ALGEBRA

II

Large-Type Edition

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

ALGEBRA II

Wednesday, June 10, 2026 — 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 36 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 Which value is a zero of $a(x) = x^3 + 3x^2 - 4x - 12$?

(1) -12

(2) -3

(3) 3

(4) 0

2 Annie, Brianna, Chandra, Dee, Evan, and Fe are the six candidates running for office in Parkway High School's student organization. If Brianna and Dee are running for president and P is the set of candidates running for president, what is P', the complement of P?

(1) { }

(2) {Annie, Brianna, Chandra, Dee, Evan, Fe}

(3) {Brianna, Dee}

(4) {Annie, Chandra, Evan, Fe}

Use this space for computations.

3 A man wants to have his car repaired but does not want to spend more than \$1500 for the repairs. The mechanic says that the parts needed will cost \$930 and the labor will cost an additional \$65 per hour. Which inequality could be used to find the greatest number of hours, h, the mechanic can work without exceeding this man's budget?

(1) $995h \leq 1500$

(2) $65 + 930h > 505$

(3) $930 + 65h \leq 1500$

(4) $930 + 65h > 1500$

4 Given $x \neq -1$, $\frac{x^3 + 5x^2 + 2x - 8}{x + 1}$ is equivalent to

(1) $x^2 + 4x + 2 - \frac{10}{x + 1}$

(2) $x^2 + 6x + 8$

(3) $x^2 + 6x - 4 - \frac{4}{x + 1}$

(4) $x^2 + 4x - 2 - \frac{6}{x + 1}$

5 The expression $k^3 \cdot \sqrt[3]{8k^2}$ can be rewritten as

(1) $2k^{\frac{11}{3}}$

(2) $2k^5$

(3) $24k^2$

(4) $4k^{\frac{11}{3}}$

Use this space for computations.

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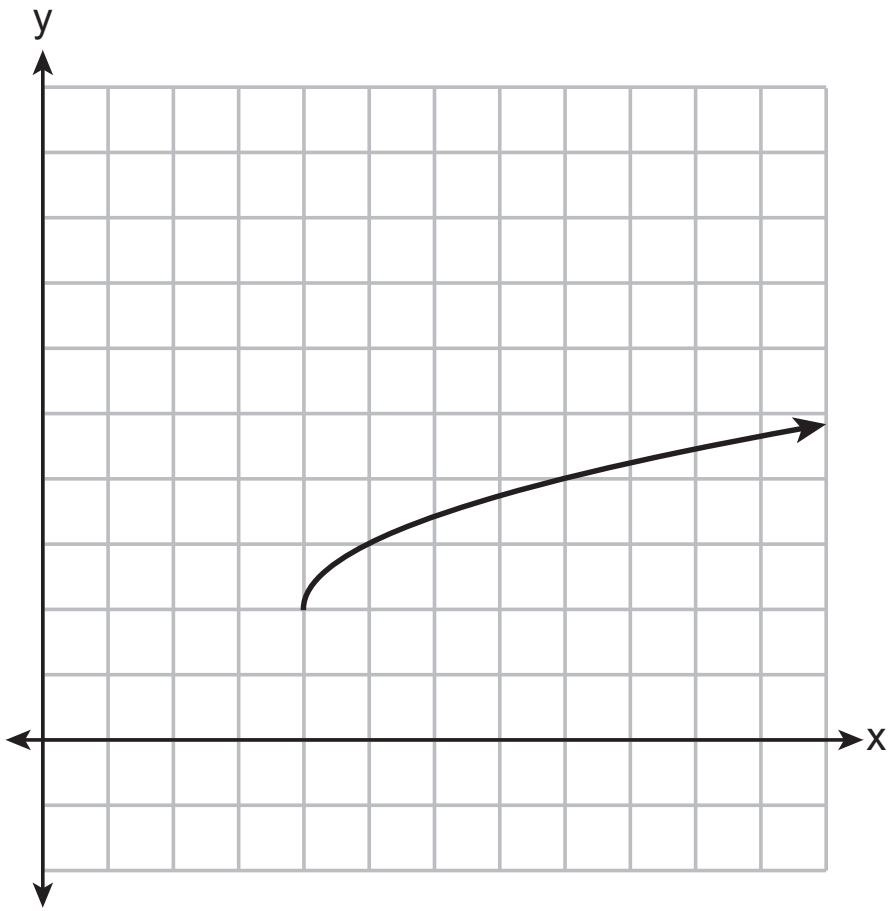
Use this space for computations.

6 Consider the graph of $y = f(x)$ below.

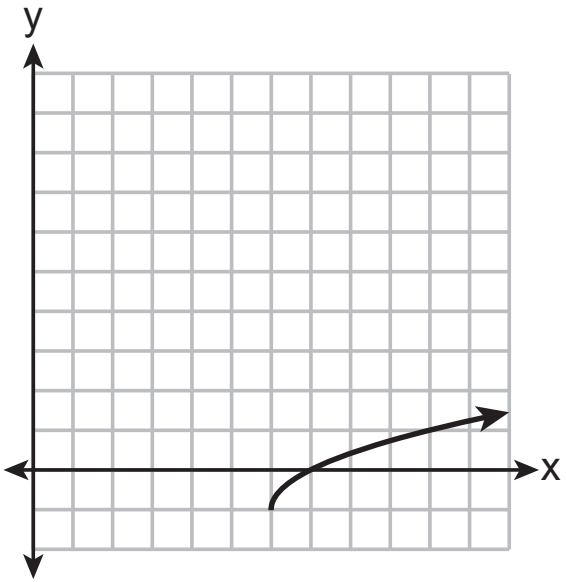


Question 6 is continued below.

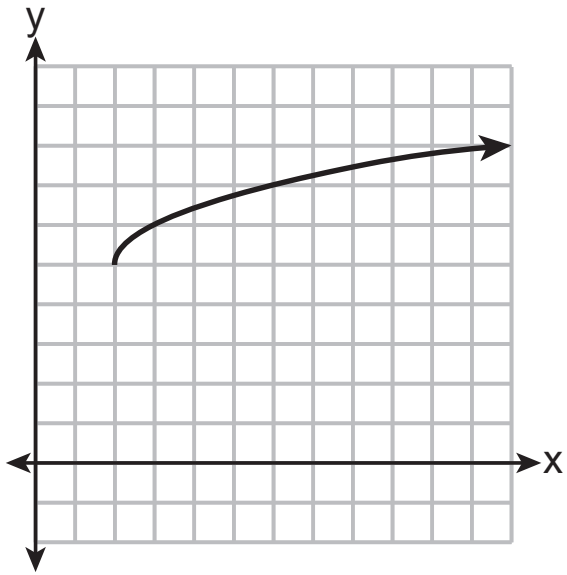
Question 6 continued

Use this space for computations.

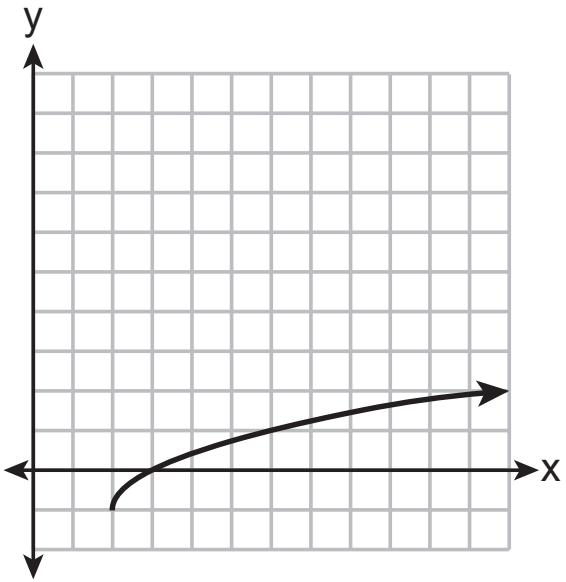
Which graph represents $y = f(x + 2) - 3$?



(1)



(3)



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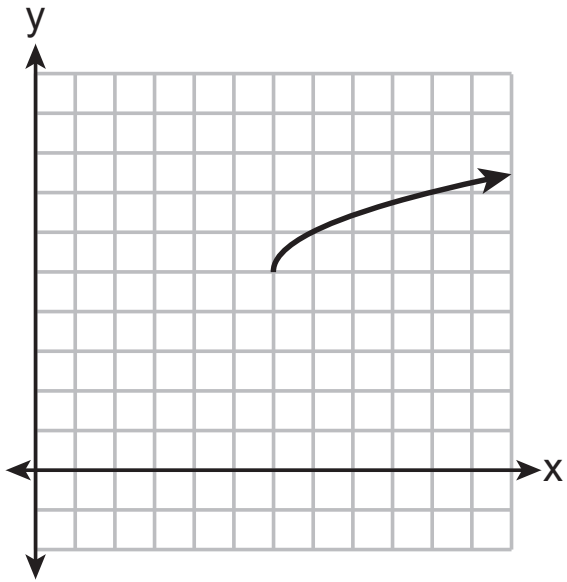


(4)

Use this space for computations.

7 What is the growth rate of the function $y = 475(1.038)^x$?

(1) 1.038%

(2) 0.038%

(3) 3.8%

(4) 38%

8 What are the solutions to the system of equations below?

$$(x - 5)^2 + y^2 - 16 = 0$$
$$x + y - 9 = 0$$

(1) $x = 5$ and $x = 9$

(2) (5, 4), only

(3) (9, 0), only

(4) (5, 4) and (9, 0)

Use this space for computations.

9 The sum of the first five terms of the geometric sequence 800, 600, 450, … is

(1) 253.125

(2) 300

(3) 2440.625

(4) 2500

10 The number of hours per day of total screen time on electronic devices for the 3000 students at Lakeside High School is approximately normally distributed with a mean of 4.6 hours and a standard deviation of 2.5 hours. Approximately how many students at the school spent more than 5 hours per day on electronic devices?

(1) 1691

(2) 1309

(3) 880

(4) 863

Use this space for computations.

11 What is the solution set to the equation $\frac{4x}{4x-3} + \frac{2}{x} = \frac{3}{4x-3}$?

(1) $\{-2\}$

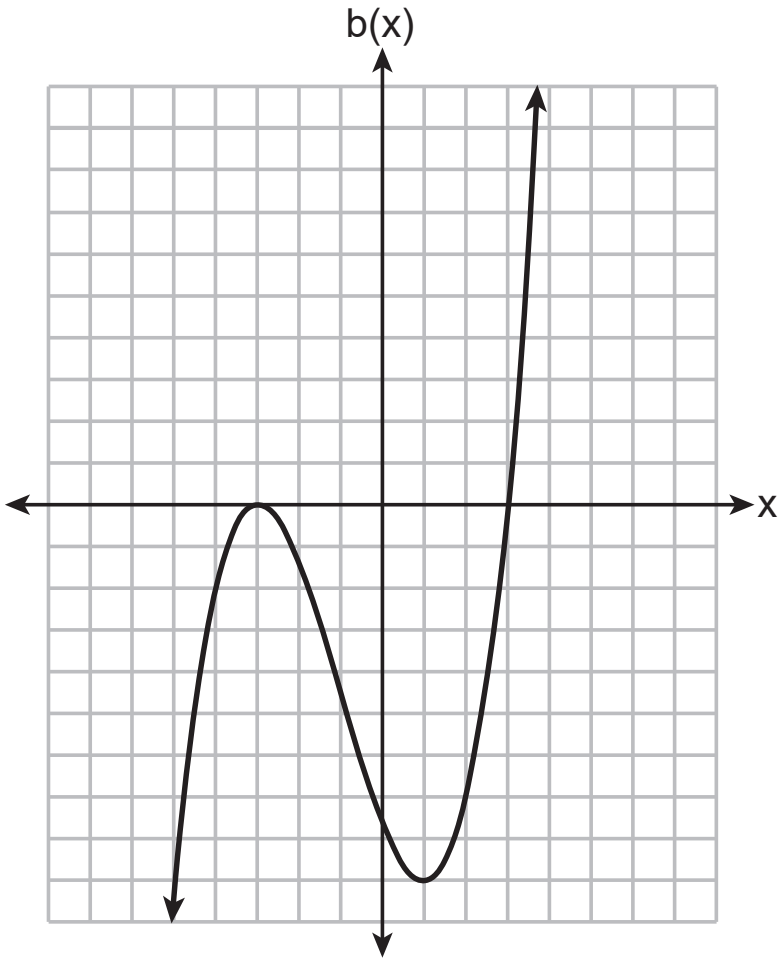
(2) $\left\{\frac{3}{4}\right\}$

(3) $\left\{-2, \frac{3}{4}\right\}$

(4) $\{\ \}$

Use this space for computations.

12 The cubic polynomial function $b(x)$ is graphed below.



Which statement is true for this function?

(1) The leading coefficient of this function is negative.

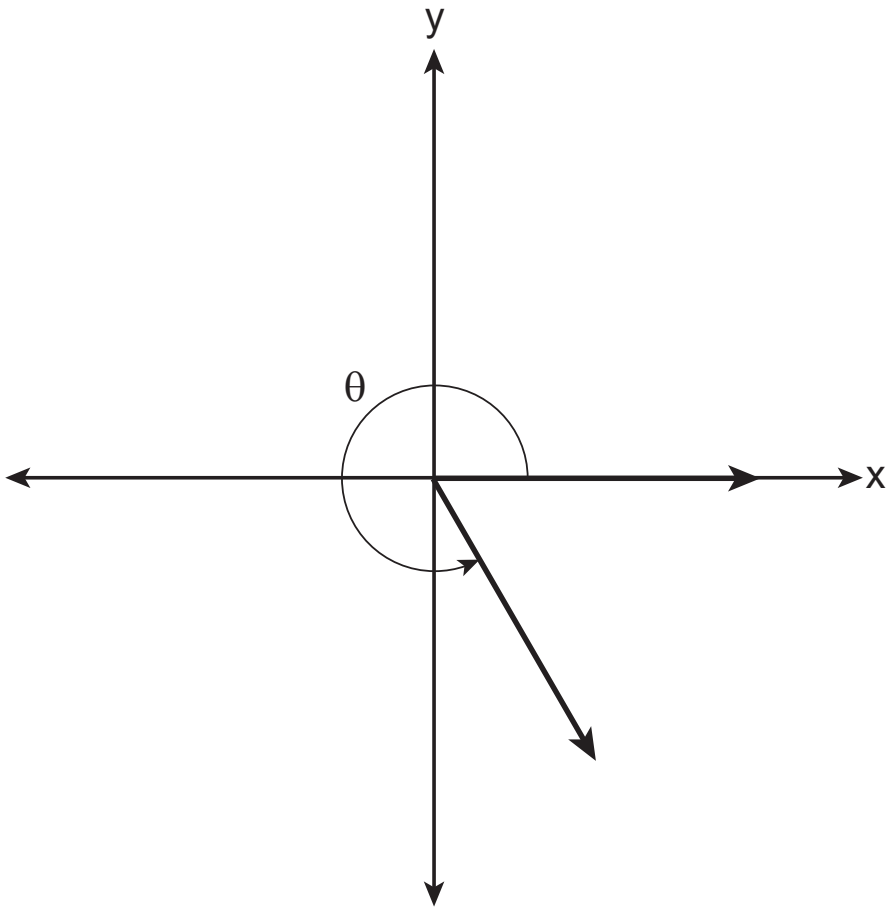
(2) A real root is repeated since it has a multiplicity greater than 1.

(3) The function is increasing over the domain $-3 < x < 1$.

(4) As $x \to -\infty$, $b(x) \to \infty$.

13 Consider the diagram shown below, where θ is an angle in standard position, and $0 \leq \theta < 2\pi$.

Use this space for computations.



Which value could represent the radian measure of θ?

(1) $\frac{5\pi}{6}$

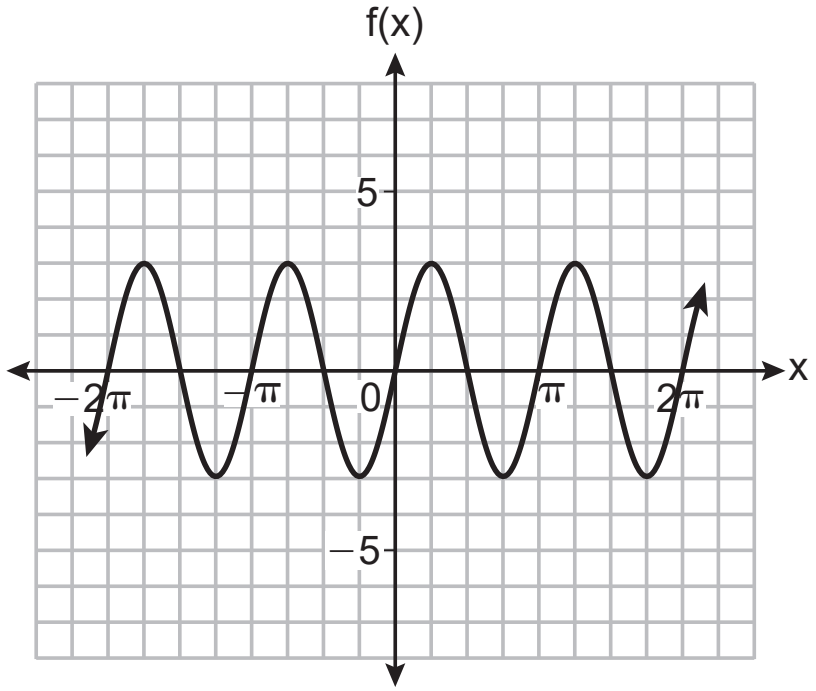
(2) $\frac{5\pi}{3}$

(3) $\frac{4\pi}{3}$

(4) $-\frac{\pi}{3}$

Use this space for computations.

14 The graph of the sinusoidal function $f(x)$ is shown below.



The function g is defined by the equation $g(x) = 2\sin(3x)$. Which statement is true?

(1) f has a greater maximum and a higher frequency than g.

(2) f has a smaller maximum and a higher frequency than g.

(3) f has a greater maximum and a lower frequency than g.

(4) f has a smaller maximum and a lower frequency than g.

Use this space for computations.

15 The expression $\left(\frac{1}{x^2}\right)^{-\frac{3}{4}}$, $x \neq 0$, is equivalent to

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

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

(3) $-\left(\sqrt[4]{\frac{1}{x^2}}\right)^3$

(4) $-\left(\sqrt[3]{\frac{1}{x^2}}\right)^4$

16 The expression $3xy - 27x^3y^3$ is equivalent to

(1) $3xy(1 + 9x^2y^2)$

(2) $3xy(1 + 9xy)(1 - 9xy)$

(3) $3xy(1 + xy)(1 - xy)$

(4) $3xy(1 + 3xy)(1 - 3xy)$

Use this space for computations.

17 If $f(x) = (x^2 + x + 3)$ and $g(x) = (x^2 - 8x + 1)$, then $f(x) \bullet g(x)$ is equal to

(1) $x^4 - 9x^3 - 4x^2 - 23x + 3$

(2) $x^4 - 7x^3 + 5x^2 - 23x + 3$

(3) $x^4 - 7x^3 - 4x^2 - 25x + 3$

(4) $x^4 - 7x^3 - 4x^2 - 23x + 3$

18 Researchers want to see if drivers are more distracted by talking on a cell phone than talking to a passenger. From a group of 100 college students, half were randomly assigned to drive in a simulator while talking on a cell phone. The other half drove in a simulator while talking to a passenger. Researchers recorded whether or not the drivers safely exited a simulated highway at the designated exit. Is this an observational study?

(1) No, because researchers randomly assigned a treatment on students.

(2) Yes, because the researchers observed what students were doing while driving.

(3) No, because the researchers should have randomly assigned some students to drive without talking.

(4) Yes, because the students were divided into two groups of equal size.

Use this space for computations.

19 If $f(x) = 3^x$, then $f^{-1}(x)$ equals

(1) $\log_3(x)$

(2) $\log_3(3)$

(3) 3^{-x}

(4) x^3

20 Given $f(x) = |x + 1| - 2$ and $g(x) = -\sqrt[3]{x - 3}$, what are the solutions to the equation $f(x) = g(x)$?

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

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

(3) $\{-5, 2\}$

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

Use this space for computations.

21 The expression $3xi^2 - 2yi^3 + 7xi^6 - 4yi^5$, in simplest $a + bi$ form, is

(1) $-10x - 2yi$

(2) $10x + 2yi$

(3) $10x - 6y$

(4) $4xyi^{16}$

22 Which values of a and b will make the function $f(x) = \sin(ax) + b$ an odd function?

(1) $a = 1, b = 0$

(2) $a = 1, b = 4$

(3) $a = 3, b = 1$

(4) $a = 3, b = 4$

Use this space for computations.

23 When solved for x, what is the solution to the equation $a(10^x) = 60$, where $a > 1$?

(1) $x = \dfrac{\log(60)}{a}$

(2) $x = \dfrac{\log(60)}{\log(10a)}$

(3) $x = \log(60)$

(4) $x = \log\left(\dfrac{60}{a}\right)$

24 Potassium-42 is a radioisotope of potassium that has a half-life of 12.4 hours. Which expression approximates the amount of a 500-gram sample of potassium-42 remaining after t hours?

(1) $500(0.1670)^t$

(2) $500(0.9456)^t$

(3) $500(1.0575)^t$

(4) $500(1.5609)^t$

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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 Given $a_1 = 5$ and $a_n = (a_{n-1})^2 + 4$, determine a_3.

Work space for Question 25 is continued on the page below.

Question 25 continued

26 The table below shows the average tuition and fees for four-year colleges in the U.S. since 1970.

Years Since 1970 (x)	1	10	20	30	40	49
Tuition and Fees in Dollars (y)	5534	5099	7878	11,079	15,408	17,030

Write an exponential regression equation for this set of data, rounding all values to the *nearest thousandth.*

Work space for question 26
is continued on the page below.

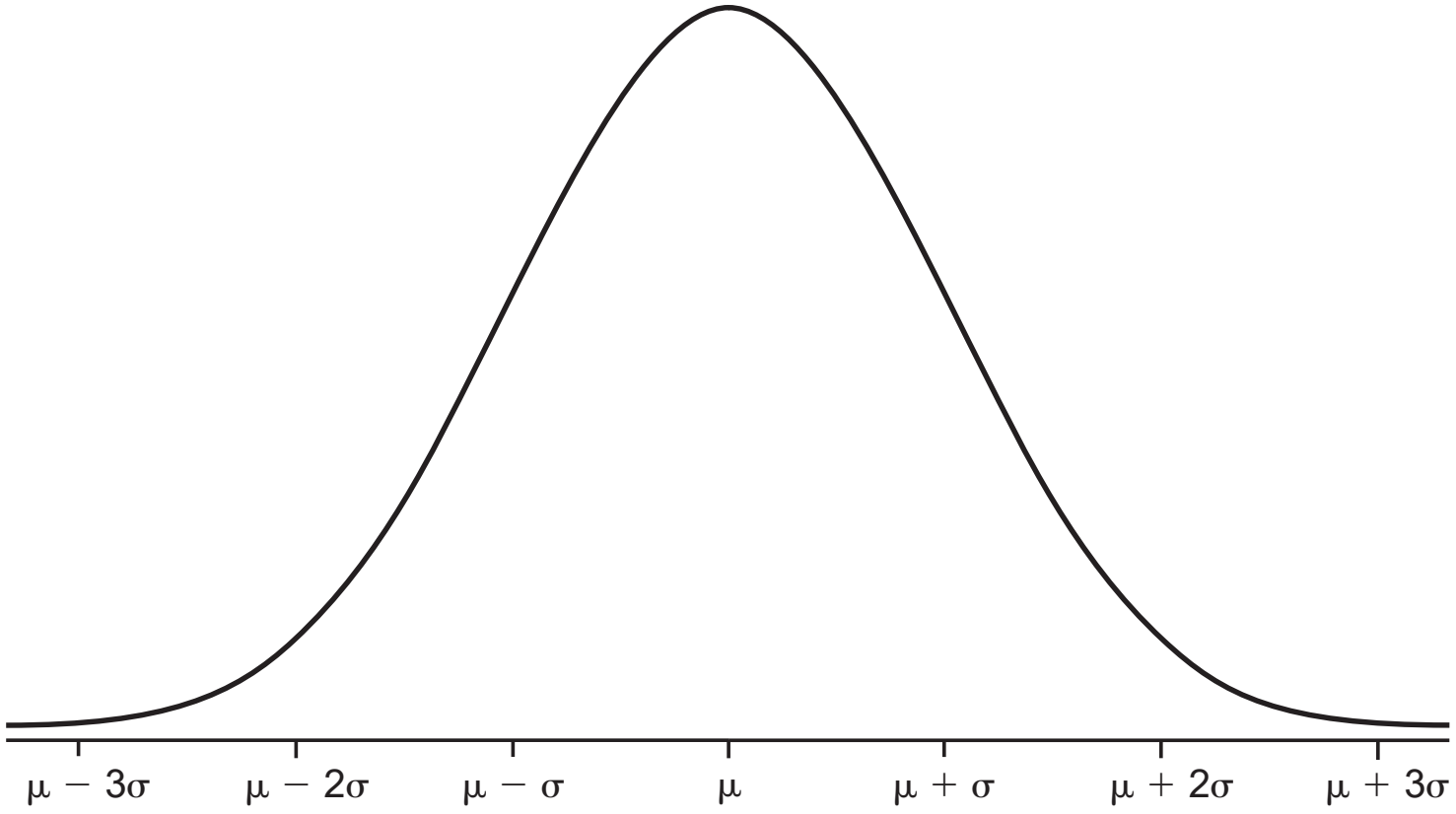
Question 26 continued

27 Given $f(x) = 3x^3 - 2x + 5$, determine the remainder when $f(x)$ is divided by $x - 2$.

Work space for question 27 is continued on the page below.

Question 27 continued

28 In the U.S., the number of hours people sleep per day is approximately normally distributed with a mean of eight hours and a standard deviation of one hour. Write the seven values representing hours of sleep on the labeled increments below.



Question 28 is continued on the page below.

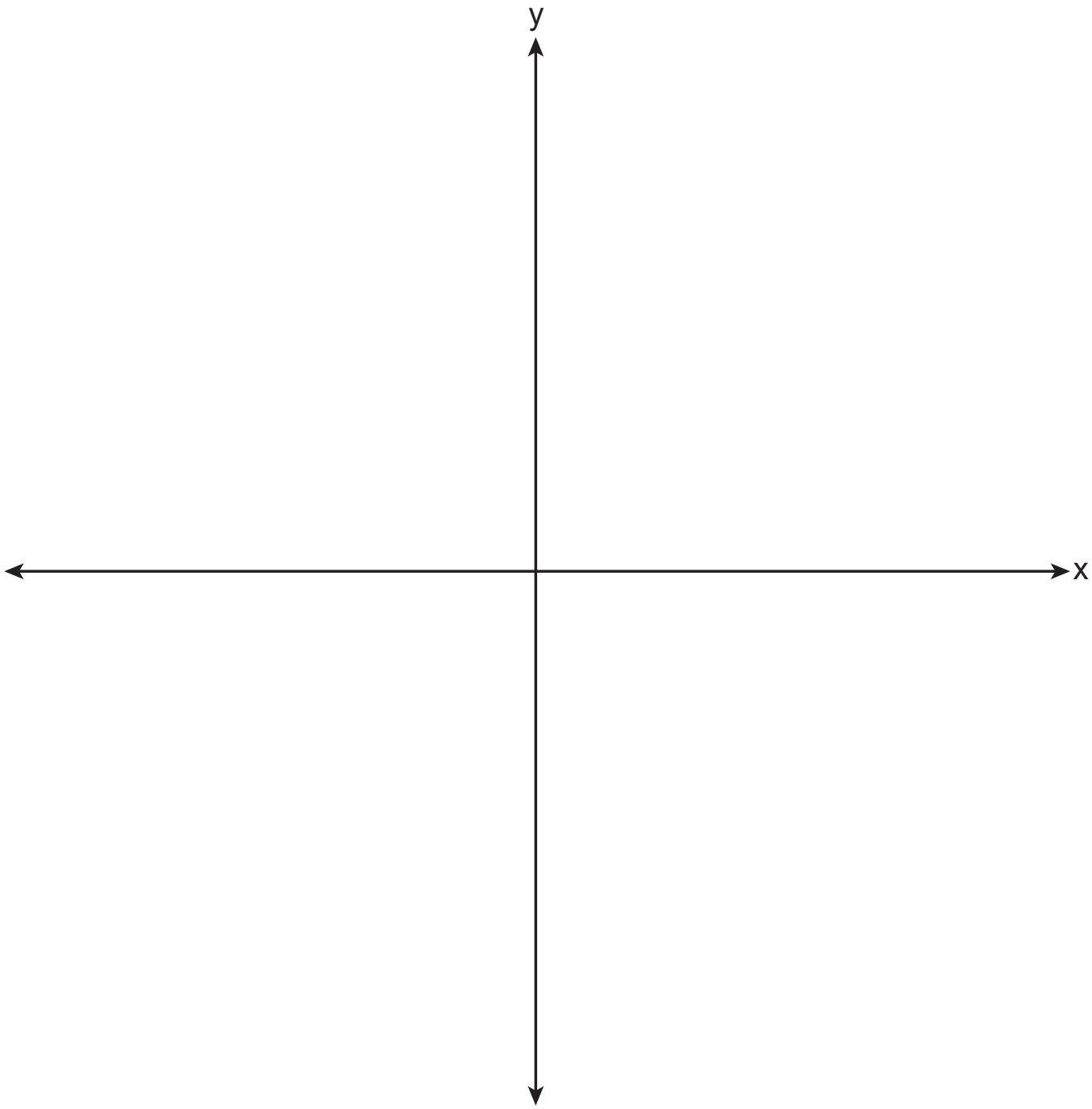
Question 28 continued

Using your values from the normal curve, state the interval centered on the mean representing approximately 68% of sleep times, in hours.

29 The zeros of a cubic polynomial function are -3, 2, and 5. There is a relative maximum of the function at $(-1, 9)$. Construct a sketch of the function on the set of axes below.

The set of axes for question 29 is on the page below.

Question 29 continued



30 Given $\cos(\theta) = \frac{7}{12}$ and $\sin(\theta) < 0$, determine the exact value of $\tan(\theta)$.

Work space for question 30
is continued on the page below.

Question 30 continued

31 Over the set of complex numbers, determine the roots of the equation $6x^2 + 50 = 2$ in simplest form.

Work space for question 31 is continued on the page below.

Question 31 continued

32 For all the values of x for which the expression is defined, rewrite the expression below in simplest form.

$$\frac{x^3 + 64}{2x^2 + 7x - 4}$$

Work space for question 32 is continued on the page below.

Question 32 continued

Part III

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. 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. [12]

33 Researchers surveyed 312 American adults to see if people's ages are related to whether they prefer ebooks or print books. The survey results are summarized in the table below.

	Prefer eBooks	Prefer Print Books	Total
Ages 27-58	42	126	168
Ages 59-90	36	108	144
Total	78	234	312

Find the probability that a randomly selected adult from the survey prefers ebooks.

Question 33 is continued on the page below.

Question 33 continued

Find the probability that a randomly selected adult from the survey prefers ebooks, given that the person is aged 27 to 58.

Are the events "prefer ebooks" and "ages 27 to 58" independent? Use the survey results to justify your answer.

34 Somika opens a savings account and deposits \$20,000 into the account that grows at a rate of 2.46% per year, compounded monthly. Write an exponential function, $S(t)$, that represents the amount of money in the account t years after it is opened, assuming no other money is deposited or withdrawn from the account.

Question 34 is continued on the page below.

Question 34 continued

Algebraically calculate the number of years, to the *nearest tenth*, it will take for her account to reach $24,000.

35 Solve algebraically for x:

$$\sqrt{x+4} - \sqrt{3x} = -2$$

Work space for question 35 is continued on the page below.

Question 35 continued

Part IV

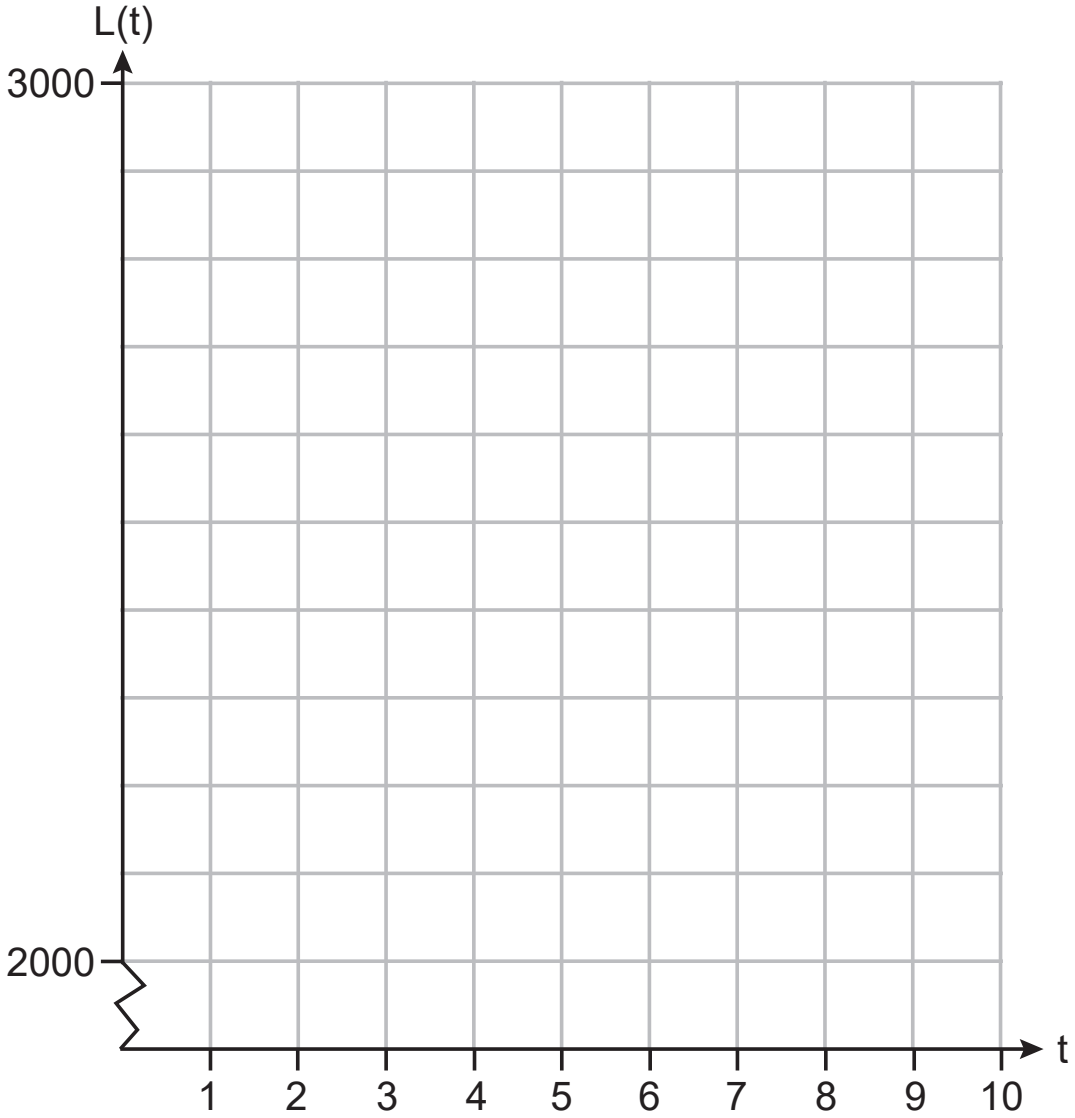
Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale.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

36 A spirometer is used to measure lung capacity, in mL, of air while breathing. During rest, the lung capacity, L, in mL, can be approximately modeled by $L(t) = 250\sin\left(\frac{\pi}{2}t\right) + 2450$, where t is time in seconds.

Question 36 is continued on the page below.

Question 36 continued

Graph $L(t)$ for $0 \leq t \leq 10$.



Question 36 is continued on the next page.

Question 36 continued

Use $L(t)$ to state the first time, to the *nearest tenth of a second*, on the interval $0 \leq t \leq 10$ when the lung capacity is 2350 mL.

Determine the average rate of change, in mL per second, from $t = 3$ to $t = 5$.

Question 36 is continued on the page below.

Question 36 continued

Explain what this means in the context of the problem.

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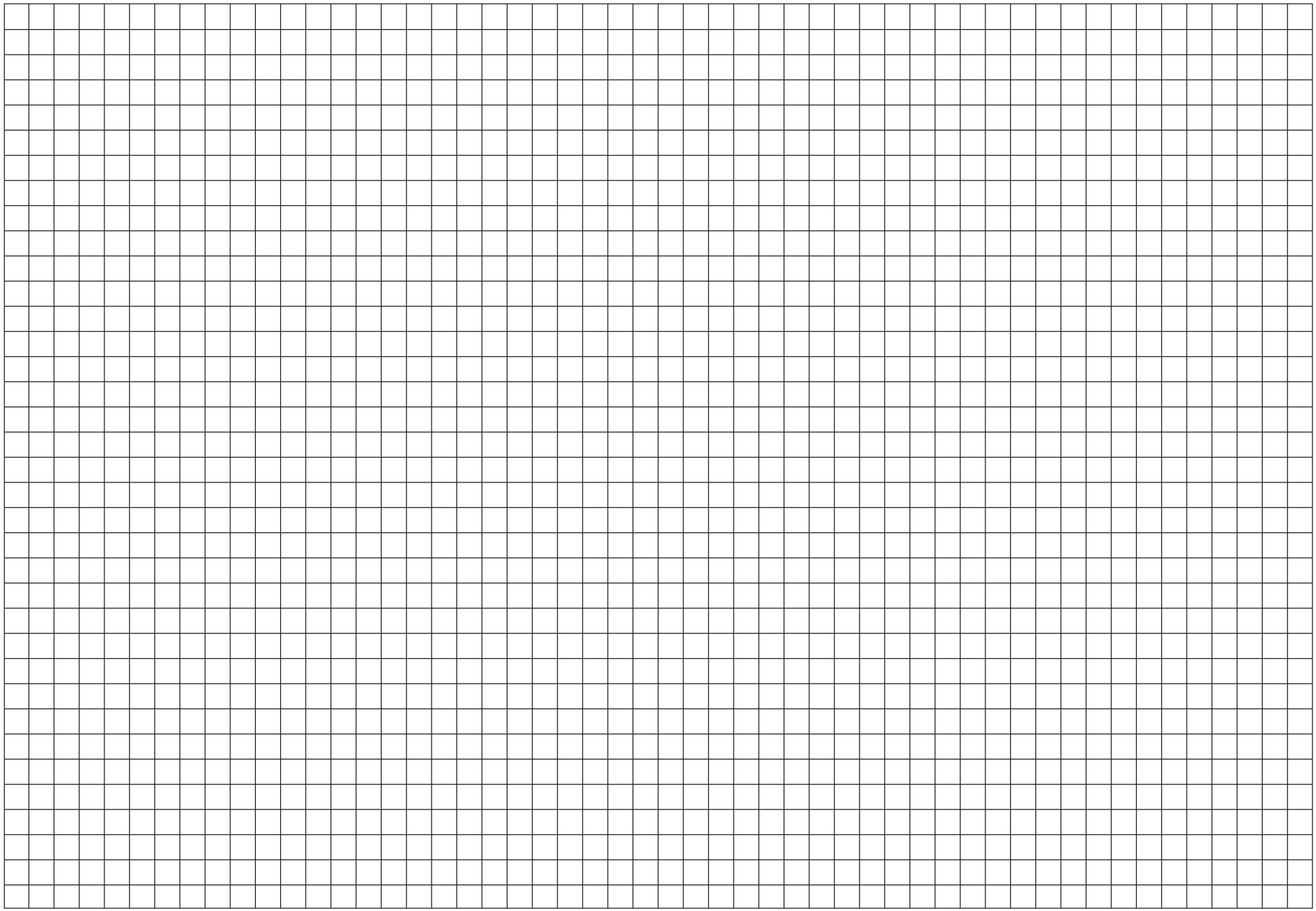

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Algebra II Reference Sheet (NGLS)

Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Trigonometric Identities	$\sin^2(\theta) + \cos^2(\theta) = 1$ $\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)} \quad \cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$ $\csc(\theta) = \frac{1}{\sin(\theta)} \quad \sec(\theta) = \frac{1}{\cos(\theta)}$
Cubic Factorizations	$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Arithmetic Sequence	$a_n = a_1 + d(n-1)$
Arithmetic Series	$S_n = \frac{n(a_1 + a_n)}{2}$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1(1-r^n)}{1-r}, r \neq 1$ $S_n = \sum_{k=1}^{n} a_1 r^{k-1}, r \neq 1$

The Reference Sheet is continued on the next page.

Probability	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A \mid B) = \frac{P(A \cap B)}{P(B)}$
Independence	$P(A \cap B) = P(A) \cdot P(B)$ $P(A \mid B) = P(A)$

Exponential Growth and Decay	$A = P\left(1 + \frac{r}{n}\right)^{nt}$ $A = Pe^{rt}$ $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$

Normal Curve