

**ALGEBRA I**

Wednesday, August 16, 2017 — 8:30 to 11:30 a.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 37 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 for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

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 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for  
computations.

- 1 A part of Jennifer's work to solve the equation  $2(6x^2 - 3) = 11x^2 - x$  is shown below.

$$\text{Given: } 2(6x^2 - 3) = 11x^2 - x$$

$$\text{Step 1: } 12x^2 - 6 = 11x^2 - x$$

Which property justifies her first step?

- (1) identity property of multiplication
  - (2) multiplication property of equality
  - (3) commutative property of multiplication
  - (4) distributive property of multiplication over subtraction
- 2 Which value of  $x$  results in equal outputs for  $j(x) = 3x - 2$  and  $b(x) = |x + 2|$ ?
- (1)  $-2$
  - (2)  $2$
  - (3)  $\frac{2}{3}$
  - (4)  $4$

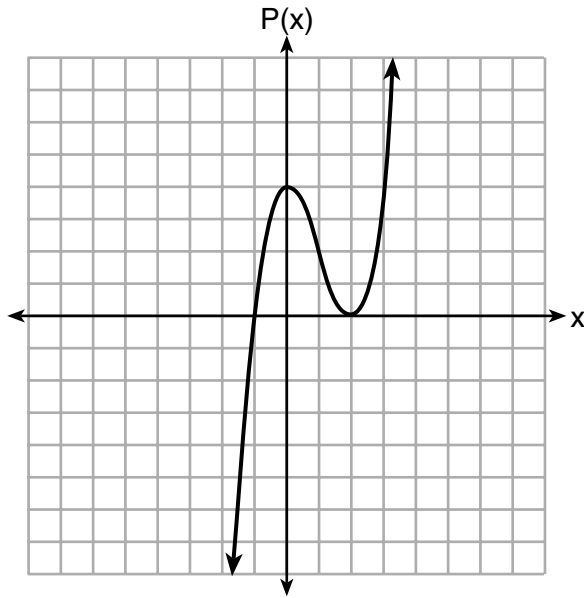
- 3 The expression  $49x^2 - 36$  is equivalent to

- (1)  $(7x - 6)^2$
- (2)  $(24.5x - 18)^2$
- (3)  $(7x - 6)(7x + 6)$
- (4)  $(24.5x - 18)(24.5x + 18)$



Use this space for  
computations.

7 Wenona sketched the polynomial  $P(x)$  as shown on the axes below.



Which equation could represent  $P(x)$ ?

- (1)  $P(x) = (x + 1)(x - 2)^2$       (3)  $P(x) = (x + 1)(x - 2)$   
(2)  $P(x) = (x - 1)(x + 2)^2$       (4)  $P(x) = (x - 1)(x + 2)$

8 Which situation does *not* describe a causal relationship?

- (1) The higher the volume on a radio, the louder the sound will be.  
(2) The faster a student types a research paper, the more pages the research paper will have.  
(3) The shorter the time a car remains running, the less gasoline it will use.  
(4) The slower the pace of a runner, the longer it will take the runner to finish the race.

- 9 A plumber has a set fee for a house call and charges by the hour for repairs. The total cost of her services can be modeled by  $c(t) = 125t + 95$ .

Which statements about this function are true?

- I. A house call fee costs \$95.
- II. The plumber charges \$125 per hour.
- III. The number of hours the job takes is represented by  $t$ .

- (1) I and II, only
- (2) I and III, only
- (3) II and III, only
- (4) I, II, and III

- 10 What is the domain of the relation shown below?

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

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

- 11 What is the solution to the inequality  $2 + \frac{4}{9}x \geq 4 + x$ ?

- (1)  $x \leq -\frac{18}{5}$
- (2)  $x \geq -\frac{18}{5}$
- (3)  $x \leq \frac{54}{5}$
- (4)  $x \geq \frac{54}{5}$

- 12 Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min.

If  $t$  represents the number of minutes on the treadmill and  $b$  represents the number of minutes on the stationary bike, which expression represents the number of Calories that Konnor can burn on the stationary bike?

- (1)  $b$
- (2)  $5b$
- (3)  $45 - b$
- (4)  $250 - 5b$

Use this space for computations.

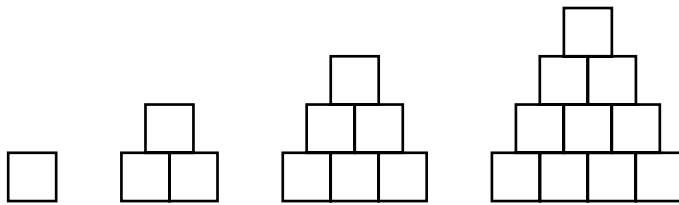
13 Which value of  $x$  satisfies the equation  $\frac{5}{6}\left(\frac{3}{8} - x\right) = 16$ ?

- (1)  $-19.575$                       (3)  $-16.3125$   
(2)  $-18.825$                       (4)  $-15.6875$

14 If a population of 100 cells triples every hour, which function represents  $p(t)$ , the population after  $t$  hours?

- (1)  $p(t) = 3(100)^t$                       (3)  $p(t) = 3t + 100$   
(2)  $p(t) = 100(3)^t$                       (4)  $p(t) = 100t + 3$

15 A sequence of blocks is shown in the diagram below.



This sequence can be defined by the recursive function  $a_1 = 1$  and  $a_n = a_{n-1} + n$ . Assuming the pattern continues, how many blocks will there be when  $n = 7$ ?

- (1) 13                                      (3) 28  
(2) 21                                      (4) 36

16 Mario's \$15,000 car depreciates in value at a rate of 19% per year. The value,  $V$ , after  $t$  years can be modeled by the function  $V = 15,000(0.81)^t$ . Which function is equivalent to the original function?

- (1)  $V = 15,000(0.9)^{9t}$                       (3)  $V = 15,000(0.9)^{\frac{t}{9}}$   
(2)  $V = 15,000(0.9)^{2t}$                       (4)  $V = 15,000(0.9)^{\frac{t}{2}}$

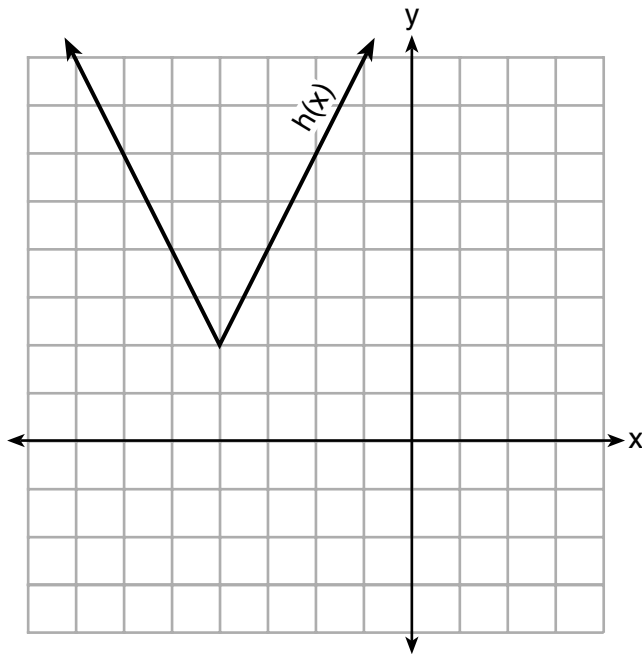
Use this space for  
computations.

17 The highest possible grade for a book report is 100. The teacher deducts 10 points for each day the report is late.

Which kind of function describes this situation?

- (1) linear
- (2) quadratic
- (3) exponential growth
- (4) exponential decay

18 The function  $h(x)$ , which is graphed below, and the function  $g(x) = 2|x + 4| - 3$  are given.



Which statements about these functions are true?

- I.  $g(x)$  has a lower minimum value than  $h(x)$ .
- II. For all values of  $x$ ,  $h(x) < g(x)$ .
- III. For any value of  $x$ ,  $g(x) \neq h(x)$ .

- (1) I and II, only
- (2) I and III, only
- (3) II and III, only
- (4) I, II, and III

**Use this space for  
computations.**

**19** The zeros of the function  $f(x) = 2x^3 + 12x - 10x^2$  are

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

(3)  $\{0, 2, 3\}$

(2)  $\{-1, 6\}$

(4)  $\{0, -1, 6\}$

**20** How many of the equations listed below represent the line passing through the points  $(2,3)$  and  $(4,-7)$ ?

$$5x + y = 13$$

$$y + 7 = -5(x - 4)$$

$$y = -5x + 13$$

$$y - 7 = 5(x - 4)$$

(1) 1

(3) 3

(2) 2

(4) 4

**21** The Ebola virus has an infection rate of 11% per day as compared to the SARS virus, which has a rate of 4% per day.

If there were one case of Ebola and 30 cases of SARS initially reported to authorities and cases are reported each day, which statement is true?

(1) At day 10 and day 53 there are more Ebola cases.

(2) At day 10 and day 53 there are more SARS cases.

(3) At day 10 there are more SARS cases, but at day 53 there are more Ebola cases.

(4) At day 10 there are more Ebola cases, but at day 53 there are more SARS cases.



Use this space for  
computations.

22 The results of a linear regression are shown below.

$$y = ax + b$$

$$a = -1.15785$$

$$b = 139.3171772$$

$$r = -0.896557832$$

$$r^2 = 0.8038159461$$

Which phrase best describes the relationship between  $x$  and  $y$ ?

- (1) strong negative correlation
- (2) strong positive correlation
- (3) weak negative correlation
- (4) weak positive correlation

23 Abigail's and Gina's ages are consecutive integers. Abigail is younger than Gina and Gina's age is represented by  $x$ . If the difference of the square of Gina's age and eight times Abigail's age is 17, which equation could be used to find Gina's age?

- (1)  $(x + 1)^2 - 8x = 17$
- (2)  $(x - 1)^2 - 8x = 17$
- (3)  $x^2 - 8(x + 1) = 17$
- (4)  $x^2 - 8(x - 1) = 17$

24 Which system of equations does *not* have the same solution as the system below?

$$\begin{aligned} 4x + 3y &= 10 \\ -6x - 5y &= -16 \end{aligned}$$

- (1)  $\begin{aligned} -12x - 9y &= -30 \\ 12x + 10y &= 32 \end{aligned}$
  - (2)  $\begin{aligned} 20x + 15y &= 50 \\ -18x - 15y &= -48 \end{aligned}$
  - (3)  $\begin{aligned} 24x + 18y &= 60 \\ -24x - 20y &= -64 \end{aligned}$
  - (4)  $\begin{aligned} 40x + 30y &= 100 \\ 36x + 30y &= -96 \end{aligned}$
-

## Part II

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. 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. [16]

**25** A teacher wrote the following set of numbers on the board:

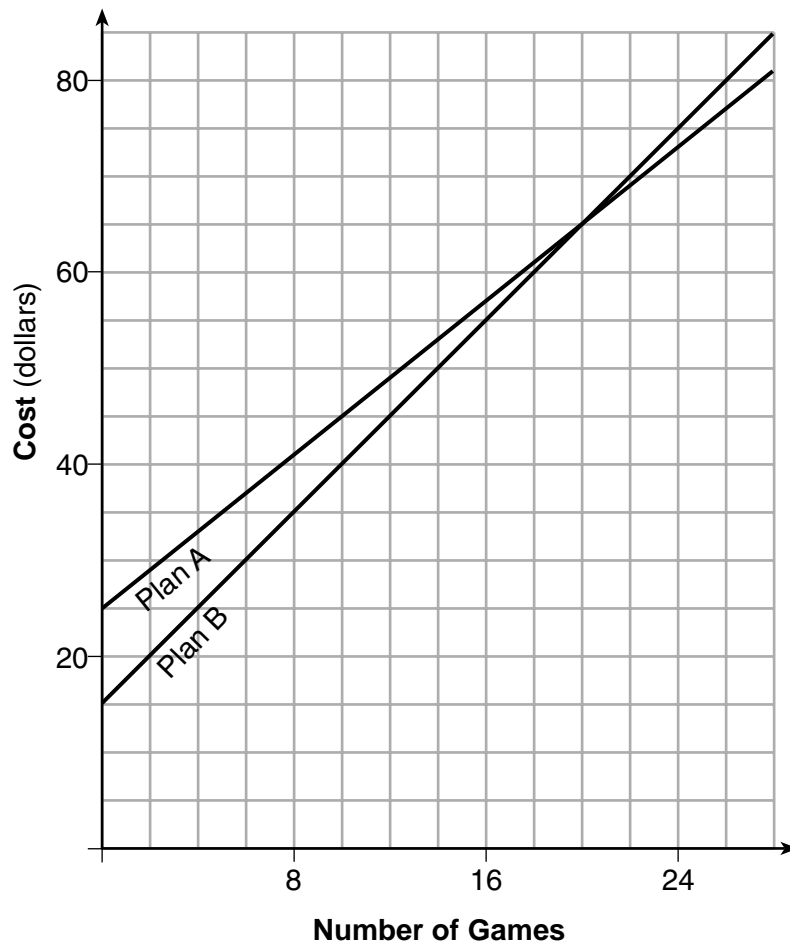
$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225}$$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

**26** Determine and state whether the sequence 1, 3, 9, 27,... displays exponential behavior. Explain how you arrived at your decision.

**27** Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

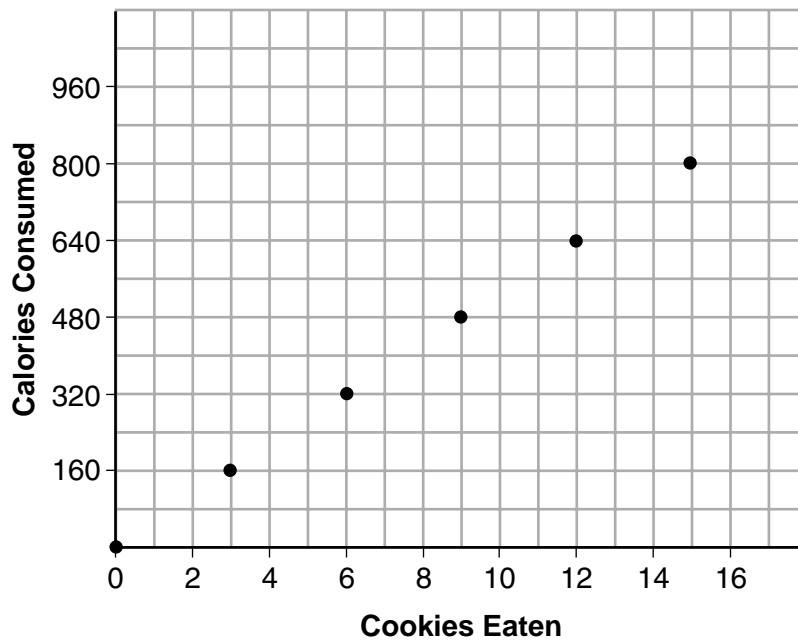
28 The graph below models the cost of renting video games with a membership in Plan A and Plan B.



Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

- 29 Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.



Explain why it is appropriate for Samantha to draw a line through the points on the graph.

**30** A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

**31** Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

**32** Solve the equation  $x^2 - 6x = 15$  by completing the square.



### Part III

Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. 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. [16]

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

**34** The heights, in feet, of former New York Knicks basketball players are listed below.

6.4	6.9	6.3	6.2	6.3	6.0	6.1	6.3	6.8	6.2
6.5	7.1	6.4	6.3	6.5	6.5	6.4	7.0	6.4	6.3
6.2	6.3	7.0	6.4	6.5	6.5	6.5	6.0	6.2	

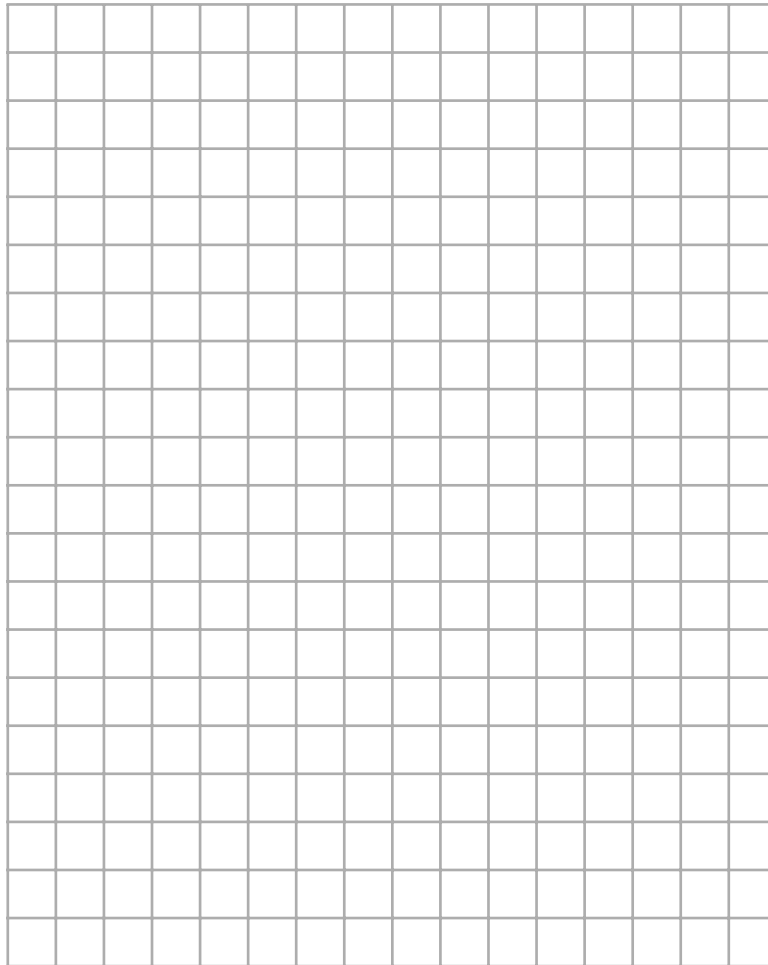
Using the heights given, complete the frequency table below.

<b>Interval</b>	<b>Frequency</b>
6.0 – 6.1	
6.2 – 6.3	
6.4 – 6.5	
6.6 – 6.7	
6.8 – 6.9	
7.0 – 7.1	

**Question 34 is continued on the next page.**

**Question 34 continued.**

Based on the frequency table created, draw and label a frequency histogram on the grid below.

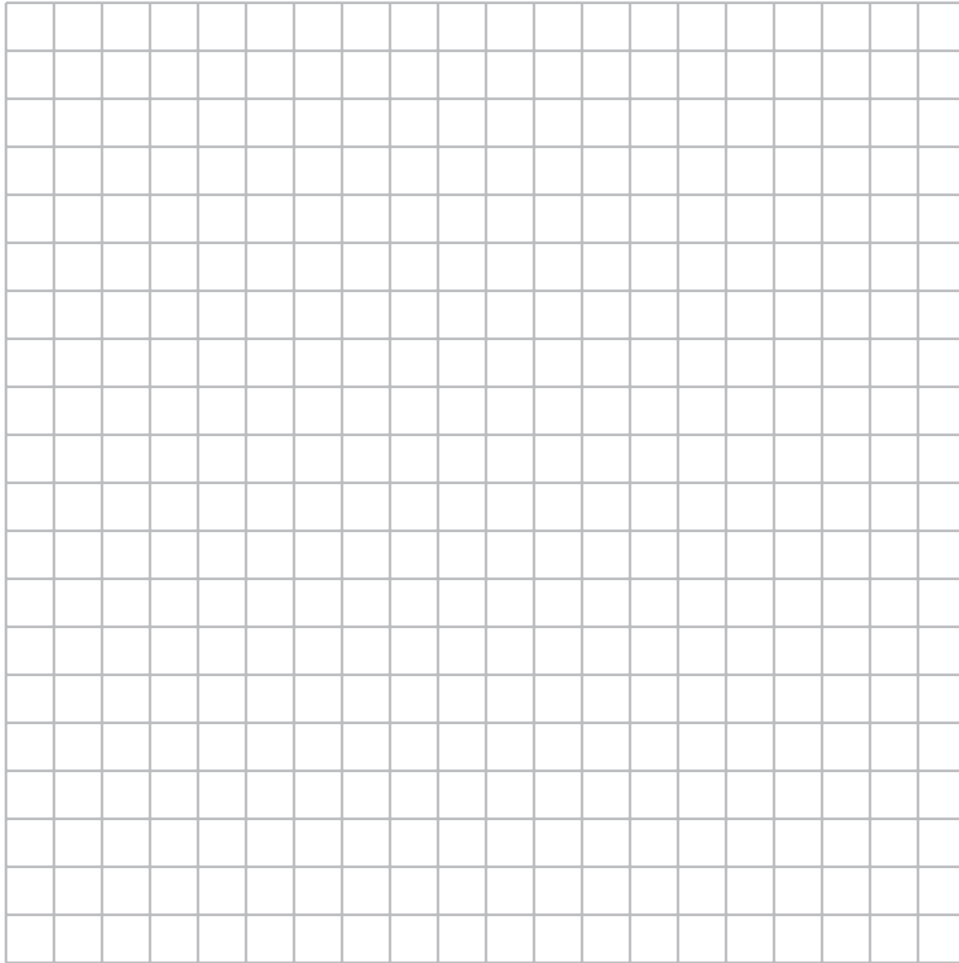


Determine and state which interval contains the upper quartile. Justify your response.

**35** Solve the following system of inequalities graphically on the grid below and label the solution  $S$ .

$$3x + 4y > 20$$

$$x < 3y - 18$$



Is the point  $(3,7)$  in the solution set? Explain your answer.

**36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

## Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. 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]

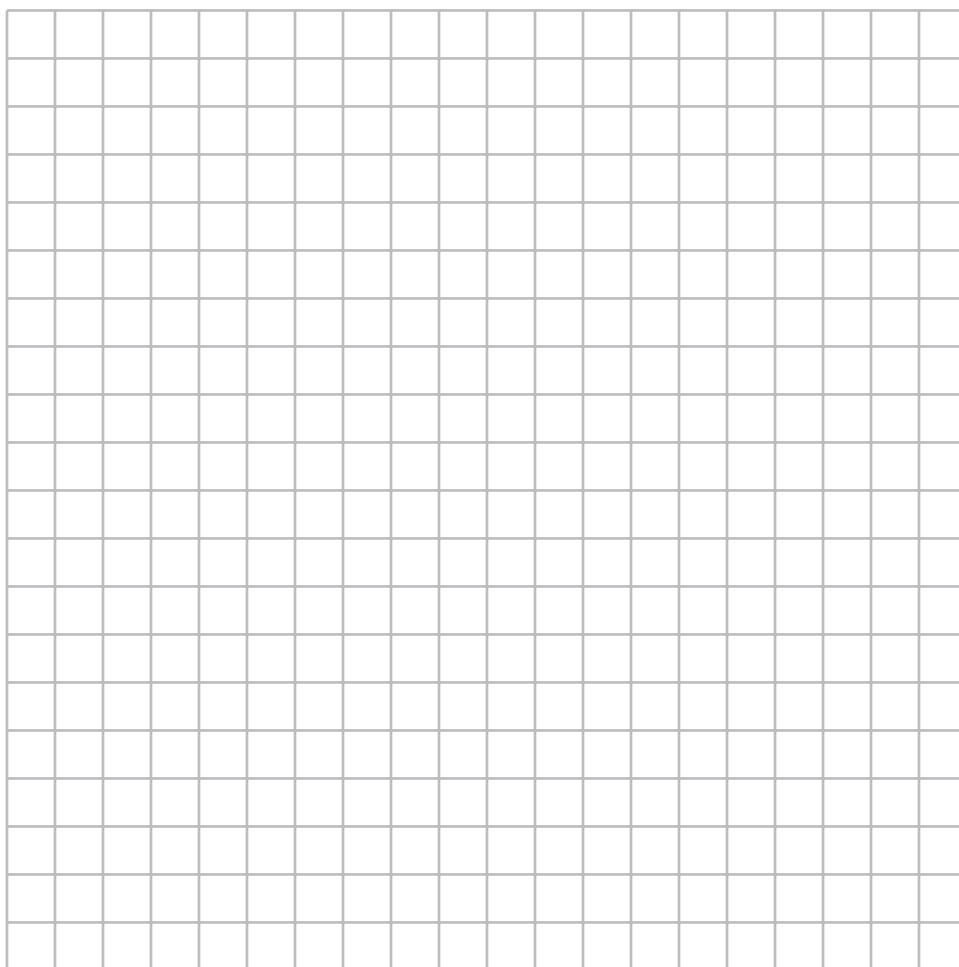
**37** Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

Question 37 is continued on the next page.

**Question 37 continued.**

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

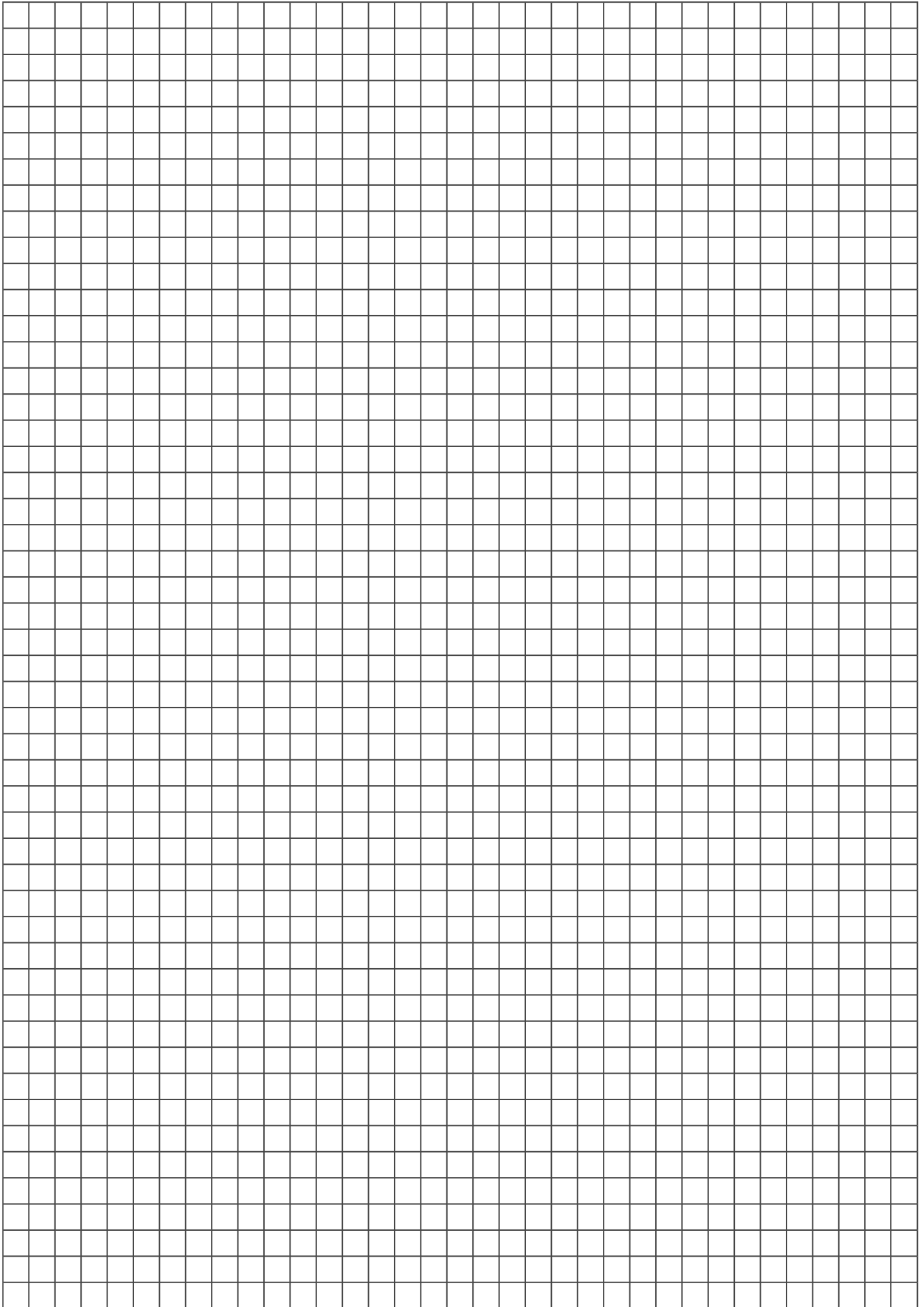




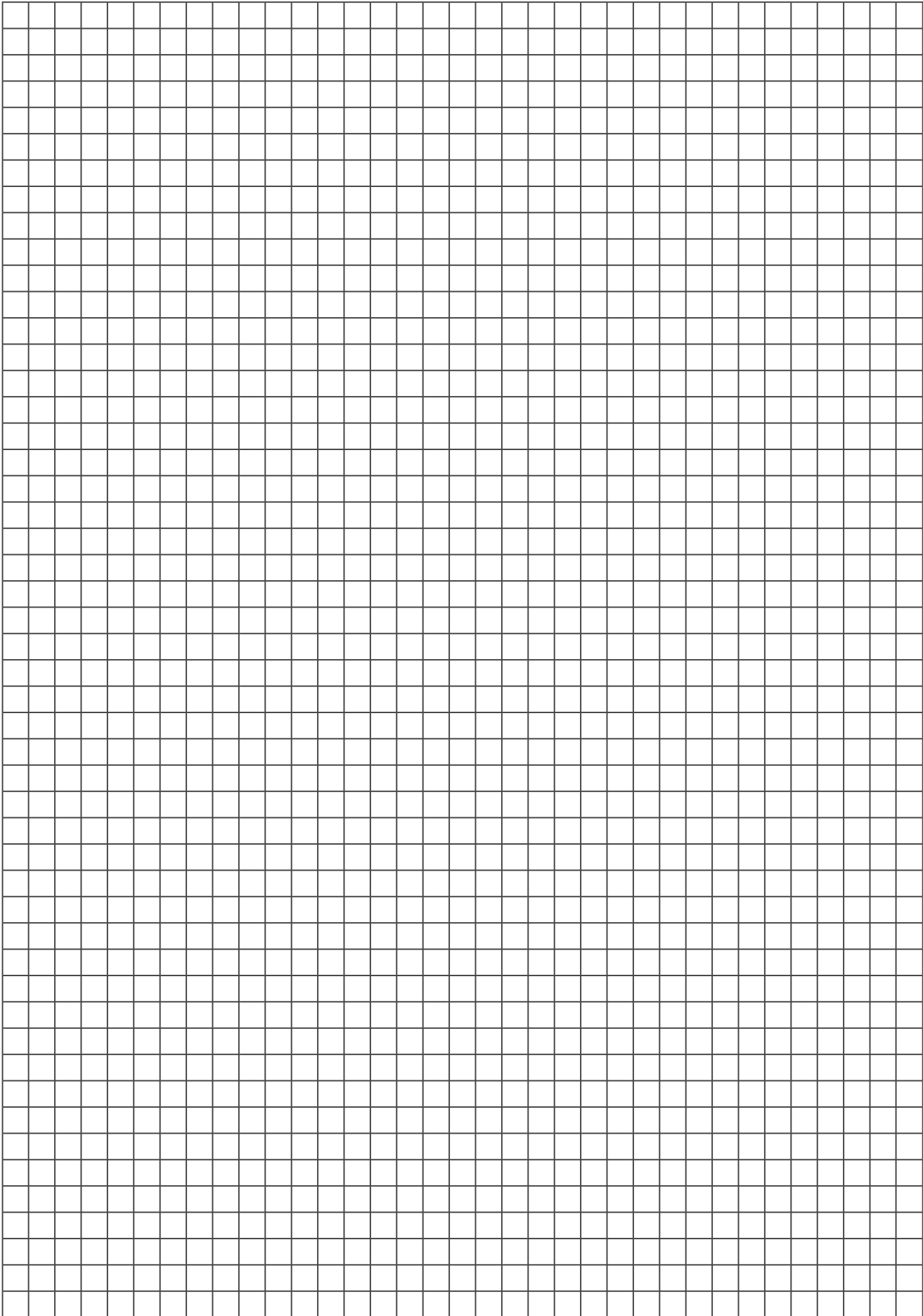
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## High School Math Reference Sheet

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilogram	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian = $\frac{180}{\pi}$ degrees
Degrees	1 degree = $\frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

# ALGEBRA I

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ALGEBRA I

# FOR TEACHERS ONLY

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

## ALGEBRA I

Wednesday, August 16, 2017 — 8:30 to 11:30 a.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 Algebra I. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examination in Algebra I*.

Do *not* attempt to correct the student's work by making insertions or changes of any kind. In scoring the constructed-response 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 constructed-response 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/> by Wednesday, August 16, 2017. 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 48 credits, 2 credits for each of the following.

(1) . . . . . 4 . . . . .	(9) . . . . . 4 . . . . .	(17) . . . . . 1 . . . . .
(2) . . . . . 2 . . . . .	(10) . . . . . 1 . . . . .	(18) . . . . . 2 . . . . .
(3) . . . . . 3 . . . . .	(11) . . . . . 1 . . . . .	(19) . . . . . 3 . . . . .
(4) . . . . . 3 . . . . .	(12) . . . . . 2 . . . . .	(20) . . . . . 3 . . . . .
(5) . . . . . 2 . . . . .	(13) . . . . . 2 . . . . .	(21) . . . . . 3 . . . . .
(6) . . . . . 1 . . . . .	(14) . . . . . 2 . . . . .	(22) . . . . . 1 . . . . .
(7) . . . . . 1 . . . . .	(15) . . . . . 3 . . . . .	(23) . . . . . 4 . . . . .
(8) . . . . . 2 . . . . .	(16) . . . . . 2 . . . . .	(24) . . . . . 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.

The Department is providing supplemental scoring guidance, the "Model Response Set," for the Regents Examination in Algebra I. This guidance is recommended to be part of the scorer training. Schools are encouraged to incorporate the Model Response Sets into the scorer training or to use them as additional information during scoring. While not reflective of all scenarios, the model responses selected for the Model Response Set illustrate how less common student responses to constructed-response questions may be scored. The Model Response Set will be available on the Department's web site at <http://www.nysedregents.org/algebraone/>.

# General Rules for Applying Mathematics Rubrics

## I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Algebra I 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 Examination in Algebra I*, 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 a 4-credit question and no more than 3 credits should be deducted in a 6-credit question. 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.

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.

For 4- and 6-credit questions, 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. Refer to the rubric for specific scoring guidelines.

## Part II

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

- (25) [2] Two correct explanations are written.
- [1] One correct explanation is written.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (26) [2] A correct explanation indicating a positive response is written.
- [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] An incomplete explanation is written.
- [0] Yes, but no explanation is written.
- or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.



(27) [2]  $r = \sqrt{\frac{3V}{\pi h}}$ , 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  $r = \pm \sqrt{\frac{3V}{\pi h}}$ .

**or**

[1]  $r = \sqrt{\frac{3V}{\pi h}}$ , 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.

(28) [2] Two correct explanations are written.

[1] One correct explanation is written.

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

(29) [2] A correct explanation indicating a positive response is written.

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

**or**

[1] An incomplete explanation is written.

[0] Yes, but no explanation or an irrelevant explanation is written.

**or**

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

- (30) [2] 46, 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 115 feet or 1380 inches, the distance the athlete could cover in one jump, but no further correct work is shown.
- or***
- [1] 46, 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.
- 
- (31) [2]  $8x^3 + 22x^2 - 4x$ , and correct work is shown.
- [1] Appropriate work is shown, but one computational or simplification error is made.
- or***
- [1] Appropriate work is shown, but one conceptual error is made.
- or***
- [1] Appropriate work is shown, but the trinomial is not written in standard form.
- or***
- [1]  $8x^3 + 22x^2 - 4x$ , 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]  $3 \pm \sqrt{24}$  or  $3 \pm 2\sqrt{6}$ , 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]  $3 \pm \sqrt{24}$ , but a method other than completing the square is used.

*or*

[1]  $3 \pm \sqrt{24}$ , 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 4 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

- (33) [4] 10 and 0.3, and correct work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or*
- [3] Appropriate work is shown, but the driving times are not subtracted.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made.
- or*
- [2] Appropriate work is shown to find 10, but no further correct work is shown.
- [1] Appropriate work is shown to find 6, the number of hours dad planned to drive, but no further correct work is shown.
- or*
- [1] 10 and 0.3, 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.

- (34) [4] A correct table is completed, a correct histogram is drawn, 6.4 – 6.5, and a correct justification is given.
- [3] Appropriate work is shown, but the justification is missing or incorrect.
- [2] A correct table is completed and a correct histogram is drawn, but no further correct work is shown.
- or***
- [2] A correct table is completed and a correct interval is stated, but no further correct work is shown.
- [1] A correct table is completed, but no further correct work is shown.
- or***
- [1] 6.4 – 6.5, but no further correct work is shown.
- or***
- [1] Appropriate work is shown, but one conceptual error and one computational, graphing, or labeling error are made.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (35) [4] Both inequalities are graphed correctly and at least one is labeled, the solution is labeled  $S$ , and a correct explanation indicating a negative response is written.
- [3] Appropriate work is shown, but one computational, graphing, or labeling error is made.
- or***
- [3] Appropriate work is shown, but the solution is not labeled  $S$ .
- or***
- [3] Appropriate work is shown, but the explanation is missing or incorrect.
- [2] Appropriate work is shown, but two or more computational, graphing, or labeling errors are made.
- or***
- [2] Both inequalities are graphed correctly with at least one labeled, but no further correct work is shown.
- [1] A correct explanation is written, but no further correct work is shown.
- or***
- [1] One inequality is graphed correctly, 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.

- (36) [4] (4,9256), and a correct explanation is written, and 256, and a correct justification is given.
- [3] Appropriate work is shown, but one computational error is made.
- or*
- [3] Appropriate work is shown, but either the explanation or justification is missing or incorrect.
- [2] Appropriate work is shown, but two or more computational errors are made.
- or*
- [2] (4,9256), and a correct explanation is written, but no further correct work is shown.
- or*
- [2] (4,9256) and 256, but no further correct work is shown.
- [1] (4,9256) or 256, 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 this question, use the specific criteria to award a maximum of 6 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(37) [6]  $1.25x + 2.50y + 3.50 = 28.50$  or an equivalent equation, a correct graph is drawn, 11 is stated, and a correct explanation is given.

[5] Appropriate work is shown, but one computational or graphing error is made.

*or*

[5] Appropriate work is shown, but no explanation or an incorrect explanation is given.

[4] Appropriate work is shown, but two or more computational or graphing errors are made.

*or*

[4] An incorrect equation is stated, but an appropriate graph, number, and explanation are written.

*or*

[4] A correct equation is written, 11, and a correct explanation is given, but no graph is drawn.

[3] A correct graph is drawn and 11 is stated, but no further correct work is shown.

[2] A correct graph is drawn, but no further correct work is shown.

*or*

[2] A correct equation is stated, but no further correct work is shown.

[1] 11, 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.

---



**Map to the Learning Standards  
Algebra I  
August 2017**

<b>Question</b>	<b>Type</b>	<b>Credits</b>	<b>Cluster</b>
1	Multiple Choice	2	A-REI.A
2	Multiple Choice	2	A-REI.D
3	Multiple Choice	2	A-SSE.A
4	Multiple Choice	2	F-IF.A
5	Multiple Choice	2	F-IF.B
6	Multiple Choice	2	F-BF.B
7	Multiple Choice	2	A-APR.B
8	Multiple Choice	2	S-ID.C
9	Multiple Choice	2	F-LE.B
10	Multiple Choice	2	F-IF.A
11	Multiple Choice	2	A-REI.B
12	Multiple Choice	2	A-SSE.A
13	Multiple Choice	2	A-REI.B
14	Multiple Choice	2	F-BF.A
15	Multiple Choice	2	F-IF.A
16	Multiple Choice	2	A-SSE.B
17	Multiple Choice	2	F-LE.A
18	Multiple Choice	2	F-IF.C
19	Multiple Choice	2	A-SSE.B
20	Multiple Choice	2	A-REI.D

21	Multiple Choice	2	F-LE.B
22	Multiple Choice	2	S-ID.C
23	Multiple Choice	2	A-CED.A
24	Multiple Choice	2	A-REI.C
25	Constructed Response	2	F-IF.B
26	Constructed Response	2	F-LE.A
27	Constructed Response	2	A-CED.A
28	Constructed Response	2	N-RN.B
29	Constructed Response	2	F-IF.B
30	Constructed Response	2	N-Q.A
31	Constructed Response	2	A-APR.A
32	Constructed Response	2	A-REI.B
33	Constructed Response	4	A-CED.A
34	Constructed Response	4	S-ID.A
35	Constructed Response	4	A-REI.D
36	Constructed Response	4	F-IF.C
37	Constructed Response	6	A-CED.A

**Regents Examination in Algebra I**  
**August 2017**  
**Chart for Converting Total Test Raw Scores to**  
**Final Examination Scores (Scale Scores)**

**The *Chart for Determining the Final Examination Score for the August 2017 Regents Examination in Algebra I* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> by Wednesday, August 16, 2017. Conversion charts provided for previous administrations of the Regents Examination in Algebra I 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

# ALGEBRA I

Wednesday, August 16, 2017 — 8:30 to 11:30 a.m., only

## MODEL RESPONSE SET

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**Question 25**

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**25** A teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225} = 15$$

*irrational      rational      rational*

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

*The only way you get a rational is when you add 2 rational numbers otherwise its irrational.*

---

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

## Question 25

25 A teacher wrote the following set of numbers on the board:

$$a = \sqrt[1]{20} \quad b = \frac{2.5}{12} \quad c = \sqrt[12]{225}$$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

$a + b$  is Irrational because the sum of an irrational and a rational is an irrational number

$b + c$  is Rational because the sum of two rational numbers is rational

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

---

**Question 25**

---

**25** A teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225}$$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

$$a+b = 6.97213\dots$$

it DOESN'T end  
or repeat

$$b+c = 17.5$$

it ends

---

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

## Question 25

25 A teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225}$$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

The reason is that  
"a" is a irrational number.  
A irrational + rational  
number = irrational  
 $\sqrt{20}$   
4.472135955

**Score 1:** The student wrote one correct explanation.



## Question 25

25 A teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225}$$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

$$\sqrt{20} + 2.5$$

$$6.10$$

$$2.5 + \sqrt{225}$$

$$17.5$$

$a + b$  is irrational  
because the  
square root  
comes first

$b + c$  is rational because  
the square root  
is last.

**Score 0:** The student wrote two incorrect explanations.

---

**Question 26**

---

**26** Determine and state whether the sequence 1, 3, 9, 27, ... displays exponential behavior. Explain how you arrived at your decision.

The sequence displays exponential behavior because each number is a power of 3.

---

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

Question 26

26 Determine and state whether the sequence  $1, 3, 9, 27, \dots$  displays exponential behavior. Explain how you arrived at your decision.

$$y = a \cdot b^x$$
$$y = 1 \cdot 3^0$$
$$y = 1 \cdot 3^1$$
$$y = 9$$

$$y = 1 \cdot 3^1$$
$$y = 1 \cdot 3^2$$
$$y = 9$$

$$y = 1 \cdot 3^0$$
$$y = 1 \cdot 1$$
$$y = 1$$

Yes, this sequence displays exponential behavior. I explain this with my work above. As my exponent on  $3^x$  went up from 0 to 2, I got the first three numbers in the sequence.

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

---

**Question 26**

---

**26** Determine and state whether the sequence 1, 3, 9, 27,... displays exponential behavior. Explain how you arrived at your decision.

It has a common ratio of 3.

---

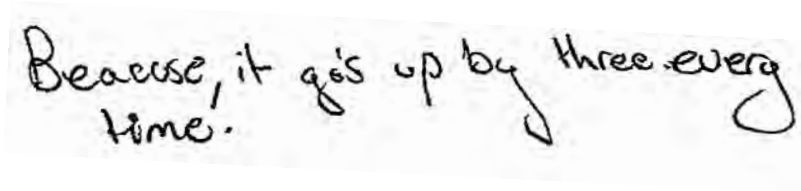
**Score 1:** The student did not indicate a positive response in the explanation.

---

**Question 26**

---

**26** Determine and state whether the sequence 1, 3, 9, 27, ... displays exponential behavior. Explain how you arrived at your decision.



Beacuse, it go's up by three every time.

**Score 0:** The student did not indicate a positive response and wrote an incorrect explanation.

---

**Question 27**

---

27 Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

$$V = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$r = \sqrt{\frac{3V}{\pi h}}$$

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

**Question 27**

27 Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

$$V = \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi h}$$

$$\sqrt{\frac{V}{\frac{1}{3}\pi h}} = \sqrt{r^2}$$

$$\boxed{\sqrt{\frac{V}{\frac{1}{3}\pi h}} = r}$$

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

Question 27

27 Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

$$\frac{V}{h} = \frac{\frac{1}{3} \pi r^2 h}{h}$$

$$\frac{V}{h} = \frac{\frac{1}{3} \pi r^2}{\pi}$$

$$\frac{V}{\pi h} = \frac{\frac{1}{3} r^2}{\frac{1}{3}}$$

$$r = \sqrt{\frac{V}{1.047197551 h}}$$

$$\sqrt{\frac{V}{.3 \pi h}} = \sqrt{r^2}$$

$$\sqrt{\frac{V}{.3 \pi h}} = r$$

$$\sqrt{\frac{V}{1.047197551 h}} = r$$

**Score 1:** The student did not leave the answer in terms of  $\pi$ .



---

**Question 27**

---

27 Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

$$V = \frac{1}{3}\pi r^2 h$$
$$\frac{3V}{\pi h} = r^2$$
$$\pm \sqrt{\frac{3V}{\pi h}} = r$$

**Score 1:** The student did not understand that the length of the radius can only be a positive number.

Question 27

27 Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

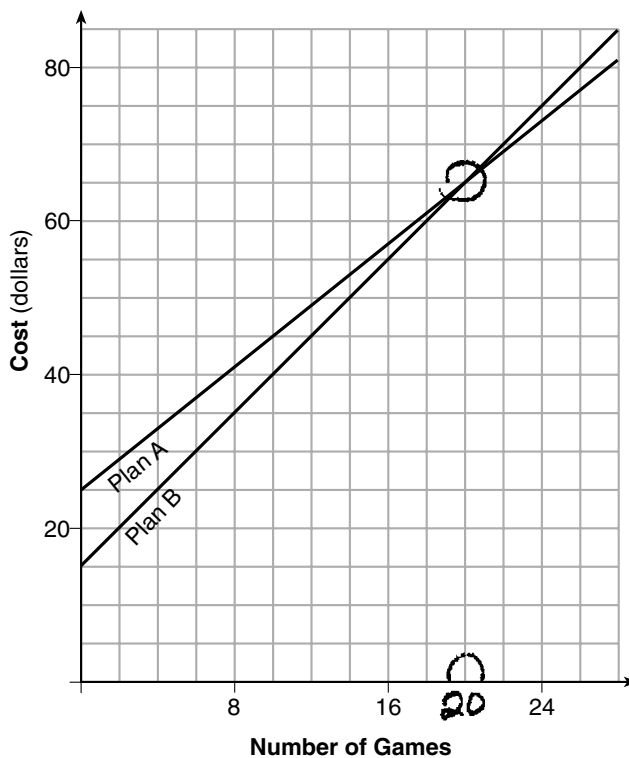
VOLUME of a cone:  
in terms of  
 $V$  and  $h$ .

$$V = \frac{1}{3} \pi r^2 h$$
$$h = \frac{1}{3} \pi r^2 V$$

**Score 0:** The student wrote an incorrect response.

**Question 28**

28 The graph below models the cost of renting video games with a membership in Plan A and Plan B.



Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

He gets 2 more video games

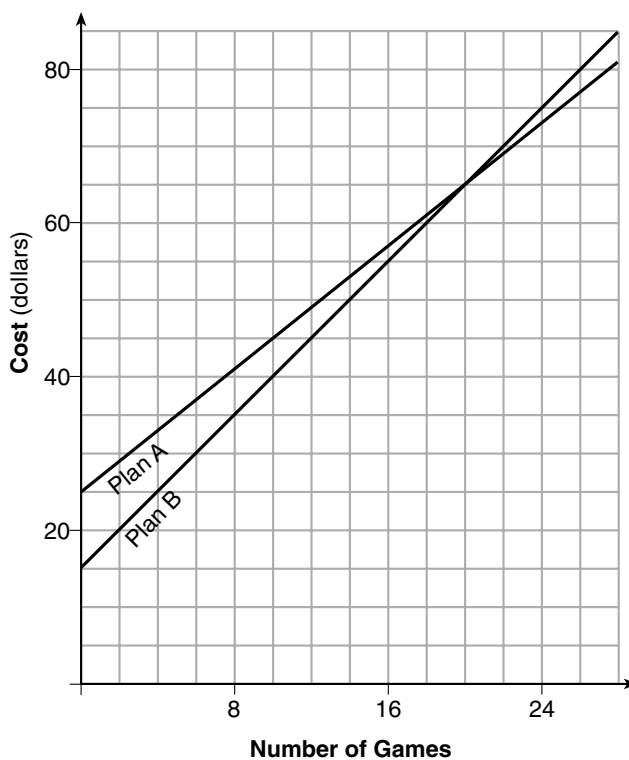
Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

Either because both plans (A & B) have 20 games when \$65 is spent.

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

## Question 28

28 The graph below models the cost of renting video games with a membership in Plan A and Plan B.



Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

With Plan B, he can buy 14 games with \$50.  
With Plan A, he can only buy 12 games with \$50.

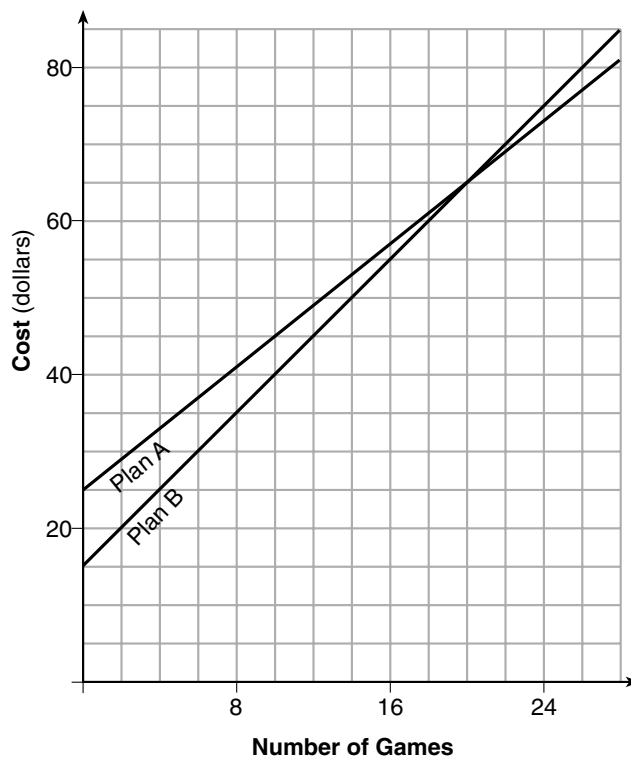
Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

It wouldn't matter which plan he uses because they both offer 20 games for \$65.

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

## Question 28

28 The graph below models the cost of renting video games with a membership in Plan A and Plan B.



Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

Plan B starts less expensive and has a slower rate

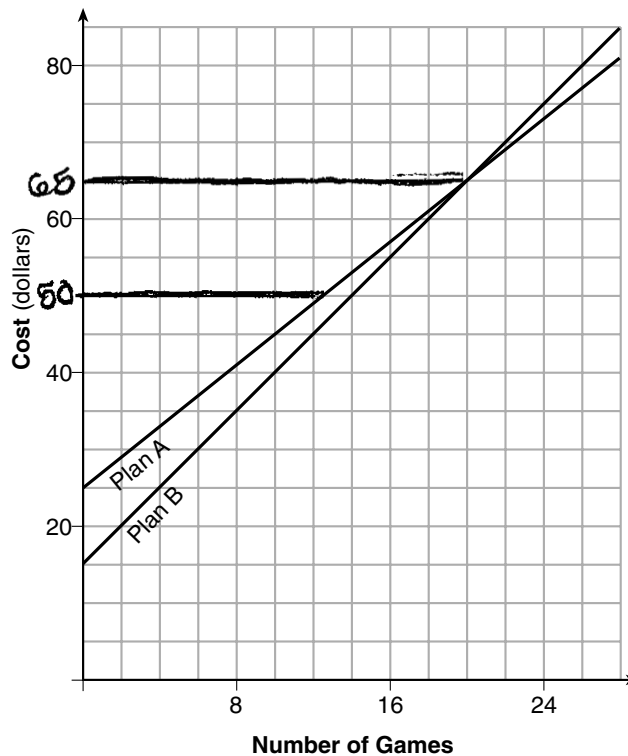
Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

Plan B as he would get the same amount of games (20) for each.

**Score 1:** The student wrote a correct explanation for Bobby.

**Question 28**

28 The graph below models the cost of renting video games with a membership in Plan A and Plan B.



24 games \$75 (B)  
18 games \$60 (A)

Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

Plan B is the better choice for Dylan because in this plan he can get more games. Plan B gets him 14 games for \$50 and Plan A gets him about 13.

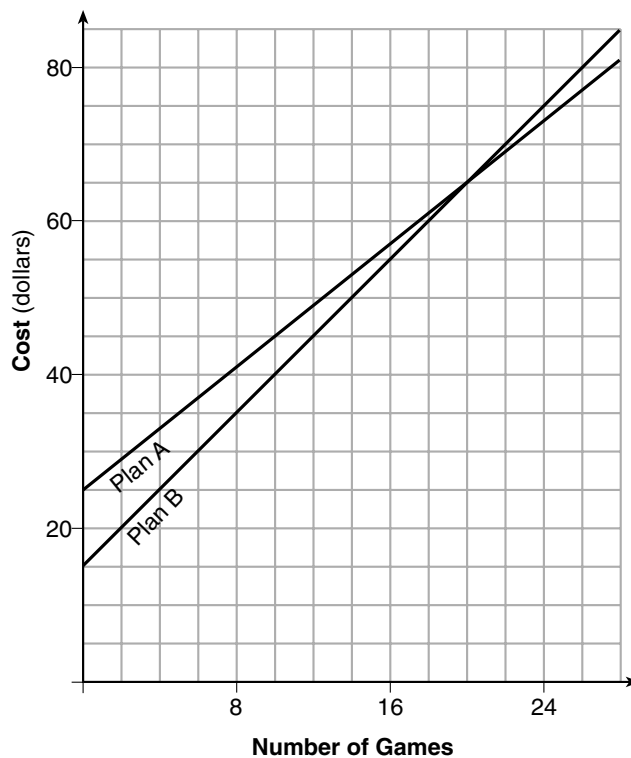
Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

Bobby should choose Plan B because if he wanted to spend less than his \$65 he will get better prices.

**Score 1:** The student wrote a correct explanation for Dylan.

## Question 28

28 The graph below models the cost of renting video games with a membership in Plan A and Plan B.



Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

He gets more games

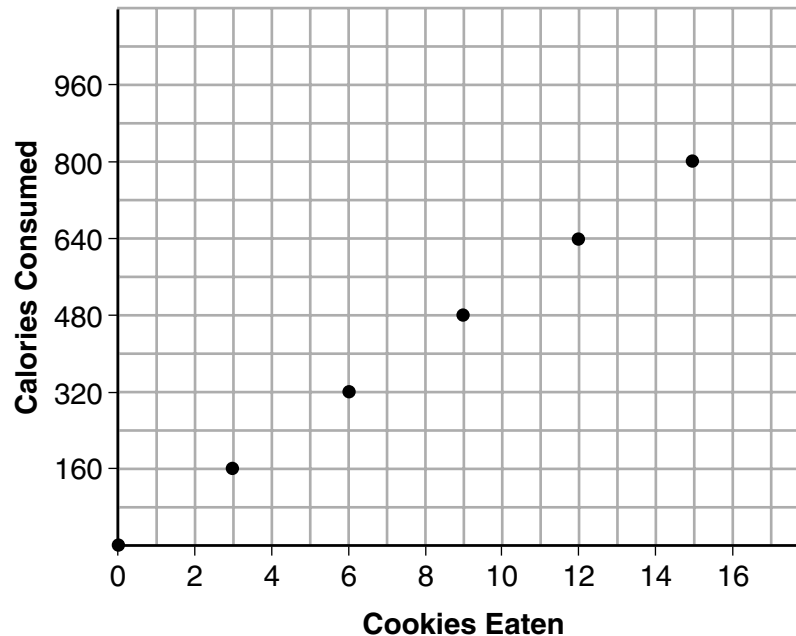
Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

They are the same

**Score 0:** The student wrote two incomplete explanations.

### Question 29

29 Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.



Explain why it is appropriate for Samantha to draw a line through the points on the graph.

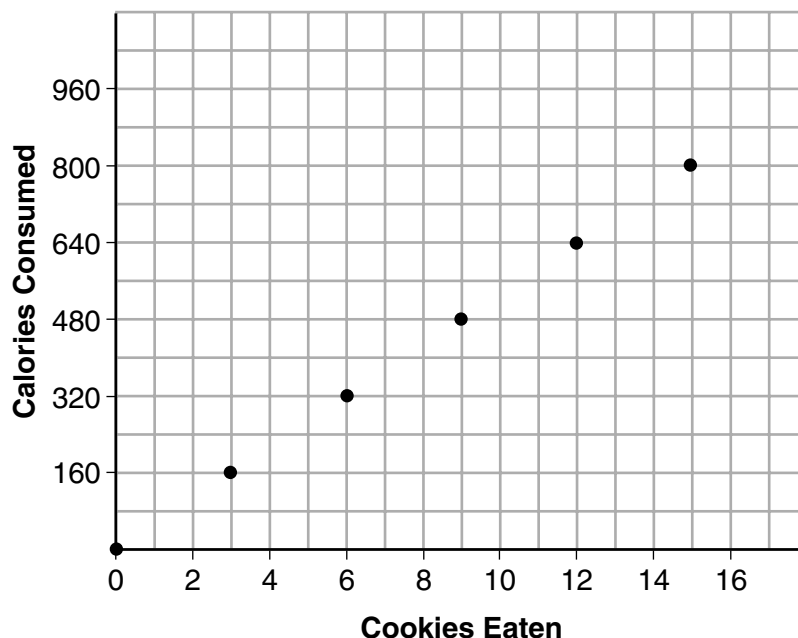
Samantha should connect the dots because she can consume 1 cookie or 2 cookies or a part of a cookie and if she does the correct number of calories would correspond with the number of cookies she ate.

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



### Question 29

29 Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.



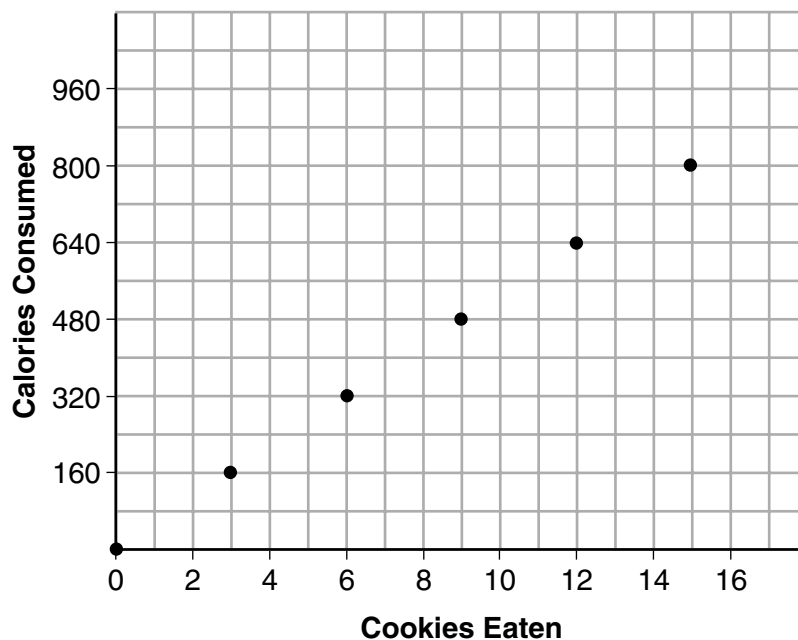
Explain why it is appropriate for Samantha to draw a line through the points on the graph.

No, because Samantha cannot eat a decimal amount of cookies, so if the line were to connect the graph, this would indicate that all points on the line were included.

**Score 1:** The student did not understand that a part of a cookie could be consumed.

### Question 29

29 Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.



Explain why it is appropriate for Samantha to draw a line through the points on the graph.

Yes to show that  
the calories increase

**Score 0:** The student wrote an irrelevant explanation.

**Question 30**

30 A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

$$\begin{array}{r} 5 \text{ feet } 9 \text{ inches} \\ \times 12 \\ \hline 60 + 9 = \\ \text{athlete} = 69 \text{ inches tall} \end{array}$$
$$\frac{69}{2} = 34.5$$
$$34.5 \cdot 40 = 1380 \text{ inches} \quad \text{a mile is } 63360 \text{ inches}$$

$$\frac{63360}{1380} = 45.9 = 46$$

It would take the athlete 46 jumps to reach a distance of one mile

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

---

**Question 30**

---

**30** A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

grasshopper jumps 20 times its length

$$5'9'' \times 20 = 100'180'' = 115'$$

$$\frac{5280}{115} = 45.91304348$$

46

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

Question 30

30 A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

$$\begin{array}{r} 40 \\ \times 30 \\ \hline 1200 \end{array} \quad \begin{array}{r} 40 \\ \times 4 \\ \hline 160 \end{array}$$

$$12 \overline{) 1380}$$

$$1m = 5280ft$$

$$\begin{array}{r} 1200 \\ + 160 \\ + 20 \\ \hline 1380 \text{ inches} \end{array}$$

115 feet

~~$$\begin{array}{r} 40 \\ \times 20 \\ \hline 1200 \end{array}$$~~

**Score 1:** The student found the distance the athlete could cover in one jump.

---

**Question 30**

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**30** A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

Grasshopper

↓

$$\frac{2}{40} \text{ or } \frac{1}{20} \text{ in.}$$

Person

$$\frac{69 \text{ in.}}{5280 \text{ in.}} = 76.521$$

It would take the Athlete  
about 77 jumps.

---

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

---

**Question 31**

---

**31** Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

$$\begin{array}{l} \textcircled{5x} + 8x^3 + 28x^2 - 6x^2 - \textcircled{9x} \\ \hline 8x^3 + 22x^2 - 4x \end{array}$$

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

**Question 31**

31 Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

$$\begin{aligned} & (4x^2 + 5x)(2x + 7) \\ & F: 4x^2 \cdot 2x = 8x^3 \\ & O: 4x^2 \cdot 7 = 28x^2 \\ & I: 5x \cdot 2x = 10x^2 \\ & L: 5x \cdot 7 = 35x \\ & \quad 8x^3 + 38x^2 + 35x \\ & + \quad \quad -6x^2 - 9x \\ & \hline & \boxed{8x^3 + 32x^2 + 26x} \end{aligned}$$

**Score 1:** The student made an error by writing  $5x + 4x^2$  as  $(4x^2 + 5x)$ , but simplified the expression appropriately.



---

**Question 31**

---

**31** Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

$$\begin{aligned} & 5x + 4x^2(2x + 7) - 6x^2 - 9 \\ & \underline{5x} + 8x^3 + \underline{28x^2} - \underline{6x^2} - 9 \\ & 5x + 8x^3 + 22x^2 - 9 \\ & 8x^3 + 22x^2 + 5x - 9 \end{aligned}$$

**Score 1:** The student made a transcription error by writing  $9x$  as  $9$ , but simplified the expression appropriately.

Question 31

31 Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

$$5x + 8x^3 + 28x^2 - 6x^2 - 9x$$

$$8x^3 + 22x^2 - 4x = 0$$

**Score 1:** The student wrote a correct trinomial, but set it equal to zero.

---

**Question 31**

---

**31** Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

$$5x + 8x^3 + 28x^2 - 6x^2 - 9$$
$$5x + 8x^3 + 22x^2 - 9 = 0$$

**Score 0:** The student made a transcription error by writing  $9x$  as  $9$ , did not write the expression in standard form, and set the expression equal to zero.

**Question 32**

32 Solve the equation  $x^2 - 6x = 15$  by completing the square.

$$x^2 - 6x = 15$$

$$\left(\frac{-6}{2}\right)^2 = (-3)^2 = 9$$

$$x^2 - 6x + 9 = 15 + 9$$

$$\sqrt{(x-3)^2} = \sqrt{24}$$

$$x-3 = \pm\sqrt{24}$$

$$x = 3 \pm 2\sqrt{6}$$

$$\{3 + 2\sqrt{6}, 3 - 2\sqrt{6}\}$$

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

---

**Question 32**

---

32 Solve the equation  $x^2 - 6x = 15$  by completing the square.

$$x^2 - 6x - 15 = 0$$

$$(x^2 - 6x + 9) - 15 - 9 = 0$$

$$(x - 3)^2 - 24 = 0$$

$$\sqrt{(x - 3)^2} = \sqrt{24}$$

$$x - 3 = \pm \sqrt{24}$$

$$x = \pm \sqrt{24} + 3$$

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

**Question 32**

32 Solve the equation  $x^2 - 6x = 15$  by completing the square.

$$x^2 - 6x = 15$$

$$x^2 - 6x + 9 = 15 + 9$$

$$\left(\frac{-6}{2}\right)^2 = (-3)^2 = 9$$

$$(x - 3)^2 = 24$$

$$-24 \quad -24$$

$$y = (x - 3)^2 - 24$$

**Score 1:** The student completed the square correctly, but did not solve for  $x$ .

**Question 32**

32 Solve the equation  $x^2 - 6x = 15$  by completing the square.

$$x^2 - 6x + (3)^2 = 15$$

$$x^2 - 6x + 9 = 15 + 9$$

$$x^2 - 6x + 9 = 24$$

$$\sqrt{(x-3)^2} = \sqrt{24}$$

$$x - 3 = \sqrt{24}$$

$$+ 3 \quad + 3$$

$$x = \sqrt{24} + 3$$

**Score 1:** The student made an error by not writing  $\pm\sqrt{24}$ .

**Question 32**

32 Solve the equation  $x^2 - 6x = 15$  by completing the square.

$$\begin{array}{l} \left(\frac{b}{2}\right)^2 \\ \left(\frac{-6}{2}\right)^2 \\ (-3)^2 \\ 9 \end{array} \quad \begin{array}{l} x^2 - 6x = 15 \\ x^2 - 6x + 9 = 15 - 9 \\ (x - 3)^2 = 6 \\ x - 3 = \pm \sqrt{6} \\ x = 3 \pm \sqrt{6} \\ \boxed{\begin{array}{l} x = 3 + \sqrt{6} \\ x = 3 - \sqrt{6} \end{array}} \end{array}$$

**Score 1:** The student did not add 9 to the right side of the equation.



---

**Question 32**

---

32 Solve the equation  $x^2 - 6x = 15$  by completing the square.

$$\begin{aligned}x^2 - 6x &= 15 \\&+ (-3)^2 \\(x-3)^2 &= 15 \\(x-3) &= \sqrt{15} \\x &= 3 + \sqrt{15}\end{aligned}$$

**Score 0:** The student did not add 9 to the right side of the equation and did not write  $\pm\sqrt{15}$ .

### Question 33

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

$$55(4) = 220$$

$$610 - 220 = 390$$

$$390 \div 65 = 6$$

$$6 + 4 = 10$$

It will take a total of 10 hours to reach the destination.

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

$$55(2) = 110$$

$$610 - 110 = 500$$

$$500 \div 65 = 7.7$$

$$2 + 7.7 = 9.7$$

$$10 - 9.7 = 0.3$$

The family will save 0.3 hours if Loretta's dad drives the remainder of the trip.

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

### Question 33

33 Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

Loretta  
220 mi  
4 hrs.

dad.  
390 mi  
6 hrs.

10 hrs.

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

Loretta  
110 mi  
2 hrs.

dad.  
500 mi  
7.69 hrs.

10 - 9.69

0.3 hrs.

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

**Question 33**

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

$$\begin{aligned} 610 &= 55(4) + 65x \\ 610 &= 220 + 65x & 6+4=10 \\ \underline{-220} & \quad \underline{-220} \\ 390 &= 65x \\ \underline{65} & \quad \underline{65} & \boxed{10 \text{ hours}} \end{aligned}$$

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

$$\begin{aligned} 610 &= 55(2) + 65x \\ 610 &= 110 + 65x \\ 500 &= 65x & 7.7 + 2 = 9.2 \\ 7.7 &= x & \begin{array}{r} 10 \\ -9.2 \\ \hline 0.8 \end{array} & 0.8 \end{aligned}$$

**Score 3:** The student made an error when adding 7.7 and 2.

**Question 33**

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

$$\begin{array}{l} \frac{55 \text{ mph}}{1 \text{ h}} = \frac{x}{4 \text{ h}} \\ 220 = x \end{array} \quad \left. \begin{array}{l} \rightarrow 610 \\ - 220 \\ \hline 390 \text{ miles for} \\ \text{her dad to drive} \end{array} \right\} \begin{array}{l} \frac{390 \text{ m}}{x \text{ h}} = \frac{65 \text{ m}}{1 \text{ h}} \\ 6 = x \end{array}$$

**10 hours**

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

$$55 \times 2 = 110$$

$$610 - 110 = \frac{500}{x} = \frac{65}{1}$$

$$x = 7.7$$

**Save 2.3 hours**

**Score 3:** The student did not consider Loretta's driving time when computing the time for the actual trip.

**Question 33**

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

$$\begin{array}{l} h = \text{total} \\ \text{time} \\ x = \text{dads} \\ \text{driving} \\ \text{time} \end{array} \quad \begin{array}{l} 4(55) + 65x = 610 \\ 220 + 65x = 610 \\ -220 \quad -220 \\ \hline 65x = 390 \\ \frac{65}{65} \quad \frac{390}{65} \\ x = 6 \end{array} \quad \begin{array}{l} e + x = h \\ 4 + 6 = \boxed{10 \text{ hours}} \end{array}$$

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

$$\begin{array}{l} 2(55) + 8(65) = 610 \\ 110 + 520 = 610 \\ 630 = 610 \quad \boxed{20 \text{ hours}} \\ 630 - 610 \end{array}$$

**Score 2:** The student showed correct work to find 10.

**Question 33**

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

	mph	# of hr.		
	55	-1	485	-8
	110	-2	545	-9
Loretta	165	-3	610	-10
	220	-4		
	<hr/>			
	285	-5		
her	350	-6		
dad	415	-7		

drt will take  
10 hrs ~~to~~ for them  
to get home.

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

55	-1	
110	-2	
175	-3	
240	-4	
305	-5	
370	-6	
435	-7	
500	-8	
565	-9	
630	-10	

630  
-565  

---

65

it will take .65 hours.

**Score 2:** The student showed correct work to find 10.

---

**Question 33**

---

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

$$\begin{aligned}55(4) + 65t &= 610 \\220 + 65t &= 610 \\65t &= 390 \\t &= 6\end{aligned}$$

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

$$\begin{aligned}55(2) + 65t &= 610 \\110 + 65t &= 610 \\65t &= 500 \\t &= 7.7\end{aligned}$$

**Score 1:** The student showed correct work to find 6, but did not show enough additional work to receive further credit.



---

**Question 33**

---

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

$$\begin{aligned}2(55) + 65x &= 610 \\110 + 65x &= 610 \\65x &= 500 \\x &= 7.692307692 \\x &= 7.7 \\x + 2 &= 9.7\end{aligned}$$

**Score 1:** The student found the total time of the actual trip.

**Question 33**

**33** Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph.

The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination.

hour is 60 min.  
55

$$610 - 55 = 555$$
$$555 - 65 = 490$$

138  
2 hrs. 6 hrs.

After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

**Score 0:** The student did not show appropriate work to find 6.

**Question 34**

34 The heights, in feet, of former New York Knicks basketball players are listed below.

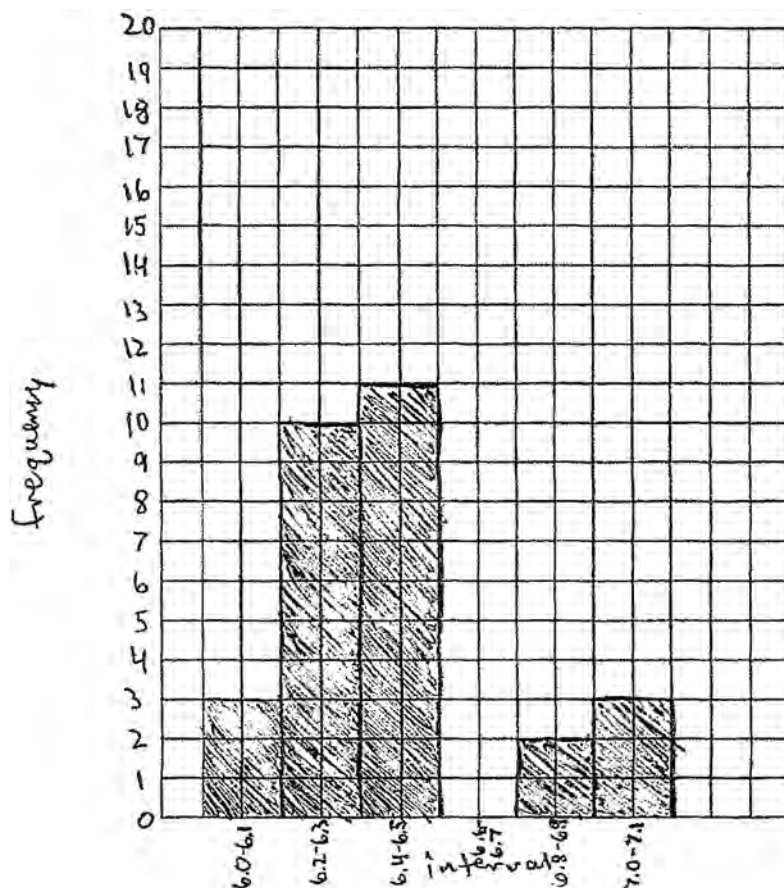
<del>6.4</del>	<del>6.9</del>	<del>6.3</del>	<del>6.2</del>	<del>6.3</del>	<del>6.0</del>	<del>6.1</del>	6.3	<del>6.8</del>	<del>6.2</del>
<del>6.5</del>	7.1	<del>6.4</del>	<del>6.3</del>	<del>6.5</del>	<del>6.5</del>	<del>6.4</del>	7.0	<del>6.4</del>	<del>6.3</del>
<del>6.2</del>	<del>6.3</del>	7.0	<del>6.4</del>	<del>6.5</del>	<del>6.5</del>	<del>6.5</del>	<del>6.0</del>	<del>6.2</del>	

Using the heights given, complete the frequency table below.

Interval	Frequency
6.0 – 6.1	2
6.2 – 6.3	10
6.4 – 6.5	11
6.6 – 6.7	0
6.8 – 6.9	2
7.0 – 7.1	3

Question 34 continued.

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

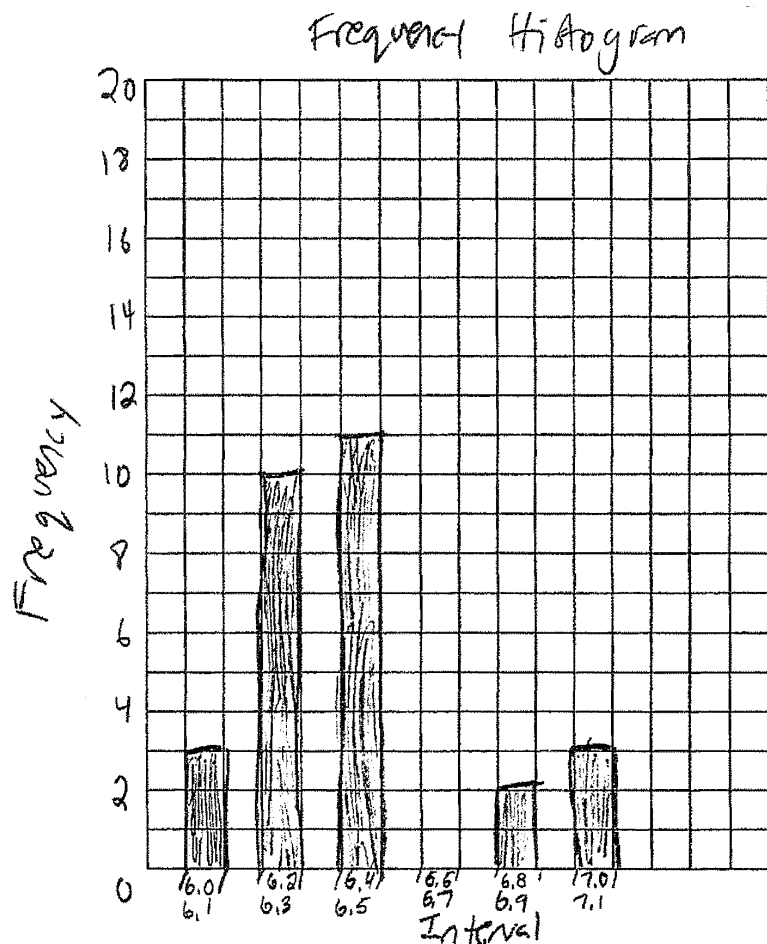
The interval 6.4-6.5 contains the upper quartile, because there are 29 heights listed, and 29 divided by 4 (into quarters) is 7.25. If you count back 7.25 heights from the tallest height you get 6.5 which is in that interval.

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



Question 34 continued.

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

The 6.4-6.5 interval contains the upper quartile because the upper quartile is 6.5 which fits into that interval.

**Score 3:** The student drew a bar graph instead of a histogram.

**Question 34**

34 The heights, in feet, of former New York Knicks basketball players are listed below.

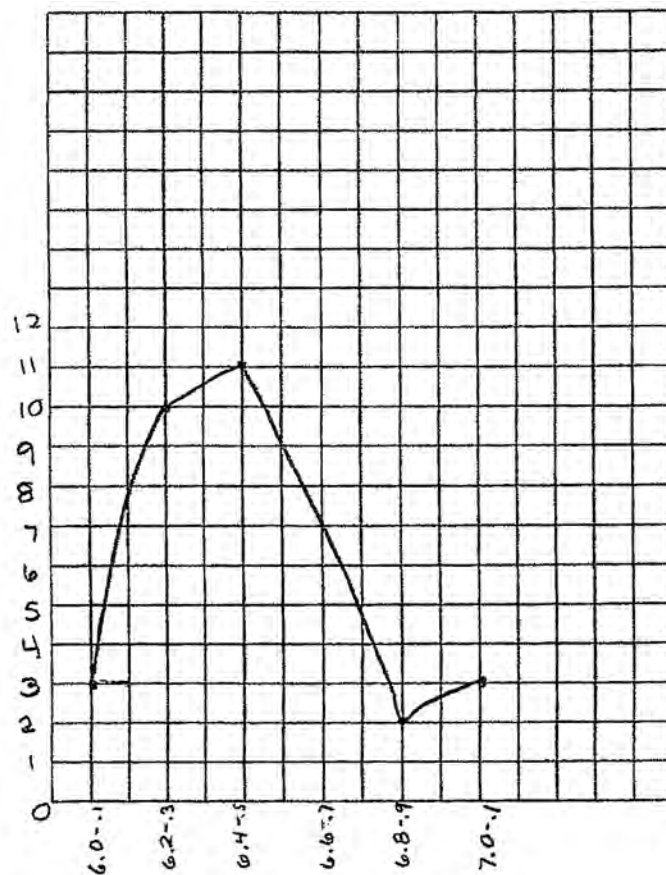
<del>6.4</del>	<del>6.9</del>	<del>6.3</del>	<del>6.2</del>	<del>6.3</del>	<del>6.0</del>	<del>6.1</del>	<del>6.3</del>	<del>6.8</del>	<del>6.2</del>
<del>6.5</del>	<del>7.1</del>	<del>6.4</del>	<del>6.3</del>	<del>6.5</del>	<del>6.5</del>	<del>6.4</del>	<del>7.0</del>	<del>6.4</del>	<del>6.3</del>
<del>6.2</del>	<del>6.3</del>	<del>7.0</del>	<del>6.4</del>	<del>6.5</del>	<del>6.5</del>	<del>6.5</del>	<del>6.0</del>	<del>6.2</del>	

Using the heights given, complete the frequency table below.

Interval	Frequency
6.0 – 6.1	3
6.2 – 6.3	10
6.4 – 6.5	11
6.6 – 6.7	0
6.8 – 6.9	2
7.0 – 7.1	3

**Question 34 continued.**

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

The interval that contains the upper quartile is the group which stands between 6.4 - 6.5 feet.

**Score 2:** The student drew a line graph instead of a histogram and did not give a justification.



**Question 34**

34 The heights, in feet, of former New York Knicks basketball players are listed below.

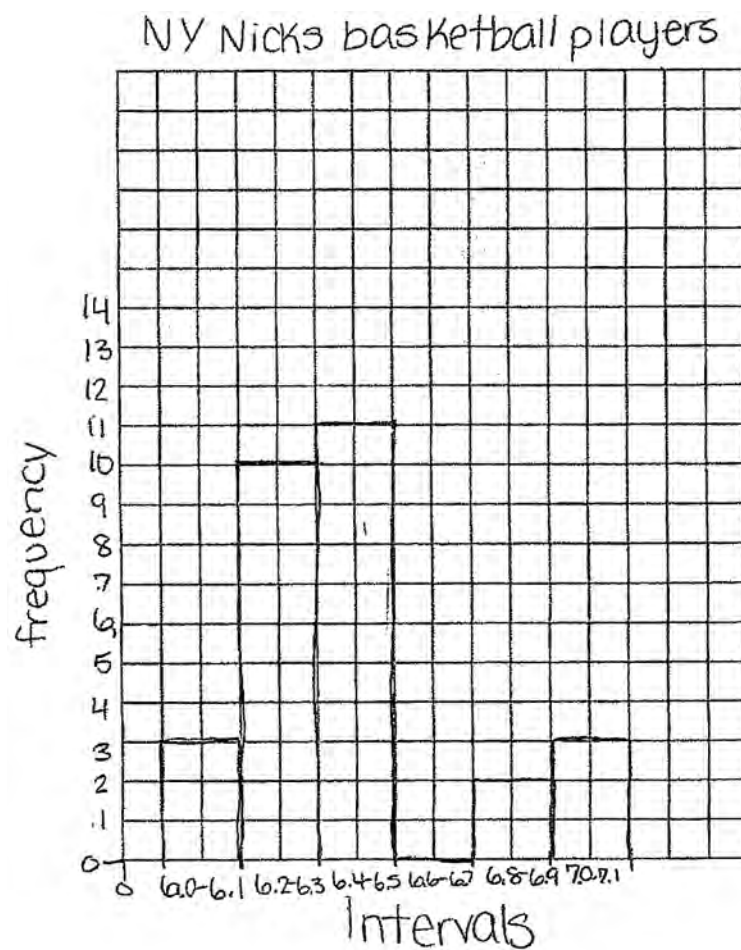
<del>6/4</del>	<del>6/9</del>	<del>6/3</del>	<del>6/2</del>	<del>6/3</del>	<del>6/0</del>	<del>6/1</del>	<del>6/3</del>	<del>6/8</del>	<del>6/2</del>
<del>6/5</del>	<del>7/1</del>	<del>6/4</del>	<del>6/3</del>	<del>6/5</del>	<del>6/5</del>	<del>6/4</del>	<del>7/0</del>	<del>6/4</del>	<del>6/3</del>
<del>6/2</del>	<del>6/3</del>	<del>7/0</del>	<del>6/4</del>	<del>6/5</del>	<del>6/5</del>	<del>6/5</del>	<del>6/0</del>	<del>6/2</del>	

Using the heights given, complete the frequency table below.

Interval	Frequency
6.0 – 6.1	
6.2 – 6.3	
6.4 – 6.5	
6.6 – 6.7	
6.8 – 6.9	
7.0 – 7.1	

Question 34 continued.

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

It would be in the 6.0-6.1 interval because the upper quartile is 6.85.

**Score 2:** The student completed the frequency table correctly and drew a correct histogram.

**Question 34**

34 The heights, in feet, of former New York Knicks basketball players are listed below.

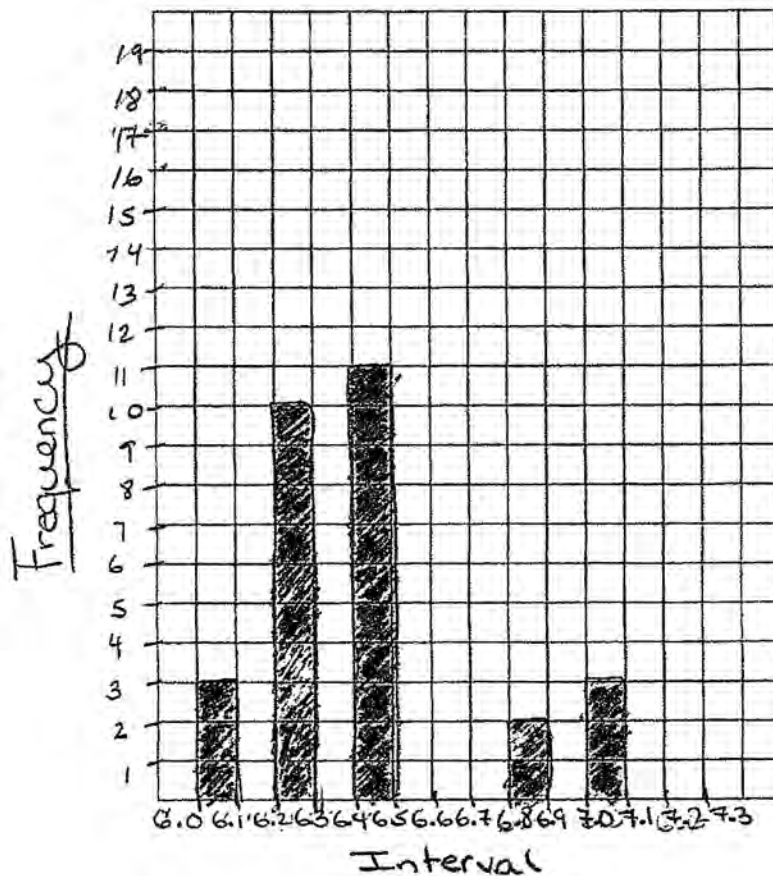
<del>6.4</del>	<del>6.9</del>	<del>6.3</del>	<del>6.2</del>	<del>6.3</del>	<del>6.0</del>	<del>6.1</del>	<del>6.3</del>	<del>6.8</del>	<del>6.2</del>
<del>6.5</del>	<del>7.1</del>	<del>6.4</del>	<del>6.3</del>	<del>6.5</del>	<del>6.5</del>	<del>6.4</del>	<del>7.0</del>	<del>6.4</del>	<del>6.3</del>
<del>6.2</del>	<del>6.3</del>	<del>7.0</del>	<del>6.4</del>	<del>6.5</del>	<del>6.5</del>	<del>6.5</del>	<del>6.0</del>	<del>6.2</del>	

Using the heights given, complete the frequency table below.

Interval	Frequency
6.0 – 6.1	
6.2 – 6.3	
6.4 – 6.5	
6.6 – 6.7	
6.8 – 6.9	
7.0 – 7.1	

Question 34 continued.

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

**Score 1:** The student completed the frequency table correctly, but drew a bar graph instead of a histogram.

---

**Question 34**

---

34 The heights, in feet, of former New York Knicks basketball players are listed below.

6.4	6.9	6.3	6.2	6.3	6.0	6.1	6.3	6.8	6.2
6.5	7.1	6.4	6.3	6.5	6.5	6.4	7.0	6.4	6.3
6.2	6.3	7.0	6.4	6.5	6.5	6.5	6.0	6.2	

Using the heights given, complete the frequency table below.

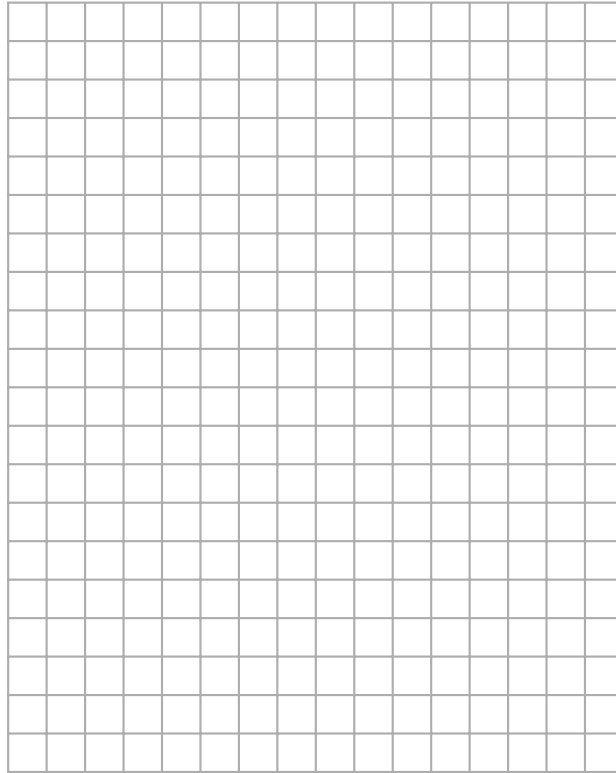
Interval	Frequency
6.0 – 6.1	3%
6.2 – 6.3	10%
6.4 – 6.5	11%
6.6 – 6.7	0%
6.8 – 6.9	2%
7.0 – 7.1	3%

---

**Question 34 continued.**

---

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

**Score 0:** The student expressed each frequency as a percent.

**Question 34**

34 The heights, in feet, of former New York Knicks basketball players are listed below.

<del>6.4</del>	<del>6.9</del>	<del>6.3</del>	<del>6.2</del>	<del>6.3</del>	<del>6.0</del>	<del>6.1</del>	<del>6.3</del>	<del>6.8</del>	<del>6.2</del>
<del>6.5</del>	7.1	<del>6.4</del>	<del>6.3</del>	6.5	6.5	6.4	7.0	6.4	<del>6.3</del>
<del>6.2</del>	6.3	7.0	6.4	6.5	6.5	6.5	6.0	6.2	

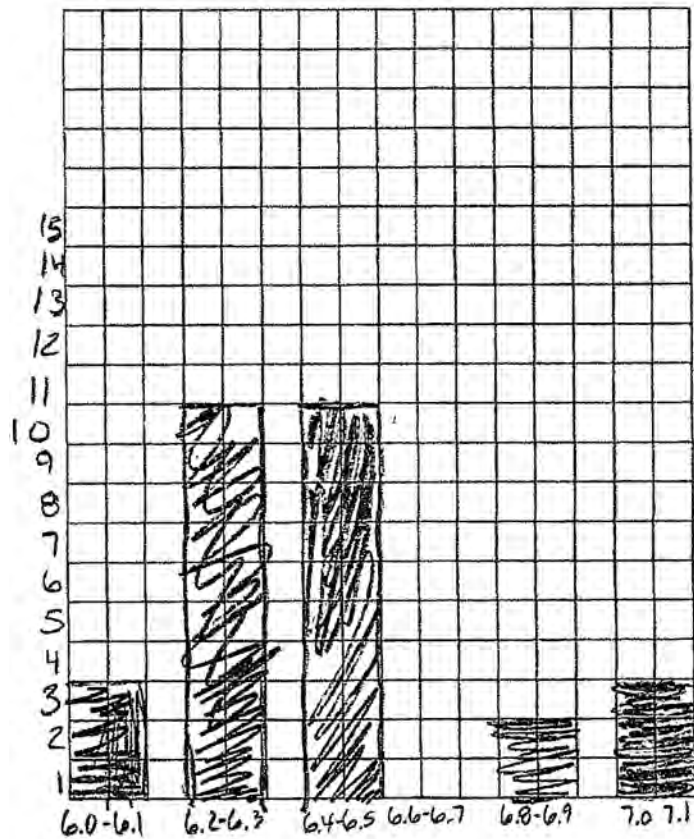
Using the heights given, complete the frequency table below.

Interval	Frequency
6.0 – 6.1	<del>2</del> 3
6.2 – 6.3	10
6.4 – 6.5	10
6.6 – 6.7	0
6.8 – 6.9	2
7.0 – 7.1	3

6.0, 6.1, 6.2, 6.3, 6.4 | 6.5, 6.8, 6.9, 7.0, 7.1

Question 34 continued.

Based on the frequency table created, draw and label a frequency histogram on the grid below.



Determine and state which interval contains the upper quartile. Justify your response.

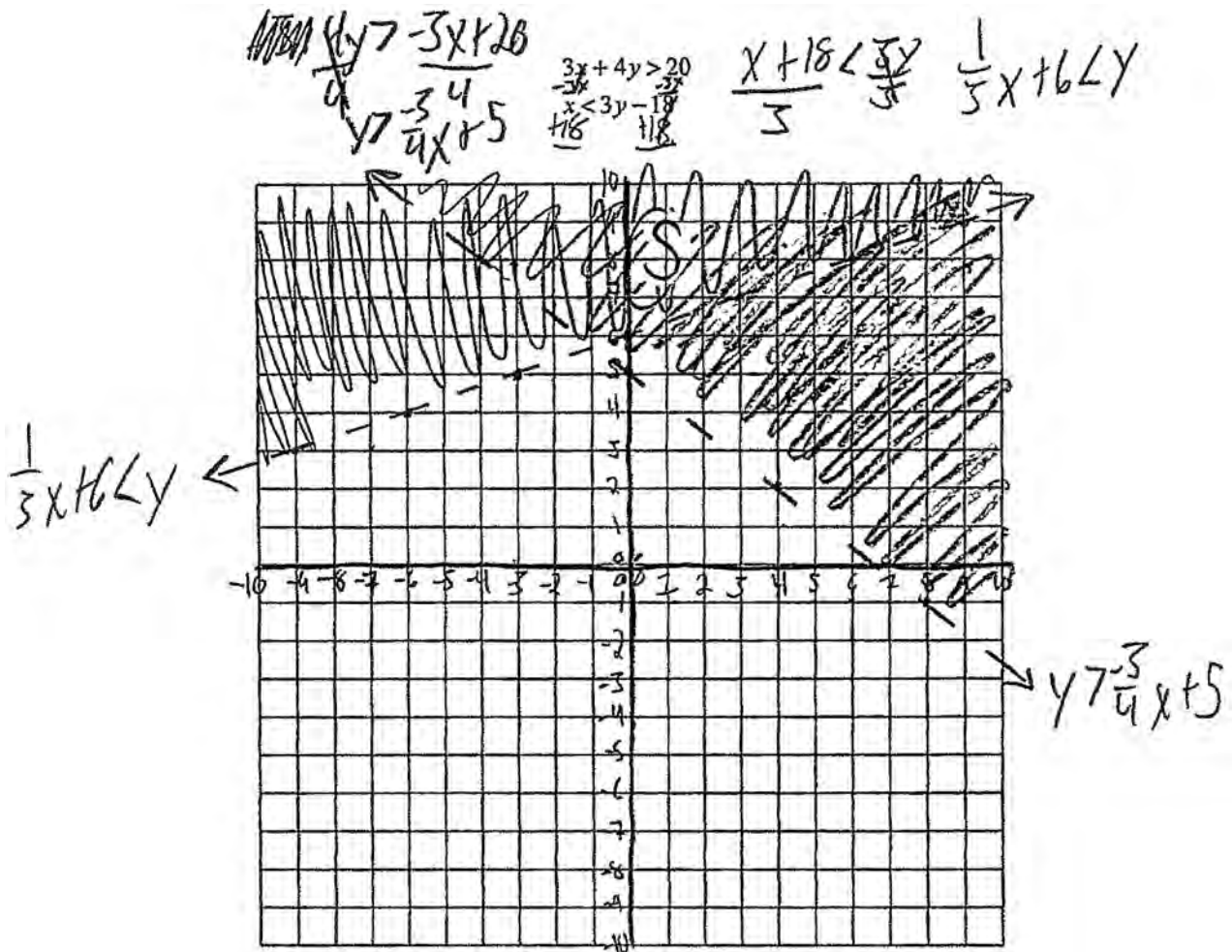
6.2-6.3  
+  
6.4-6.5

**Score 0:** The student did not show enough correct work to receive any credit.



Question 35

35 Solve the following system of inequalities graphically on the grid below and label the solution S.



Is the point (3,7) in the solution set? Explain your answer.

No, because it's on the line  
and it's only a more than not a more  
than or equal to, so it's not included.

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

Question 35

35 Solve the following system of inequalities graphically on the grid below and label the solution S.

$$3x + 4y > 20$$

$$x < 3y - 18$$

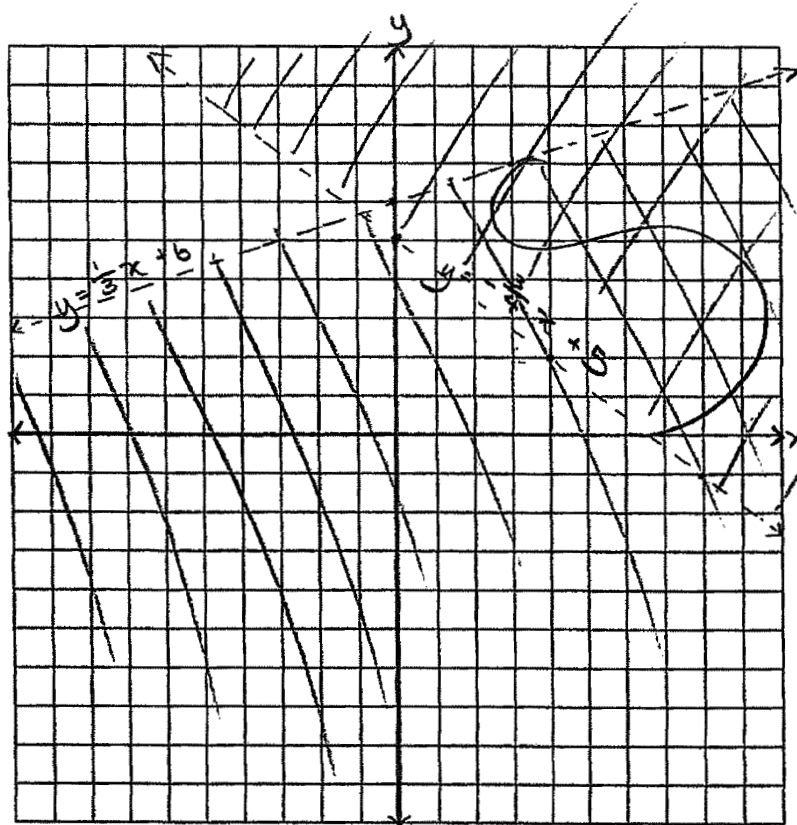
$$3x + 4y > 20$$

$$4y > -3x + 20$$

$$y > -\frac{3}{4}x + 5$$

$$y_{int} = 5$$

$$m = -\frac{3}{4}$$



$$x < 3y - 18$$

$$-3y < -x - 18$$

$$y < \frac{1}{3}x + 6$$

$$y_{int} = 6$$

$$m = \frac{1}{3}$$

Is the point (3,7) in the solution set? Explain your answer.

No, because point (3,7) is on the line of  $y = \frac{1}{3}x + 6$ , but the original equation is  $y < \frac{1}{3}x + 6$  which solutions are not including the points on it's line.

**Score 3:** The student did not reverse the inequality symbol when dividing by a negative.

**Question 35**

**35** Solve the following system of inequalities graphically on the grid below and label the solution S.

$$3x + 4y > 20$$

$$x < 3y - 18$$

$$3x + 4y > 20$$

$$4y > -3x + 20$$

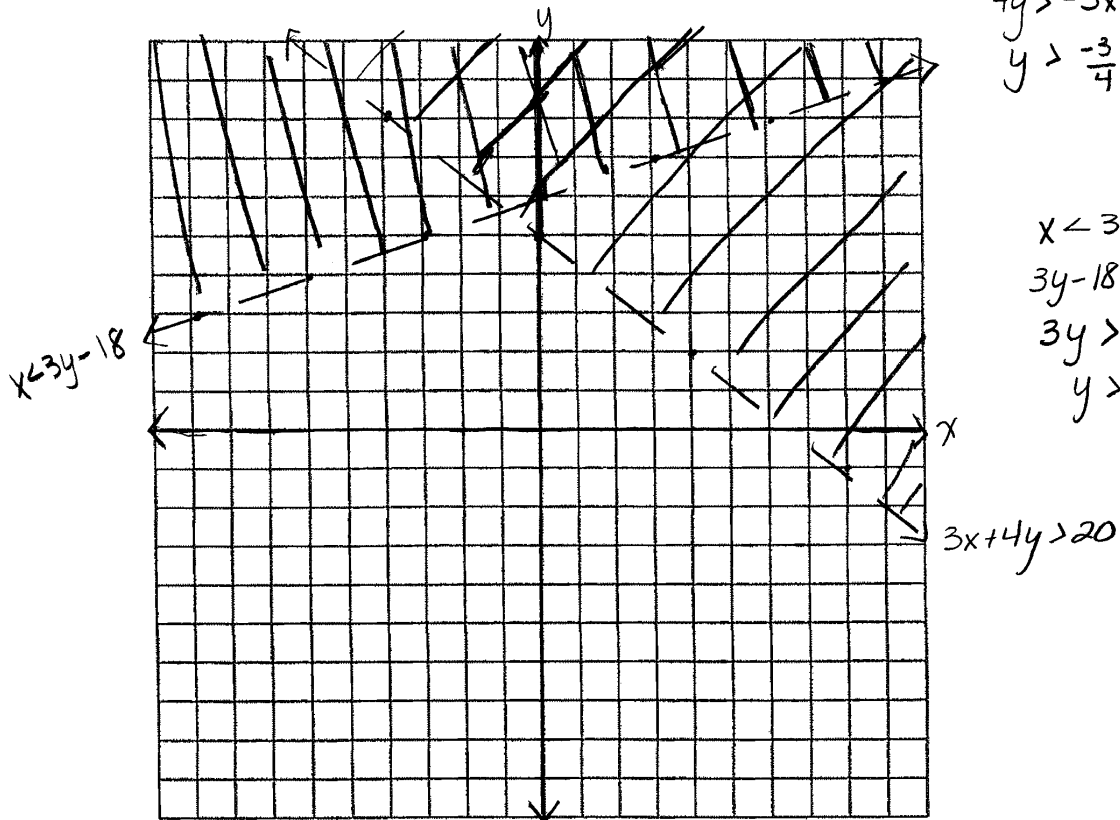
$$y > -\frac{3}{4}x + 5$$

$$x < 3y - 18$$

$$3y - 18 > x$$

$$3y > x + 18$$

$$y > \frac{1}{3}x + 6$$



Is the point (3,7) in the solution set? Explain your answer.

yes because the point is on the line

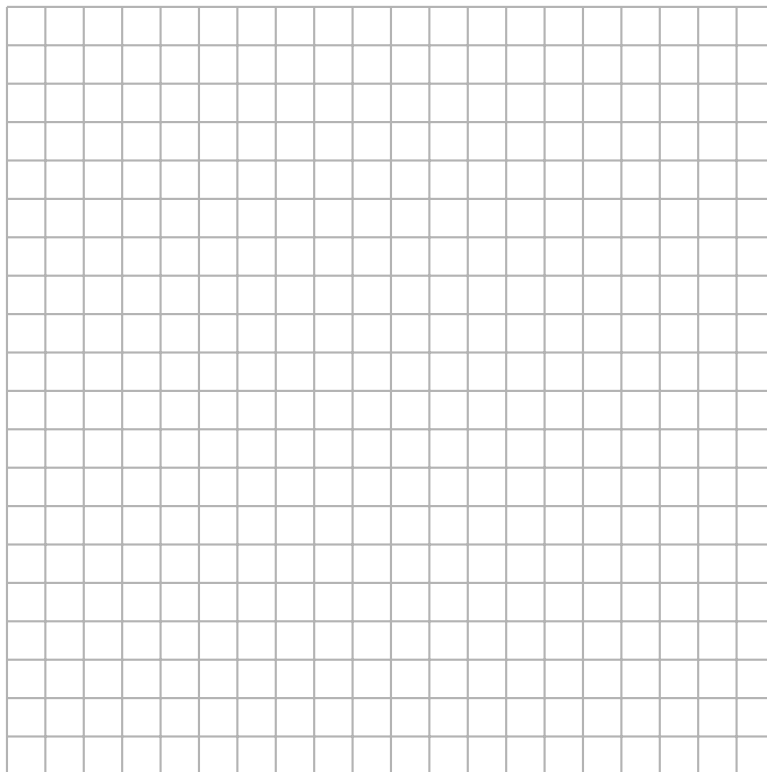
**Score 2:** Appropriate work is shown, but the solution is not labeled and an incorrect explanation is written.

**Question 35**

**35** Solve the following system of inequalities graphically on the grid below and label the solution  $S$ .

$$3x + 4y > 20$$

$$x < 3y - 18$$



Is the point  $(3,7)$  in the solution set? Explain your answer.

$$\begin{aligned} 3(3) + 4(7) &> 20 \\ 9 + 28 &> 20 \\ 27 &> 20 \\ &\checkmark \end{aligned}$$

$$\begin{aligned} 3 &< 3(7) - 18 \\ 3 &< 21 - 18 \\ 3 &< 3 \\ &\times \end{aligned}$$

No, because it  
doesn't support  
the inequalities

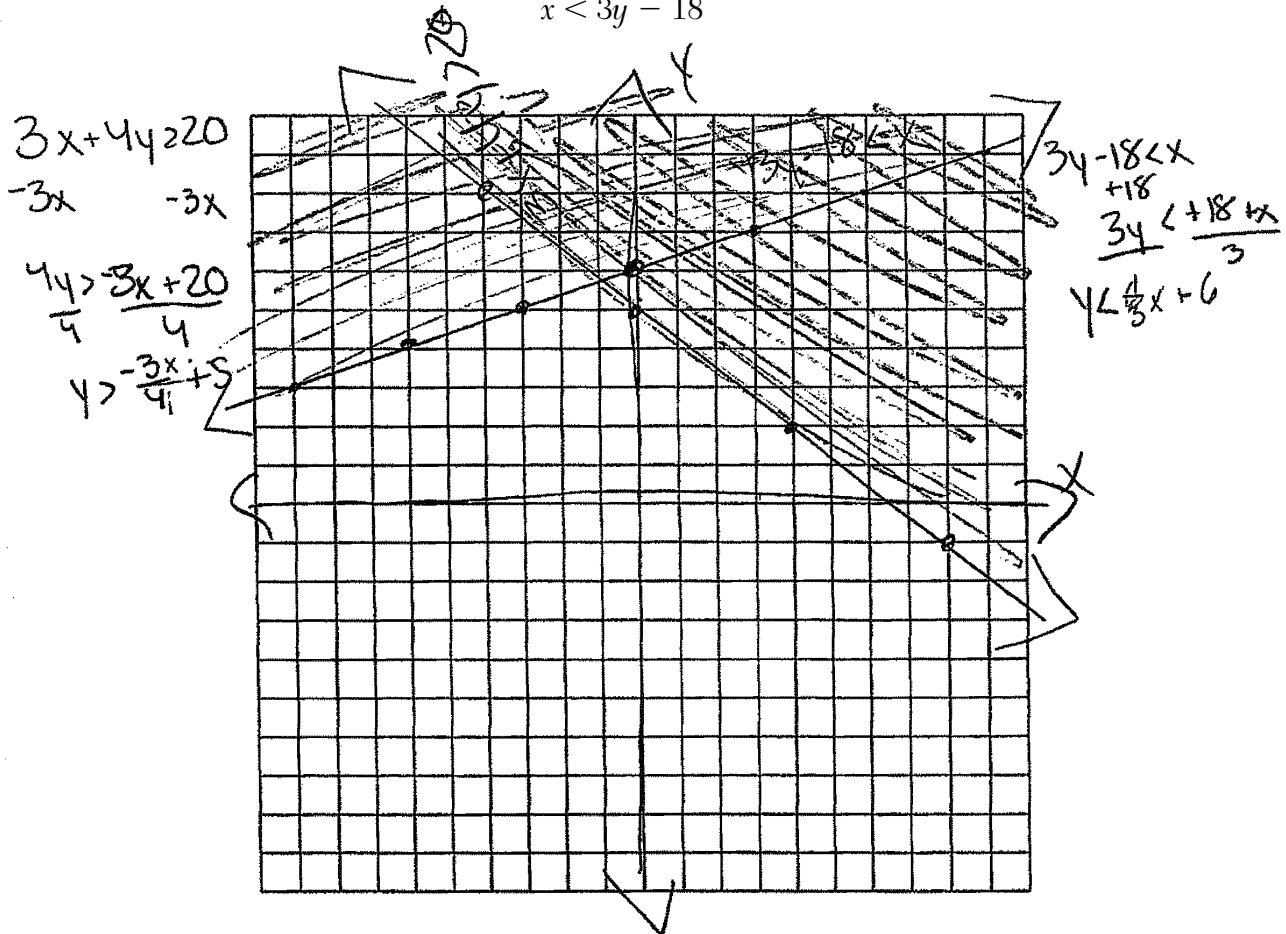
**Score 1:** The student wrote a correct explanation based on an algebraic justification.

Question 35

35 Solve the following system of inequalities graphically on the grid below and label the solution S.

$$3x + 4y > 20$$

$$x < 3y - 18$$



Is the point (3,7) in the solution set? Explain your answer.

No, because points on each line are not included in the answer.

**Score 1:** The student graphed both inequalities using solid lines and did not label the solution set. The explanation is incorrect based on their graph.

Question 35

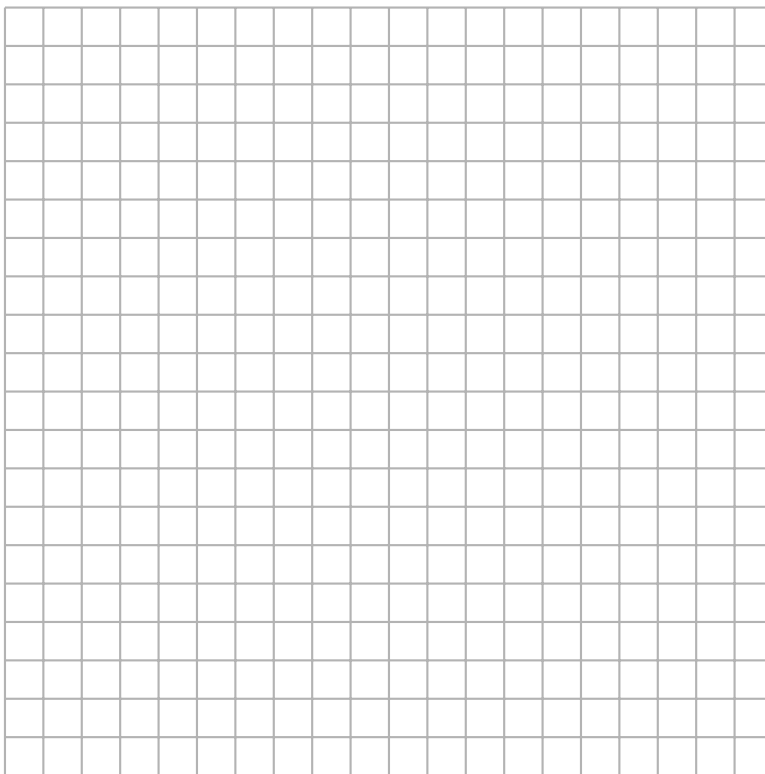
35 Solve the following system of inequalities graphically on the grid below and label the solution S.

$$\begin{array}{r} 3x + 4y > 20 \\ -3x + 4 \quad -3x + 4 \\ \hline \end{array}$$

$$\begin{array}{l} 3x + 4y > 20 \\ x < 3y - 18 \end{array}$$

$$\begin{array}{r} x < 3y - 18 \\ +18 \quad +18 \\ \hline 3x + 18 < 3y - 3 \end{array}$$

$$y > -3x + 24$$



$$3x + 18 < y$$

Is the point (3,7) in the solution set? Explain your answer.

**Score 0:** The student did not show any correct work.

### Question 36

- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

Vertex = (4, 9256)  
the y-coordinate represents the pilot's height from the ground after being ejected.

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

256 feet above because the pilot was ejected at 9000 feet but the vertex is (4, 9256), implying that the plane ejects the pilot 256 feet above the plane.

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

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**Question 36**

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- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$$(4, 9256)$$

The peak of the pilot's height above the ground after ejection from the plane.

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

256 Ft.

$$\begin{array}{r} 9256 \\ -9,000 \\ \hline 256 \end{array}$$

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



**Question 36**

- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$$-16t^2 + 128t + 9000 = h(t)$$

$$\frac{-b}{2a} = \frac{-(128)}{2(-16)} = \frac{-128}{-32} = 4$$

$$-16(4)^2 + 128(4) + 9000 = h(t)$$

$$9256 = h(t)$$

$$(4, 9256)$$

y-coordinate represents highest point where the aircraft will be in ft.

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

$$256 \text{ because } \frac{9256 - 9000}{256}$$

**Score 3:** The student wrote an incorrect explanation.

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**Question 36**

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- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$(4, 9256)$ . Y-coordinate  
is how high she is off the  
ground

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

9256, it is the vertex

---

**Score 2:** The student stated a correct vertex and wrote a correct explanation.

**Question 36**

- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$$h(t) = -16t^2 + 128t + 9000$$
$$V = \frac{-b}{2a}$$
$$V = \frac{-128}{2(-16)} = \frac{128}{32} = 4$$
$$h(4) = -16(4)^2 + 128(4) + 9000$$
$$h(4) = -256 + 512 + 9000$$
$$(9256, 4)$$

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

$$\begin{array}{r} 9256 \\ -9000 \\ \hline 256 \text{ feet} \end{array}$$

**Score 2:** The student stated the vertex incorrectly and wrote no explanation.

**Question 36**

- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$$(4, 9256)$$

THE Y-COORDINATE IS THE  
HEIGHT

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

$$\begin{aligned} & -16(4)^2 + 128(4) + 9000 \\ & -16(16) + 512 + 9000 \\ & -256 + 9512 \\ & \quad \quad \quad \textcircled{9256} \end{aligned}$$

**Score 1:** The student stated the vertex correctly, but did not write an explanation in the context of the problem.

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**Question 36**

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**36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$$(9256, 4)$$

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

$$256$$

**Score 1:** The student stated 256, but did not show a justification.

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**Question 36**

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- 36** An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function  $h(t) = -16t^2 + 128t + 9000$  models the height, in feet, of the pilot above the ground, where  $t$  is the time, in seconds, after she is ejected from the aircraft.

Determine and state the vertex of  $h(t)$ . Explain what the second coordinate of the vertex represents in the context of the problem.

$$-16x^2 + 128x + 9000$$

Vertex: 4

The y coordinate represents the height ejected from.

After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

9000 feet.

**Score 0:** The student did not show enough work to receive any credit.

**Question 37**

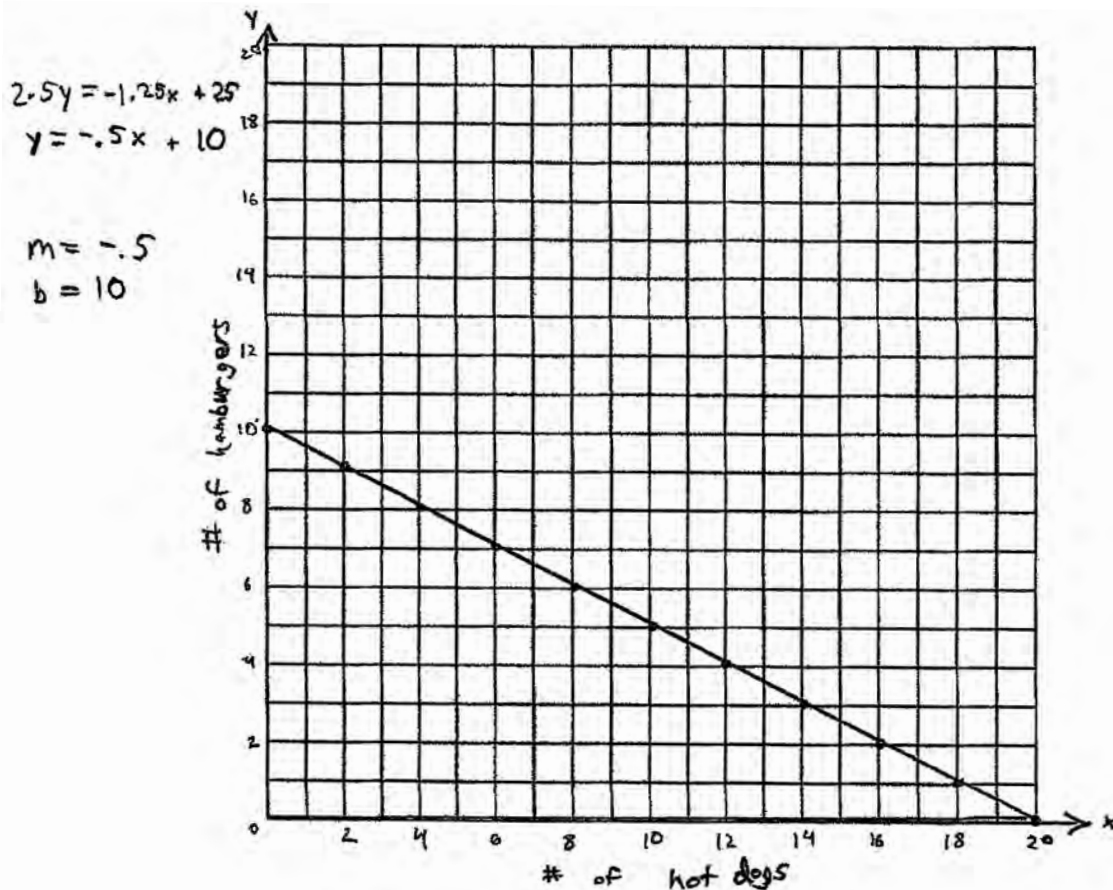
37 Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$28.5 - 3.5 = 25$$

$$25 = 1.25x + 2.5y$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

There are 11 different combinations because each dot on the above graph represents one combination

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

**Question 37**

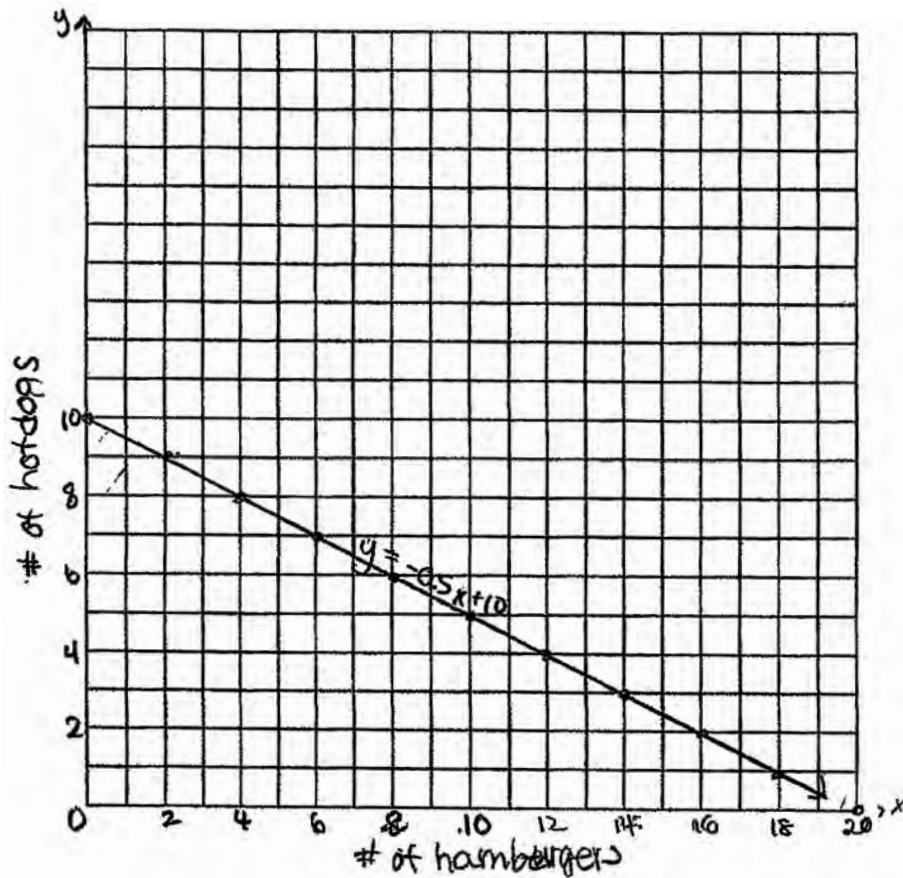
37 Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$1.25x + 2.5y = 28.5 - 7(0.50)$$

$$\rightarrow 1.25x + 2.5y = 25 \rightarrow y = -0.5x + 10$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

There are 11 different combinations because there are 11 different whole number points shown in the graph.

**Score 5:** The student labeled the axes incorrectly.



**Question 37**

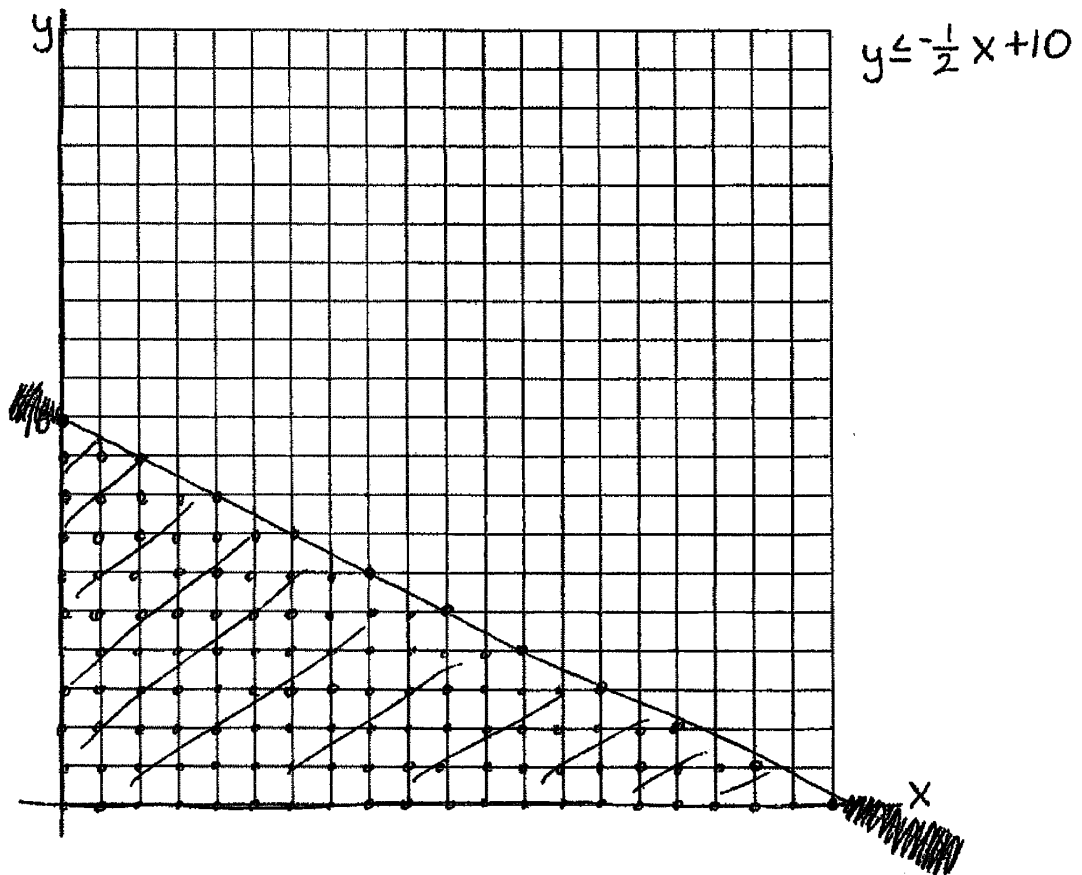
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Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$1.25x + 2.50y + 3.50 = 28.50$$

$$1.25x + 2.50y = 25$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

121 combinations  
because any integer solution in my  
solution set will work

**Score 5:** The student made an error by using an inequality to model the scenario.

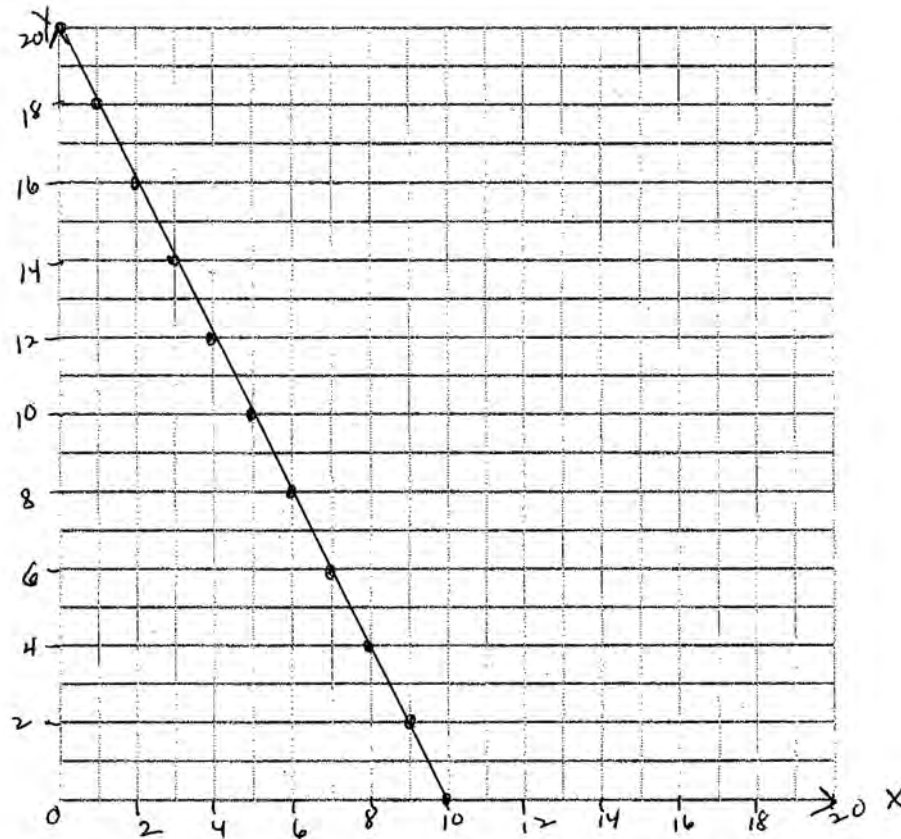
**Question 37**

**37** Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$2.5x + 1.25y = 25$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

11 each dot on the line is a combination that works

**Score 5:** The student made a transcription error by reversing the  $x$  and  $y$  when writing the equation. All other work was appropriate.

**Question 37**

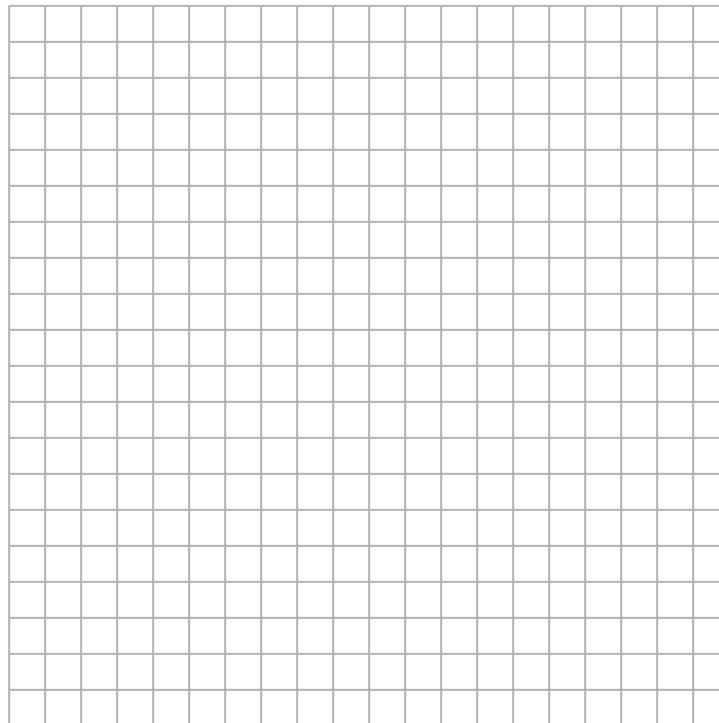
**37** Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$1.25x + 2.50y + 3.50 = 28.50$$

$$1.25x + 2.50y = 25.00$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

dogs burgers  
 $1.25x + 2.50y = 25$   
 $1.25(20) + 2.50(0) = 25$   
 $1.25(18) + 2.50(1) = 25$   
 $1.25(16) + 2.50(2) = 25$   
 $1.25(14) + 2.50(3) = 25$   
 $1.25(12) + 2.50(4) = 25$   
 $1.25(10) + 2.50(5) = 25$   
 Burgers cost twice as much as a hot dog  
 $1.25(8) + 2.50(6) = 25$   
 $1.25(6) + 2.50(7) = 25$   
 $1.25(4) + 2.50(8) = 25$   
 $1.25(2) + 2.50(9) = 25$   
 $1.25(0) + 2.50(10) = 25$   
 so it takes 2 hot dogs to make up for the cost of a burger. I tried 20 hot dogs and no burgers and it worked. I went down by 2 hot dogs and up 1 burger each time.  
 All these combinations worked. There are 11 See my work.

**Score 4:** The student wrote a correct equation and used it to determine the number of combinations. The student wrote an explanation.

Question 37

37 7 people Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

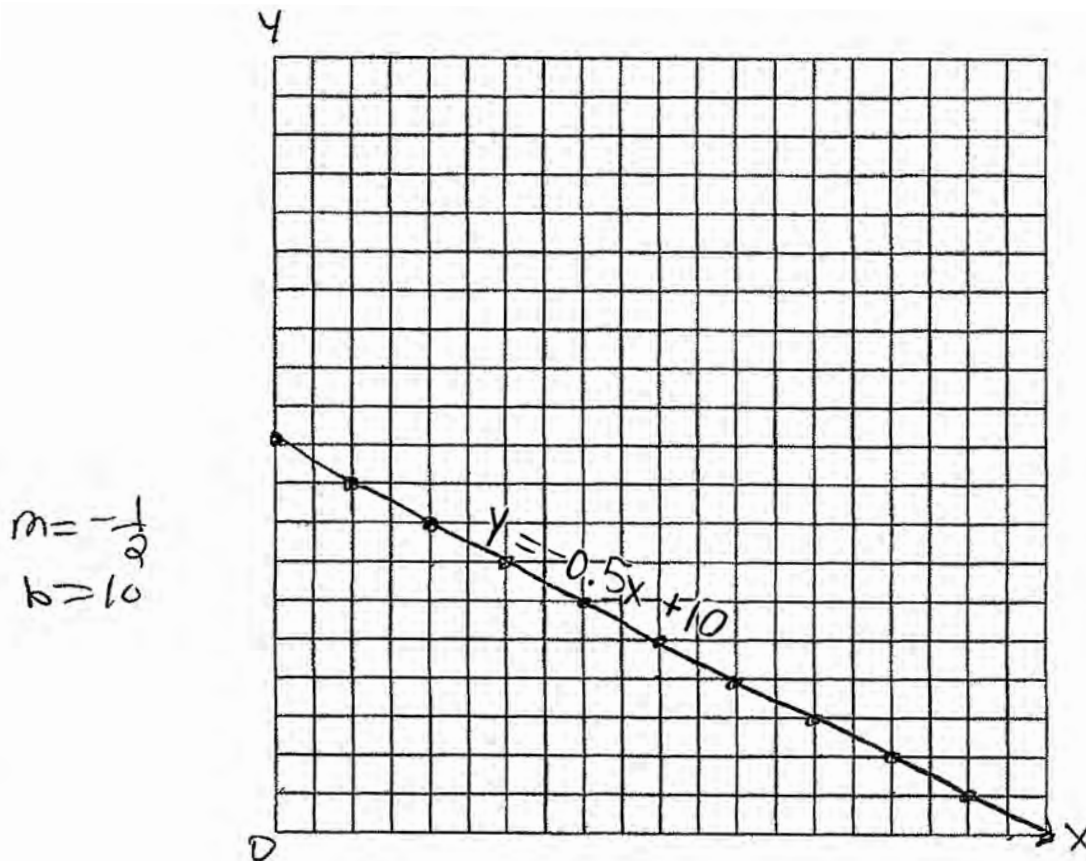
Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$28.50 \geq 0.50(7) + 1.25x + 2.50y$$

$$28.50 \geq 3.50 + 1.25x + 2.50y$$

$$25 \geq 1.25x + 2.50y$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

28 different combinations. There are 7 friends and two options for two items.

7-2-2

**Score 3:** The student made an error by using an inequality to model the scenario. The student graphed the correct equation.

---

**Question 37**

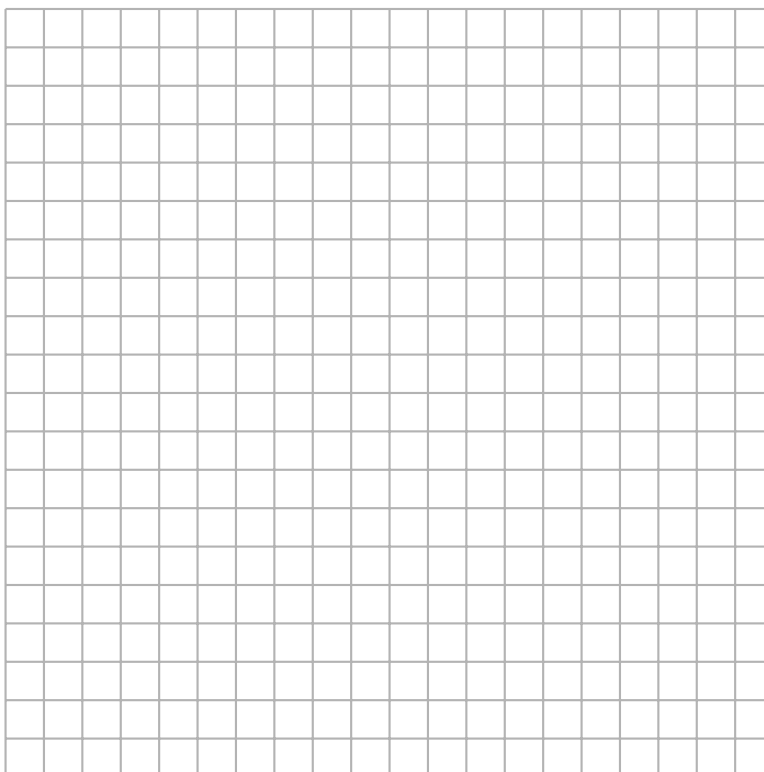
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**37** Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$1.25x + 2.5y = 25$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

---

**Score 2:** The student wrote a correct equation.

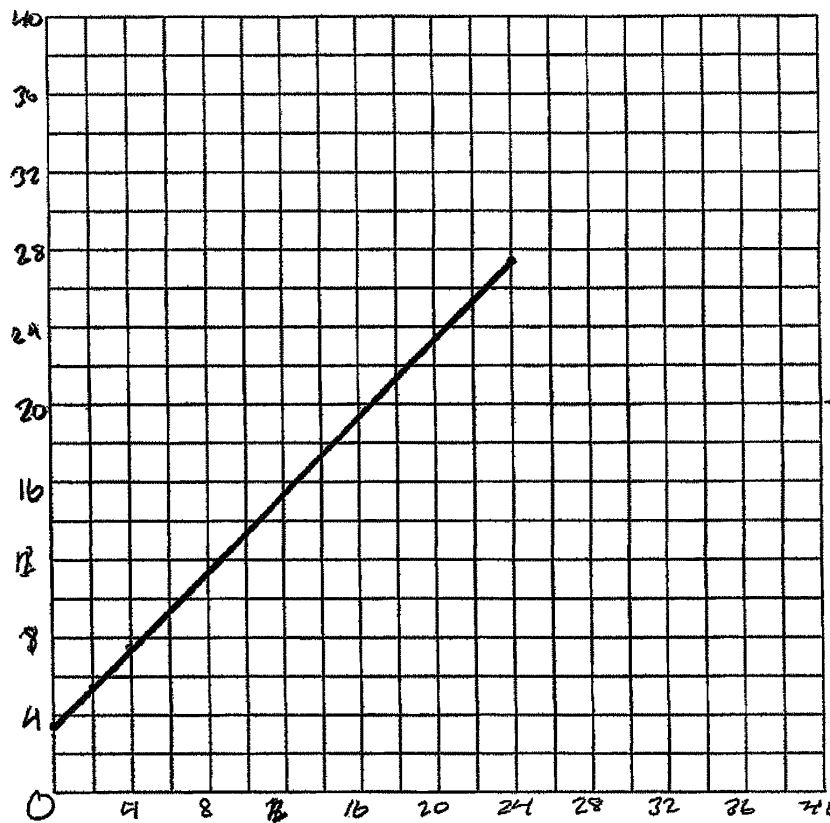
**Question 37**

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Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$y = x + 3.5$$

Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

$$\begin{array}{r} 28.5 \\ - 3.5 \\ \hline 25 \end{array}$$

$$\frac{25}{1.25}$$

25 2 hotdogs = 1 burger

20 hotdogs : 0 burgers	8 : 6
18 hotdogs : 1 burger	6 : 7
16 hotdogs : 2 burgers	4 : 8
14 hotdogs : 3 burgers	2 : 9
12 hotdogs : 4 burgers	0 : 10
10 hotdogs : 5 burgers	

**11 combinations.**

**Score 1:** The student wrote a justification for 11, not an explanation.

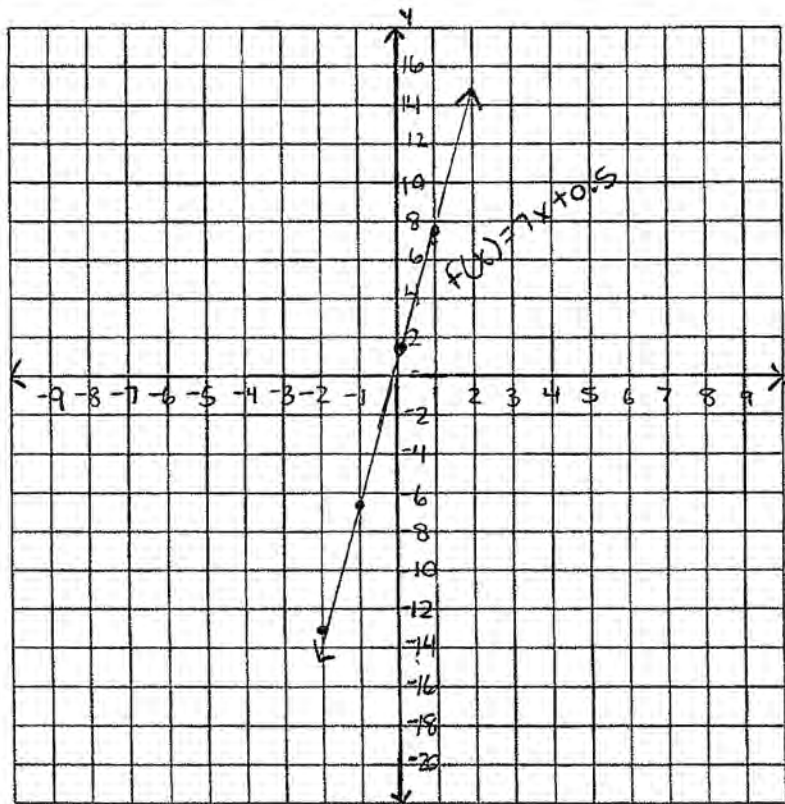
**Question 37**

37 Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs,  $x$ , and hamburgers,  $y$ , Zeke and his friends can buy.

$$F(x) = 7x + 0.50$$

Graph your equation on the grid below.



x	y
-2	-13.5
-1	-6.5
0	0.5
1	7.5
2	14.5

Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

$$1.25(7) + 2.50(7) = 26.25$$

Each person can buy one hotdog and one hamburger to come up with a total of \$26.25.

**Score 0:** The student did not show any correct work.

## Regents Examination in Algebra I – August 2017

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

(Use for the August 2017 exam only.)

Raw Score	Scale Score	Performance Level	Raw Score	Scale Score	Performance Level	Raw Score	Scale Score	Performance Level
86	100	5	57	81	4	28	66	3
85	98	5	56	81	4	27	65	3
84	97	5	55	81	4	26	64	2
83	96	5	54	80	4	25	63	2
82	94	5	53	80	4	24	62	2
81	93	5	52	80	4	23	60	2
80	92	5	51	80	4	22	59	2
79	91	5	50	79	3	21	57	2
78	91	5	49	79	3	20	56	2
77	90	5	48	79	3	19	55	2
76	89	5	47	78	3	18	52	1
75	88	5	46	78	3	17	50	1
74	88	5	45	78	3	16	49	1
73	87	5	44	77	3	15	47	1
72	87	5	43	77	3	14	44	1
71	86	5	42	77	3	13	42	1
70	86	5	41	76	3	12	40	1
69	86	5	40	76	3	11	37	1
68	85	5	39	75	3	10	35	1
67	84	4	38	74	3	9	32	1
66	84	4	37	74	3	8	29	1
65	84	4	36	73	3	7	26	1
64	83	4	35	73	3	6	23	1
63	83	4	34	72	3	5	19	1
62	83	4	33	71	3	4	16	1
61	82	4	32	70	3	3	12	1
60	82	4	31	69	3	2	8	1
59	82	4	30	68	3	1	4	1
58	82	4	29	67	3	0	0	1

To determine the student’s final examination score (scale 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 Algebra I.