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

# ALGEBRA II

**Tuesday,** August 19, 2025 — 12:30 to 3:30 p.m., only

**Student Name** _____

**School Name** _____

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

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

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

This examination has four parts, with a total of 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 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** What is the seventh term of the sequence $-2, 6, -18, 54, \ldots$ ?

(1) $-1458$

(2) $-4374$

(3) 1458

(4) 4374

**2** Given $x \neq 0$, where $m(x) = 12x^{8a}$ and $p(x) = 3x^{2a}$, the expression $\frac{m(x)}{p(x)}$ is equivalent to

(1) $9x^{4a}$

(2) $4x^{6a}$

(3) $4x^{6}$

(4) $4x^{4}$

**3** What is the inverse of $f(x) = 2x + 6$?

(1) $f^{-1}(x) = -2(x + 3)$

(2) $f^{-1}(x) = x - 3$

(3) $f^{-1}(x) = \frac{x}{2} - 3$

(4) $f^{-1}(x) = \frac{x}{2} + 3$

**Use this space for computations.**

**4** The expression $\sqrt[3]{16x^6}$ is equivalent to

(1) $4x^3$

(2) $4x^2$

(3) $2x^2\sqrt[3]{2}$

(4) $2x^3\sqrt[3]{2}$

**5** Mary would like to determine if there is an association between a student's height and their shoe size. She measures the height and shoe size of every $10^{\text{th}}$ person entering her school. This is an example of

(1) a census

(2) an observational study

(3) a simulation

(4) a controlled experiment

**6** For all values for which the expressions are defined, which expression can *not* be rewritten as $(x - 6)(x + 2)$?

(1) $\frac{(x + 2)(x^2 - 2x - 24)}{(x + 4)}$

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

(3) $\frac{(x - 2)(x^2 - 4x - 12)}{(x - 6)}$

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

**Use this space for computations.**

**7** The number of hours in the lifespan of a certain brand of light bulb is normally distributed with a mean of 2387 hours and a standard deviation of 238 hours. To the *nearest tenth of a percent*, what percent of light bulbs have a lifespan of greater than 2750 hours?

(1) 6.4%

(2) 15.9%

(3) 43.6%

(4) 93.6%

**8** The solution set to the equation $\frac{2}{x^3} + \frac{1}{x} = \frac{6}{x^3}$ is

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

(2) $\{2\}$

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

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

**9** What is the solution to $9(e^{x-2}) = 36$?

(1) $x = \frac{\ln(36)}{\ln(9e)} + 2$

(2) $x = \ln(4) - 2$

(3) $x = \ln(4) + 2$

(4) $x = \ln\left(\frac{4}{e}\right) + 2$

**Use this space for computations.**

**10** Reynaldo got a score of 40 on his first test. If he gets a score of 100 on every additional test, which equation can be used to determine the number of additional tests, $x$, he would need to take in order to raise his test average to an 80?

(1) $\frac{40 + 100x}{x + 1} = 80$

(2) $\frac{40 + 100x}{x} = 80$

(3) $\frac{40 + 100 + x}{x} = 80$

(4) $\frac{40 + 100 + x}{x + 1} = 80$

**11** Given $f(x) = \ln(x + 5)$, what is the *smallest* integer value of $x$ for which $f(x)$ is defined?

(1) $-5$

(2) $-4$

(3) $-1$

(4) 0

**12** Which expression is equivalent to $\frac{6x^3 + 7x^2 - 9x - 1}{2x - 1}$ when $x \neq \frac{1}{2}$?

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

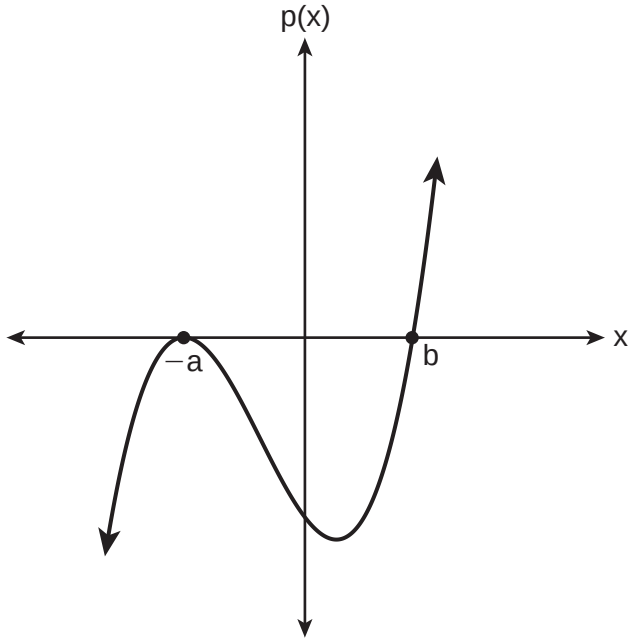
(2) $3x^2 + 5x - 7 - \frac{8}{2x - 1}$

(3) $3x^2 + 2x + 5 - \frac{6}{2x - 1}$

(4) $3x^2 + 5x - 2 - \frac{3}{2x - 1}$

**Use this space for computations.**

**13** A sketch for $p(x)$ is shown below, where $a > 0$ and $b > 0$.




An equation for $p(x)$ could be

(1) $p(x) = (x + a)(x - b)$

(2) $p(x) = (x + a)^2(x - b)$

(3) $p(x) = (x - a)(x + b)$

(4) $p(x) = (x - a)^2(x + b)$

**14** If $f(x) = \frac{1}{2}x^3 + 3x^2 - 4x$ and $g(x) = 5\log_3(x + 10)$, then which value, rounded to the *nearest tenth*, is *not* a solution to $f(x) = g(x)$?

(1) $-6.9$

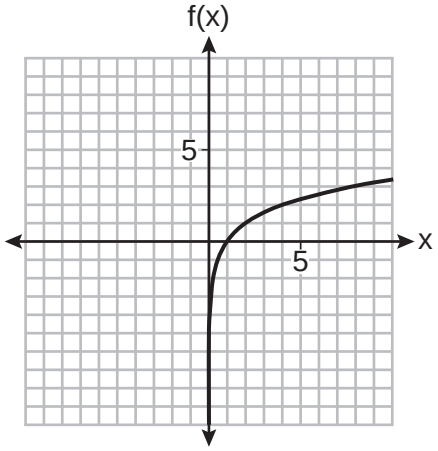
(2) $-1.4$

(3) 2.2

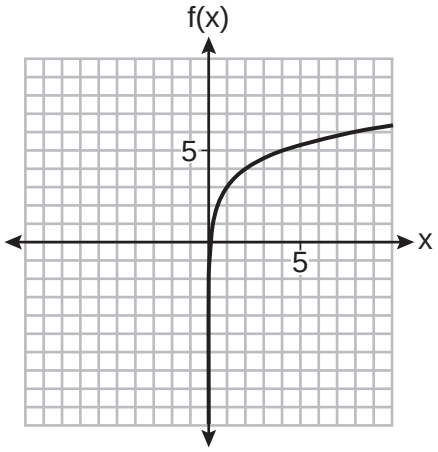
(4) 9.8

**15** The graph of $f(x)$ is shown below.

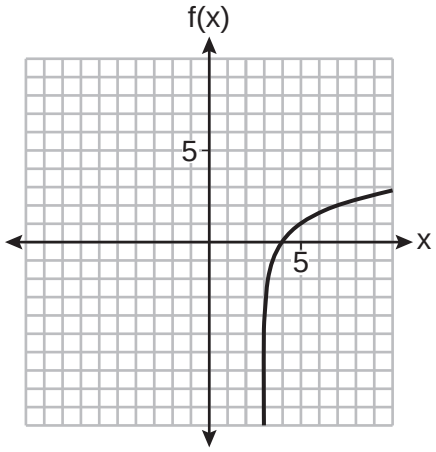
**Use this space for computations.**



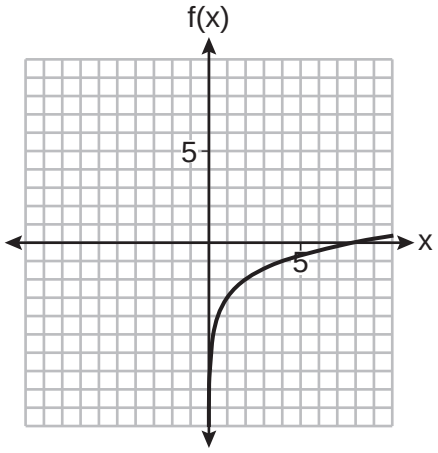

Which graph represents $f(x + 3)$?



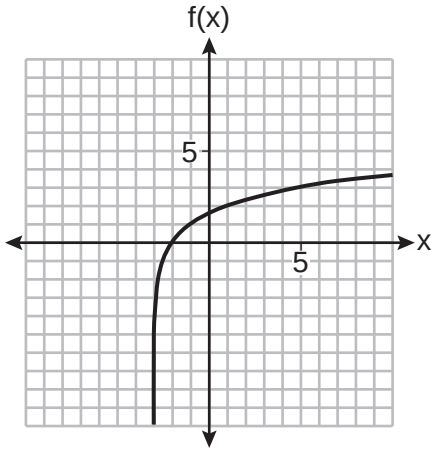

(1)




(3)




(2)




(4)

**Use this space for computations.**

**16** What is one solution to the system of equations shown below?

$$x^2 + y^2 = 20$$
$$y = x - 6$$

(1) $x = 2$

(2) $(4,-2)$

(3) $y = -4$

(4) $(4, 2)$

**17** At a high school, 10th-grade students were recently asked if they walk to school and if they eat breakfast. The survey results are summarized in the table below.

| | Walks to School | Doesn't Walk to School |
|---|---|---|
| **Eats Breakfast** | 7 | 53 |
| **Doesn't Eat Breakfast** | 10 | 30 |

What is the probability that a randomly selected 10th-grade student from the school walks to school or eats breakfast?

(1) 0.07

(2) 0.70

(3) 0.77

(4) 0.84

**Use this space for computations.**

**18** A vehicle's depreciation rate is 9.2% per year. If a vehicle costs \$34,950, then which recursive formula models the value of the vehicle $n$ years after it was purchased?

(1) $a_n = 34{,}950(1.092)^n$

(2) $a_n = 34{,}950(0.921)^n$

(3) $a_0 = 34{,}950$
$a_n = 1.092a_{n-1}$

(4) $a_0 = 34{,}950$
$a_n = 0.908a_{n-1}$

**19** When factored completely, $(3x - 1)^2 - 5(3x - 1) + 6$ is equivalent to

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

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

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

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

**20** Given $E(t) = 26(2)^{\frac{t}{20}}$ represents the mass, in grams, of a substance after $t$ minutes in a laboratory, which statement or statements must be true?

I. The initial mass of the substance is 26 grams.

II. The mass of the substance doubles every 20 days.

III. The mass of the substance after 3 hours is approximately 29 grams.

(1) I, only

(2) III, only

(3) I and II, only

(4) I and III, only

**Use this space for computations.**

**21** For $x > 0$, which expression is equivalent to $\sqrt[3]{9x^2} \cdot \sqrt{9x}$?

(1) $9^5 x^{\frac{7}{2}}$

(2) $9^6 x^3$

(3) $9^{\frac{1}{6}} x^{\frac{1}{3}}$

(4) $9^{\frac{5}{6}} x^{\frac{7}{6}}$

**22** The number of people who have read an article grows exponentially throughout the day and can be modeled by the function $N(t) = 2(1.0098)^t$, where $t$ represents the number of minutes since the article has been posted.

Which equation best represents the number of people who have read the article in terms of the growth rate per second?

(1) $N(t) = 2(1.000163)^{\frac{t}{60}}$

(2) $N(t) = 2(1.000163)^{60t}$

(3) $N(t) = 2(1.79524)^{\frac{t}{60}}$

(4) $N(t) = 2(1.79524)^{60t}$

**23** Which equation represents a parabola with focus $(2,-5)$ and directrix $y = 3$?

(1) $(x - 2)^2 = -16(y + 1)$

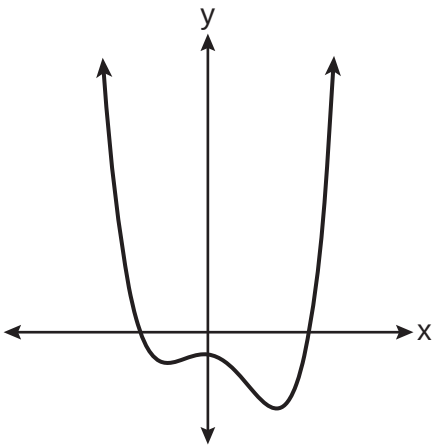
(2) $(x - 2)^2 = -16(y - 1)$

(3) $(x + 2)^2 = -16(y - 1)$

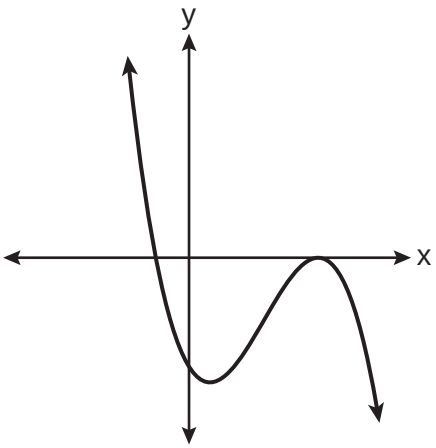
(4) $(x - 2)^2 = 16(y + 1)$

**Use this space for computations.**

**24** Which graph shows a fourth-degree polynomial function with exactly two imaginary roots?




(1)

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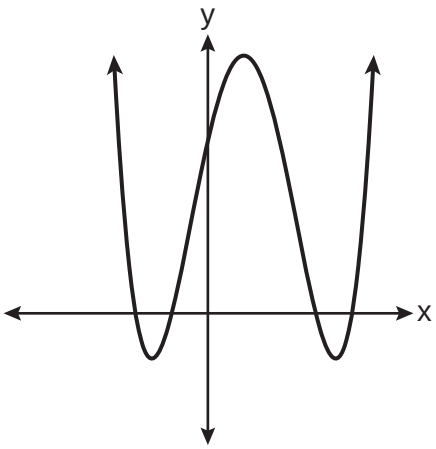
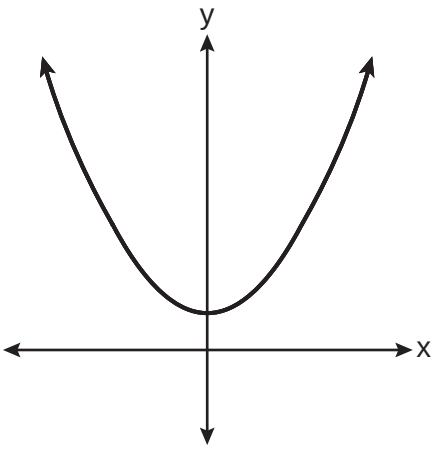



(2)




(4)

## Part II

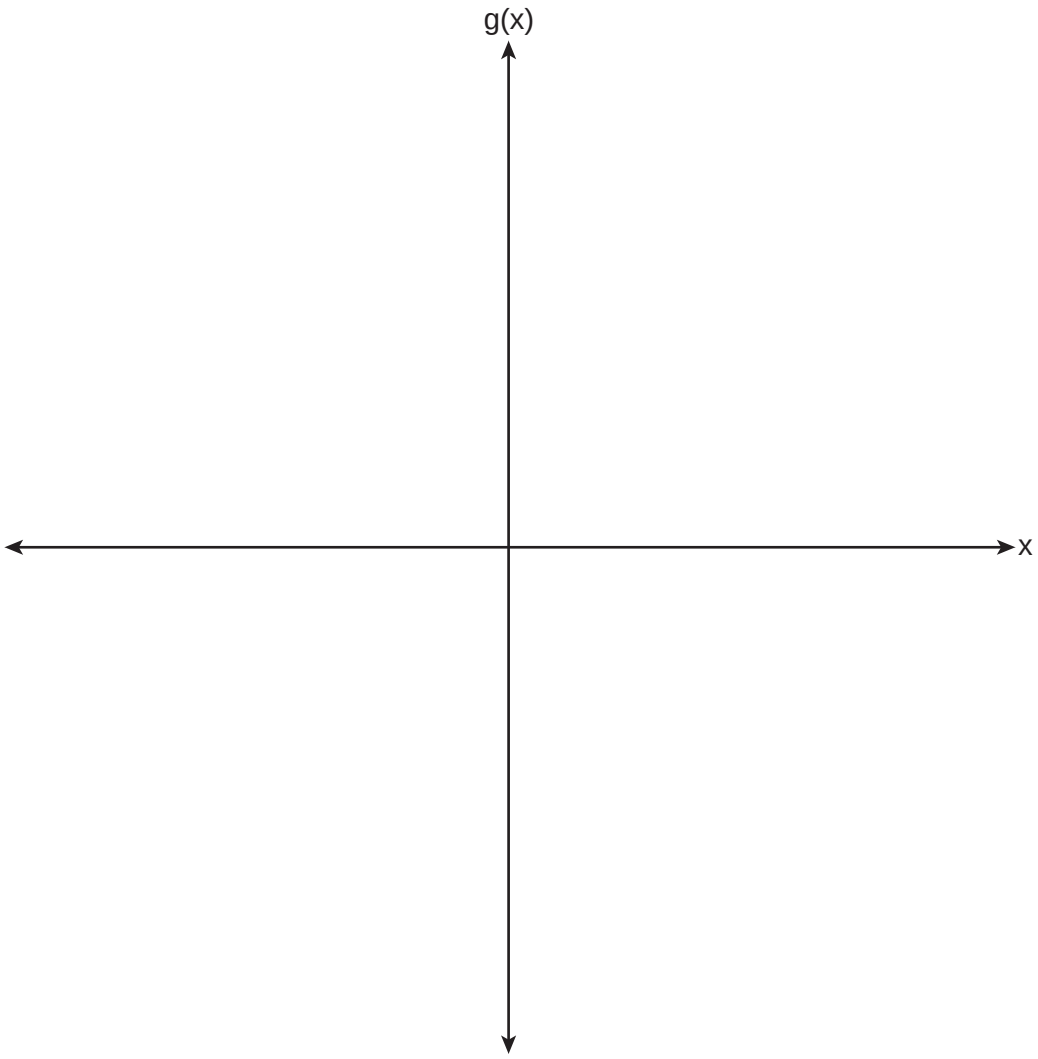
**Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not 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** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | Hoodie | Jacket |
|---|---|---|
| **Back** | 45 | 15 |
| **Front** | 27 | 13 |

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.



**27** Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where $i$ is the imaginary unit.

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

**29** An angle, $\theta$, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.

**30** Solve algebraically for all values of $x$.

$$\sqrt{x+5} - x = 3$$

**31** Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

## 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** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

Determine all zeros of $f(x)$.

**35** Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

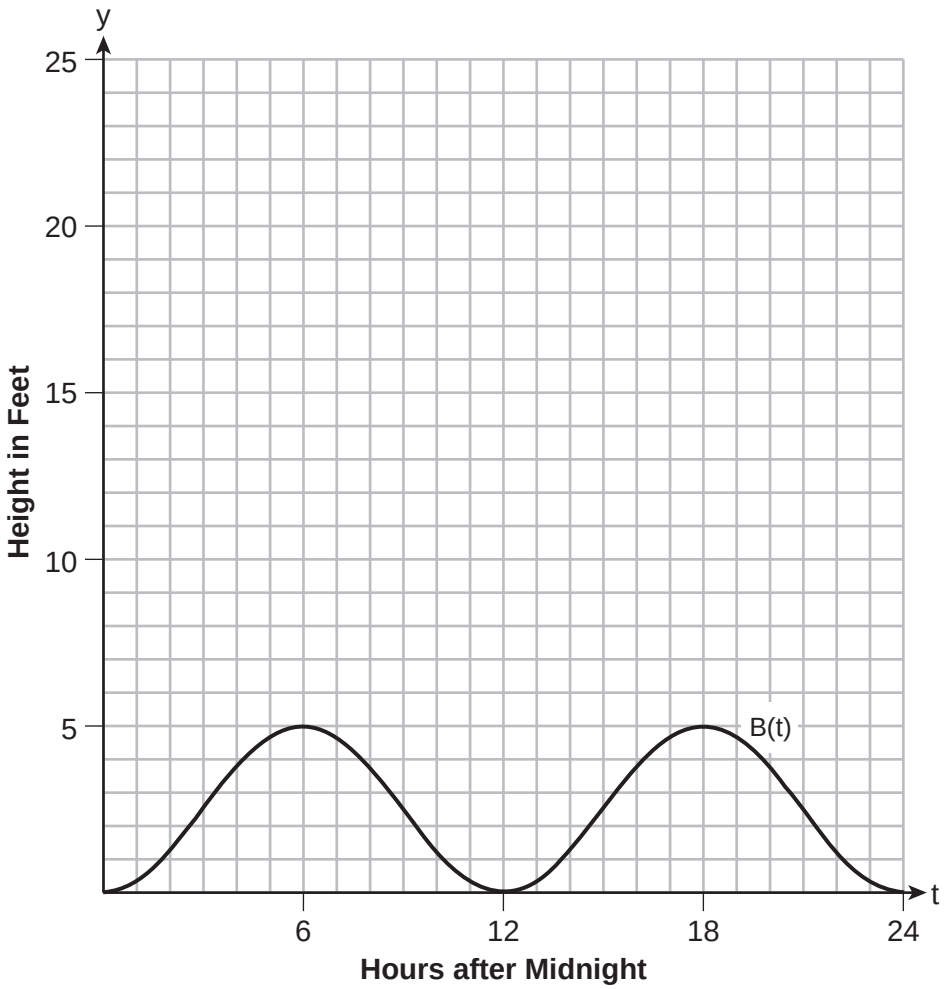
**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

## 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** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Question 37 is continued on the next page.**

**Question 37 continued**

State the period of $B(t)$, in hours.

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

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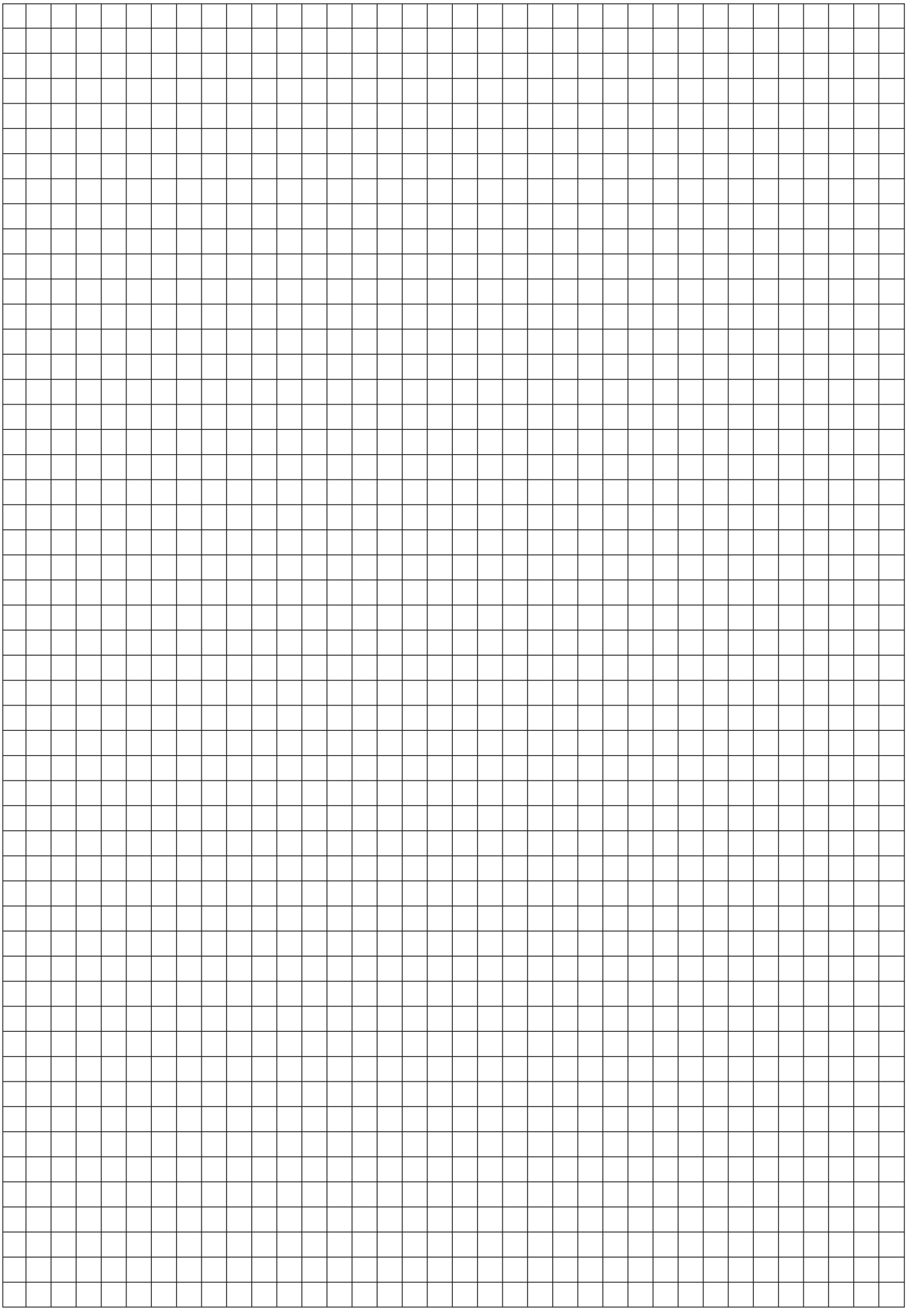
**Scrap Graph Paper — this sheet will *not* be scored.**



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## High School Math Reference Sheet

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilogram
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
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 | $S_n = \frac{a_1 - a_1 r^n}{1 - \mathrm{r}}$ 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 II

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ALGEBRA II

The State Education Department / The University of the State of New York

## Regents Examination in Algebra II – August 2025

### Scoring Key: Part I (Multiple-Choice Questions)

| Examination | Date | Question Number | Scoring Key | Question Type | Credit |
|---|---|---|---|---|---|
| Algebra II | August '25 | **1** | 1 | MC | 2 |
| Algebra II | August '25 | **2** | 2 | MC | 2 |
| Algebra II | August '25 | **3** | 3 | MC | 2 |
| Algebra II | August '25 | **4** | 3 | MC | 2 |
| Algebra II | August '25 | **5** | 2 | MC | 2 |
| Algebra II | August '25 | **6** | 3 | MC | 2 |
| Algebra II | August '25 | **7** | 1 | MC | 2 |
| Algebra II | August '25 | **8** | 3 | MC | 2 |
| Algebra II | August '25 | **9** | 3 | MC | 2 |
| Algebra II | August '25 | **10** | 1 | MC | 2 |
| Algebra II | August '25 | **11** | 2 | MC | 2 |
| Algebra II | August '25 | **12** | 4 | MC | 2 |
| Algebra II | August '25 | **13** | 2 | MC | 2 |
| Algebra II | August '25 | **14** | 4 | MC | 2 |
| Algebra II | August '25 | **15** | 4 | MC | 2 |
| Algebra II | August '25 | **16** | 2 | MC | 2 |
| Algebra II | August '25 | **17** | 2 | MC | 2 |
| Algebra II | August '25 | **18** | 4 | MC | 2 |
| Algebra II | August '25 | **19** | 3 | MC | 2 |
| Algebra II | August '25 | **20** | 1 | MC | 2 |
| Algebra II | August '25 | **21** | 4 | MC | 2 |
| Algebra II | August '25 | **22** | 2 | MC | 2 |
| Algebra II | August '25 | **23** | 1 | MC | 2 |
| Algebra II | August '25 | **24** | 1 | MC | 2 |

## Regents Examination in Algebra II – August 2025

### Scoring Key: Parts II, III, and IV (Constructed-Response Questions)

| Examination | Date | Question Number | Scoring Key | Question Type | Credit |
|---|---|---|---|---|---|
| Algebra II | August '25 | **25** | - | CR | 2 |
| Algebra II | August '25 | **26** | - | CR | 2 |
| Algebra II | August '25 | **27** | - | CR | 2 |
| Algebra II | August '25 | **28** | - | CR | 2 |
| Algebra II | August '25 | **29** | - | CR | 2 |
| Algebra II | August '25 | **30** | - | CR | 2 |
| Algebra II | August '25 | **31** | - | CR | 2 |
| Algebra II | August '25 | **32** | - | CR | 2 |
| Algebra II | August '25 | **33** | - | CR | 4 |
| Algebra II | August '25 | **34** | - | CR | 4 |
| Algebra II | August '25 | **35** | - | CR | 4 |
| Algebra II | August '25 | **36** | - | CR | 4 |
| Algebra II | August '25 | **37** | - | CR | 6 |

| Key |
|---|
| MC = Multiple-choice question |
| CR = Constructed-response question |

The chart for determining students' final examination scores for the **August 2025 Regents Examination in Algebra II** will be posted on the Department's web site at: https://www.nysedregents.org/algebratwo/ on the day of the examination. Conversion charts provided for the previous administrations of the Regents Examination in Algebra II must NOT be used to determine students' final scores for this administration.

# FOR TEACHERS ONLY

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

# ALGEBRA II

**Tuesday,** August 19, 2025 — 12:30 to 3:30 p.m., only

## RATING GUIDE

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: https://www.nysed.gov/state-assessment/high-school-regents-examinations 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 II. This guidance is intended to be part of the scorer training. Schools should use the Model Response Set along with the rubrics in the Rating Guide to help guide scoring of student work. 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 https://www.nysedregents.org/algebratwo/.

## Mechanics of Rating

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

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 constructed-response 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: https://www.nysed.gov/state-assessment/ by Tuesday, August 19, 2025. 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.

# General Rules for Applying Mathematics Rubrics

## I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Algebra II 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 II*, 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]** $\frac{45}{60}$ or equivalent, and correct work is shown.

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

***or***

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

***or***

**[1]** $\frac{45}{60}$, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(26) **[2]** A correct sketch is drawn.

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

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(27) **[2]** $-8x - 6xi + 2yi$ or equivalent, 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]** $-8x - 6xi + 2yi$, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(28) **[2]** 2, and a correct justification is given.

**[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]** A correct justification is given, but 2 is not stated.

***or***

**[1]** 2, but the justification is incomplete, incorrect, or missing.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(29) **[2]** 3 or equivalent, and correct work is shown.

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

***or***

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

***or***

**[1]** 3, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(30) **[2]** $-1$, and correct algebraic work is shown.

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

***or***

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

***or***

**[1]** A correct quadratic equation in standard form is written, but no further correct work is shown.

***or***

**[1]** Appropriate work is shown, but –4 is not rejected.

***or***

**[1]** $-1$, but a method other than algebraic is used.

***or***

**[1]** $-1$, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(31) **[2]** 1,998,000, 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]** 1,998,000, but a method other than the geometric series formula is used.

***or***

**[1]** A correct substitution into the geometric series formula is made, but no further correct work is shown.

***or***

**[1]** 1,998,000, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(32) **[2]** $x = \frac{1}{2} \pm \frac{i}{2}$ or equivalent, and correct algebraic 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]** $x = \frac{1}{2} \pm \frac{i}{2}$, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, 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]** $y = 9290.57(1.02)^x$ and 24.2, and correct work is shown.

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

***or***

**[3]** $y = 9290.57(1.02)^x$ and 24.2, but a method other than algebraic is used.

**[2]** Appropriate work is shown, but two or more computational, notation, or rounding errors are made.

***or***

**[2]** $y = 9290.57(1.02)^x$, but no further correct work is shown.

**[1]** 24.2, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(34) **[4]** A positive response is indicated and a correct justification is given, $-3$, $-\sqrt{2}$, $\sqrt{2}$, and correct work is shown.

**[3]** Appropriate work is shown, but one computational or factoring error is made.

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

***or***

**[2]** Yes, and a correct justification is given, but no further correct work is shown.

***or***

**[2]** Appropriate work is shown to find $-3$, $-\sqrt{2}$, $\sqrt{2}$, but no further correct work is shown.

**[1]** Yes, but an incomplete justification is given, and no further correct work is shown.

***or***

**[1]** $-3$, $-\sqrt{2}$, and $\sqrt{2}$, but no work is shown.

**[0]** Yes, but no work is shown.

***or***

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(35) **[4]** $a = \frac{1}{2}, b = -2, c = 3$ or equivalent, and correct algebraic work is shown.

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

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

***or***

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

***or***

**[2]** Appropriate work is shown to find one correct value, but no further correct work is shown.

***or***

**[2]** $a = \frac{1}{2}, b = -2, c = 3$, but a method other than algebraic is used.

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

***or***

**[1]** Appropriate work is shown to eliminate one variable to create a system of two equations with the same two variables, but no further correct work is shown.

***or***

**[1]** $a = \frac{1}{2}, b = -2, c = 3$, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(36) **[4]** $-5x^2 - 5x$, and correct work is shown.

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

***or***

**[3]** Appropriate work is shown, but the polynomial is not written in standard form.

**[2]** Appropriate work is shown, but two computational errors are made.

***or***

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

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

***or***

**[1]** Correct substitutions are made for $g(x)$ and $f(x + 1)$, but no further correct work is shown.

***or***

**[1]** $-5x^2 - 5x$, but no work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, 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]** 12, $B(t) = -2.5\cos\left(\frac{\pi}{6}t\right) + 2.5$ or equivalent, a correct graph is drawn, and 8.5.

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

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

**[3]** Appropriate work is shown, but three or more computational, graphing, or notation errors are made.

**[2]** $B(t) = -2.5\cos\left(\frac{\pi}{6}t\right) + 2.5$, but no further correct work is shown.

***or***

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

***or***

**[2]** 12 and 8.5, but no further correct work is shown.

**[1]** 12 or 8.5, but no further correct work is shown.

**[0]** A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

## Map to the Learning Standards
## Algebra II
## August 2025

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

| | | | |
|---|---|---|---|
| 21 | Multiple Choice | 2 | N-RN.A |
| 22 | Multiple Choice | 2 | A-SSE.B |
| 23 | Multiple Choice | 2 | G-GPE.A |
| 24 | Multiple Choice | 2 | N-CN.C |
| 25 | Constructed Response | 2 | S-CP.A |
| 26 | Constructed Response | 2 | F-IF.B |
| 27 | Constructed Response | 2 | N-CN.A |
| 28 | Constructed Response | 2 | S-IC.B |
| 29 | Constructed Response | 2 | F-TF.C |
| 30 | Constructed Response | 2 | A-REI.A |
| 31 | Constructed Response | 2 | A-SSE.B |
| 32 | Constructed Response | 2 | A-REI.B |
| 33 | Constructed Response | 4 | S-ID.B |
| 34 | Constructed Response | 4 | A-APR.B |
| 35 | Constructed Response | 4 | A-REI.C |
| 36 | Constructed Response | 4 | F-BF.A |
| 37 | Constructed Response | 6 | F-IF.B |

**The *Chart for Determining the Final Examination Score for the August 2025 Regents Examination in Algebra II* will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations on the day of the examination. Conversion charts provided for previous administrations of the Regents Examination in Algebra II 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 https://www.nysed.gov/state-assessment/teacher-feedback-state-assessments.

2. Click Regents Examinations.

3. Complete the required demographic fields.

4. Select the test title from the Regents Examination dropdown list.

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

6. 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 II

**Tuesday,** August 19, 2025 — 12:30 to 3:30 p.m., only

## MODEL RESPONSE SET

**Table of Contents**

## Question 25

**25** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | | H<br>Hoodie | J<br>Jacket | |
|---|---|---|---|---|
| B | Back | 45 | 15 | 60 |
| F | Front | 27 | 13 | 40 |
| | | 72 | 28 | 100 |

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$$P(H|B) = \frac{P(H \text{ and } B)}{P(B)}$$

$$P(H|B) = \frac{.45}{.6}$$

$$P(H|B) = 0.75 = \frac{3}{4}$$

$$\boxed{P(H|B) = \frac{3}{4}}$$

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

## Question 25

**25** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | Hoodie | Jacket | |
|---|---|---|---|
| **Back** | 45 | 15 | 60 |
| **Front** | 27 | 13 | 40 |
| | 72 | 28 | |

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$$\frac{45}{60}$$

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

## Question 25

**25** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | Hoodie | Jacket |
|---|---|---|
| **Back** | 45 | 15 |
| **Front** | 27 | 13 |

72

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$\frac{45}{72} = .625 \rightarrow$ 62.5%

**Score 1:** The student determined an incorrect conditional probability.

## Question 25

**25** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | Hoodie | Jacket |
|---|---|---|
| **Back** | 45 | 15 |
| **Front** | 27 | 13 |

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

45 / (45 + 15 + 27 + 13)

45/100

45% probability

**Score 1:** The student did not determine a conditional probability.

## Question 25

**25** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | Hoodie | Jacket |
|---|---|---|
| **Back** | 45 | 15 |
| **Front** | 27 | 13 |

77

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$\frac{45}{77} = .584415844$

**Score 0:** The student made multiple errors.

## Question 25

**25** Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

| | Hoodie | Jacket |
|---|---|---|
| **Back** | 45 | 15 |
| **Front** | 27 | 13 |

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

45 + 15 = 60
27 + 13 = 40
100

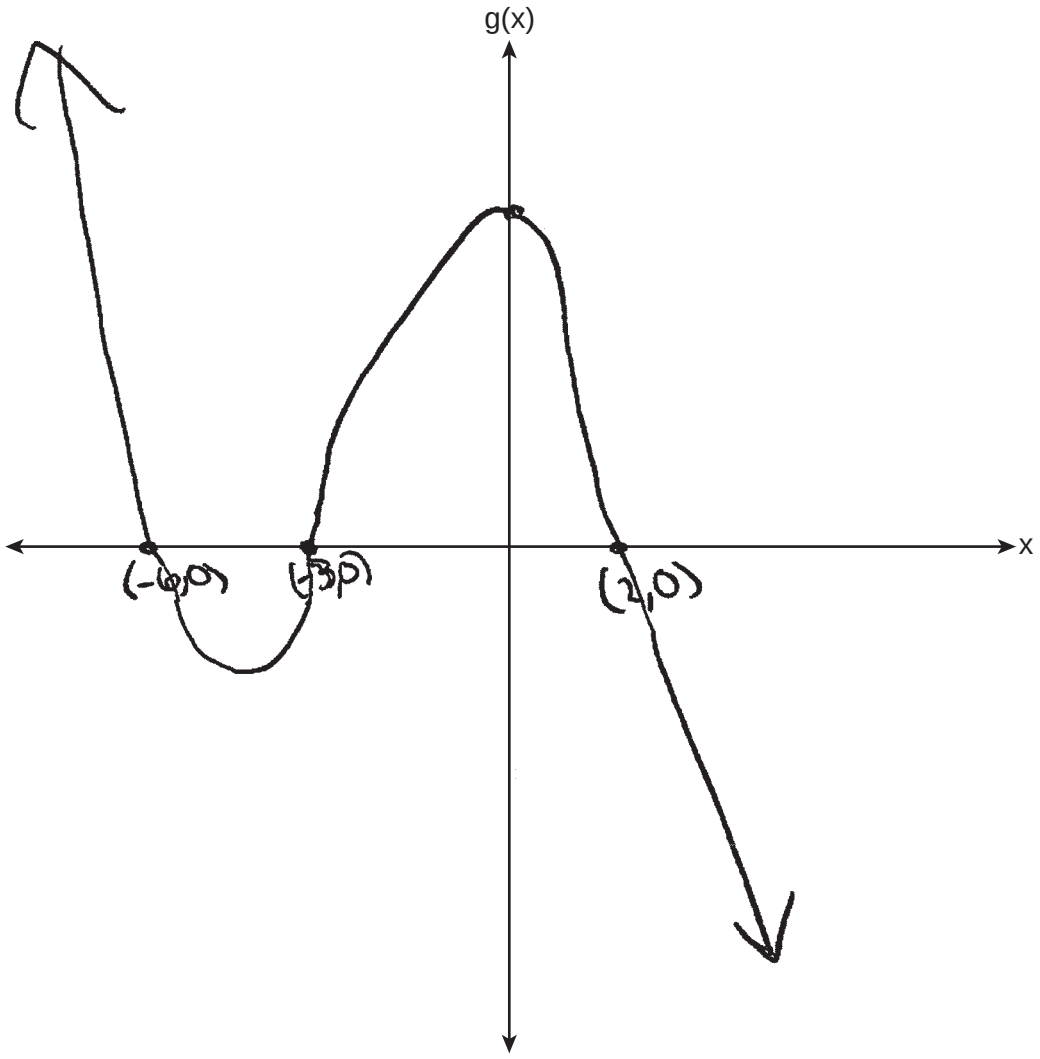
45 + 27 = 72
15 + 13 = 28
100

The exact probability of the hoodie is 100

**Score 0:** The student response did not show enough relevant course-level work to receive any credit.

## Question 26

**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.

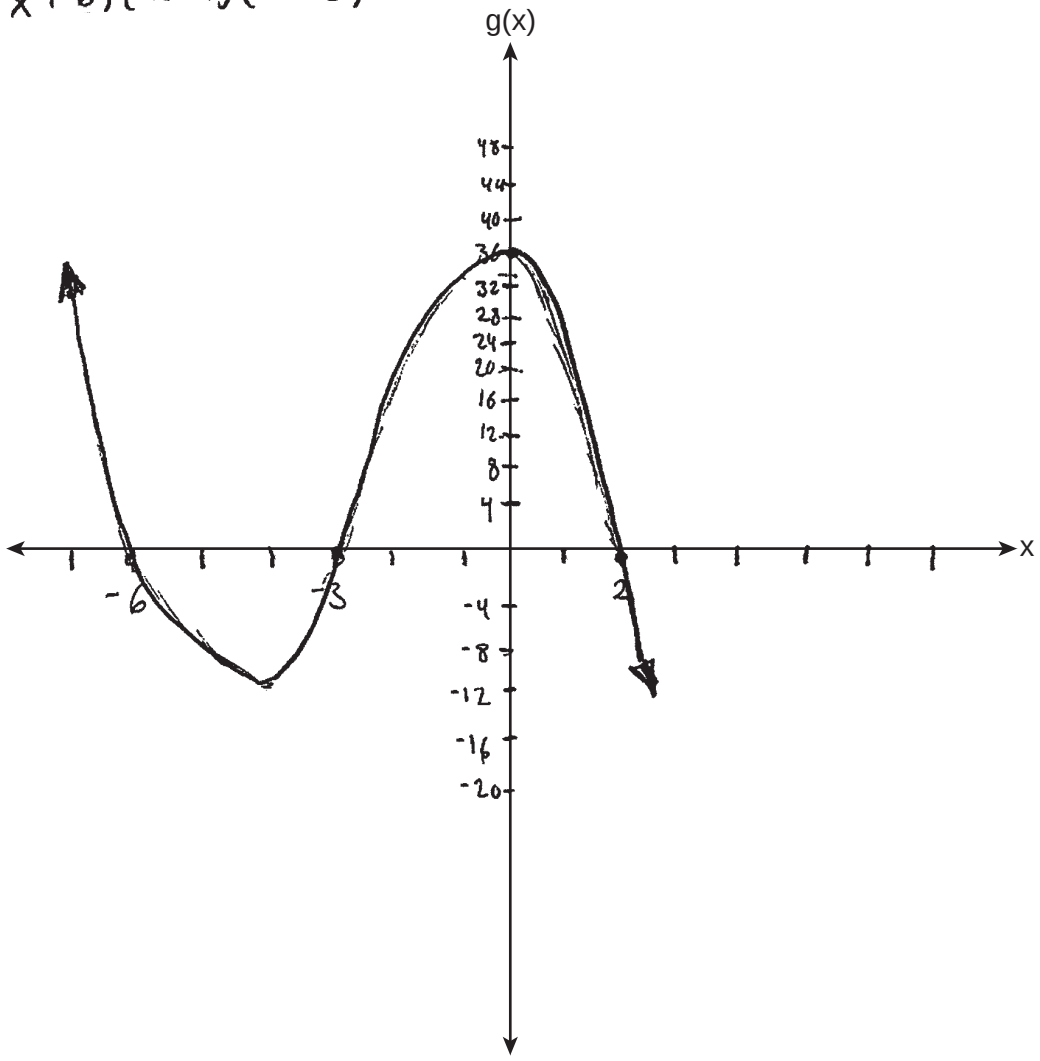



**Score 2:** The student gave a complete and correct response.

**Question 26**

**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.

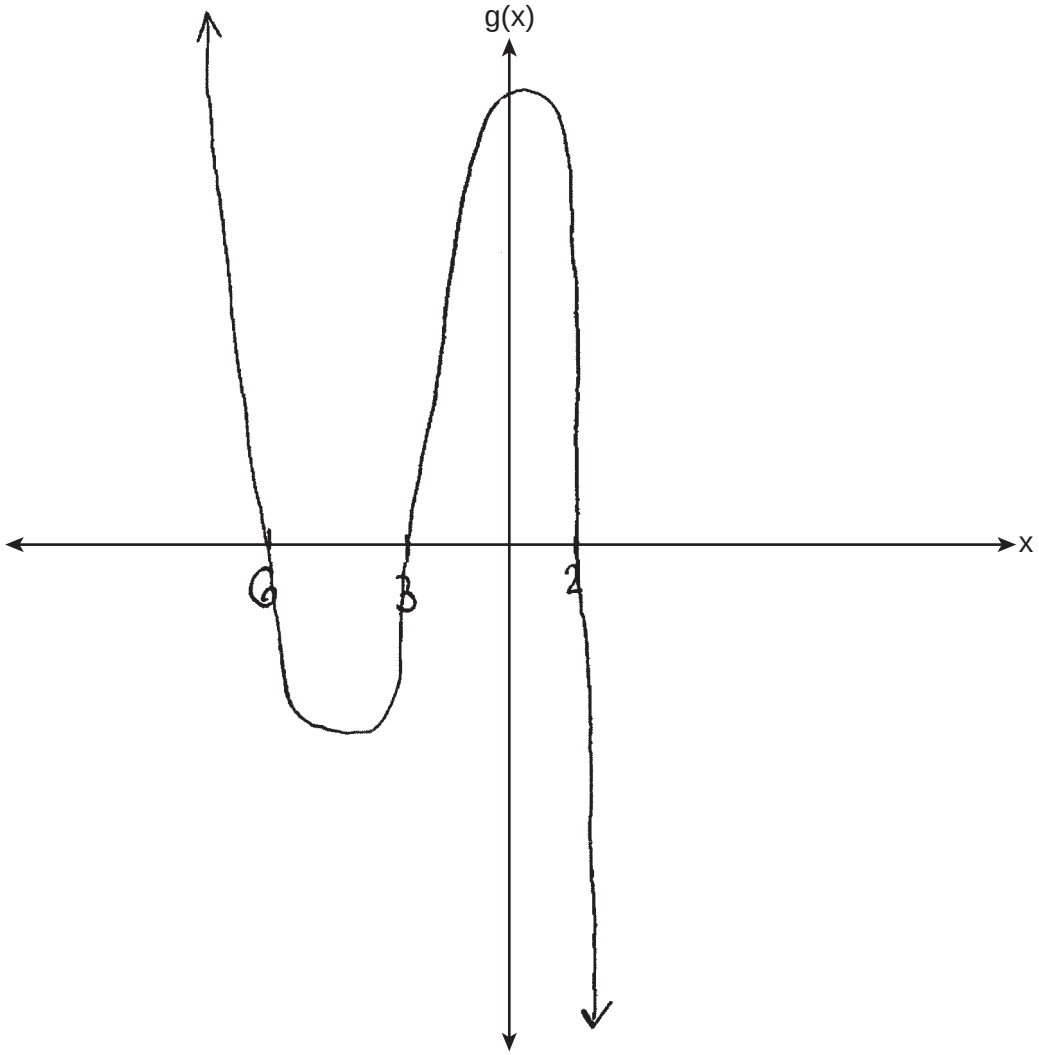
$(x+6)(x+3)(x-2)$




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

## Question 26

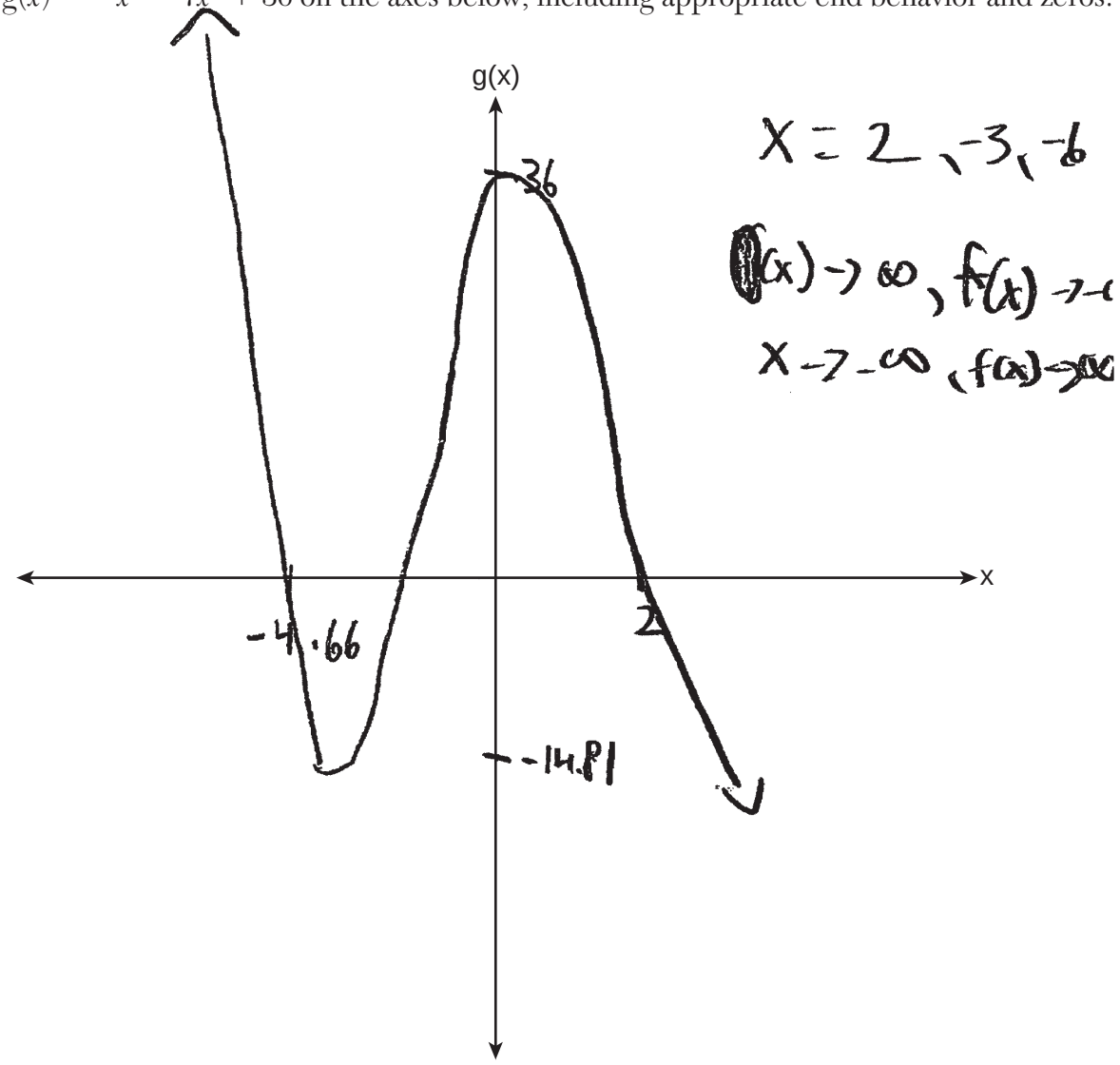
**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.




**Score 1:** The student incorrectly labeled the $x$-axis.

**Question 26**

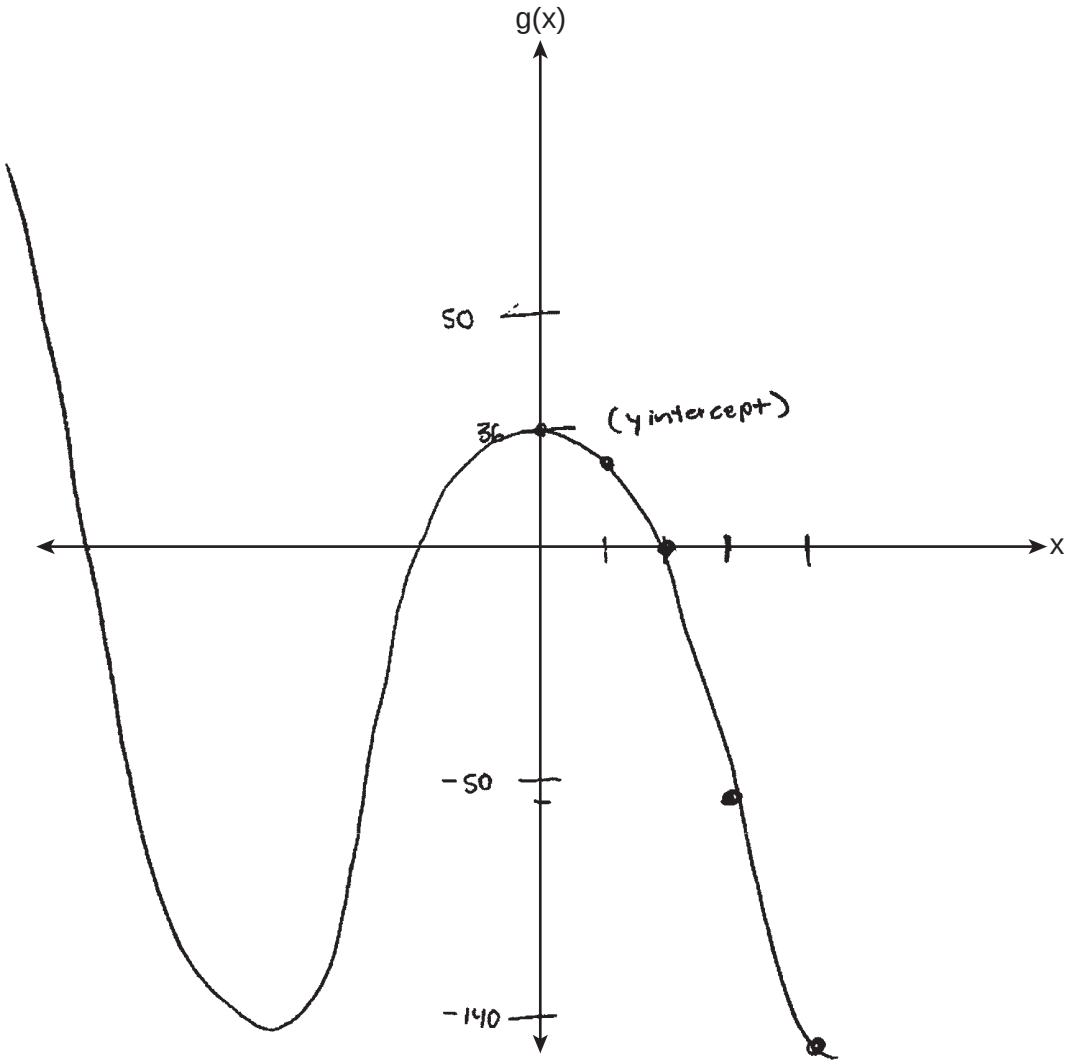
**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.




**Score 1:** The student indicated an incorrect $x$-intercept.

## Question 26

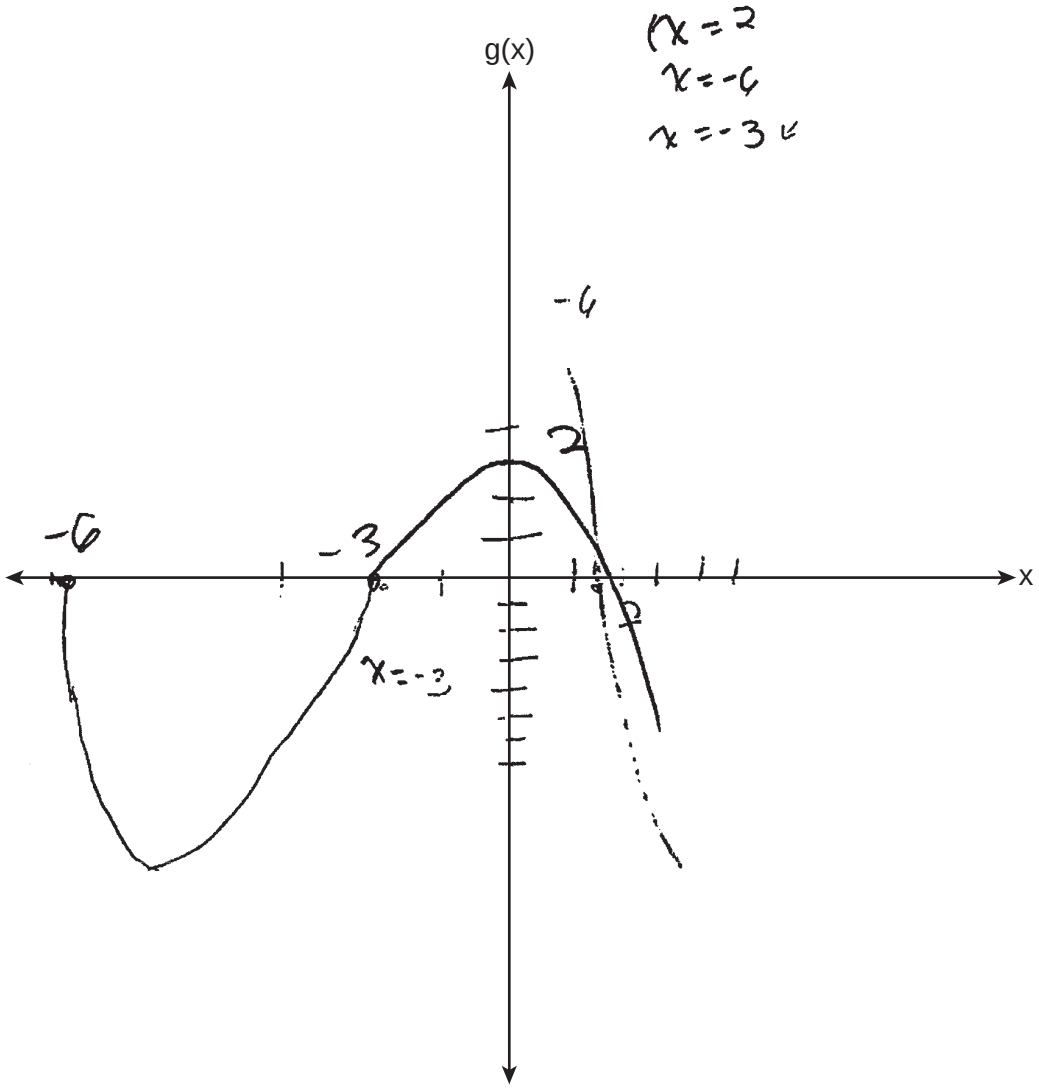
**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.




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

## Question 26

**26** Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.




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

**Question 27**

**27** Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where $i$ is the imaginary unit.

$8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$

$(1)8xi^2 - (1)4yi^3 + 2yi^3 - 6xi$

$8x(-1) - 4y(-i) + 2y(-i) - 6xi$

$-8x + 4yi - 2yi - 6xi$

$-8x + 2yi - 6xi$

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

**Question 27**

**27** Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where $i$ is the imaginary unit.

$-8x + 4yi - 2yi - 6xi$

$-8x + 2yi - 6xi$

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

**Question 27**

**27** Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where $i$ is the imaginary unit.

$8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$

$8x(-1) - 4y(1) + 2y(-i) - 6xi$

$-8x - 4y - 2yi - 6xi$

**Score 1:** The student made one error.

## Question 27

**27** Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where $i$ is the imaginary unit.

$8x(-1) - 4y(-i) - 6xi$

$+2y(-i)$

~~$-8x+4yi+6xi$~~

$-8x + 4yi - 2yi + 6xi$

$-8x + 2yi + 6xi$

**Score 1:** The student made one transcription error.

**Question 27**

**27** Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where $i$ is the imaginary unit.

$\sqrt{16}$ $\sqrt{3}$
4

$(8xi^{10} - 4yi^{19})(+2yi^3 - 6xi)$

$-8x - L$

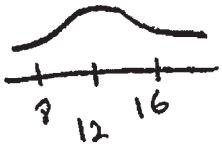
$-8x + 4y - 2y + 6x$

$-2x + 2y$

**Score 0:** The student made multiple errors.

**Question 28**

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

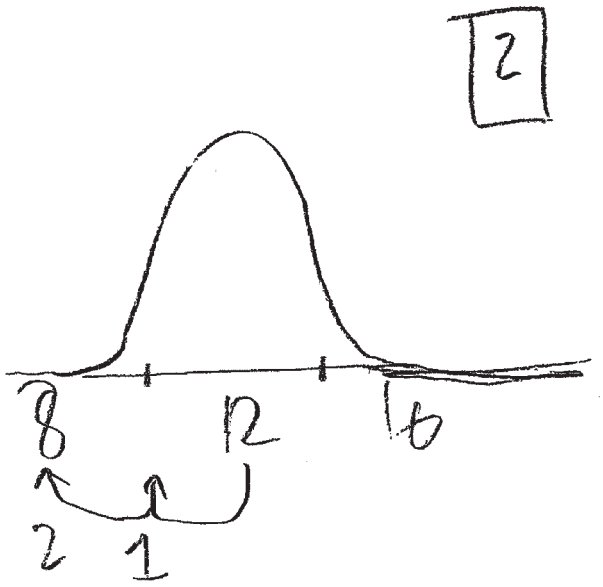



The Sd is 2. The interval is just $\bar{x} \pm 2(sd)$, so if you take the $\bar{x}$, and subtract it by the lower data point, then /2 you get the Sd. 12-8= 4, 4/2=2.

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

## Question 28

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.




normalCdf(8,16,12,2) = 95%

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

**Question 28**

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

Standard deviation is 2

12 - 2 - 2 = 8

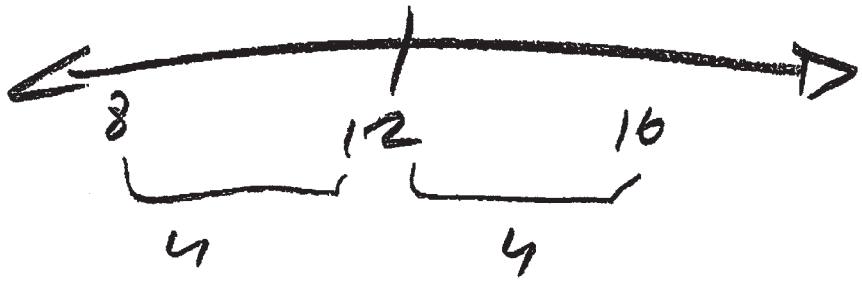
12 + 2 + 2 = 16

8 - 16 = 95%

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

## Question 28

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

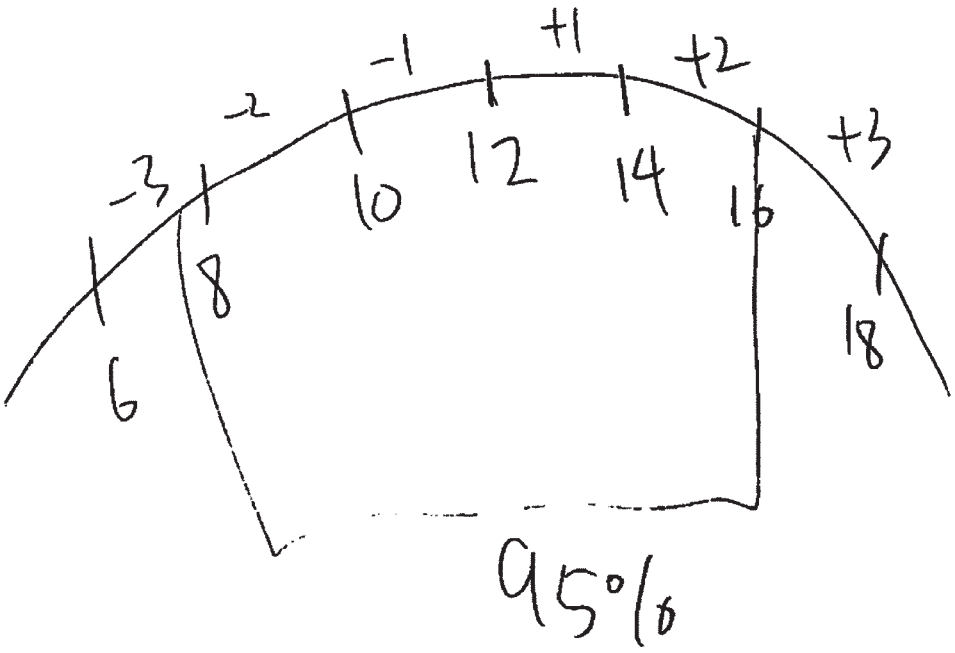



SD = 4, because that's the difference between the 95% scores and the mean.

**Score 1:** The student found the margin of error.

## Question 28

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.




the standard of deviation will be ±2

**Score 1:** The student incorrectly stated the standard deviation.

**Question 28**

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

It means the other 5% of scores are either higher or lower than the range of 8-16. This is justified because the mean of those 2 numbers is 12 and if 95% of the scores are around there, then there has to be 5% that arent.

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

**Question 28**

**28** The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

12(.95)

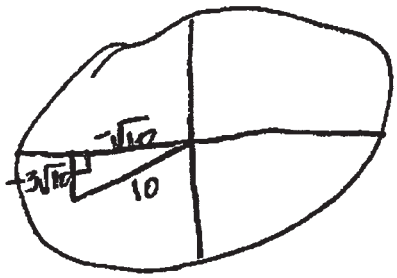
11.4 = Standard deviation

because its the range around the mean

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

**Question 29**

**29** An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of tan θ.




$a^2 + (-\sqrt{10})^2 = 10^2$

$a^2 + 10 = 100$

$-10 \quad -10$

$\sqrt{a^2} = \sqrt{90}$

$a = \sqrt{9}\sqrt{10}$

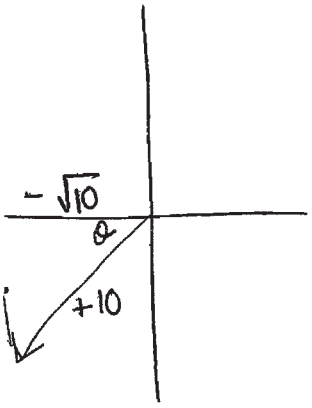
$a = 3\sqrt{10}$

$\frac{-3\sqrt{10}}{-\sqrt{10}} = \frac{3\sqrt{10}}{\sqrt{10}}$ $\tan\theta = 3$

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

**Question 29**

**29** An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of tan θ.




$x^2 + \sqrt{10}^2 = 10^2$

$x^2 + 10 = 100$

$-10 \quad -10$

$\sqrt{x^2} = \sqrt{90}$

$x = \sqrt{9}\sqrt{10}$

$x = 3\sqrt{10}$

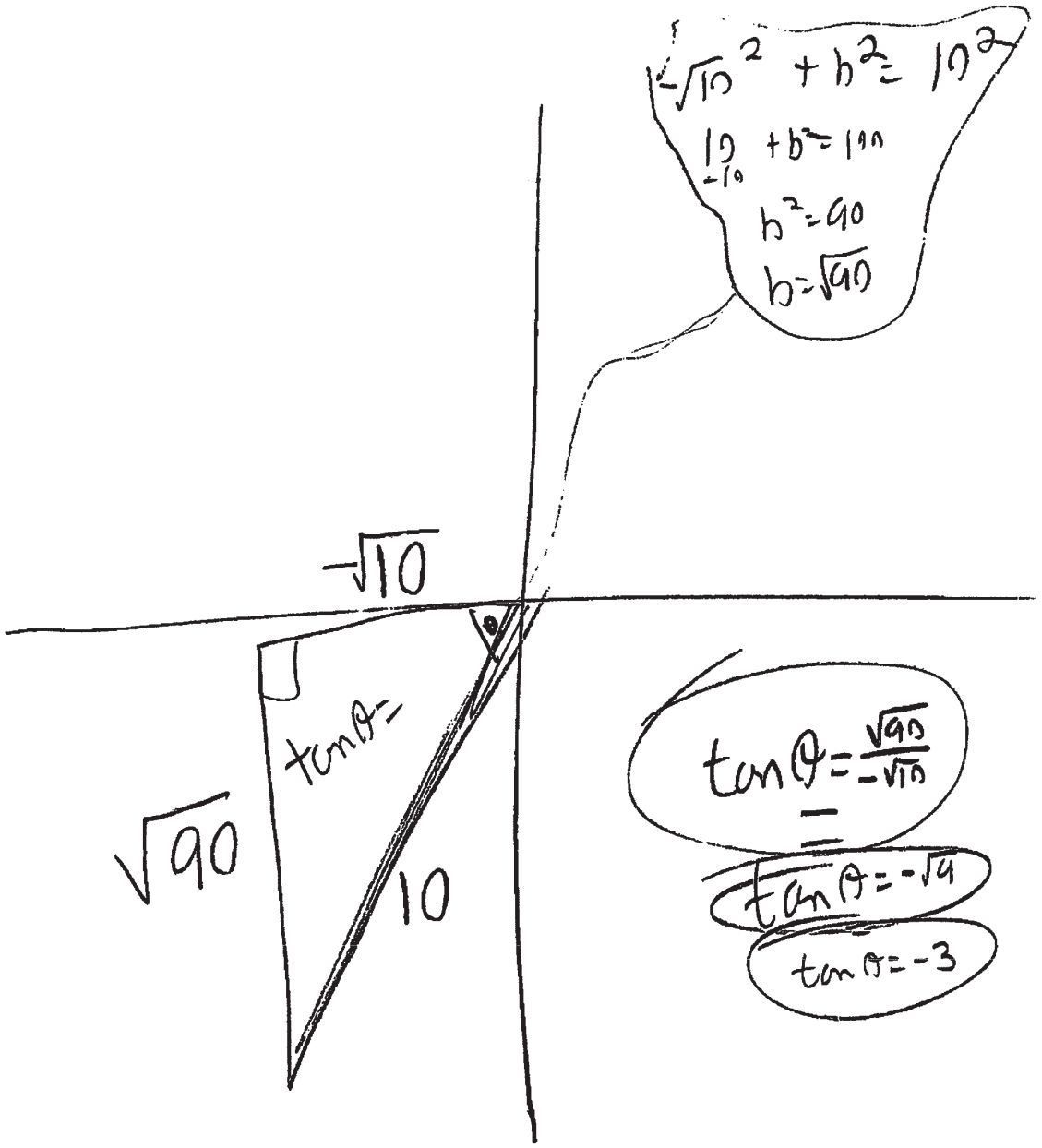
$\frac{-3\sqrt{10}}{-\sqrt{10}} \rightarrow \frac{3\sqrt{10}}{\sqrt{10}} \rightarrow 3$

$\tan\theta = 3$

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

## Question 29

**29** An angle, $\theta$, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of tan $\theta$.




**Score 1:** The student made a sign error.

**Question 29**

**29** An angle, $\theta$, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.

$\sin\theta = \pm\sqrt{1-\cos^2\theta}$

$\sin\theta = \pm\sqrt{1-\left(\frac{-\sqrt{10}}{10}\right)^2}$

$\sin\theta = \pm\sqrt{1-\frac{10}{100}}$

$\sin\theta = \pm\sqrt{1-\frac{1}{10}}$

$\sin\theta = \pm\sqrt{\frac{9}{10}}$

$\sin\theta = \pm\frac{3\sqrt{10}}{10}$

find value of tan

$\tan = \frac{\sin\theta}{\cos\theta}$

$\tan\theta = \frac{\pm\frac{3\sqrt{10}}{10}}{\frac{-\sqrt{10}}{10}}$

$\tan\theta = \pm\frac{3\sqrt{10}}{10} \cdot \frac{-10}{\sqrt{10}}$

$\tan\theta = \pm 3$

**Score 1:** The student did not determine the correct sign.

## Question 29

**29** An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.

A
4

D
A

$-\sqrt{10}^2 + B^2 = 10^2$

$-10 + B^2 = 100$

$B^2 = 110$

$\sqrt{110}$

$\frac{\sqrt{110}}{-\sqrt{10}} \quad \frac{-\sqrt{10}}{-\sqrt{10}} \quad \frac{-\sqrt{1100}}{10}$

**Score 0:** The student made multiple errors.

**Question 30**

**30** Solve algebraically for all values of $x$.

$\sqrt{x+5} - x = 3$

$\sqrt{(-4)+5} - (-4) = 3$

$\sqrt{1} - (-4) = 3$

$1 - (-4) = 3$

$5 = 3$ x

$\sqrt{x+5} - x = 3$

$+x \quad +x$

$(\sqrt{x+5})^2 = (x+3)^2$

$x+5 = x^2 + 6x + 9$

$-x-5$

$0 = x^2 + 5x + 4$

$0 = x^2 + 4x + x + 4$

$x(x+4) + 1(x+4)$

$0 = (x+1)(x+4)$

$x+1=0 \quad x+4=0$

$-1 \quad -1 \quad -4 \quad -4$

$x = -1$ $\quad x = -4$ x

$\sqrt{x+5} - x = 3$

$\sqrt{(-1)+5} - (-1) = 3$

$\sqrt{4} - (-1) = 3$

$2 - (-1) = 3$

$3 = 3$ ✓

$(x+3)(x+3)$

$x^2 + 3x + 3x + 9$

$x^2 + 6x + 9$

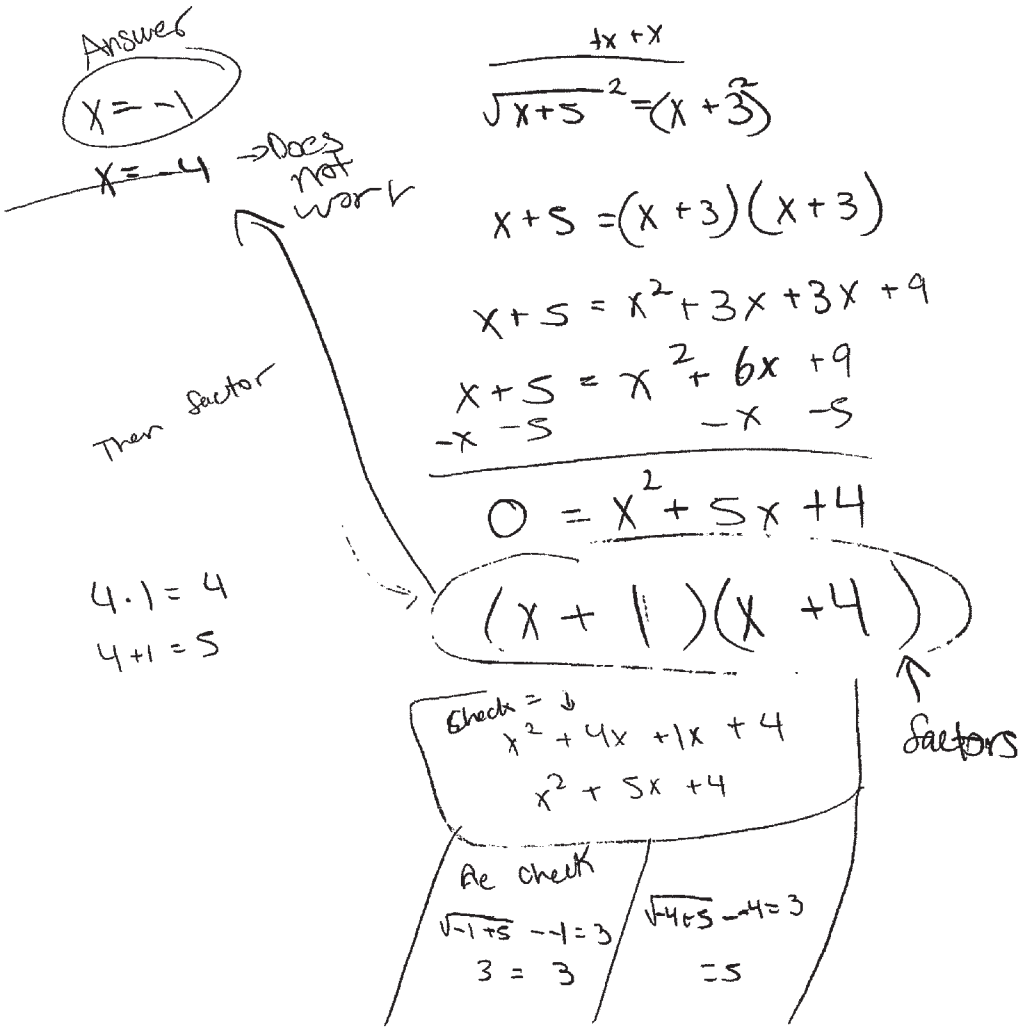
$x = -1$

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

## Question 30

**30** Solve algebraically for all values of $x$.

$$\sqrt{x+5} - x = 3$$

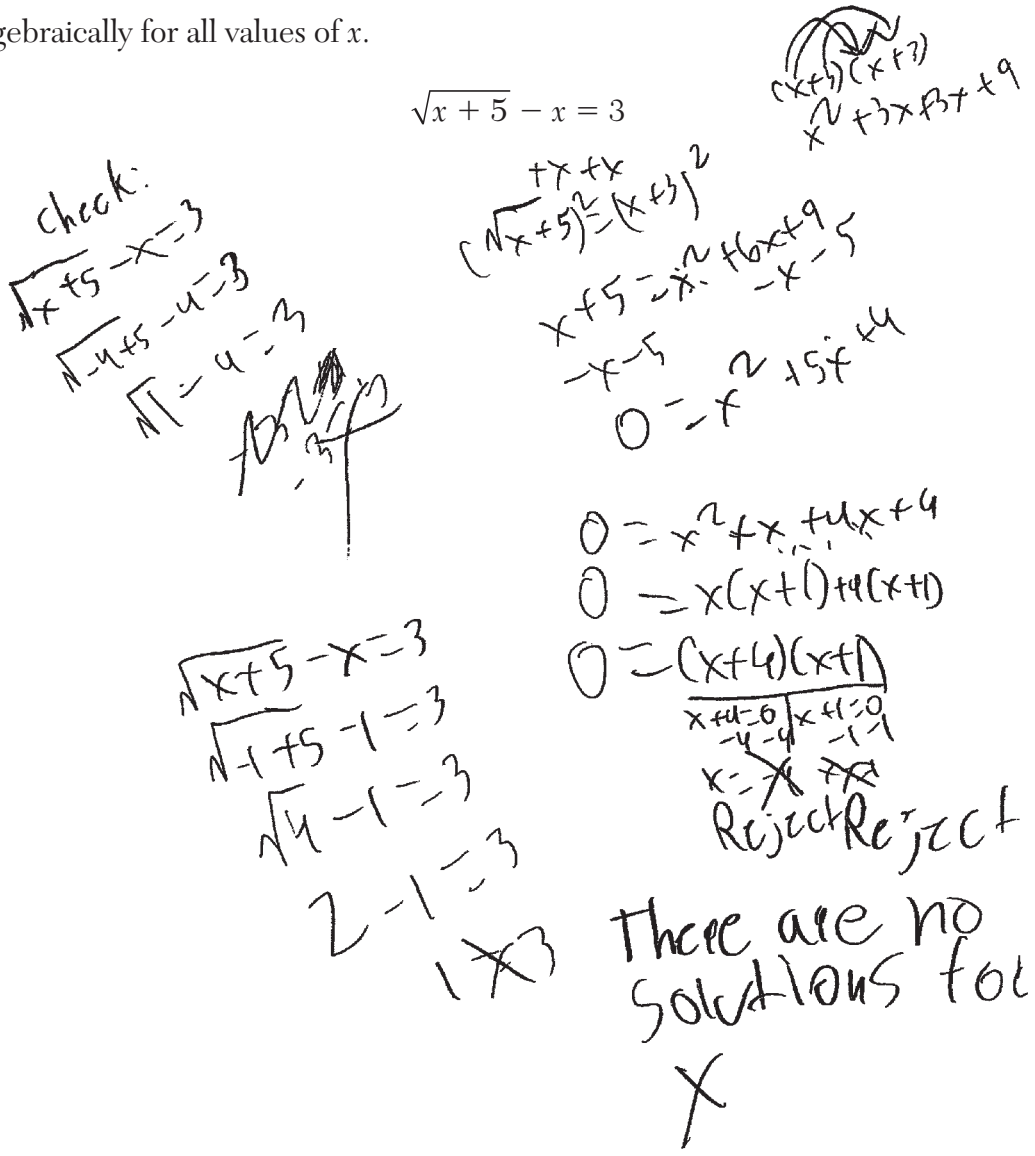



**Score 2:** The student gave a complete and correct response.

**Question 30**

**30** Solve algebraically for all values of $x$.

$\sqrt{x+5} - x = 3$




**Score 1:** The student made a repeated computational error in checking solutions.

## Question 30

**30** Solve algebraically for all values of $x$.

$\sqrt{x+5} - x = 3$

$+x \quad +x$

$\left(\sqrt{x+5}\right)^2 = (3+x)^2 = (3+x)(3+x)$

$9+3x+3x+x^2$

$x+5 = x^2+6x+9$

$-x \quad -5 \quad -x \quad -5$

$0 = x^2+5x+4$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-5 \pm \sqrt{5^2-4(1)(4)}}{2(1)}$

$\frac{-5 \pm \sqrt{25-16}}{2}$

$\frac{-5 \pm \sqrt{9}}{2}$

$\frac{-5 \pm 3}{2}$

$\frac{-5+3}{2} = \frac{-2}{2}$ $\quad$ $\frac{-5-3}{2}$

$x = -1$ $\quad$ $x = -4$

check

$\sqrt{-1+5}+1 = 3$

$\sqrt{4}+1 = 3$

$2+1 = 3$

$3 = 3$ ✓

$\sqrt{-4+5}+4 = 3$

$\sqrt{1}+4 = 3$

$-1+4 = 3$ ✓

$1+4 = 5$ ✗

**Score 1:** The student did not correctly identify the extraneous solution.

**Question 30**

**30** Solve algebraically for all values of $x$.

$\sqrt{x+5} - x = 3$

$\sqrt{x+5} - x = 3$

$+x \quad +x$

$(\sqrt{x+5})^2 = (3+x)^2$

$x+5 = (3+x)(3+x)$

$x+5 = 9+3x+3x+x^2$

$x+5 = 9+6x+x^2$

$-x \quad -5 \quad -5 \quad -x$

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

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

$a=1$

$b=5$

$c=-4$

$-b \pm \sqrt{(b^2)-4(a)(c)}$ / $2(a)$

$-(5) \pm \sqrt{(5)^2-4(1)(-4)}$ / $2(1)$

$-5 \pm \sqrt{25-4(1)(-4)}$ / $2$

$-5 \pm \sqrt{25+16}$ / $2$

$-5 \pm \sqrt{41}$ / $2$

FINAL ANSWER → $\frac{-5 \pm \sqrt{41}}{2}$

**Score 0:** The student made multiple errors and did not reject extraneous solutions.

## Question 30

**30** Solve algebraically for all values of $x$.

$\sqrt{x+5} - x = 3$

$(x+5)(x+3)$

$\sqrt{x+5} - x = 3$

$\sqrt{x+5}^2 = x+3^2$

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

$x+5 = x^2+6x+9$

$x = x^2+6x+4$

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

~~$(x^2-5x-1x+4=0$~~

~~$x(x^2-5)-1(x-4)=0$~~

$(x-1)(x-4)=0$

$x=1, x=4$

**Score 0:** The student made a computational error and did not reject extraneous solutions.

## Question 31

**31** Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is $42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$

$$S_{30} = \frac{42{,}000 - 42{,}000(1.03)^{30}}{1 - 1.03}$$

$$\$1948167.46$$

$$\boxed{\$1{,}948{,}000}$$

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

## Question 31

**31** Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is $42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$a_n = a_1(r^{n-1})$

$a_{30} = 42000(1.03^{29})$

$a_{30} = 99000$

**Score 1:** The student made one conceptual error.

## Question 31

**31** Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$$S_n = \frac{a_1 - a_1 r^n}{1-r}$$

$$S_{30} = \frac{42000 - 42000^{1.03}}{1-1.03}$$

$$S_{30} = \$526750.651$$

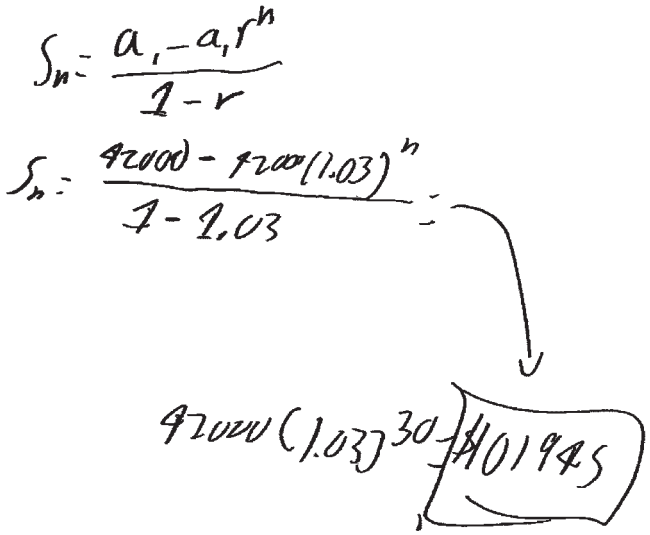
$$S_{30} = \$527000$$

\$527,000

**Score 1:** The student incorrectly substituted into the formula.

## Question 31

**31** Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.




**Score 0:** The student made multiple errors.

## Question 31

**31** Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$a_1 = 42000$

$r = .03$

$n = 30$

$$S_n = \frac{42000 - 42000(.03)^{30}}{1 - .03}$$

$S_n = 43299$

**Score 0:** The student made multiple errors.

## Question 32

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$2x^2 = 2x - 1$

$-2x+1 \quad -2x+1$

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

2

2 −2

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

$x = \frac{2 \pm \sqrt{-4}}{4}$

$x = \frac{2}{4} \pm \frac{2i}{4}$

$x = \frac{1}{2} \pm \frac{1}{2}i$

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

**Question 32**

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$2x^2 = 2x - 1$

$2x^2 - 2x = -1$

$x^2 - x = -\frac{1}{2}$

$x^2 - x + \frac{1}{4} = -\frac{1}{2} + \frac{1}{4}$

$(x - \frac{1}{2})(x - \frac{1}{2}) = -\frac{1}{4}$

$(x - \frac{1}{2})^2 = -\frac{1}{4}$

$x - \frac{1}{2} = i(\pm\frac{1}{2})$

$x = \frac{1}{2} \pm \frac{1}{2}i$

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

## Question 32

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$2x^2 = 2x - 1$

$-2x+1 \quad -2x+1$

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

$a = 2, b = -2, c = 1$

$x = \frac{-b \pm \sqrt{(b)^2 - 4ac}}{2a}$

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

$x = \frac{2 \pm \sqrt{-4}}{4}$

$\sqrt{-4}$

$\sqrt{-1} \quad \sqrt{4}$

$i \quad 2$

$2i$

$x = \frac{2 \pm 2i}{4}$

$x = \frac{1 \pm i}{2}$

**Score 1:** The student did not express the answer in $a + bi$ form.

**Question 32**

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$2x^2 = 2x - 1$

$-2x+1 \quad -2x+1$

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

$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(2)(1)}}{2(2)}$

$\frac{+2 \pm \sqrt{-4}}{4}$

$\frac{2+\sqrt{-4}}{4}$ or $\frac{2-\sqrt{-4}}{4}$

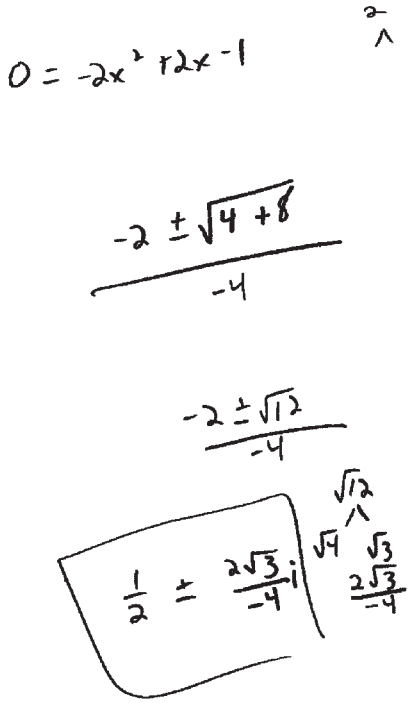
$\frac{2+2i}{4}$ or $\frac{2-2i}{4}$

$\boxed{\frac{1}{2}+i \text{ or } \frac{1}{2}-i}$

**Score 1:** The student did not correctly simplify the solution.

## Question 32

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.




**Score 0:** The student made multiple errors.

## Question 32

**32** Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$2x^2 = 2x - 1$

$-2x + 1 \quad -2x + 1$

$2x^2 - 2x + 1 = 0 \qquad a = 2 \quad b = -2 \quad c = 1$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{4ac}$

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

$\sqrt{-2^2 - 4(2)(1)}$

$= \sqrt{-2^2 - 8}$

$= \sqrt{-4 - 8}$

$= \sqrt{-12}$

$4 \quad 3$

$2i\sqrt{3}$

**Score 0:** The student made multiple errors.

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$y = a(b)^x$ $\quad$ $y = 9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$$\frac{15,000}{9290.57} = \frac{9290.57(1.02)^x}{9290.57}$$

$$\frac{15,000}{9290.57} = (1.02)^x$$

$$\log_{1.02} \frac{15,000}{9290.57} = \log_{1.02} 1.02^x$$

$$\log_{1.02} \frac{15,000}{9290.57} = x$$

$x = 24.2$ years

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

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$y = 9290.57 \cdot 1.02^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$\frac{15000}{9290.57} = \frac{9290.57}{9290.57} \cdot 1.02^x$

$\frac{\log 1.61454}{\log 1.02} = \frac{x \log 1.02}{\log 1.02}$

$24.19124 = x$

$x = 24.2$ years

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

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$y = 9290.56(1.021)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$\frac{15000}{9290.56} = \frac{9290.56(1.021)^x}{9290.56}$

$1.615 = 1.021^x$

$\frac{\log 1.615}{\log 1.021} = \frac{\log 1.021}{\log 1.021}$

$x = 23.1$ years

**Score 3:** The student incorrectly rounded the coefficients.

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$y = 9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$$\frac{15,000}{9290.57} = \frac{9290.57(1.02)^x}{9290.57}$$

$$1.61 = 1.02^x$$

$$\log 1.61 = x \log(1.02)$$

24.1 years

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

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$9290.57(1.02)^{29.2} = 15000$

**Score 2:** The student wrote an expression and used a method other than algebraic.

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$y = 9290.57 \times 1.02^{x}$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$y = 9290.57 \times 1.02^{25}$

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

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$9290.57(1.02)^x = 150$

$\log 9476 \quad \log 1500 = x$

$x = 23$

**Score 1:** The student wrote a correct expression.

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

In calc
Stat Edit
(insert list from table)
Stat calc
0: ExpReg
Enter

$9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$15000 = 9290.57(1.02)^x$

$1.6145 = (1.02)^x$

1.6 years

**Score 1:** The student wrote a correct expression.

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$y=(a)(b^x)$

$y=(9292.9)(1.0)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$15{,}000=(9292.9)(1.0)^x$

$-9292.9 \quad -9292.9$

$5707.1 = 1.0^x$

(18)

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

## Question 33

**33** The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, $y$, in dollars, $x$ years after 1990 is listed in the table below.

| x | y |
|---|---|
| 1 | 9680 |
| 6 | 10,201 |
| 18 | 13,713 |
| 25 | 15,552 |
| 29 | 16,976 |

$\frac{10,201}{9680} = 1.05$

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, $x$ years after 1990. Round all coefficients to the *nearest hundredth*.

$f(x) = 9680(1.05)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$15000 = 9680(1.05)^x$

$\log(1.05)15000 = x$

$x = 9.0$ year

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

## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

$x^2 - 2$

$(x+3)\overline{)x^3+3x^2-2x-6}$

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

$0 - 2x - 6$

$-(-2x-6)$

$0$

yes, (x+3) is a factor because it has a remainder of 0

Determine all zeros of $f(x)$.

$0 = x^3+3x^2-2x-6$

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

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

$x+3=0$

$-3 \quad -3$

$x=-3$

$0 = x^2-2$

$+2 \quad +2$

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

$\pm\sqrt{2} = x$

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

**Question 34**

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

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

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

Yes, $(x+3)$ is a factor of $f(x)$.

Determine all zeros of $f(x)$.

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

$x^2 - 2 = 0$

$+2 \quad +2$

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

$x = \pm\sqrt{2}$ ✓

$x = -3$ ✓

$x = \{-3, \pm\sqrt{2}\}$

check:

$(-\sqrt{2})^3 + 3(\sqrt{2})^2 - 2(\sqrt{2}) - 6 =$

✓ 0

$(-\sqrt{2})^3 + 3(-\sqrt{2})^2 - 2(-\sqrt{2}) - 6.$

✓ 0

$(-3)^3 + 3(-3)^2 - 2(-3) - 6 = 0$

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

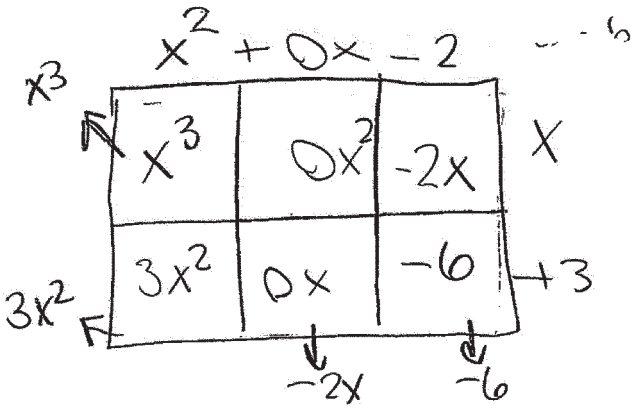
## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

3-1=2

(x+3) is a factor. there is no remainder.




$x^2 - 2$

Determine all zeros of $f(x)$.

$x^3+3x^2-2x-6=0$

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

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

$x=-3$ | $x^2-2=0$

$+2 \quad +2$

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

$x=\pm i\sqrt{2}$

$-3, -i\sqrt{2}, i\sqrt{2}$

**Score 3:** The student did not correctly find the zeros.

## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

$x+3=0$
$x=-3$

$-3 \rightarrow x$

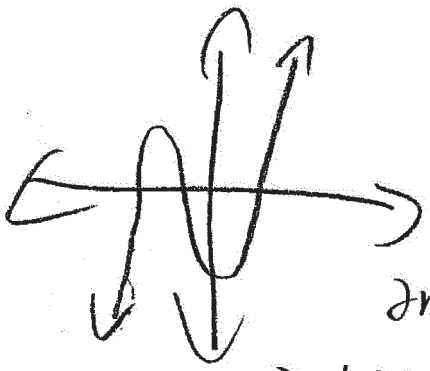
$x^3+3x^2-2x-6=0$

$0=0$ ✓

$x+3$ is a factor of $f(x)$ because it equals a zero

Determine all zeros of $f(x)$.

Window
Xmin = -10
Xmax = 10
Ymin = -10
Ymax = 10



2nd → calc → zero

$x = 1.414236$

$x = -1.414214$

**Score 3:** The student did not determine all zeros.

## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

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

$-27+81+6-6$

$54 \neq 0$ It is not a factor

Determine all zeros of $f(x)$.

$x^3+3x^2-2x-6=0$

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

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

$x^2-2=0 \quad x=-3$

$\sqrt{x^2} \pm\sqrt{2}$

$x=\sqrt{2}, -3$

**Score 2:** The student made two errors.

## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

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

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

$=0$

Yes, it is a factor due to no remainders.

Determine all zeros of $f(x)$.

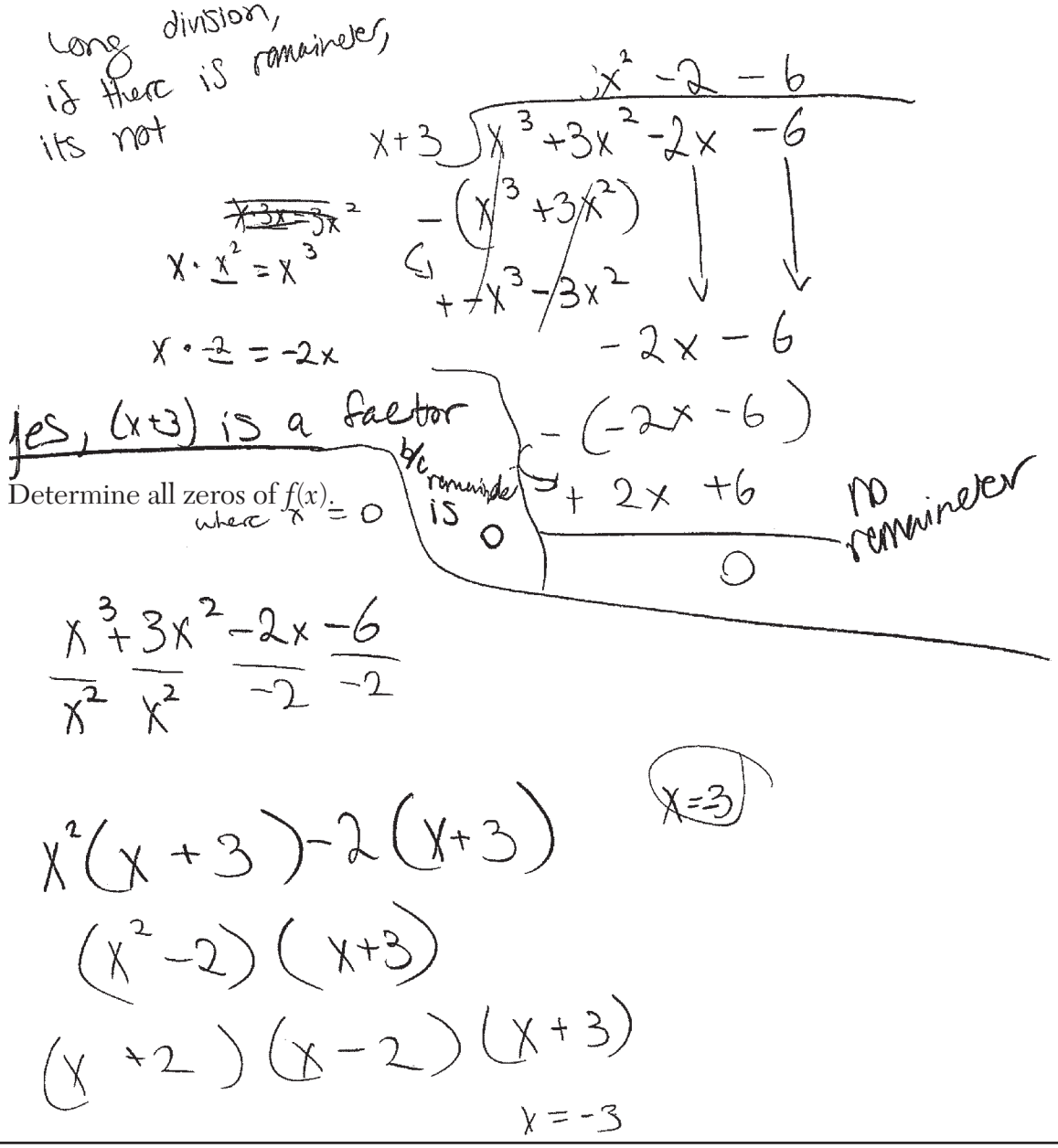
No zeros due to there being no remainders.

**Score 2:** The student did not determine the zeros.

## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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

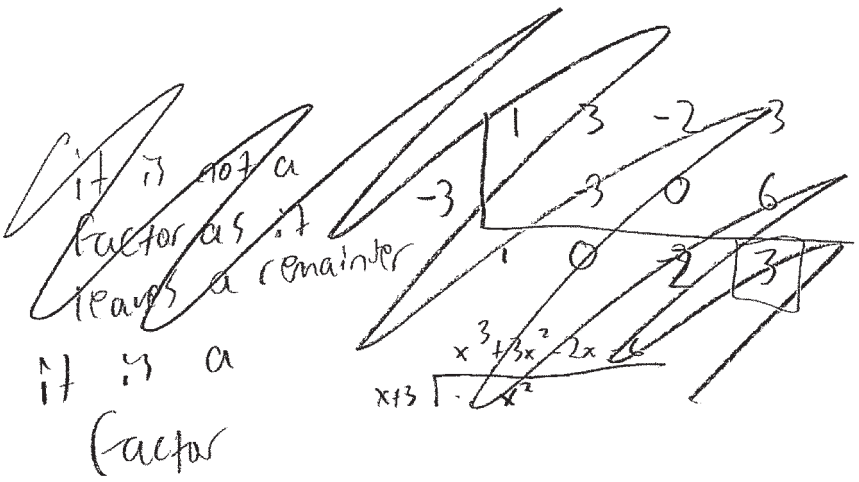



**Score 1:** The student correctly interpreted the remainder.

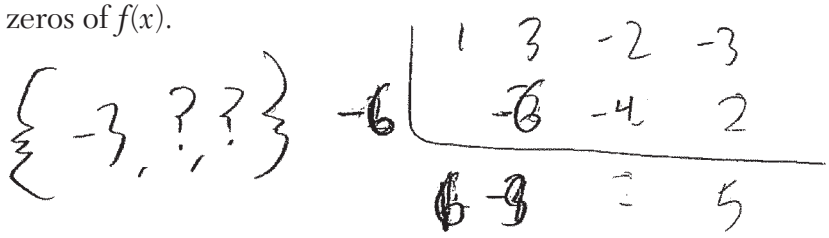
## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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




Determine all zeros of $f(x)$.

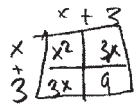



**Score 0:** The student did not satisfy the criteria for one or more credits.

## Question 34

**34** Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

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




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

$= 2x^2 + 12x + 18 + 3(x^2 + 6x + 9) - 2x - 6 - 6$

$= 2x^2 + 12x + 18 + 3x^2 + 18x + 27 - 2x - 12$

$= 5x^2 + 28x + 33$

$(x+3)$ is not factor of $f(x)$

$x^2 + 3x + x^2 + 3x + 3x + 9 + 3x + 9$

$2x^2 + 12x + 18$

$(x+3)(x+3)(x+3)$

Determine all zeros of $f(x)$.

$(x+3)$

$x_1 = -x$

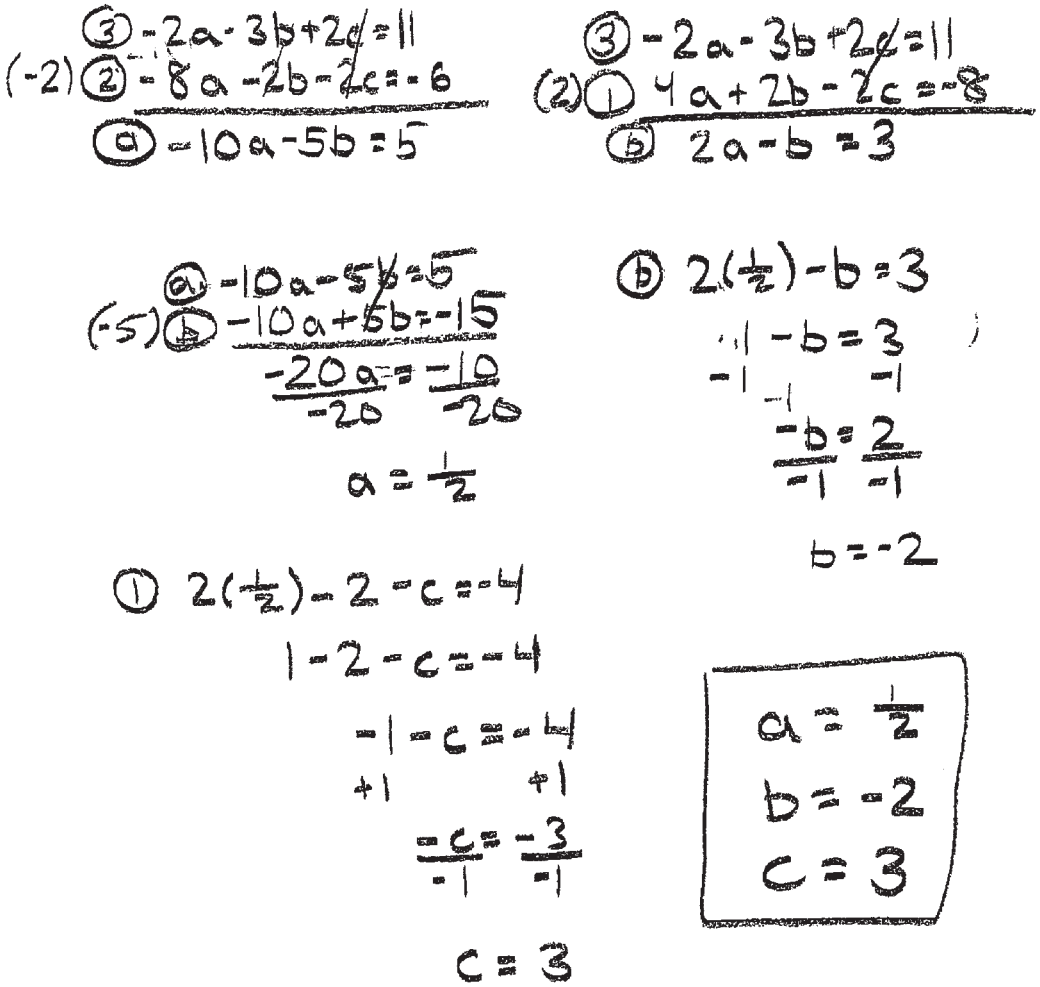
$x_2 = -3$

**Score 0:** The student did not satisfy the criteria for one or more credits.

## Question 35

**35** Solve the system algebraically:

$$\begin{aligned} &(1)\ 2a + b - c = -4 \\ &(2)\ 4a + b + c = 3 \\ &(3)\ -2a - 3b + 2c = 11 \end{aligned}$$

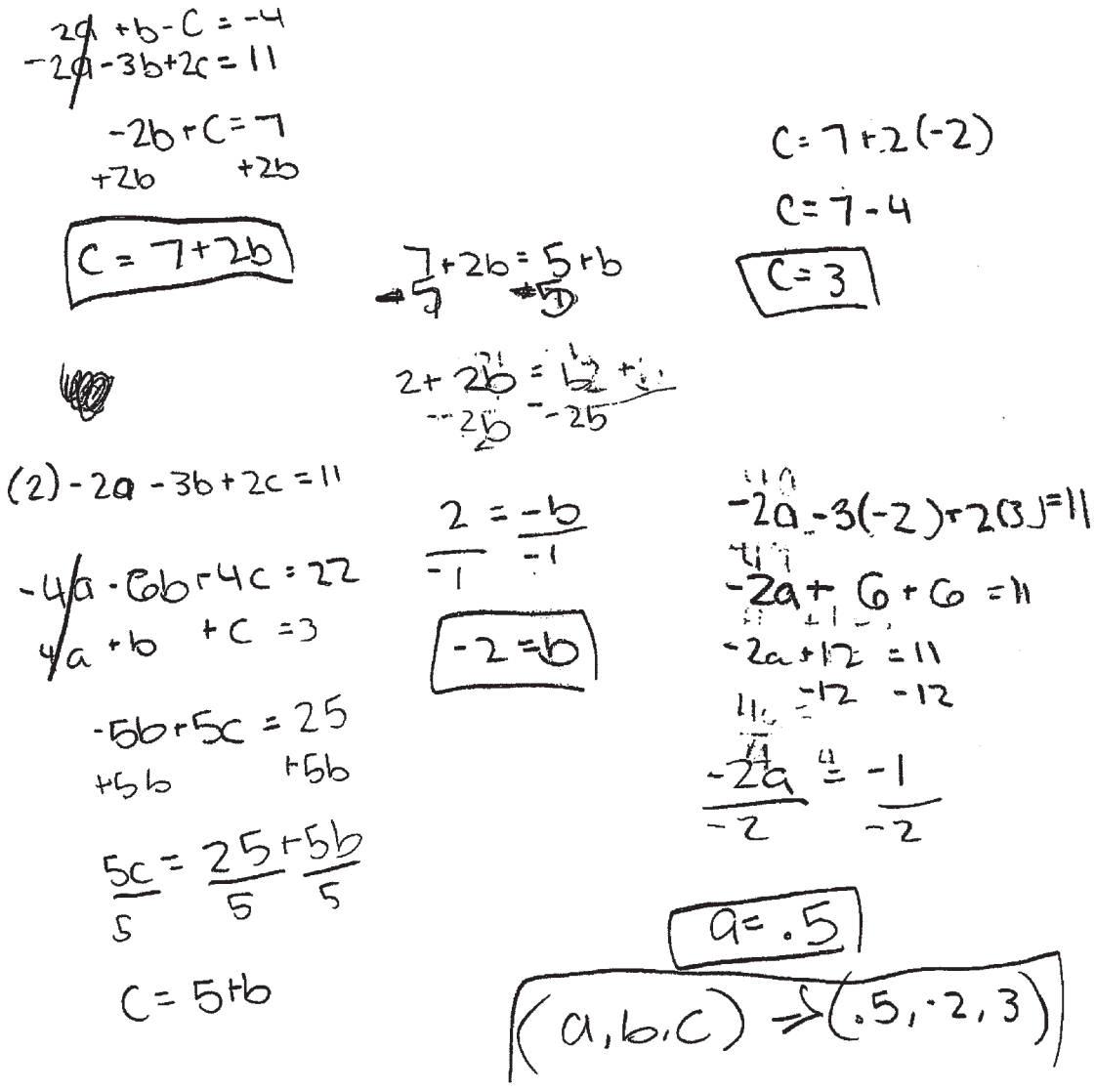



**Score 4:** The student gave a complete and correct response.

## Question 35

**35** Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$




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

## Question 35

**35** Solve the system algebraically:

$$\begin{cases} 2a + b - c = -4 \\ 4a + b + c = 3 \\ -2a - 3b + 2c = 11 \end{cases}$$

A
B
C

$-2(2a + b - c = -4)$

$-4a - 2b + 2c = 8$

$+ \quad 4a + b + c = 3$

$-b + 3c = 11$

$4a + b + c = 3$

$+ \quad -4a - 3b + 2c = 22$

$-2b + 5c = 25$

$-2b + 5c = 25$

$+ \quad 2b - 6c = -22$

$-c = 3$

$c = -3$

$-b + 3(-3) = 11$

$-b - 9 = 11$

$+9 \quad +9$

$\frac{-b}{-1} = \frac{20}{-1}$

$b = -20$

$4a - 23 = 3$

$+23 \quad +23$

$4a = 26$

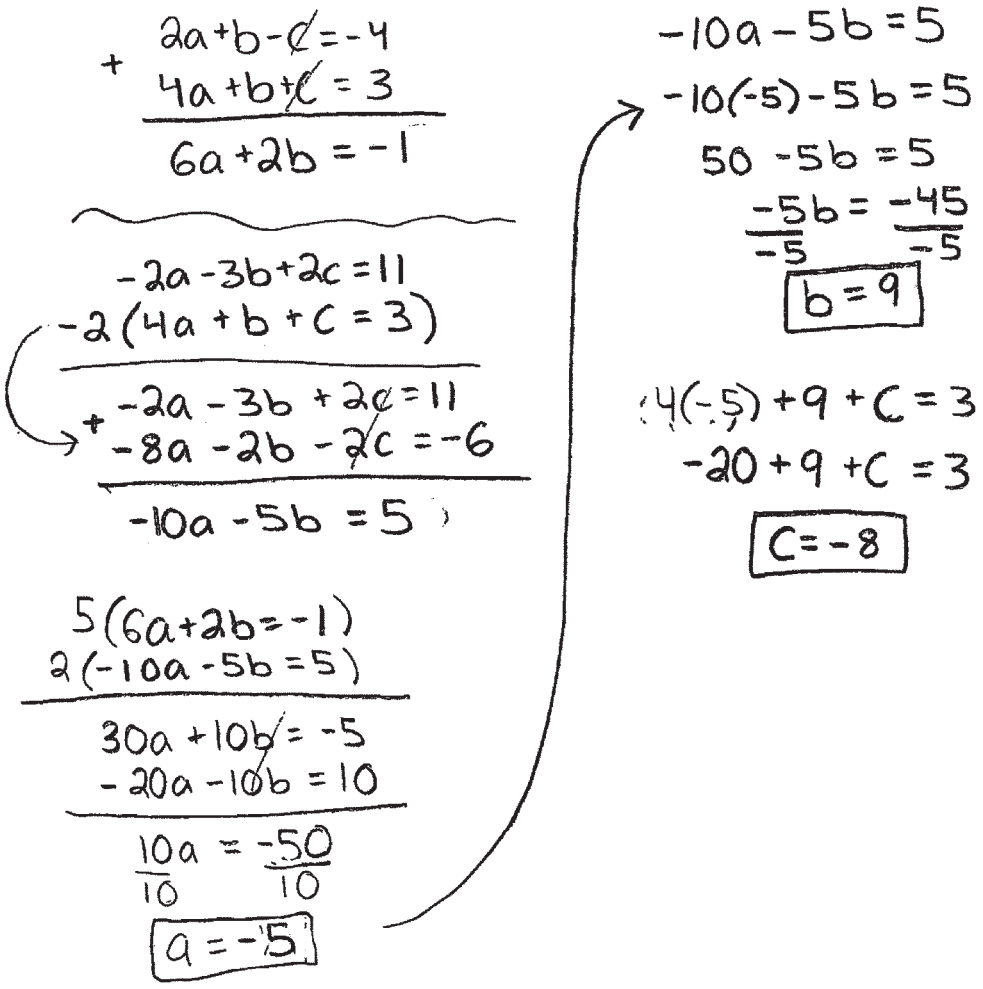
$a = 6.5$

**Score 3:** The student made one computational error distributing 2 in the second elimination.

**Question 35**

**35** Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$




**Score 2:** The student made two computational errors.

## Question 35

**35** Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

Equations 1 & 3.

$2a + b - c = -4$

$-2a - 3b + 2c = 11$

$-2b + c = 7$

Equations 2 & 3

$4a + b + c = 3$

$-2a - 3b + 2c = 11$

$4a + b + c = 3$

$-4a - 12b + 8c = 44$

$-11b + 9c = 47$

$4a + b + c = 3$

$-4a - 6b + 4c = 22$

$-5b + 5c = 25$

Solve 1 and 2

$-9(-2b + c = 7)$

$-11b + 9c = 47$

$18b - 9c = -63$

$-11b + 9c = 47$

$7b = -16$

$b = -\frac{16}{7}$

**Score 1:** The student created a correct system of two equations with the same two variables.

## Question 35

**35** Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

1
Matrix

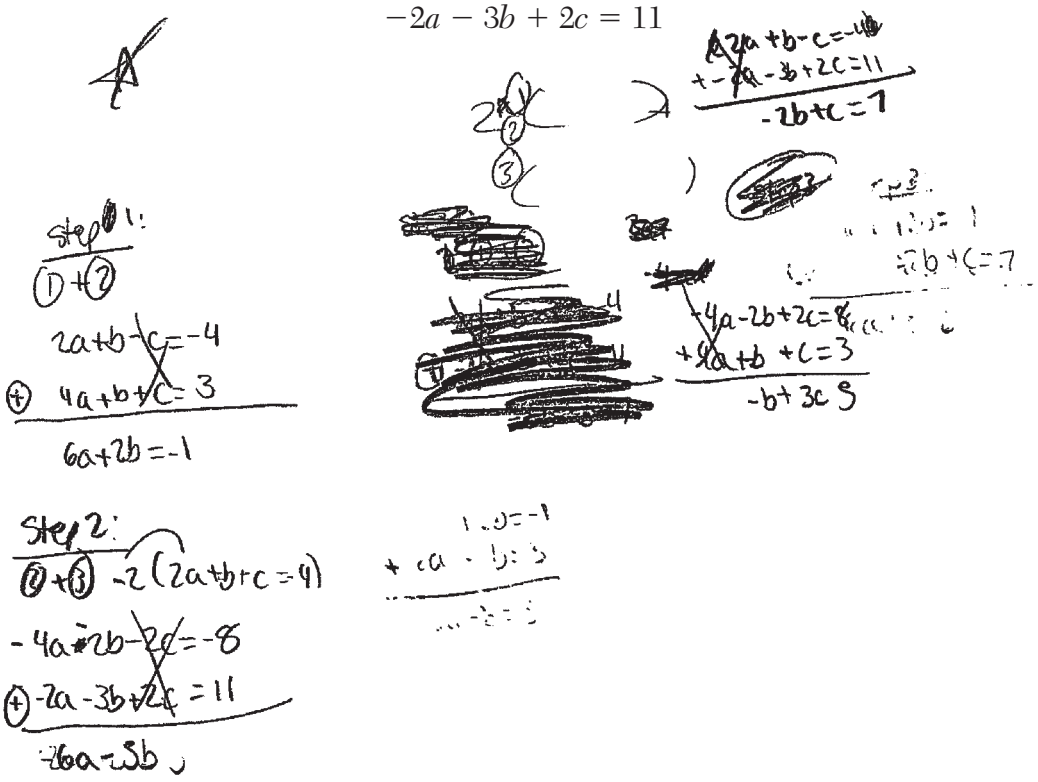
$a = .5$
$b = -2$
$c = 3$

**Score 1:** The student stated the solution, but no work was shown.

## Question 35

**35** Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$




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

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

$4(2x-1) - [5(x+1)^2 + 3(x+1) - 12]$
$= 4(2x-1) - 5(x+1)^2 - 3(x+1) + 12$
$= 8x - 4 - 5(x^2+2x+1) - 3x - 3 + 12$
$= 8x - 4 - 5x^2 - 10x - 5 - 3x - 3 + 12$
$= -5x^2 - 10x + 8x - 3x - 4 - 5 - 3 + 12$
$= -5x^2 - 5x - 12 + 12$
$= -5x^2 - 5x$

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

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

$= 4(2x-1) - (5(x+1)^2 + 3(x+1) - 12)$

$= 8x - 4 - (5x^2 + 10x + 5 + 3x + 3 - 12)$

$= 8x - 4 - (5x^2 + 13x - 4)$

$= 8x - 4 - 5x^2 - 13x + 4$

$= \boxed{-5x^2 - 5}$

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

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

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

$4(2x-1) - [5(x+1)^2 + 3(x+1) - 12]$

$8x - 4 - x^2 - x - x - 1 - 3x - 3 + 12$

$-x^2 - 3x + 4$

**Score 2:** The student made two computational errors.

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

$4(2x-1) - 5(x+1)^2 + 3(x+1) - 12$

$8x - 4 - 5(x^2+2x+1) + 3x + 3 - 12$

$8x - 4 - 5x^2 - 10x - 5 + 3x + 3 - 12$

$-5x^2 - x - 18$

**Score 2:** The student partially distributed the negative and made a computational error.

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

$4(2x-1) - [(5x^2+3x-12)(x+1)]$

$(8x-4) - [5x^3 + 3x^2 - 12x + 5x^2 + 3x - 12]$

$-5x^3 + -8x^2 - 9x - 12$

$(8x-4) + (-5x^3 - 8x^2 + 9x + 12)$

$-5x^3 - 8x^2 + 17x + 9$

**Score 1:** The student did not evaluate $f(x+1)$ and made a computational error.

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

$4g(x) - [f(x+1)]$

$4(2x-1) - [5(x+1)^2 + 3(x+1) - 12]$

$(8x - 4) - [5x^2 + 1 + 3x + 1 - 12]$

$(8x - 4) - [5x^2 + 10]$

**Score 1:** The student substituted correctly.

## Question 36

**36** Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

3 $4(2x-1) - 5x^2+3x-12$

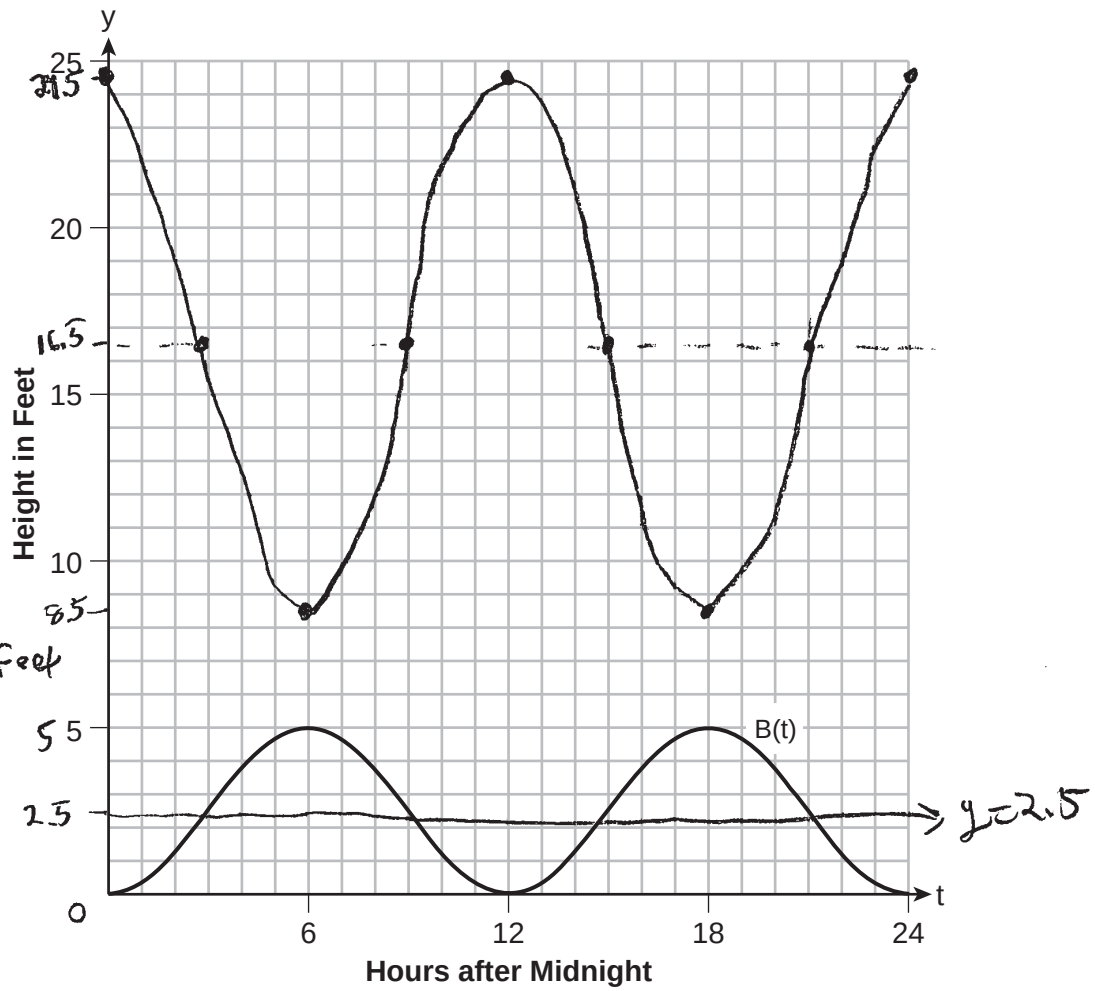
$8x-4-5x^2+3x-12$

$-5x^2+11x-16$

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

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




a = 2.5 feet

b =

$12 = \frac{2\pi}{b}$

$12b = 2\pi$

$b = \frac{\pi}{6}$

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

**Question 37 continued**

State the period of $B(t)$, in hours.

P = 12 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = -2.5\cos\left(\frac{\pi}{6}t\right) + 2.5$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

a = 8 ft

midline = 16.5

$b = \frac{\pi}{6}$

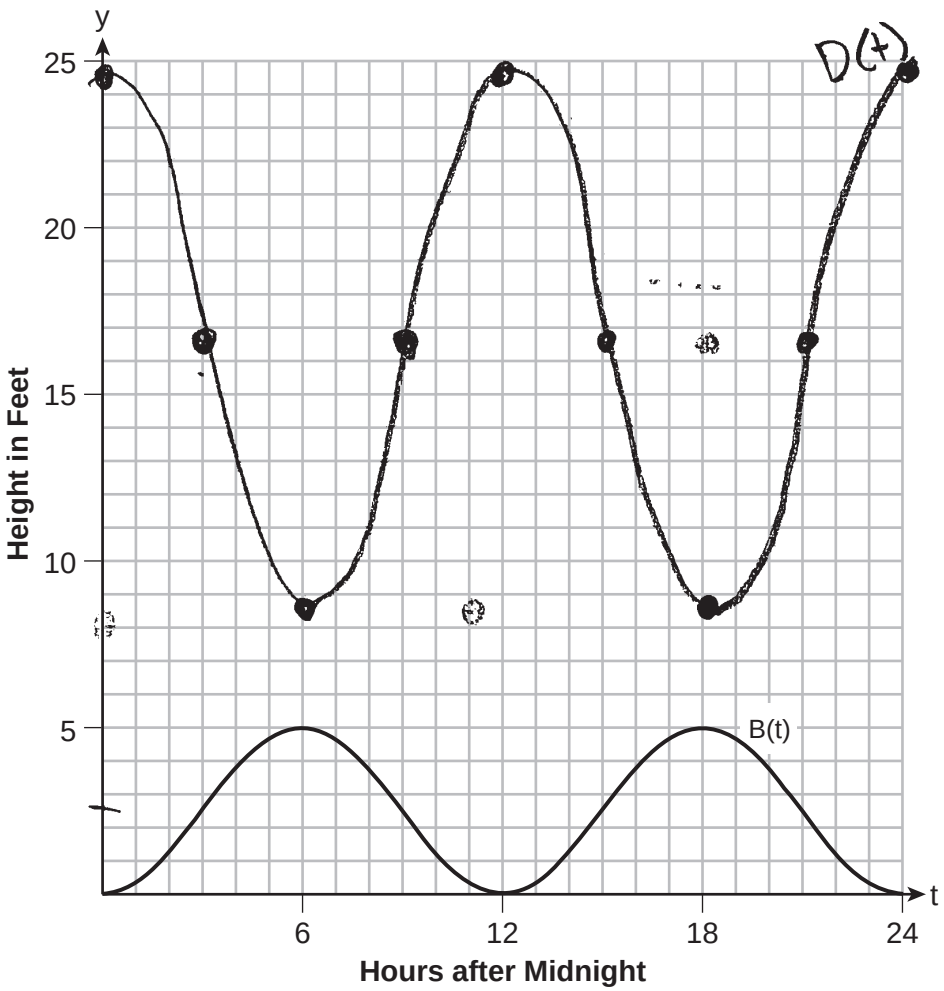
$P = \frac{2\pi}{\frac{\pi}{6}} = 12$

State the height, in feet, of the low tide in Derby.

8.5 ft

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




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

**Question 37 continued**

State the period of $B(t)$, in hours.

$P = 12$

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 2.5\cos\left(\frac{\pi}{6}t\right) + 2.5$

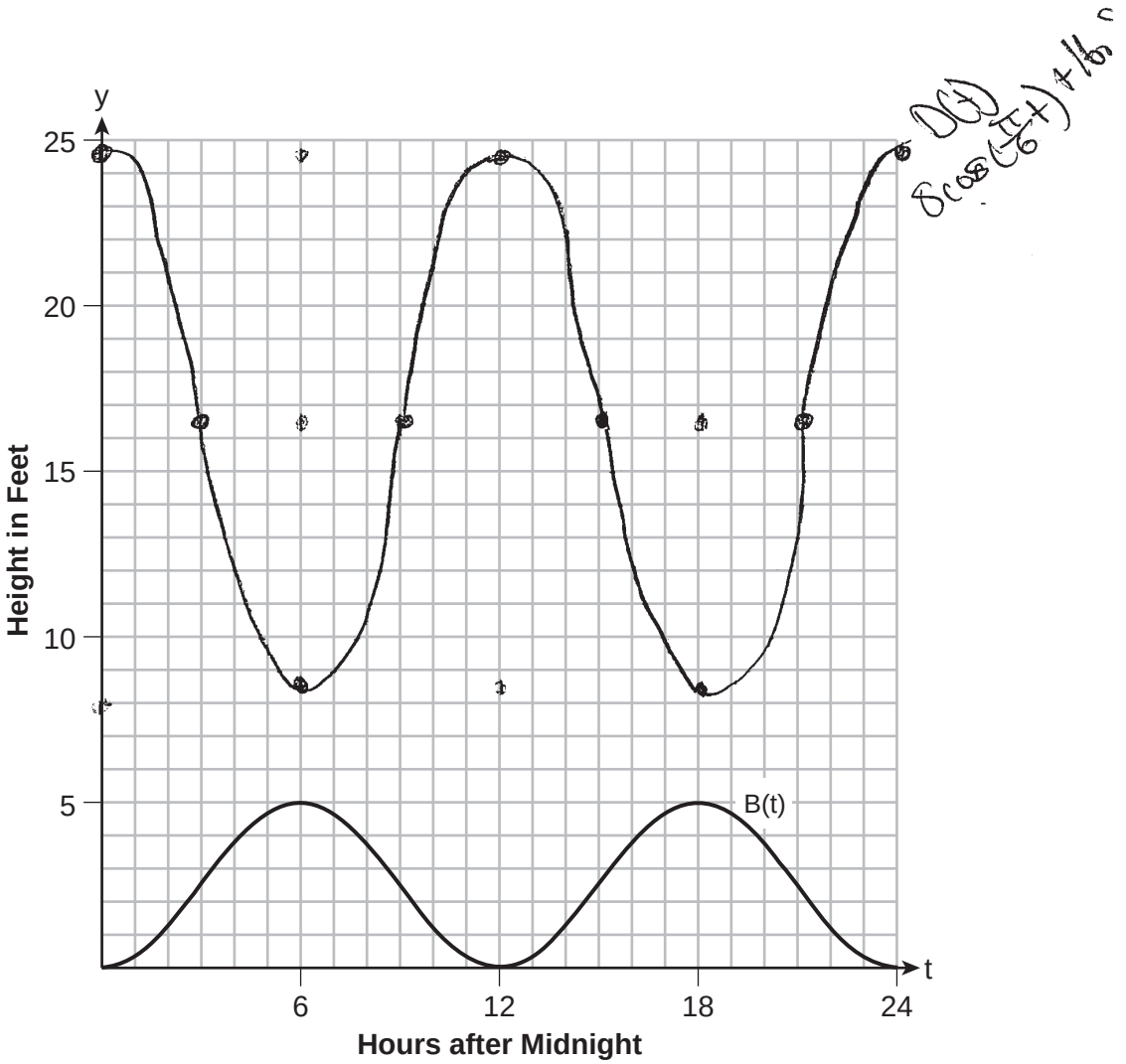
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

8.5

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 5:** The student did not write a negative cosine equation.

**Question 37 continued**

State the period of $B(t)$, in hours.

12 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 2.5\cos\left(\frac{\pi}{6}t\right) + 2.5$

$12 = \frac{2\pi}{B}$

$12B = 2\pi$

$B = \frac{\pi}{6}$

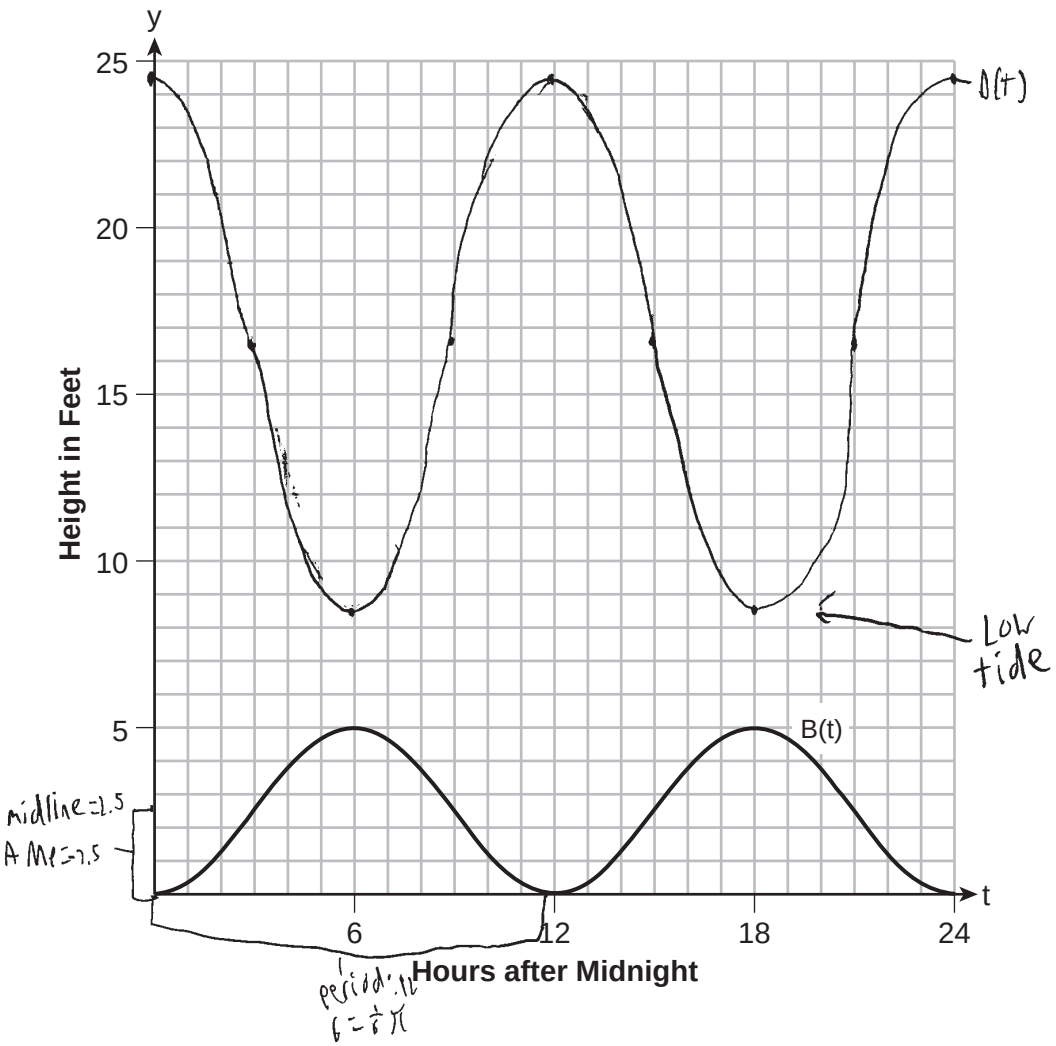
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

8.5 ft

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 5:** The student did not include the variable in the cosine equation.

**Question 37 continued**

State the period of $B(t)$, in hours.

12 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$a = -2.5$
$b = \frac{\pi}{6}$
$c = 2.5$

$B(t) = -2.5\cos\left(\frac{\pi}{6}\right) + 2.5$

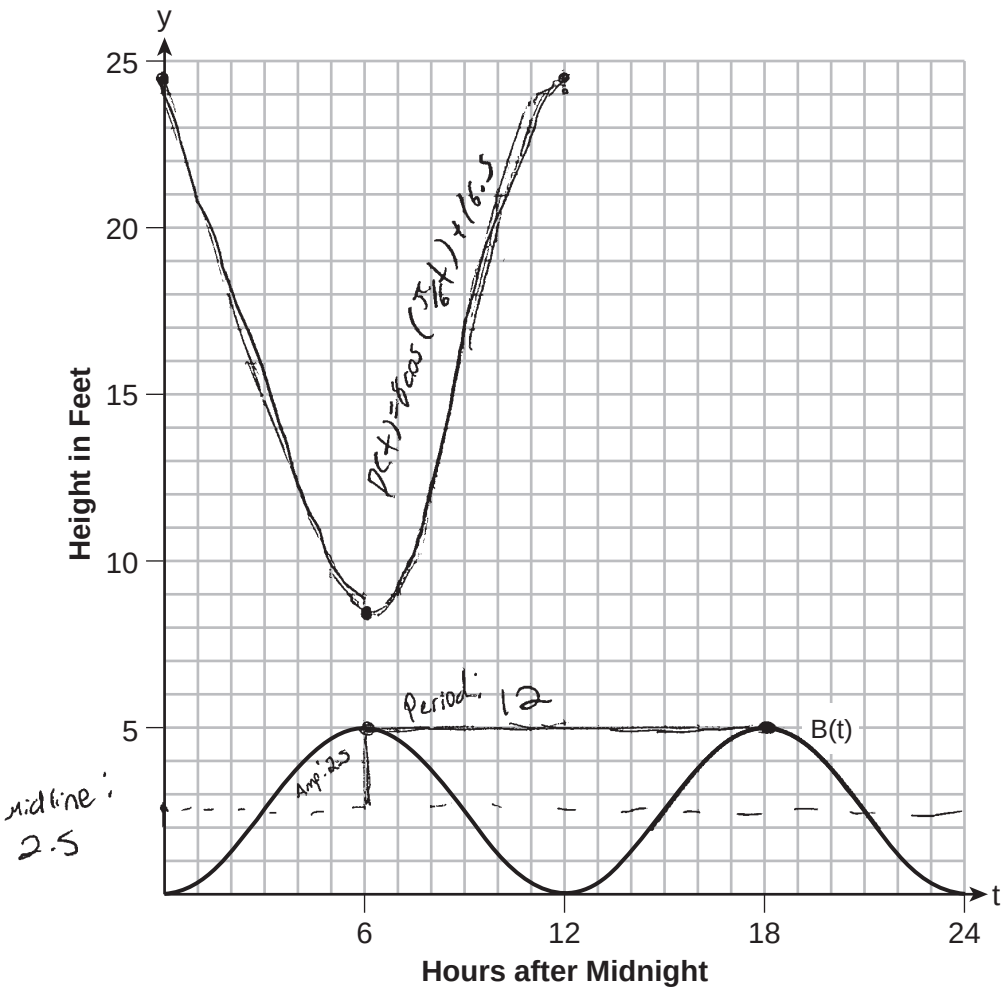
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

8.5 feet

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 4:** The student made a graphing error and did not write a negative cosine equation.

**Question 37 continued**

State the period of $B(t)$, in hours.

12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$\frac{2\pi}{12} = \frac{\pi}{6}$

$B(t) = 2.5\cos(\pi/6 t) + 2.5$

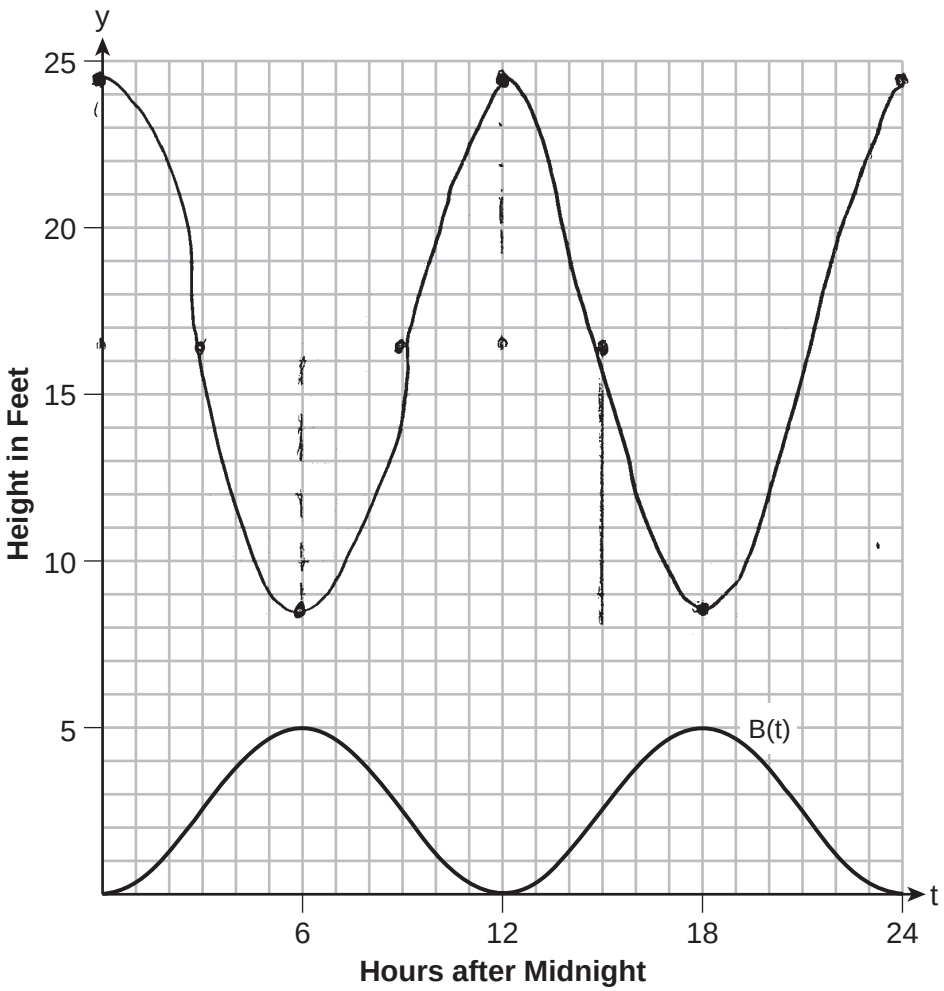
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

The low tide / the minimum of the graph is 8.5 ft

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 3:** The student did not state the correct period and did not write a correct equation.

**Question 37 continued**

State the period of $B(t)$, in hours.

18 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 5\cos\left(\frac{\pi}{9}x\right)$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

$\frac{2\pi}{x} = \frac{\pi}{6}$

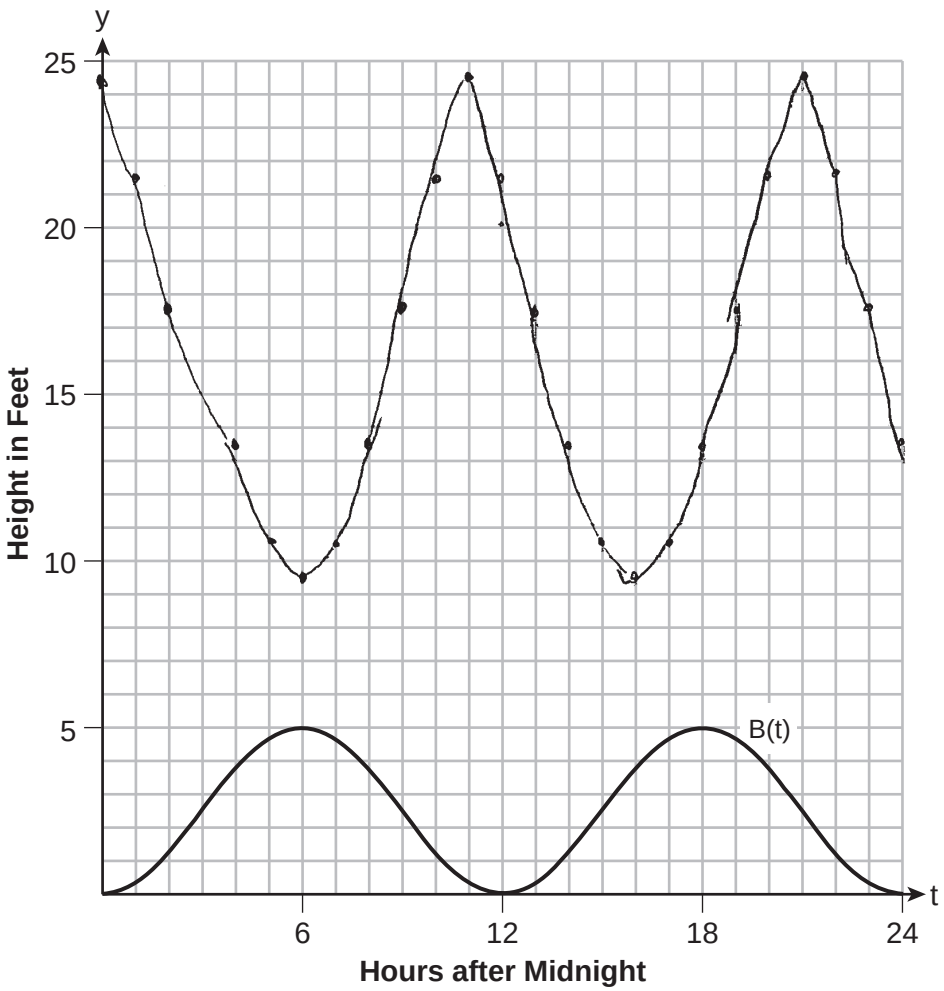
$\frac{\pi x}{\pi} = \frac{12\pi}{\pi}$ $x = 12$

State the height, in feet, of the low tide in Derby.

the height is 8.5 as low tide in Derby

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 2:** The student stated the period and minimum correctly.

**Question 37 continued**

State the period of $B(t)$, in hours.

12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 2\cos(6t) + 2.5$

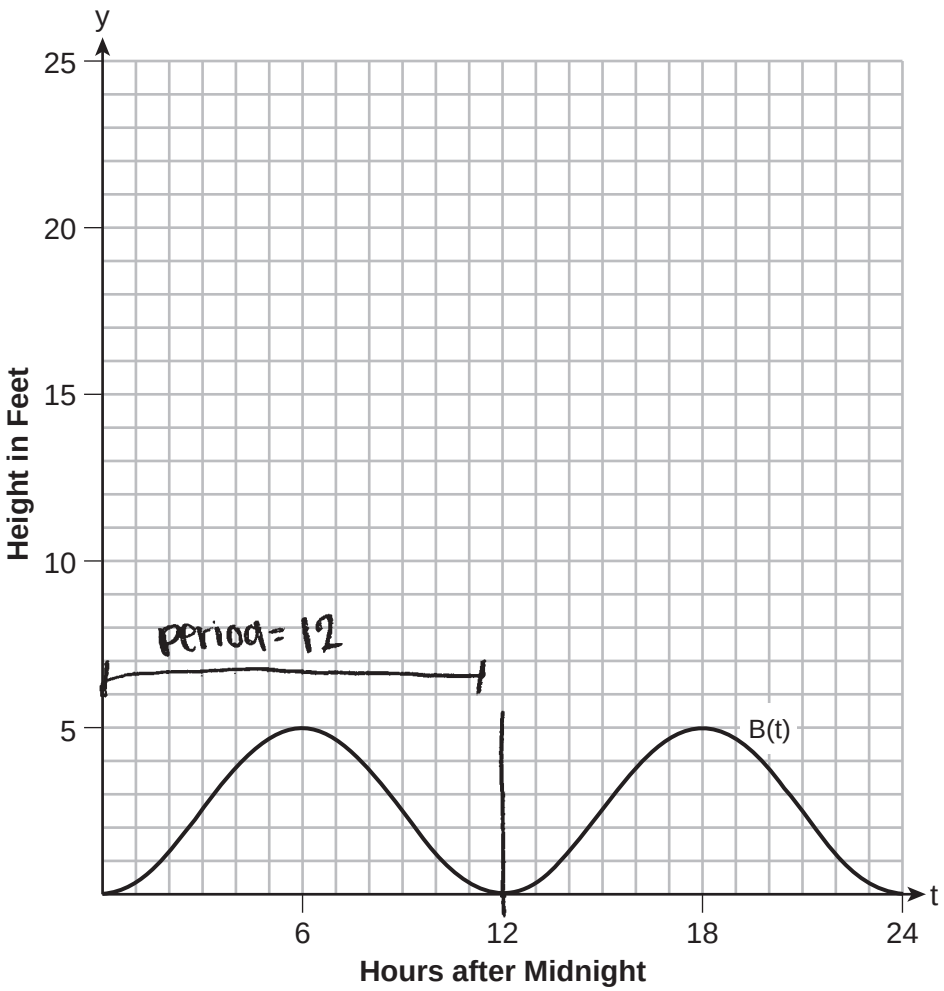
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

8.5 ft

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 1:** The student stated the period correctly.

**Question 37 continued**

State the period of $B(t)$, in hours.

period = 12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$\frac{2\pi}{b} = \frac{12}{1}$

$2\pi = 12b$

$b = \frac{2\pi}{12} = \frac{\pi}{6}$

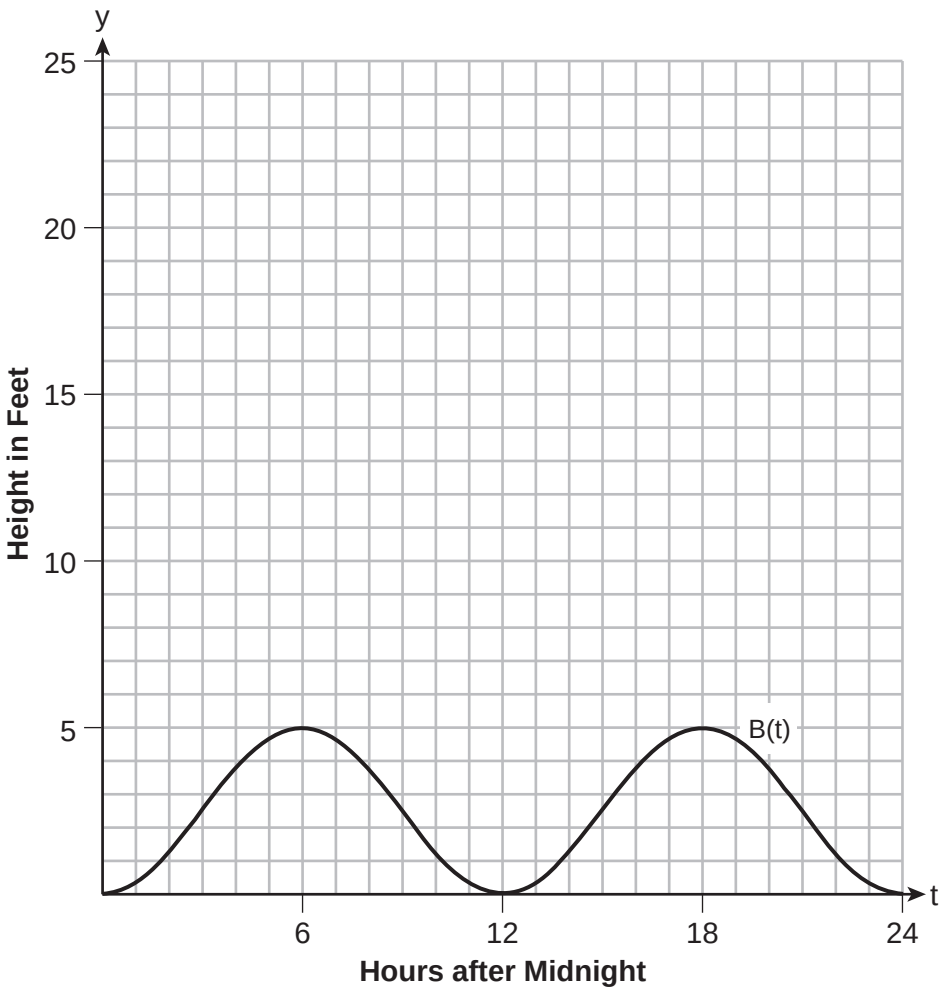
$B(t) = 5\cos\left(\frac{\pi}{6}t\right) + 12$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 1:** The student stated the period correctly.

**Question 37 continued**

State the period of $B(t)$, in hours.

12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

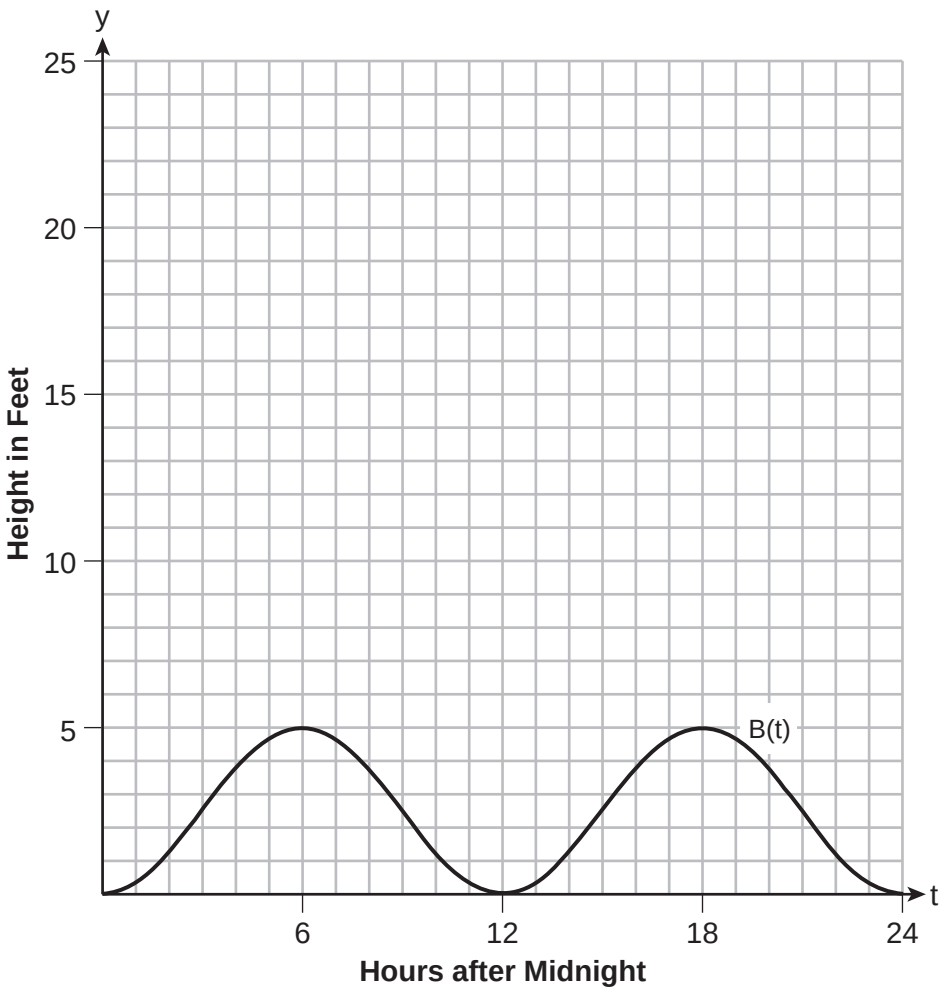
$D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$

$D(t) = 23.428203723t$

| X | D(t) |
|---|---|
| 0 | 24.5 |
| 1 | 23.428 |
| 2 | 20.5 |
| 3 | 16.5 |
| 4 | 12.5 |
| 5 | 9.5718 |
| 6 | 8.5 |
| 7 | 9.5718 |
| 8 | 12.5 |
| 9 | 16.5 |
| 10 | 20.5 |
| 11 | 23.428 |
| 12 | 24.5 |
| 13 | 23.428 |
| 14 | 20.5 |
| 15 | 16.5 |
| 16 | 12.5 |
| 17 | 9.5718 |
| 18 | 8.5 |
| 19 | 9.5718 |
| 20 | 12.5 |
| 21 | 16.5 |
| 22 | 20.5 |
| 23 | 23.428 |
| 24 | 24.5 |

## Question 37

**37** The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, $t$ hours after midnight on a day in July.




**Score 0:** The student did not satisfy the criteria for one or more credits.

**Question 37 continued**

State the period of $B(t)$, in hours.

$\frac{5 \cdot P}{5} = \frac{2\pi}{5}$

$P = \frac{2\pi}{5}$

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$C = \frac{5+0}{2} = 2.5$

$A = \frac{5+0}{2} = 2.5$

$2.5\cos(5t) + 2.5$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

The State Education Department / The University of the State of New York

# Regents Examination in Algebra II – August 2025

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

(Use for the August 2025 exam only.)

| Raw Score | Scale Score | Performance Level |
|---|---|---|
| 86 | **100** | 5 |
| 85 | **99** | 5 |
| 84 | **98** | 5 |
| 83 | **97** | 5 |
| 82 | **96** | 5 |
| 81 | **95** | 5 |
| 80 | **94** | 5 |
| 79 | **93** | 5 |
| 78 | **92** | 5 |
| 77 | **92** | 5 |
| 76 | **91** | 5 |
| 75 | **90** | 5 |
| 74 | **90** | 5 |
| 73 | **89** | 5 |
| 72 | **88** | 5 |
| 71 | **88** | 5 |
| 70 | **87** | 5 |
| 69 | **87** | 5 |
| 68 | **86** | 5 |
| 67 | **86** | 5 |
| 66 | **86** | 5 |
| 65 | **85** | 5 |
| 64 | **84** | 4 |
| 63 | **84** | 4 |
| 62 | **84** | 4 |
| 61 | **83** | 4 |
| 60 | **83** | 4 |
| 59 | **82** | 4 |
| 58 | **82** | 4 |

| Raw Score | Scale Score | Performance Level |
|---|---|---|
| 57 | **82** | 4 |
| 56 | **81** | 4 |
| 55 | **81** | 4 |
| 54 | **81** | 4 |
| 53 | **80** | 4 |
| 52 | **80** | 4 |
| 51 | **80** | 4 |
| 50 | **79** | 4 |
| 49 | **79** | 4 |
| 48 | **79** | 4 |
| 47 | **78** | 4 |
| 46 | **78** | 4 |
| 45 | **78** | 4 |
| 44 | **77** | 3 |
| 43 | **77** | 3 |
| 42 | **77** | 3 |
| 41 | **76** | 3 |
| 40 | **76** | 3 |
| 39 | **75** | 3 |
| 38 | **75** | 3 |
| 37 | **74** | 3 |
| 36 | **73** | 3 |
| 35 | **73** | 3 |
| 34 | **72** | 3 |
| 33 | **72** | 3 |
| 32 | **71** | 3 |
| 31 | **70** | 3 |
| 30 | **69** | 3 |
| 29 | **68** | 3 |

| Raw Score | Scale Score | Performance Level |
|---|---|---|
| 28 | **67** | 3 |
| 27 | **66** | 3 |
| 26 | **65** | 3 |
| 25 | **64** | 2 |
| 24 | **63** | 2 |
| 23 | **61** | 2 |
| 22 | **60** | 2 |
| 21 | **59** | 2 |
| 20 | **56** | 2 |
| 19 | **55** | 2 |
| 18 | **53** | 1 |
| 17 | **52** | 1 |
| 16 | **50** | 1 |
| 15 | **48** | 1 |
| 14 | **46** | 1 |
| 13 | **43** | 1 |
| 12 | **41** | 1 |
| 11 | **38** | 1 |
| 10 | **35** | 1 |
| 9 | **33** | 1 |
| 8 | **30** | 1 |
| 7 | **26** | 1 |
| 6 | **23** | 1 |
| 5 | **20** | 1 |
| 4 | **16** | 1 |
| 3 | **12** | 1 |
| 2 | **8** | 1 |
| 1 | **4** | 1 |
| 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 II.