.} - \text{est.}}{\text{Act.}}$$
$$\frac{162.24 - 150}{162.24}$$

**Score 2:** The student showed correct work to find the expression, but did not find the relative error.

---

**Question 35**

---

**35** Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the *nearest thousandth*.

$$5 \cdot 5 \cdot 6 = 150$$

$$5.2 \cdot 5.2 \cdot 6 = 162.24$$

$$\frac{162 - 150}{162} = .074$$

**Score 2:** The student found the correct surface areas, but inappropriately rounded 162.24 to 162 before calculating the relative error.

---

**Question 35**

---

**35** Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the *nearest thousandth*.

$$SA = 2(5.2)(5.2) + 2(5.2)(5.2) + 2(5.2)(5.2)$$

$$SA = 162.240$$

$$SA = 2(5)(5) + 2(5)(5) + 2(5)(5)$$

$$SA = 150.000$$

$$SA = \frac{162.240}{150.000}$$

$$SA = 1.085$$

---

**Score 1:** The student showed correct work to find 162.24 and 150, but found the relative error incorrectly.

Question 35

35 Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the nearest thousandth.

$$5^3 = 125$$

$$5.2^3 = 140.608$$

$$\frac{15.608}{140.608}$$

$$140.608$$

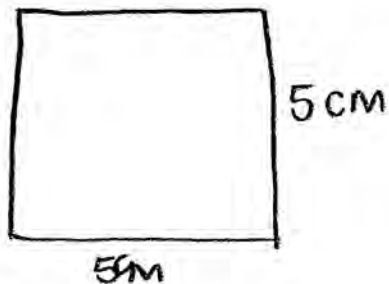
$$.111$$

**Score 1:** The student made a conceptual error by calculating volume instead of surface area, but gave an appropriate answer.

Question 35

35 Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the nearest thousandth.

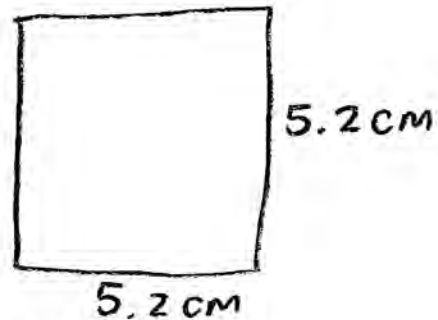
Terry's cube:



$$A = 5 \cdot 5$$
$$A = 25 \text{ cm}^2$$

$$\begin{array}{r} 27.04 \\ - 25 \\ \hline 2.04 \end{array}$$

actual cube:



$$A = 5.2 \cdot 5.2$$
$$A = 27.04$$

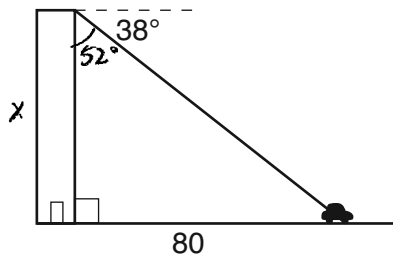
The relative error of the surface area of the cube to the nearest tenth is 2.04.

**Score 0:** The student made two conceptual errors.

Question 36

36 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the nearest tenth of a foot.

$$\begin{array}{r} 90^\circ \\ - 38^\circ \\ \hline 52^\circ \end{array}$$



$$\tan = \frac{\text{opposite}}{\text{adjacent}}$$

$$\tan 52^\circ = \frac{80}{x}$$

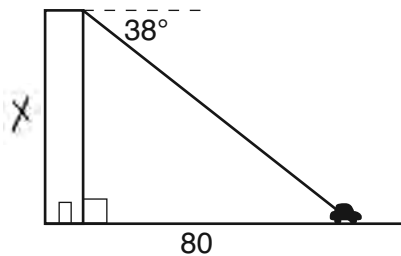
$$\frac{x \tan 52^\circ}{\tan 52^\circ} = \frac{80}{\tan 52^\circ}$$

$$x \approx 62.5 \text{ ft}$$

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

**Question 36**

36 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.



$$\tan 38 = \frac{x}{80}$$

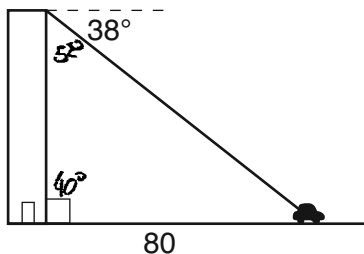
$$80 \tan 38 = x$$

$$x = 62.5 \text{ ft}$$

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

**Question 36**

36 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.



$$90 - 38$$

$$\tan 52 = \frac{80}{x}$$

$$(x)(1.3) = \frac{80}{x}(x)$$

$$\frac{1.3x}{1.3} = \frac{80}{1.3}$$

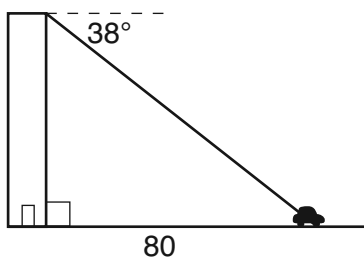
$$x = 61.5 \text{ ft}$$

**Score 2:** The student made one rounding error by using 1.3 for  $\tan 52^\circ$  instead of 1.279941632. The rounding should be done at the final step, not in the first step.



**Question 36**

36 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.

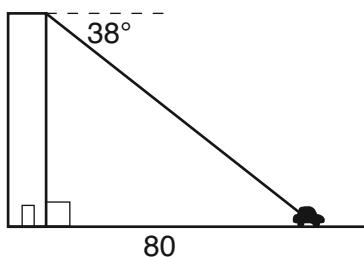


$$\begin{aligned}\tan 38 &= \frac{x}{80} \\ 80 \tan 38 &= x \\ 24.8 &= x\end{aligned}$$

**Score 2:** The student wrote the correct tangent ratio, but used radian mode instead of degree mode.

**Question 36**

36 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.



$$\frac{\tan 38^\circ}{1} = \frac{80}{x}$$

$$\frac{80}{\tan 38^\circ} = \frac{\tan 38^\circ}{\tan 38^\circ} x$$

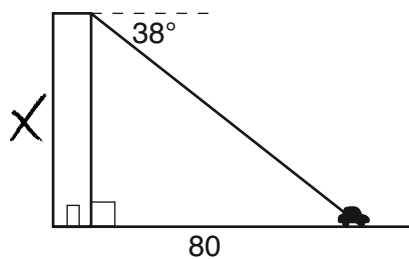
$$x = 102.3953306$$

$$x = 102.4 \text{ ft}$$

**Score 1:** The student showed appropriate work, but made one conceptual error by using an incorrect trigonometric equation.

**Question 36**

**36** From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.



$$\frac{38}{80} = x$$

$$.475 = x$$

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

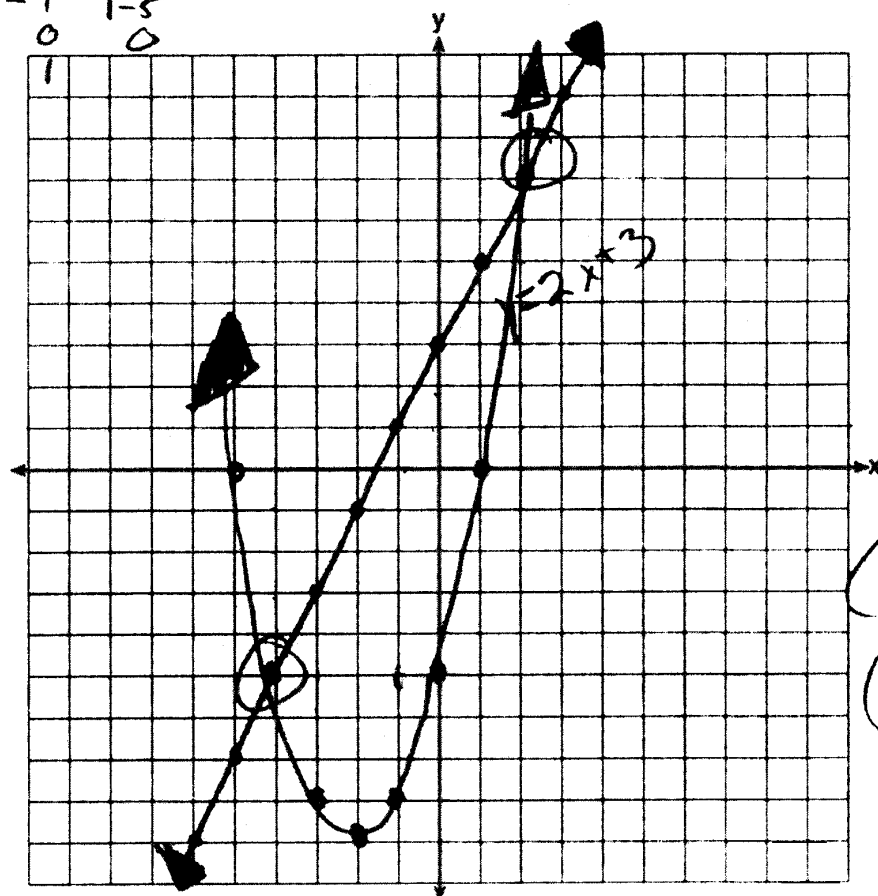
Question 37

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

X	Y
-5	0
-4	1
-3	2
-2	3
-1	4
0	5

$$y = x^2 + 4x - 5$$

$$y = 2x + 3$$



$(-4, -5)$   
 $(2, 7)$

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

Question 37

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

$$y = x^2 + 4x - 5$$

$$y = x^2 + 4x - 5$$

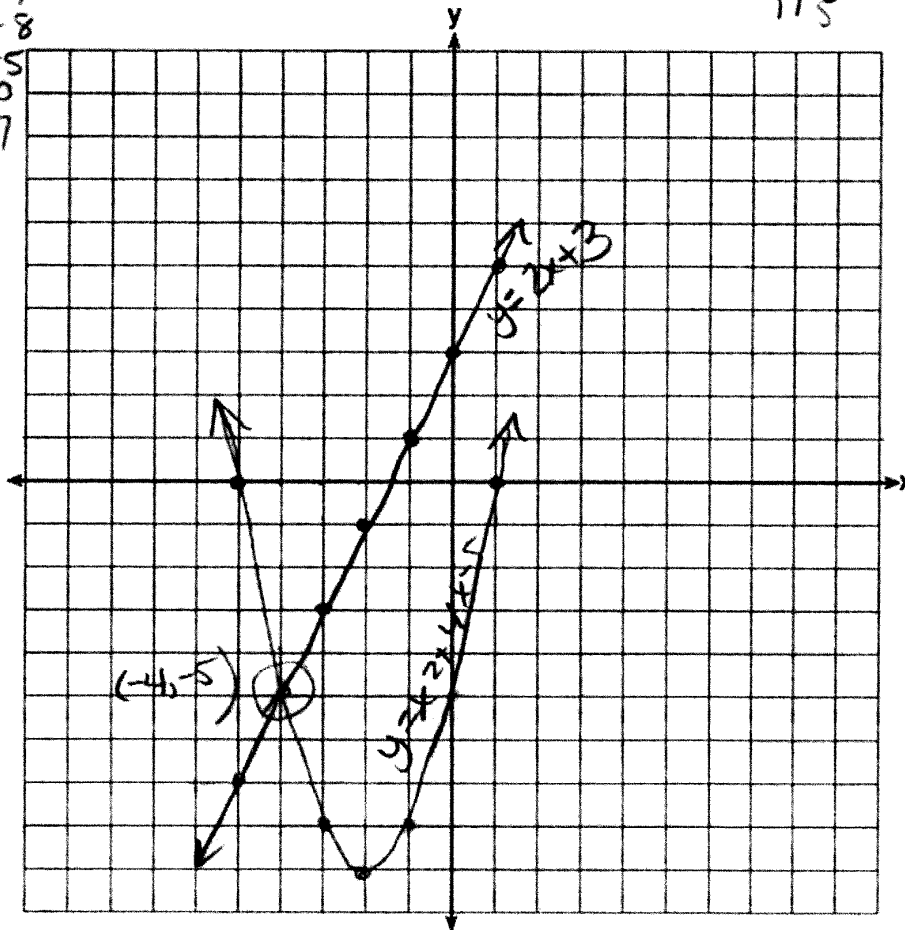
$$y = 2x + 3$$

$$y = 2x + 3$$

x	y
-4	-5
-3	-8
-2	-9
-1	-8
0	-5
1	0
2	7

$(-4, -5)$

x	y
-4	-5
-3	-3
-2	-1
-1	1
0	3
1	5



**Score 3:** The student graphed both equations correctly, but stated only one point.

Question 37

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

$$y = x^2 + 4x - 5$$

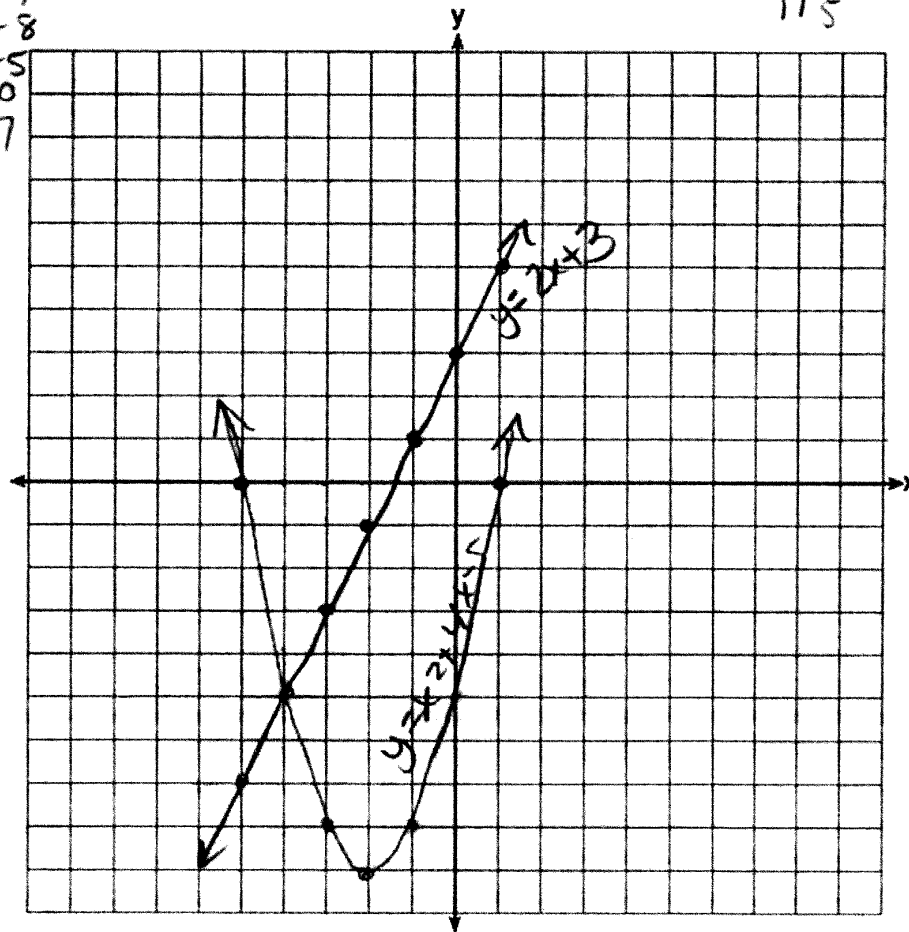
$$y = x^2 + 4x - 5$$

$$y = 2x + 3$$

$$y = 2x + 3$$

x	y
-4	9
-3	8
-2	-9
-1	-8
0	-5
1	0
2	7

x	y
-4	-5
-3	-3
-2	-1
-1	1
0	3
1	5



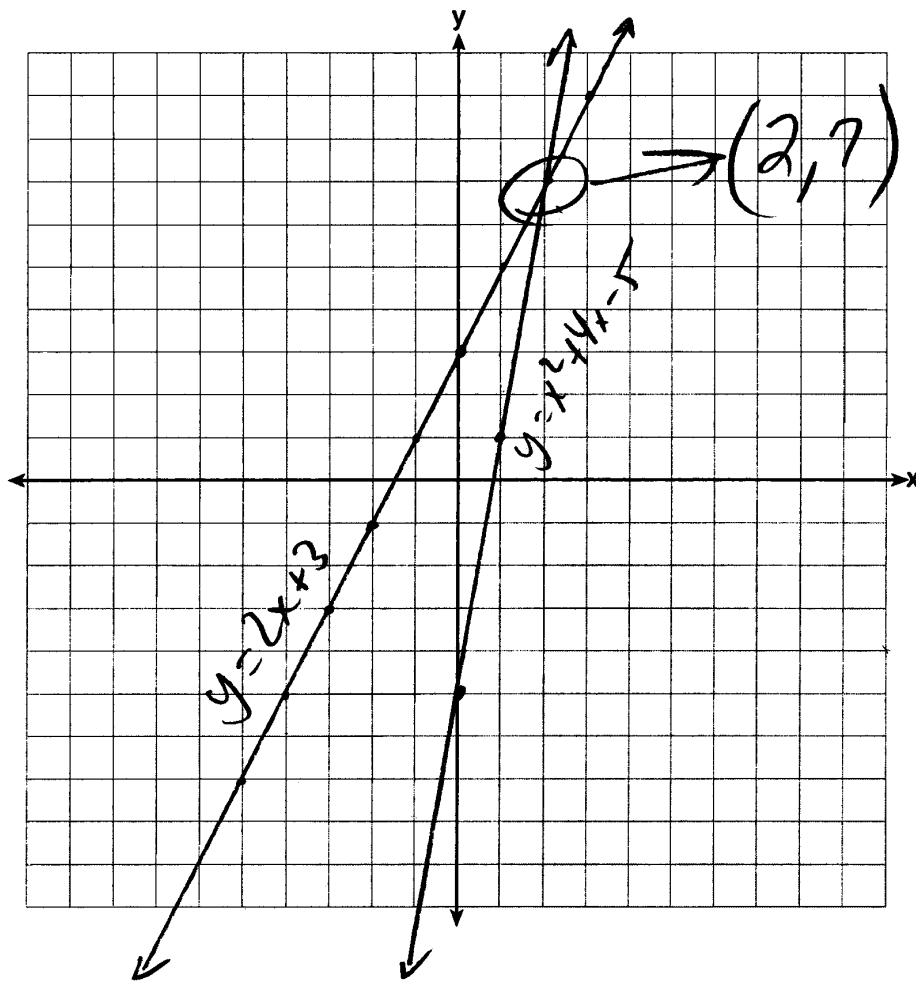
**Score 2:** The student graphed both equations correctly, but stated neither point.

**Question 37**

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

$$y = x^2 + 4x - 5$$

$$y = 2x + 3$$



**Score 2:** The student made a conceptual error by graphing a line instead of a parabola, but stated an appropriate solution.

**Question 37**

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

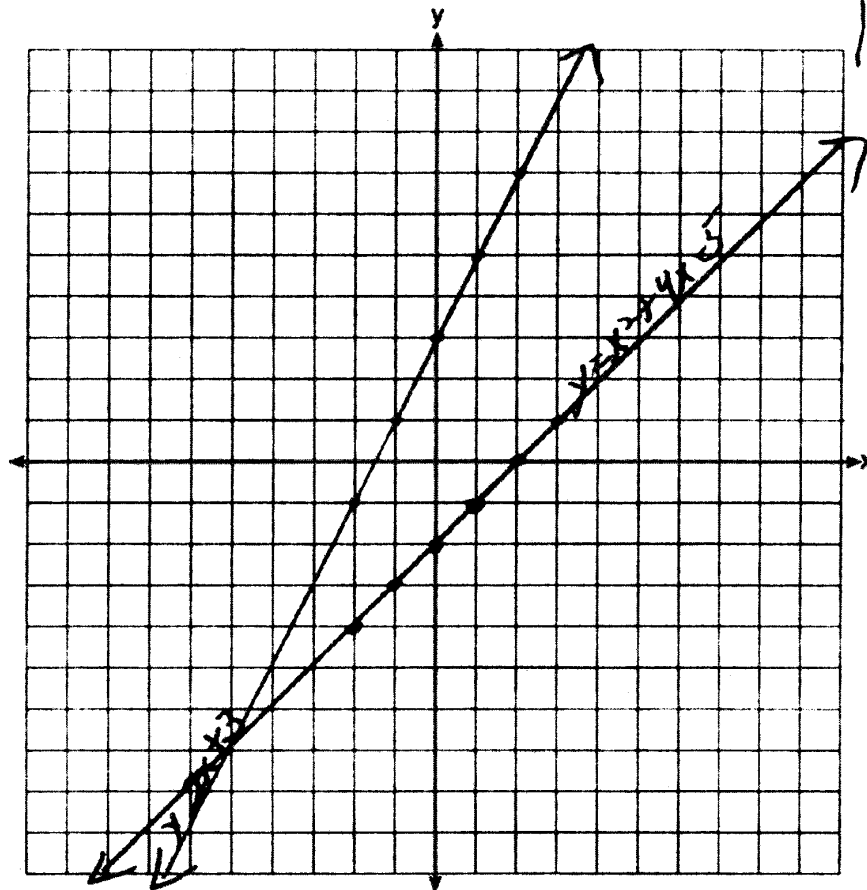
$$y = x^2 + 4x - 5$$

$$y = 2x + 3$$

$$y = x^2 - 2$$

$$1(x^2 + 4x - 5)$$

$$\begin{array}{r} (x^2 + 4x - 5) \\ \underline{-(x^2 - x)} \\ 5x - 5 \\ \underline{-5} \\ 5x \\ \underline{-5} \\ 5x - 5 \\ \underline{-5} \\ 5x - 10 \\ \underline{-5} \\ 5x - 15 \\ \underline{-5} \\ 5x - 20 \\ \underline{-5} \\ 5x - 25 \\ \underline{-5} \\ 5x - 30 \\ \underline{-5} \\ 5x - 35 \\ \underline{-5} \\ 5x - 40 \\ \underline{-5} \\ 5x - 45 \\ \underline{-5} \\ 5x - 50 \end{array}$$



**Score 1:** The student graphed  $y = 2x + 3$  correctly, but showed no further correct work.

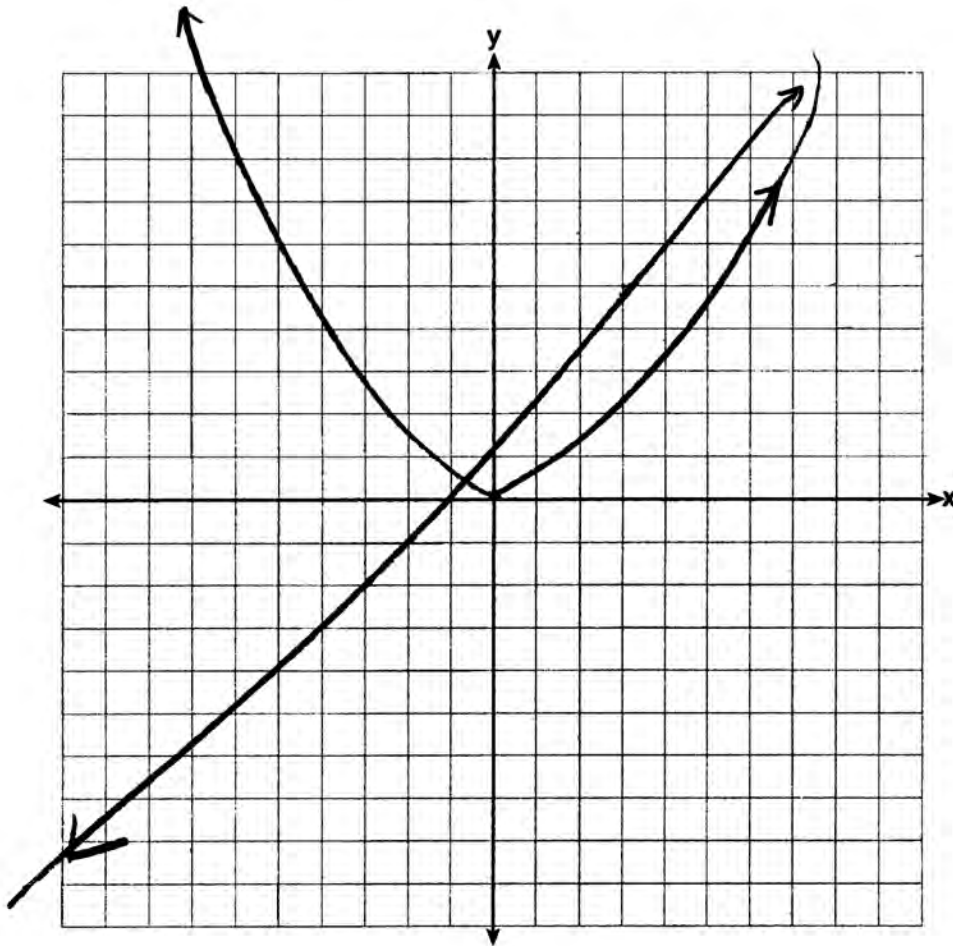


**Question 37**

37 On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ . State the coordinates of all the solutions.

$$y = x^2 + 4x - 5$$

$$y = 2x + 3$$



**Score 0:** The student showed completely incorrect work.

**Question 38**

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

$$3(x^2-8) = 2x(x+5)$$

$$\begin{array}{r} 3x^2 - 24 \\ -2x^2 \end{array} = \begin{array}{r} 2x^2 + 10x \\ -2x^2 \end{array}$$

$$x^2 - 24 = 10x$$

$$\begin{array}{r} -10x \\ -10x \end{array}$$

$$x^2 - 10x - 24 = 0$$

$$(x-12)(x+2)$$

$$x=12 \quad x=-2$$

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

**Question 38**

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

$$3(x^2-8) = 2x(x+5)$$

$$\begin{array}{r} 3x^2 - 24 = 2x^2 + 10x \\ -2x^2 \quad -2x^2 \\ \hline \end{array}$$

$$\begin{array}{r} x^2 - 24 = 10x \\ = 10x + 10x \\ \hline \end{array}$$

$$x^2 - 24 - 10x = 0$$

$$(x-12)(x+2)$$

$x=12$	$x=2$
--------	-------

**Score 3:** The student made one computational error.

Question 38

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} \times \frac{2x}{x^2-8}$

$$3(x^2-8) = 2x(x+5)$$

$$\begin{array}{r} 3x^2 - 24 = 2x^2 + 10x \\ -2x^2 \quad -2x^2 \\ \hline 1x^2 - 24 = 10x \end{array}$$

$$1x^2 - 24 = 10x$$

$$1x^2 - 10x - 24 = 0$$

$$\begin{array}{r} -24 \\ \times \\ \hline 6 \quad -4 \\ -10 \end{array}$$

$$(x+6)(x-4) = 0$$

$$\begin{array}{r} x+6=0 \\ -6 \quad -6 \\ \hline x=-6 \end{array} \quad \left| \quad \begin{array}{r} x-4=0 \\ +4 \quad +4 \\ \hline x=4 \end{array}$$

**Score 3:** The student made one factoring error.

Question 38

38 Solve algebraically for all values of  $x$ :

$$\frac{3}{x+5} = \frac{2x}{x^2-8}$$

$$3x^2 - 24 = 2x^2 + 10x$$

$$9x - 24 = 4x + 10x$$

$$\begin{array}{r} 9x - 24 = 14x \\ \underline{-9x} \qquad \underline{-9x} \end{array}$$

$$\begin{array}{r} -24 = 5x \\ \underline{\quad} \quad \underline{\quad} \\ 5 \qquad 5 \end{array}$$

$$\boxed{-4.8 = x}$$

**Score 2:** The student made one conceptual error ( $3x^2 \rightarrow 9x$ ,  $2x^2 \rightarrow 4x$ ), but followed through and correctly solved  $9x - 24 = 4x + 10x$  for an appropriate answer.

Question 38

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

graphed

$$y_1 = \frac{3}{x+5}$$

$$y_2 = \frac{2x}{x^2-8}$$

Window

$$X_{\text{Min}} = -20$$

$$X_{\text{Max}} = 20$$

Zoom F.1

calculated both intersections

$$x = 12$$

$$x = -2$$

**Score 2:** The student found both 12 and -2, but used a method other than algebraic.

Question 38

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

$$3(x^2-8) = 2x(x+5)$$

$$\begin{array}{r} 3x^2 - 24 = 2x^2 + 10x \\ +2x^2 \qquad \qquad \underline{+2x^2} \end{array}$$

$$\begin{array}{r} 5x^2 - 24 = 10x \\ \underline{-10x} \qquad \underline{-10x} \end{array}$$

$$5x^2 - 34x = 0$$

$$x(5x - 34) = 0$$

$$x = 0$$

$$\begin{array}{l} 5x - 34 = 0 \\ 5x = 34 \\ \underline{\quad 5} \quad \underline{\quad 5} \\ x = 6.8 \end{array}$$

**Score 1:** The student made one computational error (adds  $2x^2$ ) and one conceptual error ( $-24 + -10x = -34x$ ), but stated appropriate values.

Question 38

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

$$2x(x+5) \quad 3(x^2-8)$$

$$\begin{array}{r} 2x^2 + 5 = 3x^2 - 8 \\ -2x^2 \quad -2x^2 \hline \end{array}$$

$$\begin{array}{r} 5 = x^2 - 8 \\ 8+ \quad +8 \hline \end{array}$$

$$\sqrt{13} = \sqrt{x^2}$$

$$x = \sqrt{13}$$

**Score 1:** The student made one conceptual error by using distribution incorrectly and one computational error by not writing  $\pm \sqrt{13}$ .



Question 38

38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

$$\frac{3}{x+5} = \frac{2x}{x^2-8}$$

$$\frac{3x^2-24}{2x^2+10x}$$

**Score 0:** The student cross-multiplied, but expressed the result as a quotient, not an equation. The student showed no further work.

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**Question 38**

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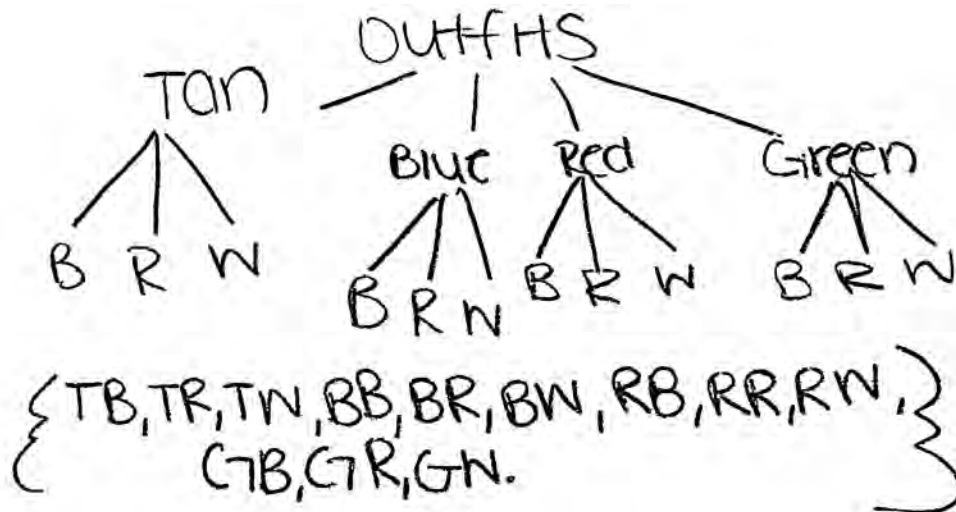
38 Solve algebraically for all values of  $x$ :  $\frac{3}{x+5} = \frac{2x}{x^2-8}$

$$\begin{array}{r} \cancel{x^2} + 5 = \frac{3x^2 - 24}{\cancel{x^2}} \\ \hline 5 = x^2 - 24 \\ +24 \quad \quad \quad +24 \\ \hline 29 = x^2 \\ \hline \end{array}$$

**Score 0:** The student made two conceptual errors. The student did not distribute correctly and solved  $x^2 = 29$  by dividing by 2.

**Question 39**

**39** Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.



Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

10 outfits.

On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

6 outfits.

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

**Question 39**

39 Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.

hat color	jacket color
tan	white
red	red
blue	blue
green	white
blue	white
red	white
blue	red
red	blue
green	red
green	blue

Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

$$\frac{10}{12}$$

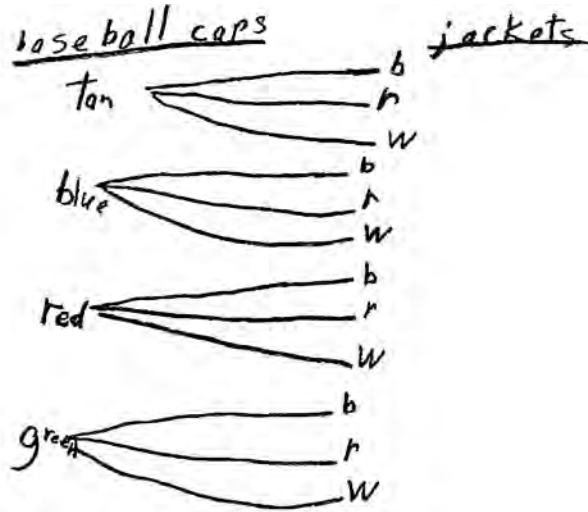
On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

$$\frac{6}{12}$$

**Score 3:** The student showed a correct sample space, but  $\frac{10}{12}$  and  $\frac{6}{12}$  are given instead of 10 and 6.

**Question 39**

39 Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.



Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

11

On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

6

- g,b
- g,r
- g,w
- r,w
- b,w
- t,w

**Score 3:** The student drew a correct tree diagram, but only 6 is stated correctly.

Question 39

39 Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.



Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

10 outfits

On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

**Score 2:** The student drew a partially correct tree diagram and only 10 is stated correctly.

Question 39

39 Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.



Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

9 outfits

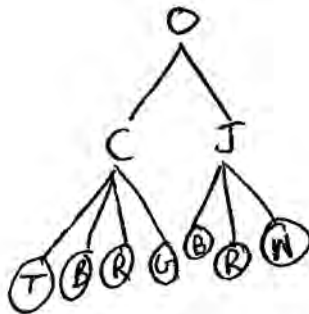
On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

3 outfits

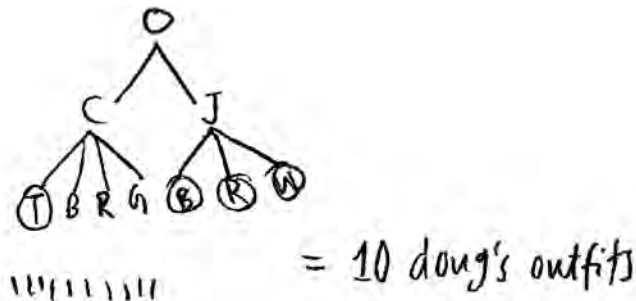
**Score 1:** The student drew a partially correct tree diagram. The student showed no further correct work.

**Question 39**

**39** Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.



Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.



On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

**Score 0:** The student drew an incorrect tree diagram, and gave one correct response based on an obviously incorrect procedure.



## Regents Examination in Integrated Algebra – January 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	75	21	53
86	99	64	84	42	75	20	52
85	98	63	84	41	74	19	50
84	97	62	84	40	73	18	48
83	96	61	83	39	73	17	47
82	95	60	83	38	72	16	45
81	95	59	82	37	71	15	43
80	94	58	82	36	70	14	41
79	93	57	82	35	69	13	39
78	92	56	81	34	69	12	37
77	92	55	81	33	68	11	35
76	91	54	81	32	67	10	33
75	90	53	80	31	66	9	30
74	90	52	80	30	65	8	28
73	89	51	79	29	63	7	25
72	88	50	79	28	62	6	22
71	88	49	79	27	61	5	19
70	87	48	78	26	60	4	16
69	87	47	78	25	59	3	12
68	86	46	77	24	57	2	9
67	86	45	77	23	56	1	5
66	86	44	76	22	55	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.