

# ALGEBRA II (Common Core)

Friday, January 27, 2017 — 9:15 a.m. to 12:15 p.m., only.

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

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

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

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

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

This examination has four parts, with a total of 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 Relative to the graph of  $y = 3\sin x$ , what is the shift of the graph of

$$y = 3\sin\left(x + \frac{\pi}{3}\right)?$$

- (1)  $\frac{\pi}{3}$  right                      (3)  $\frac{\pi}{3}$  up  
(2)  $\frac{\pi}{3}$  left                        (4)  $\frac{\pi}{3}$  down

2 A rabbit population doubles every 4 weeks. There are currently five rabbits in a restricted area. If  $t$  represents the time, in weeks, and  $P(t)$  is the population of rabbits with respect to time, about how many rabbits will there be in 98 days?

- (1) 56                                (3) 3688  
(2) 152                              (4) 81,920

3 When factored completely,  $m^5 + m^3 - 6m$  is equivalent to

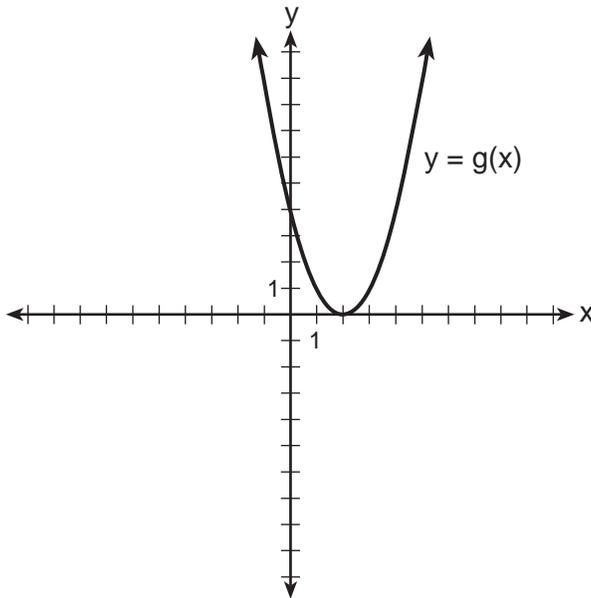
- (1)  $(m + 3)(m - 2)$               (3)  $m(m^4 + m^2 - 6)$   
(2)  $(m^3 + 3m)(m^2 - 2)$         (4)  $m(m^2 + 3)(m^2 - 2)$

4 If  $\sin^2(32^\circ) + \cos^2(M) = 1$ , then  $M$  equals

- (1)  $32^\circ$                               (3)  $68^\circ$   
(2)  $58^\circ$                               (4)  $72^\circ$

**Use this space for computations.**

- 5 What is the solution to the system of equations  $y = 3x - 2$  and  $y = g(x)$  where  $g(x)$  is defined by the function below?



- (1)  $\{(0, -2)\}$                       (3)  $\{(1, 6)\}$   
(2)  $\{(0, -2), (1, 6)\}$               (4)  $\{(1, 1), (6, 16)\}$
- 6 Which statement about statistical analysis is *false*?
- (1) Experiments can suggest patterns and relationships in data.  
(2) Experiments can determine cause and effect relationships.  
(3) Observational studies can determine cause and effect relationships.  
(4) Observational studies can suggest patterns and relationships in data.

- 7 The expression  $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$  is equivalent to

- (1)  $-\sqrt[6]{m^5}$                       (3)  $-m^5\sqrt{m}$   
(2)  $\frac{1}{\sqrt[6]{m^5}}$                       (4)  $\frac{1}{m^5\sqrt{m}}$



Use this space for computations.

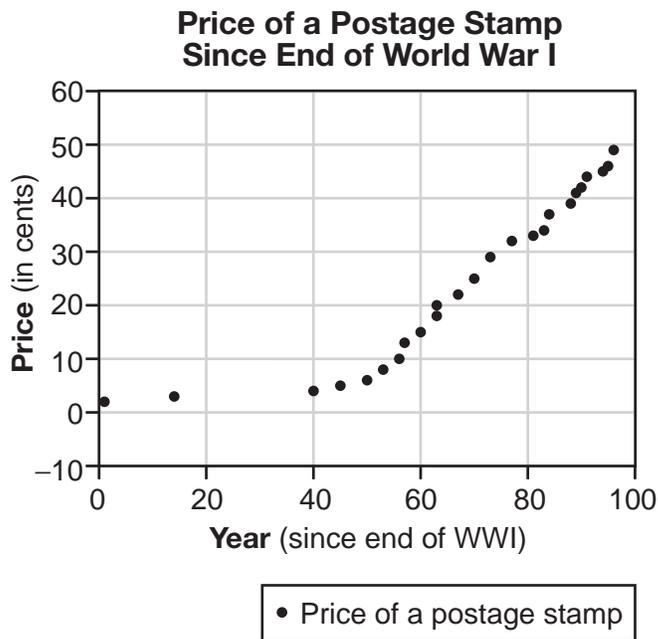
11 The solution to the equation  $18x^2 - 24x + 87 = 0$  is

- (1)  $-\frac{2}{3} \pm 6i\sqrt{158}$                       (3)  $\frac{2}{3} \pm 6i\sqrt{158}$   
(2)  $-\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$                       (4)  $\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$

12 When  $g(x) = \frac{2}{x+2}$  and  $h(x) = \log(x + 1) + 3$  are graphed on the same set of axes, which coordinates best approximate their point of intersection?

- (1)  $(-0.9, 1.8)$                               (3)  $(1.4, 3.3)$   
(2)  $(-0.9, 1.9)$                               (4)  $(1.4, 3.4)$

13 The price of a postage stamp in the years since the end of World War I is shown in the scatterplot below.



The equation that best models the price, in cents, of a postage stamp based on these data is

- (1)  $y = 0.59x - 14.82$                       (3)  $y = 1.43(1.04)^x$   
(2)  $y = 1.04(1.43)^x$                       (4)  $y = 24\sin(14x) + 25$



Use this space for computations.

17 What is the solution, if any, of the equation

$$\frac{2}{x+3} - \frac{3}{4-x} = \frac{2x-2}{x^2-x-12} ?$$

- (1)  $-1$  (3) all real numbers  
(2)  $-5$  (4) no real solution

18 In 2013, approximately 1.6 million students took the Critical Reading portion of the SAT exam. The mean score, the modal score, and the standard deviation were calculated to be 496, 430, and 115, respectively. Which interval reflects 95% of the Critical Reading scores?

- (1)  $430 \pm 115$  (3)  $496 \pm 115$   
(2)  $430 \pm 230$  (4)  $496 \pm 230$

19 Which statement regarding the graphs of the functions below is *untrue*?

$$\begin{aligned} f(x) &= 3 \sin 2x, \text{ from } -\pi < x < \pi & h(x) &= \log_2 x \\ g(x) &= (x - 0.5)(x + 4)(x - 2) & j(x) &= -|4x - 2| + 3 \end{aligned}$$

- (1)  $f(x)$  and  $j(x)$  have a maximum  $y$ -value of 3.  
(2)  $f(x)$ ,  $h(x)$ , and  $j(x)$  have one  $y$ -intercept.  
(3)  $g(x)$  and  $j(x)$  have the same end behavior as  $x \rightarrow -\infty$ .  
(4)  $g(x)$ ,  $h(x)$ , and  $j(x)$  have rational zeros.

20 When  $g(x)$  is divided by  $x + 4$ , the remainder is 0. Given  $g(x) = x^4 + 3x^3 - 6x^2 - 6x + 8$ , which conclusion about  $g(x)$  is true?

- (1)  $g(4) = 0$   
(2)  $g(-4) = 0$   
(3)  $x - 4$  is a factor of  $g(x)$ .  
(4) No conclusion can be made regarding  $g(x)$ .

**Use this space for computations.**

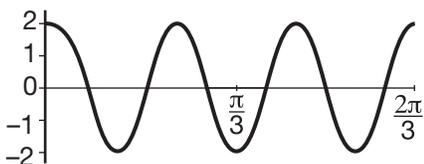
- 21 Joelle has a credit card that has a 19.2% annual interest rate compounded monthly. She owes a total balance of  $B$  dollars after  $m$  months. Assuming she makes no payments on her account, the table below illustrates the balance she owes after  $m$  months.

$m$	$B$
0	1000.00
10	1172.00
19	1352.00
36	1770.80
60	2591.90
69	2990.00
72	3135.80
73	3186.00

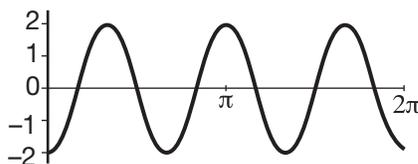
Over which interval of time is her average rate of change for the balance on her credit card account the greatest?

- (1) month 10 to month 60      (3) month 36 to month 72  
 (2) month 19 to month 69      (4) month 60 to month 73

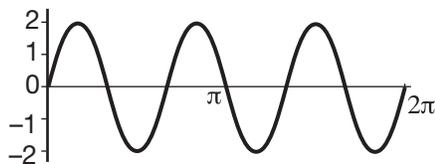
- 22 Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of  $\frac{2\pi}{3}$ ?



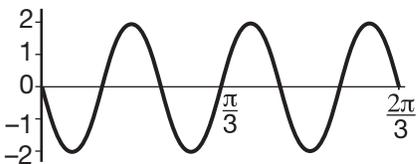
(1)



(3)



(2)



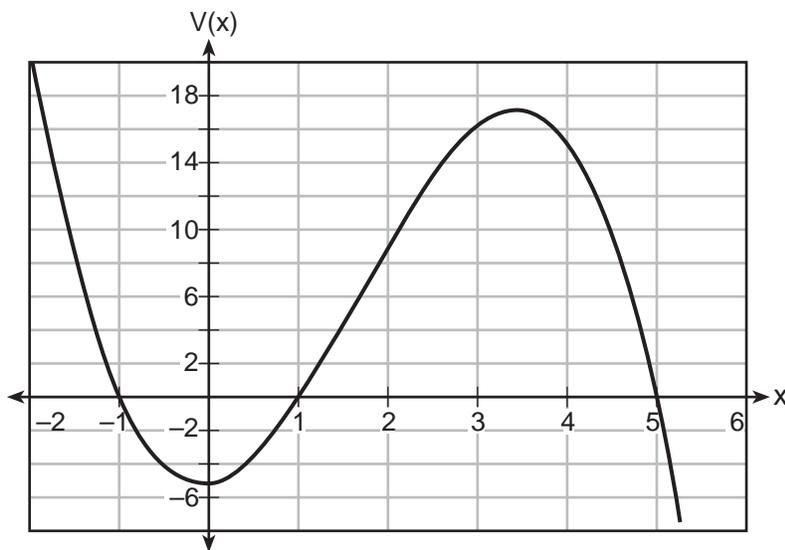
(4)

Use this space for computations.

23 According to a pricing website, Indroid phones lose 58% of their cash value over 1.5 years. Which expression can be used to estimate the value of a \$300 Indroid phone in 1.5 years?

- (1)  $300e^{-0.87}$                       (3)  $300e^{-0.58}$   
(2)  $300e^{-0.63}$                       (4)  $300e^{-0.42}$

24 A cardboard box manufacturing company is building boxes with length represented by  $x + 1$ , width by  $5 - x$ , and height by  $x - 1$ . The volume of the box is modeled by the function below.



Over which interval is the volume of the box changing at the fastest average rate?

- (1)  $[1,2]$                               (3)  $[1,5]$   
(2)  $[1,3.5]$                             (4)  $[0,3.5]$
-

## Part II

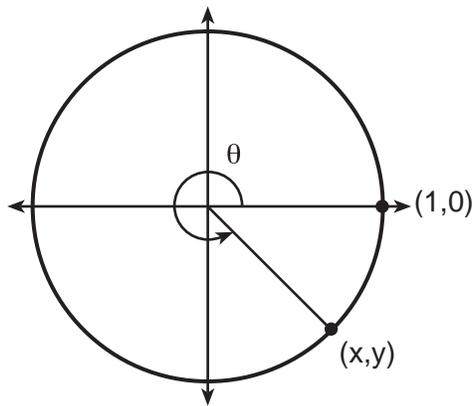
Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 Express  $(1 - i)^3$  in  $a + bi$  form.

**26** An orange-juice processing plant receives a truckload of oranges. The quality control team randomly chooses three pails of oranges, each containing 50 oranges, from the truckload. Identify the sample and the population in the given scenario.

State *one* conclusion that the quality control team could make about the population if 5% of the sample was found to be unsatisfactory.

27 Using the unit circle below, explain why  $\csc\theta = \frac{1}{y}$ .

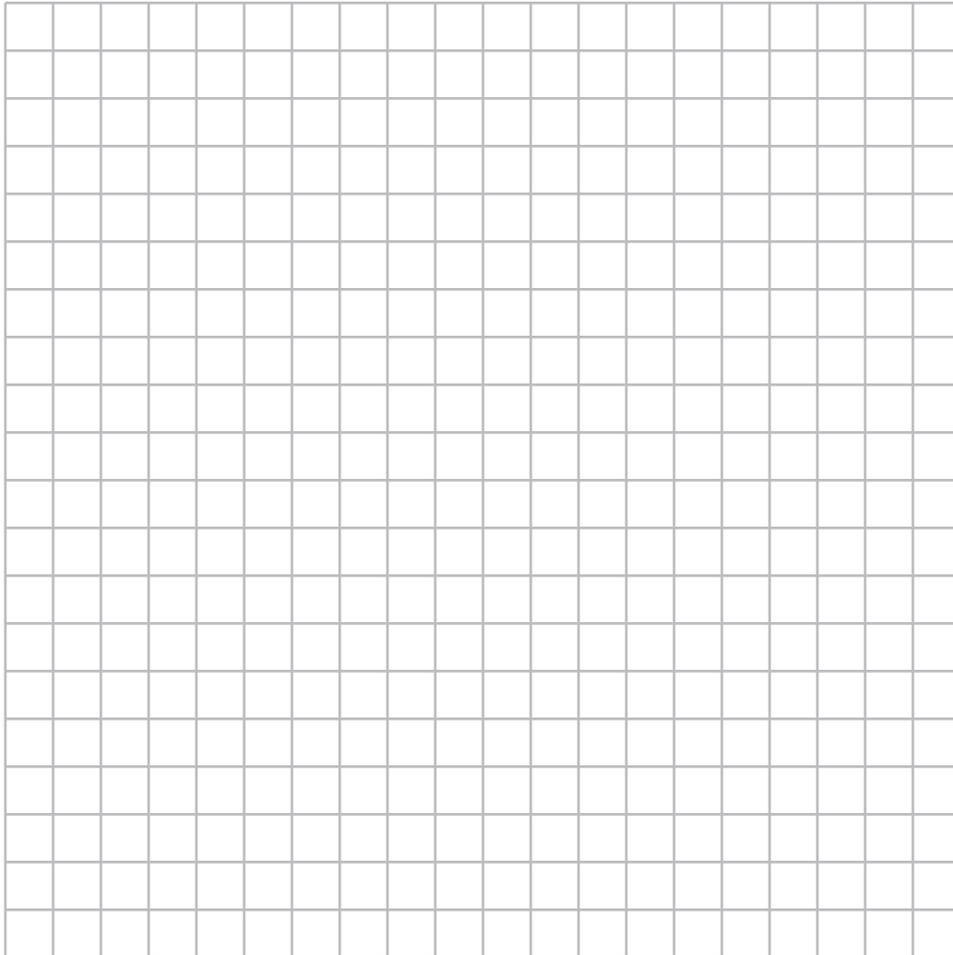


**28** The function  $M(t)$  represents the mass of radium over time,  $t$ , in years.

$$M(t) = 100e^{\frac{\left(\ln \frac{1}{2}\right)t}{1590}}$$

Determine if the function  $M(t)$  represents growth or decay. Explain your reasoning.

**29** On the grid below, sketch a cubic polynomial whose zeros are 1, 3, and  $-2$ .



**30** Given the equal terms  $\sqrt[3]{x^5}$  and  $y^{\frac{5}{6}}$ , determine and state  $y$ , in terms of  $x$ .

31 The results of a survey of the student body at Central High School about television viewing preferences are shown below.

	<b>Comedy Series</b>	<b>Drama Series</b>	<b>Reality Series</b>	<b>Total</b>
<b>Males</b>	95	65	70	230
<b>Females</b>	80	70	110	260
<b>Total</b>	175	135	180	490

Are the events “student is a male” and “student prefers reality series” independent of each other? Justify your answer.

**32** Given  $f(x) = 3x^2 + 7x - 20$  and  $g(x) = x - 2$ , state the quotient and remainder of  $\frac{f(x)}{g(x)}$ , in the form  $q(x) + \frac{r(x)}{g(x)}$ .

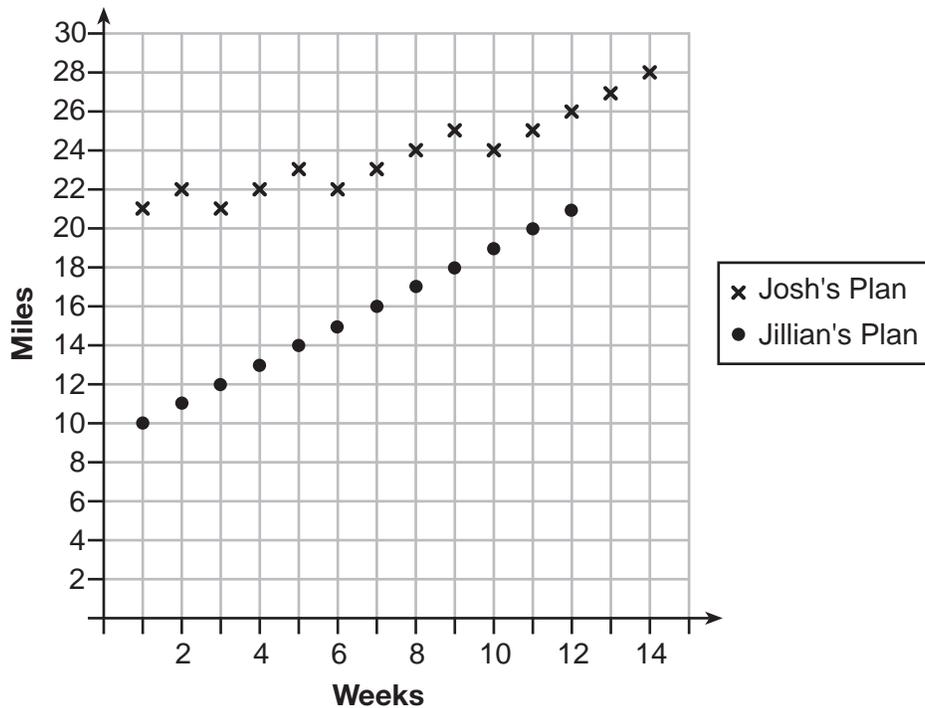
### Part III

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 Algebraically determine the values of  $h$  and  $k$  to correctly complete the identity stated below.

$$2x^3 - 10x^2 + 11x - 7 = (x - 4)(2x^2 + hx + 3) + k$$

34 Elaina has decided to run the Buffalo half-marathon in May. She researched training plans on the Internet and is looking at two possible plans: Jillian's 12-week plan and Josh's 14-week plan. The number of miles run per week for each plan is plotted below.



Which one of the plans follows an arithmetic pattern? Explain how you arrived at your answer.

Write a recursive definition to represent the number of miles run each week for the duration of the plan you chose.

Jillian's plan has an alternative if Elaina wanted to train instead for a full 26-mile marathon. Week one would start at 13 miles and follow the same pattern for the half-marathon, but it would continue for 14 weeks. Write an explicit formula, in *simplest form*, to represent the number of miles run each week for the full-marathon training plan.

**35** The guidance department has reported that of the senior class, 2.3% are members of key club,  $K$ , 8.6% are enrolled in AP Physics,  $P$ , and 1.9% are in both.

Determine the probability of  $P$  given  $K$ , to the *nearest tenth of a percent*.

The principal would like a basic interpretation of these results. Write a statement relating your calculated probabilities to student enrollment in the given situation.

**36** Using the formula below, determine the monthly payment on a 5-year car loan with a monthly percentage rate of 0.625% for a car with an original cost of \$21,000 and a \$1000 down payment, to the *nearest cent*.

$$P_n = PMT \left( \frac{1 - (1 + i)^{-n}}{i} \right)$$

$P_n$  = present amount borrowed

$n$  = number of monthly pay periods

$PMT$  = monthly payment

$i$  = interest rate per month

The affordable monthly payment is \$300 for the same time period. Determine an appropriate down payment, to the *nearest dollar*.

#### 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]

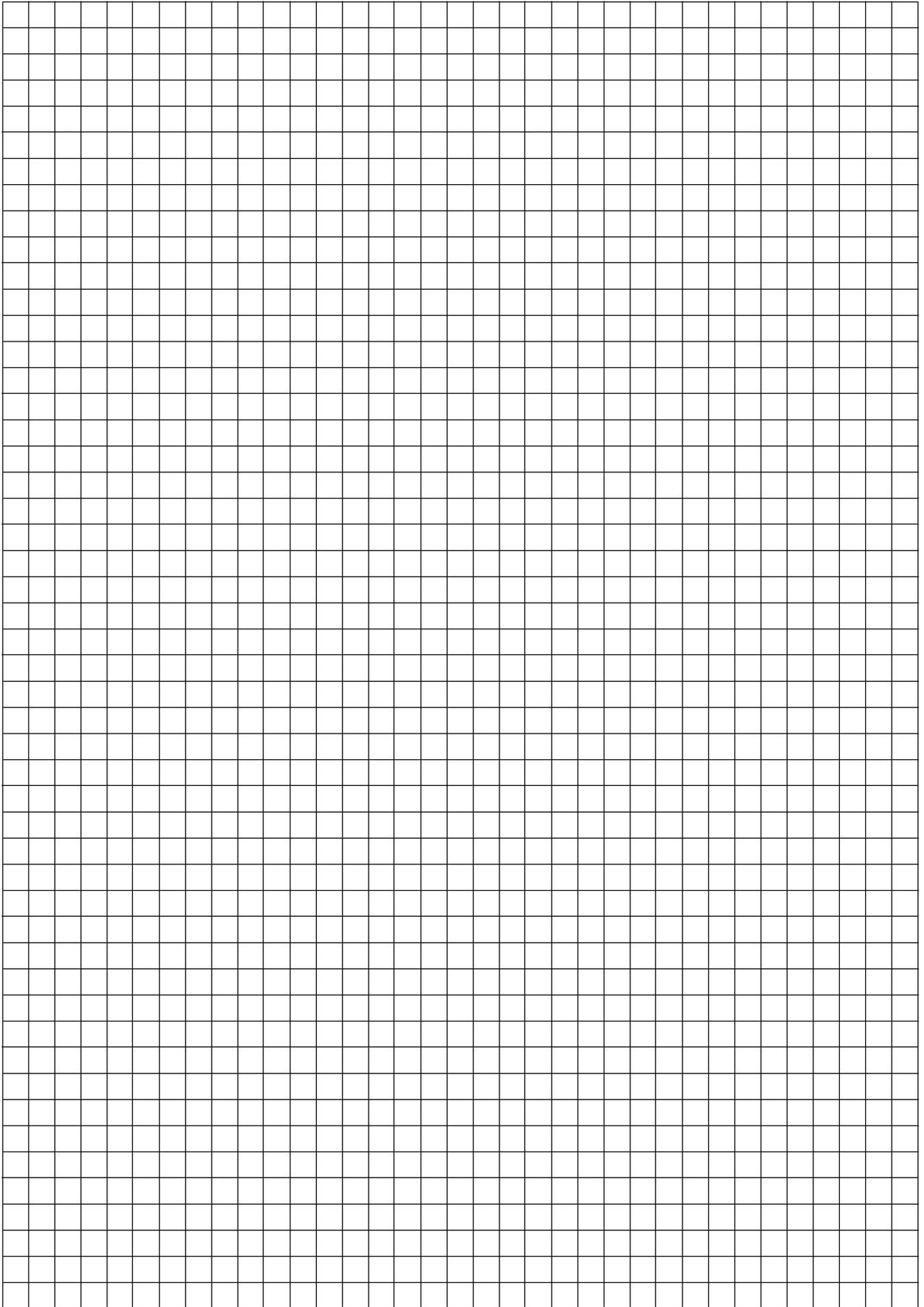
37 The speed of a tidal wave,  $s$ , in hundreds of miles per hour, can be modeled by the equation  $s = \sqrt{t} - 2t + 6$ , where  $t$  represents the time from its origin in hours. Algebraically determine the time when  $s = 0$ .

How much faster was the tidal wave traveling after 1 hour than 3 hours, to the *nearest mile per hour*? Justify your answer.

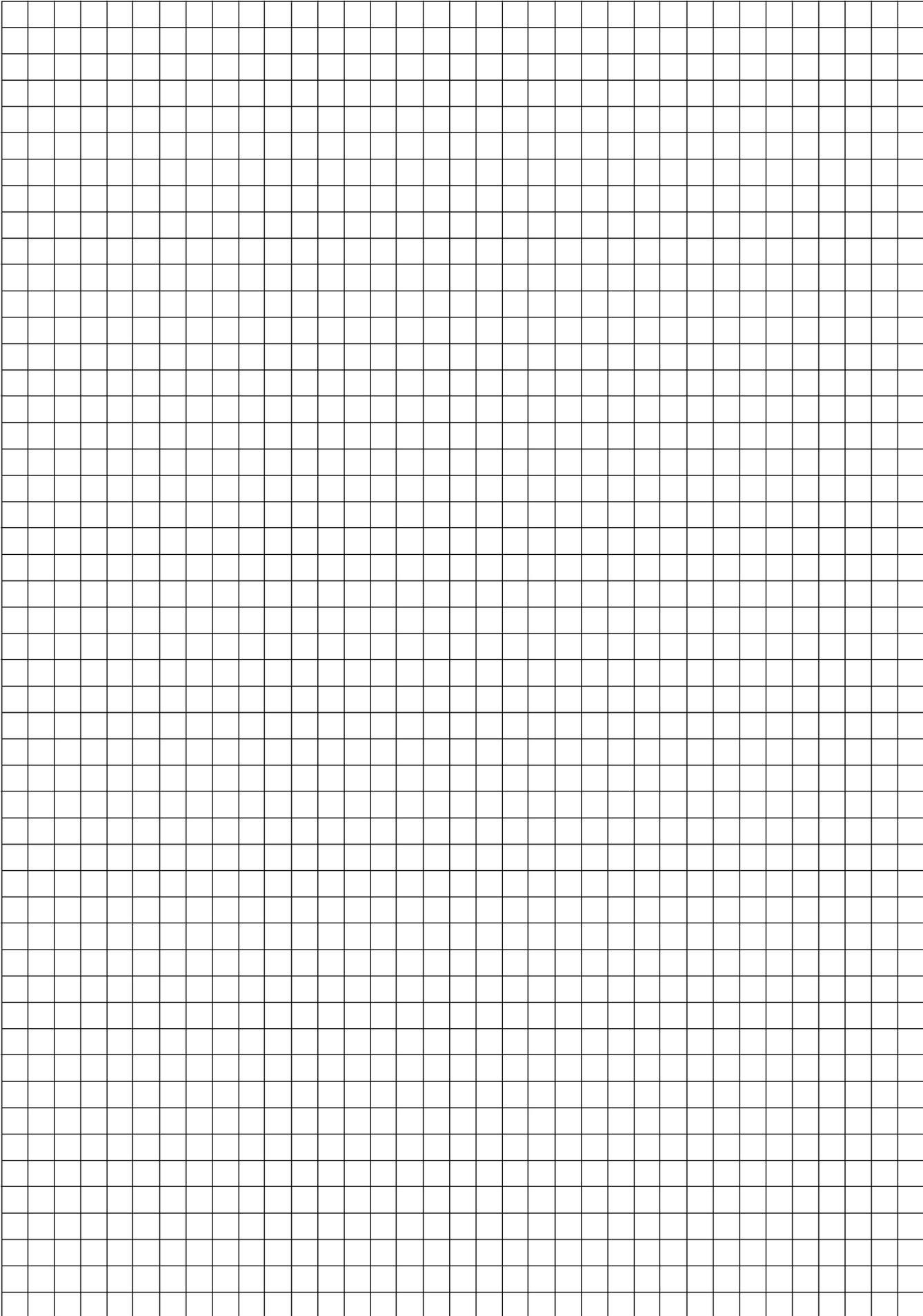
**Scrap Graph Paper — this sheet will not be scored.**

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



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## High School Math Reference Sheet

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

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

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





ALGEBRA II (COMMON CORE)

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ALGEBRA II (COMMON CORE)

# FOR TEACHERS ONLY

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

## ALGEBRA II (Common Core)

Friday, January 27, 2017 — 9:15 a.m. to 12:15 p.m., only

### SCORING KEY AND RATING GUIDE

#### Mechanics of Rating

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

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> by Friday, January 27, 2017. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

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

### Part I

Allow a total of 48 credits, 2 credits for each of the following.

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

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

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

# 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 (Common Core) 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 (Common Core)*, 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]  $-2 - 2i$

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

*or*

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

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

(26) [2] Sample: three pails of oranges, population: the truckload of oranges, and a correct conclusion is stated.

[1] One conceptual error is made.

*or*

[1] Three pails of oranges, the truckload of oranges, but they are labeled incorrectly or not at all. A correct conclusion is stated.

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

(27) [2] A correct explanation is written.

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

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

- (28) [2] Decay, and a correct explanation is written.
- [1] Appropriate work is shown, but one computational error is made.
- or**
- [1] Appropriate work is shown, but one conceptual error is made.
- or**
- [1] Decay, but an incomplete explanation is written.
- [0] Decay, but no explanation is written.
- or**
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (29) [2] A correct sketch is drawn that includes intercepts at (1,0), (3,0), and (-2,0).
- [1] One graphing error is made.
- or**
- [1] One conceptual error is made.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (30) [2]  $y = x^2$  or equivalent, and correct algebraic 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]  $y = x^2$ , but no work is shown.
- or**
- [1] Appropriate work is shown, but the expression  $x^2$  is written.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(31) [2] No, 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] No, but an incomplete justification is given.

[0] No, but no justification is given.

*or*

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

(32) [2]  $3x + 13 + \frac{6}{x - 2}$ , 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] The quotient  $3x + 13$  and the remainder 6 are found, but no further correct work is shown.

*or*

[1] Appropriate work is shown to find 3, 13, and 6 by synthetic division, but no further correct work is shown.

*or*

[1]  $3x + 13 + \frac{6}{x - 2}$ , but no work is shown.

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

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### 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]  $h = -2$ ,  $k = 5$ , and correct work is shown.
- [3] Appropriate work is shown, but one computational or simplification error is made.
- or*
- [3] Appropriate work is shown, but the answers are not labeled or labeled incorrectly.
- [2] Appropriate work is shown, but two or more computational or simplification errors are made.
- or*
- [2] Appropriate work is shown, but one conceptual error is made.
- or*
- [2] Appropriate work is shown to find  $h = -2$  or  $k = 5$ .
- [1] Appropriate work is shown, but one conceptual error and one computational or simplification error are made.
- or*
- [1]  $h = -2$ ,  $k = 5$ , but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(34) [4] Jillian's plan, a correct explanation,  $\begin{cases} a_1 = 10 \\ a_n = a_{n-1} + 1 \end{cases}$  and  $a_n = 12 + n$  or equivalent equations are written.

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

**or**

[3] Appropriate work is shown, but Jillian is not stated or the explanation is missing or incorrect.

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

**or**

[2] Jillian's plan, a correct explanation, and  $\begin{cases} a_1 = 10 \\ a_n = a_{n-1} + 1 \end{cases}$ , but no further correct work is shown.

**or**

[2]  $a_n = 12 + n$ , but no further correct work is shown.

[1] Jillian's plan and a correct explanation, but no further correct work is shown.

**or**

[1] A correct recursive formula is written, but no further correct work is shown.

[0] Jillian's plan, but no further correct work is shown.

**or**

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

- (35) [4] 82.6% and correct work is shown, and a correct statement is written.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- or**
- [3] Appropriate work is shown to find 82.6%, but the statement is missing or incorrect.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made.
- or**
- [2] Appropriate work is shown, but one conceptual error is made.
- or**
- [2] Appropriate work is shown to find the probability of  $(K|P)$  as 22.1%, and an appropriate statement is written.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or**
- [1] The formula for determining conditional probability is written, but no further correct work is shown.
- or**
- [1] Appropriate work is shown to find 22.1%, but a statement is missing or incorrect.
- or**
- [1] 82.6%, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- (36) [4] \$400.76 and \$6028 and correct work is shown.
- [3] Appropriate work is shown, but one computational or rounding error is made.
- [2] Appropriate work is shown, but two or more computational or rounding errors are made.
- or*
- [2] Appropriate work is shown, but one conceptual error is made.
- or*
- [2] Appropriate work is shown to find \$400.76, but no further correct work is shown.
- or*
- [2] Appropriate work is shown to find \$6028, but no further correct work is shown.
- or*
- [2] \$400.76 and \$6028, but no work is shown.
- [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or*
- [1] \$400.76 or \$6028, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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## Part IV

For each 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] 4, and correct algebraic work is shown, 327 and correct work is shown.
- [5] Appropriate work is shown, but one computational, factoring, simplification, or rounding error is made.
- or*
- [5] Appropriate work is shown to find 4, 2.25, and 327, but 2.25 is not rejected.
- or*
- [5] Appropriate work is shown, but no conversion to miles is made.
- [4] Appropriate work is shown, but two computational, factoring, simplification, or rounding errors are made.
- or*
- [4] Appropriate work is shown, but one conceptual error is made.
- or*
- [4] Appropriate work is shown to find 4, but no further correct work is shown.
- or*
- [4] 4, but a method other than algebraic is used, and 327 is given.
- [3] Appropriate work is shown, but three or more computational, factoring, simplification, or rounding errors are made.
- or*
- [3] Appropriate work is shown, but one conceptual error and one computational, factoring, simplification, or rounding error are made.
- [2] Appropriate work is shown, but two conceptual errors are made.
- or*
- [2] A quadratic equation in standard form is written, but no further correct work is shown.
- or*
- [2] Appropriate work is shown to find 327, but no further correct work is shown.
- or*
- [2] 4 and 327, but no work is shown.

[1] Appropriate work is shown, but two conceptual errors and one computational, factoring, simplification, or rounding errors are made.

*or*

[1] 4 or 327, but no work is shown.

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

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