

Appendix A: Sample Questions for the Regents Examination in Algebra II

To aid in the implementation of the Next Generation Mathematics Learning Standards, a limited number of sample questions are being provided to help students, parents, and educators better understand the shifts of the NGMLS. The eleven questions below illustrate these shifts for Algebra II.

While educators from around the state have helped craft these sample questions, they have not undergone the same extensive review, vetting, and field testing that occurs with actual questions used on the State exams. The sample questions were designed to help educators think about content, NOT to show how operational exams look exactly or to provide information about how teachers should administer the test.

1. S-CP.A

a. Given:

$$A = \{3, 6, 9, 12, 15\}$$

$$B = \{2, 4, 6, 8, 10, 12\}$$

What is $A \cup B$, the union of set A and set B ?

(1) $\{6\}$

(2) $\{6, 12\}$

(3) $\{2, 3, 4, 8, 9, 10, 15\}$

(4) $\{2, 3, 4, 6, 8, 9, 10, 12, 15\}$

b. A fair six-sided die is rolled three times. Let A be the event that at least one of the rolls is a six. Which event represents A' , the complement of A ?

(1) Exactly one of the rolls is a six.

(2) None of the rolls is a six.

(3) At most one of the rolls is a six.

(4) All of the rolls are sixes.

2. F-TF.B

Which statement is true of the function $y = -2\cos[3(x - 4)] + 7$?

- (1) The midline is $y = -4$
- (2) The amplitude is -2
- (3) The range is $[-2, 2]$
- (4) The frequency is $\frac{3}{2\pi}$

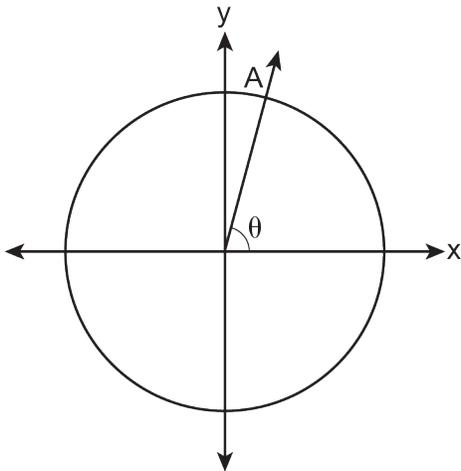
3. F-BF.B

The quadratic function $f(x)$ has a vertex of $(-4, 2)$. If $g(x) = f(2x)$, what is the vertex of $g(x)$?

- (1) $(-8, 2)$
- (2) $(-2, 2)$
- (3) $(-8, 4)$
- (4) $(-2, 1)$

4. F-TF.A

In the diagram below point A , $(\frac{1}{4}, \frac{\sqrt{15}}{4})$, represents the point where the terminal side of θ intersects the unit circle.



What is $\sin(-\theta)$?

- (1) $\frac{1}{4}$
- (2) $-\frac{1}{4}$
- (3) $\frac{\sqrt{15}}{4}$
- (4) $-\frac{\sqrt{15}}{4}$

5. A-REI.D

Given $f(x) = -|x|$ and $g(x) = \log_2(x)$, which interval best represents the solution set to the inequality $g(x) > f(x)$?

- (1) $(-0.64, \infty)$
- (2) $(0.64, \infty)$
- (3) $(0, 0.64]$
- (4) $(0, 0.64)$

6. S-ID.B

The table below shows the results of an experiment involving the growth of bacteria.

Time (x) (in minutes)	1	3	5	7	9	11
Number of Bacteria (y)	2	25	81	175	310	497

A power regression equation for this set of data is

- (1) $y = 48.914x - 111.819$
- (2) $y = 3.186(1.670)^x$
- (3) $y = 2.001x^{2.298}$
- (4) $y = 5.071x^2 - 11.943x + 11.586$

7. A-CED.A

A rabbit population doubles every four 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, which inequality could be used to determine when there will be at least 56 rabbits?

- (1) $5(2)^{\frac{t}{4}} \geq 56$
- (2) $5(2)^{\frac{t}{4}} \leq 56$
- (3) $5(2)^{\frac{4}{t}} \geq 56$
- (4) $5(2)^{\frac{4}{t}} \leq 56$

8. A-APR.D

Find the quotient when $3x^4 - 19x^3 - 29x^2 - x + 8$ is divided by $x^2 - 8x + 3$. If there is a remainder, express the result in the form $q(x) + \frac{r(x)}{b(x)}$.

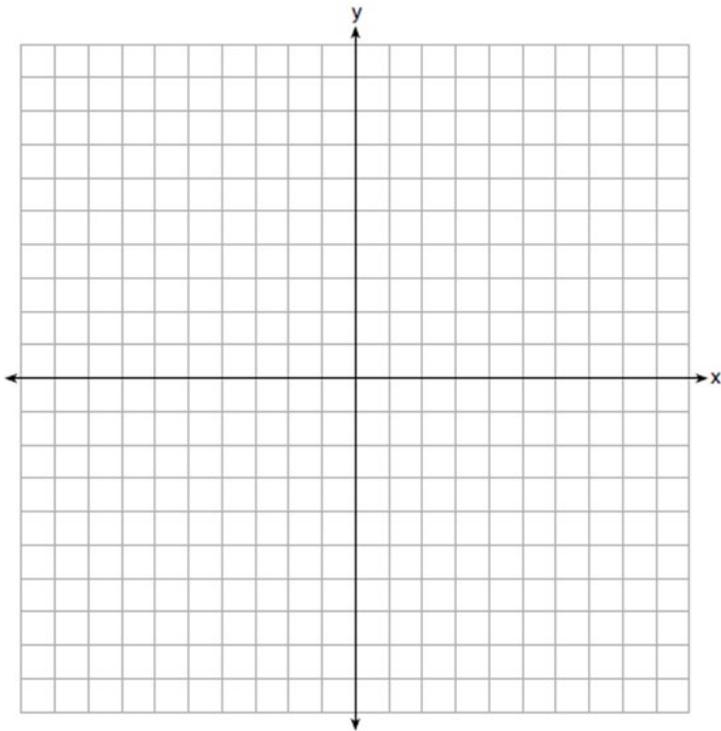
9. A-REI.A

Solve for x algebraically:

$$\sqrt{9-x} - \sqrt{2x} = 3$$

10. F-IF.C

On the set of axes below, graph $y = \tan(x) + 1$ for *at least one cycle*.



Answer Key and Commentary to Algebra II Sample Items

1. a. Choice 4. The union is the set of all elements that are in A, B, or both.

b. Choice 2. The complement of A is the set of all elements in the sample space that are not in A.

2. Choice 4. Frequency is defined as the reciprocal of the period. $P = \frac{2\pi}{|B|}$ and $F = \frac{1}{P}$, $F = \frac{3}{2\pi}$

3. Choice 2. A horizontal compression or stretch of $f(kx)$ means $(x, f(x)) \rightarrow \left(\frac{x}{k}, f(x)\right)$

4. Choice 4. Since $\sin(\theta)$ is an odd function, $\sin(-\theta) = -\sin(\theta)$, $\sin(-\theta) = -\frac{\sqrt{15}}{4}$.

5. Choice 2. As noted in the standards, inequalities involving linear, polynomial, absolute value, square root, cube root, trigonometric, exponential, and logarithmic functions are included.

6. Choice 3. As noted in the standards, power, quadratic, and exponential regressions are included.

7. Choice 1. As noted in the standards, creating inequalities will be assessed.

8. Rubric

[2] $3x^2 + 5x + 2 + \frac{2}{x^2 - 8x + 3}$, and correct work is shown.

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

or

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

or

[1] Appropriate work is shown to find $3x^2 + 5x + 2$, 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.

9. Rubric

[4] 0, and correct algebraic work is shown.

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

or

[3] Appropriate work is shown, but 8 is not rejected.

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

or

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

or

[2] Appropriate work is shown to find 0, but a method other than algebraic is used.

or

[2] A correct quadratic equation in standard form is written.

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

or

[1] A correct equation with one radical is written, but no further correct work is shown.

or

[1] 0, 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.

10. Rubric

[2] A correct graph is drawn, such as one on the following page.

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

or

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

Examples of a 2-credit graph for question 10

