

Example Items

Algebra II Pre-AP

Algebra II Pre-AP Example Items are a **representative set** of items for the ACP. Teachers may use this set of items along with the test blueprint as guides to prepare students for the ACP. On the last page, the correct answer, content SE and SE justification are listed for each item.

*The specific part of an SE that an Example Item measures is **NOT** necessarily the only part of the SE that is assessed on the ACP.* None of these Example Items will appear on the ACP.

Teachers may provide feedback regarding Example Items.

(1) Download the [Example Feedback Form](#) and email it. The form is located on the homepage of the Assessment website (assessment.dallasisd.org).

OR

(2) To submit directly: Login to the [Assessment website](#). Under “News” in the left-hand column, click on “Sem 2 Example Items Download.” Above the subjects, click on “Example Feedback Form.”

Second Semester

2017–2018

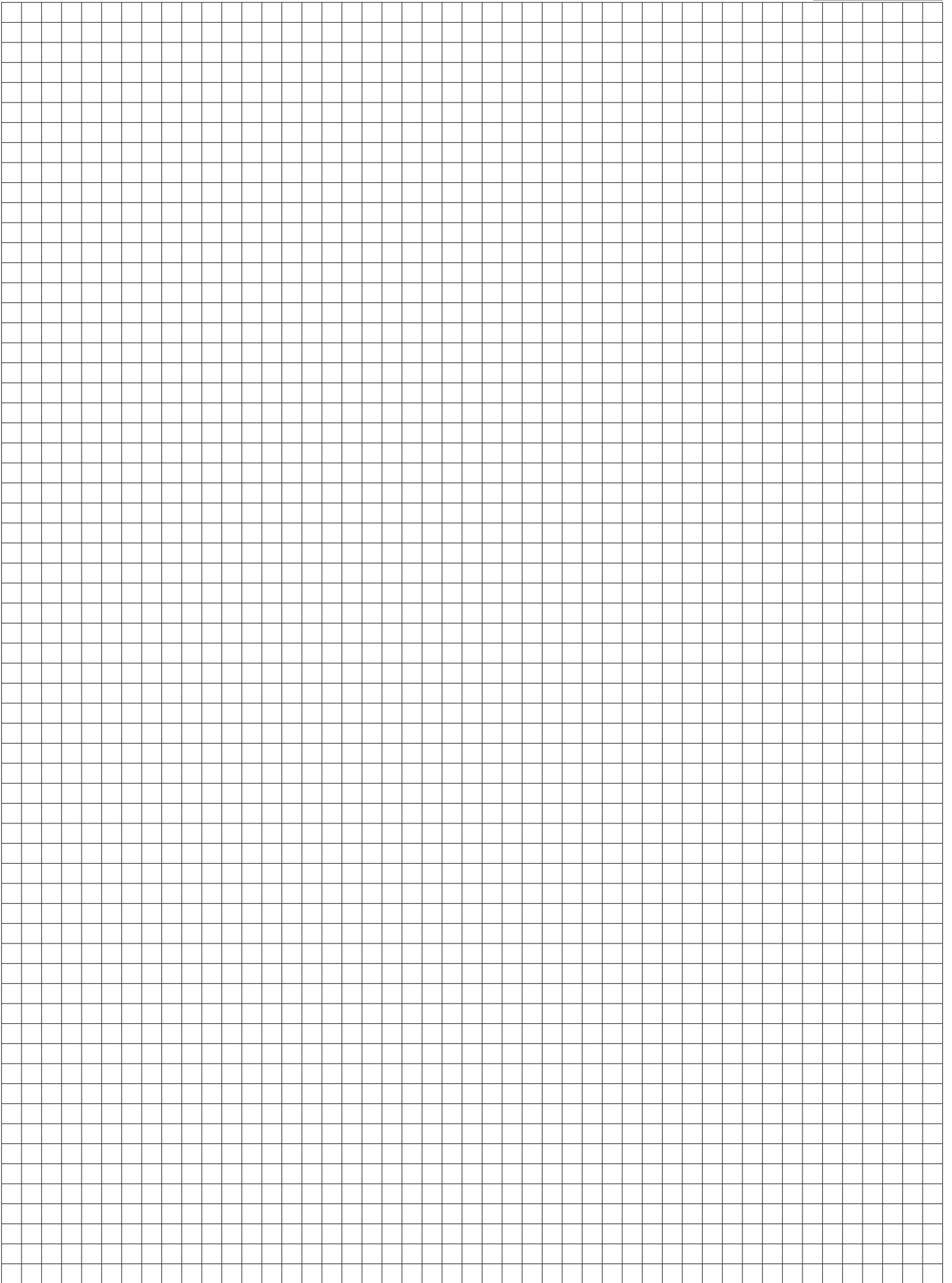
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ACP Formulas
Algebra II/Algebra II PAP
2017-2018

Coordinate Geometry	
Midpoint: $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$
Distance: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
Logarithms	
Product Property: $\log_x ab = \log_x a + \log_x b$	Power Property: $\log_b m^p = p \log_b m$
Quotient Property: $\log_x \frac{a}{b} = \log_x a - \log_x b, b \neq 0$	Change of Base: $\log_a n = \frac{\log_b n}{\log_b a}$
Properties of Exponents	
Product of Powers: $a^m a^n = a^{(m+n)}$	Power of a Power: $(a^m)^n = a^{mn}$
Quotient of Powers: $\frac{a^m}{a^n} = a^{(m-n)}$	Rational Exponent: $a^{\frac{m}{n}} = \sqrt[n]{a^m}$
Negative Exponents: $a^{-n} = \frac{1}{a^n}$	
Quadratic Equations	
Standard Form: $f(x) = ax^2 + bx + c$	Vertex Form: $f(x) = a(x - h)^2 + k$
Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Parabolas: $(x - h)^2 = 4py(y - k)$ $(y - k)^2 = 4px(x - h)$
Axis of Symmetry: $x = \frac{-b}{2a}$	
Polynomials	
Perfect Square Trinomials: $a^2 + 2ab + b^2 = (a + b)^2$	$a^2 - 2ab + b^2 = (a - b)^2$
Difference of Squares: $a^2 - b^2 = (a - b)(a + b)$	
Sum of Cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$	
Difference of Cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$	
Square of a Sum: $(a + b)^2 = (a + b)(a + b) = a^2 + 2ab + b^2$	
Square of a Difference: $(a - b)^2 = (a - b)(a - b) = a^2 - 2ab + b^2$	
Product of a Sum and a Difference: $(a + b)(a - b) = a^2 - b^2$	

ACP Formulas
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Matrices	
Adding:	$\begin{bmatrix} a & b \\ c & d \end{bmatrix} + \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} a+e & b+f \\ c+g & d+h \end{bmatrix}$
Subtracting:	$\begin{bmatrix} a & b \\ c & d \end{bmatrix} - \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} a-e & b-f \\ c-g & d-h \end{bmatrix}$
Multiplying by a Scalar:	$k \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} ka & kb \\ kc & kd \end{bmatrix}$
Multiplying:	$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \cdot \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} ae+bg & af+bh \\ ce+dg & cf+dh \end{bmatrix}$



EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

1 If $f(x) = 6 \log_7(x - 2)$, what is $f^{-1}(x)$?

A $f^{-1}(x) = 6(7)^{x-2}$

B $f^{-1}(x) = 7^{\frac{x}{6}} + 2$

C $f^{-1}(x) = 7^{\frac{x+2}{6}}$

D $f^{-1}(x) = \frac{1}{6}(7)^{x+2}$

2 What value of x makes the equation $2x^{-\frac{3}{2}} - 7 = 27^{\frac{2}{3}}$ true?

Record the answer and fill in the bubbles on the grid provided. Be sure to use the correct place value.

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	4	4	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
	6	6	6	6	6	6	6	6
	7	7	7	7	7	7	7	7
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	9	9	9	9	9	9	9	9

3 Which equation represents an asymptote of the function $f(x) = \left(\frac{1}{3}\right)^{x-2} + 1$?

A $x = 0$

B $y = 0$

C $x = 2$

D $y = 1$

EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

- 4 If $f(x) = \frac{1}{x}$ is changed to $g(x) = -2f(x + 4) + 3$, how is the graph transformed?
- A The graph of $f(x)$ is vertically stretched by a factor of 2, reflected across the x -axis, then translated 3 units up and 4 units left to create the graph of $g(x)$.
 - B The graph of $f(x)$ is vertically stretched by a factor of 2, reflected across the x -axis, then translated 3 units down and 4 units right to create the graph of $g(x)$.
 - C The graph of $f(x)$ is vertically compressed by a factor of 2, reflected across the x -axis, then translated 3 units up and 4 units left to create the graph of $g(x)$.
 - D The graph of $f(x)$ is vertically compressed by a factor of 2, reflected across the x -axis, then translated 3 units down and 4 units right to create the graph of $g(x)$.

- 5 Which expression is equivalent to $\frac{3x - 12}{x^2 - 36} \div \frac{10x - 60}{12x + 72} \cdot \frac{x^2 - 2x - 24}{6x^2 - 96}$?

A $\frac{5(x - 6)}{12(x + 6)^2}, x \neq -6$

B $\frac{5(x + 6)}{12(x - 6)^2}, x \neq 6$

C $\frac{3}{5(x + 6)}, x \neq -6$

D $\frac{3}{5(x - 6)}, x \neq 6$

- 6 Mr. Perkins wants to identify a relationship between the amount of his electric bill each month and the average temperature for that month. He collected data for a seven-month period and organized his results in a table.

Average Monthly Temperature (°F), x	30	42	51	65	75	84	91
Amount of Electric Bill (dollars), y	345	287	232	173	191	215	320

Based on the data in the table, what is the best prediction for the amount of Mr. Perkins' electric bill if the average monthly temperature is 55 degrees?

- A \$187
- B \$199
- C \$210
- D \$260

EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

7 The graph of a function has the given key attributes.

Domain: $(-\infty, \infty)$
Range: $(0, \infty)$
x-intercept: None
y-intercept: 1
Symmetries: None
Asymptote(s): Horizontal at $f(x) = 0$
Maximum: None
Minimum: None

Which function has a graph with all of these key attributes?

- A $f(x) = x^3$
- B $f(x) = \sqrt[3]{x}$
- C $f(x) = b^x$
- D $f(x) = \log_b x$

8 The shoulder height, in centimeters, of an elephant is modeled by the function

$$h(t) = 62.5\sqrt[3]{t} + 75.8$$

where t is the age, in years, of the elephant. If the shoulder height of an elephant is 260 centimeters, what is the approximate age of the elephant, to the nearest year?

Record the answer and fill in the bubbles on the grid provided. Be sure to use the correct place value.

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	6	6	6	6	6	6	6	6
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	8	8	8	8	8	8	8	8
	9	9	9	9	9	9	9	9

EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

9 Which expression is equivalent to $\frac{2x}{4x^2 - 12x + 9} - \frac{3}{2x^2 - 7x + 6}$?

A $\frac{2x^2 - 10x + 9}{(2x - 3)^2(x - 2)}, x \neq \frac{3}{2}, 2$

B $\frac{2x^2 - 10x - 9}{(2x - 3)^2(x - 2)}, x \neq \frac{3}{2}, 2$

C $\frac{2x^2 - 4x - 3}{(2x - 3)^2(x - 2)}, x \neq \frac{3}{2}, 2$

D $\frac{2x^2 - 2x + 9}{(2x - 3)^2(x - 2)}, x \neq \frac{3}{2}, 2$

10 If $f(x) = \ln x$ is changed to $g(x) = 3f(x) + 2$, how is the graph transformed?

A The graph of $f(x)$ is vertically stretched by a factor of 3 and translated 2 units up to create the graph of $g(x)$.

B The graph of $f(x)$ is vertically stretched by a factor of 3 and translated 2 units down to create the graph of $g(x)$.

C The graph of $f(x)$ is vertically compressed by a factor of 3 and translated 2 units up to create the graph of $g(x)$.

D The graph of $f(x)$ is vertically compressed by a factor of 3 and translated 2 units down to create the graph of $g(x)$.

11 If $f(x) = 2e^{x-1} + 3$, what is $f^{-1}(x)$?

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

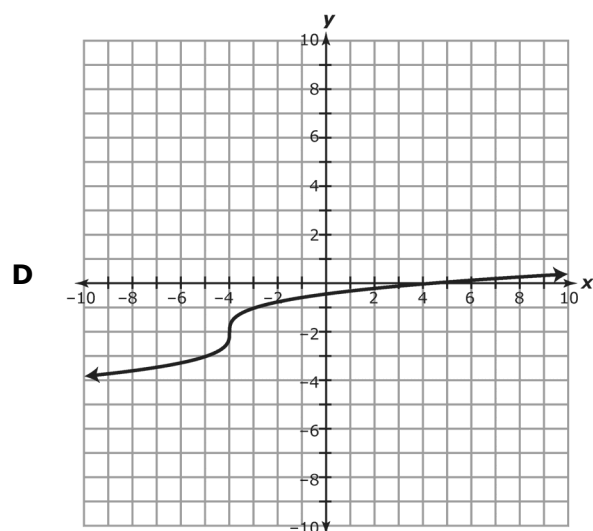
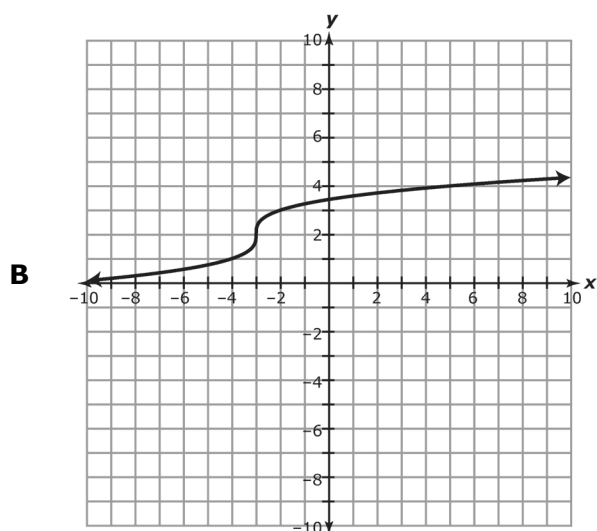
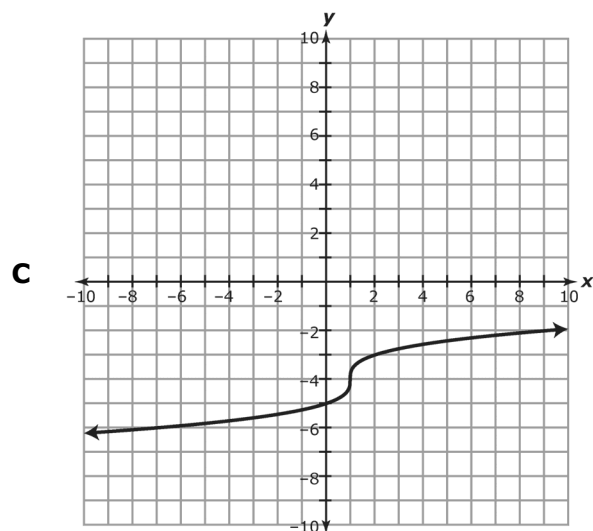
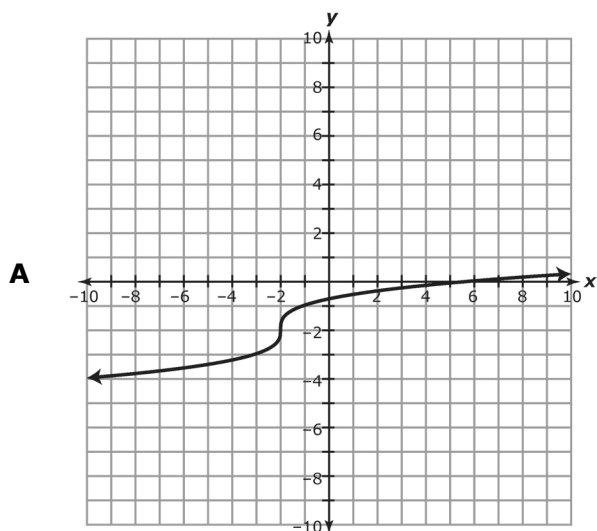
B $f^{-1}(x) = \frac{\ln x - 1}{2}$

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

D $f^{-1}(x) = \ln\left(\frac{x - 3}{2}\right) + 1$

EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

- 12 If $f(x) = \sqrt[3]{x+3} + 2$ is changed to $g(x) = f(x-1) - 4$, which graph represents $g(x)$?



- 13 If $f(x) = 2^x$ is changed to $f(x) = 2^{x-4} - 3$, which statement best describes how the graph is transformed?

- A** The graph is translated 4 units left and 3 units down.
- B** The graph is translated 4 units right and 3 units down.
- C** The graph is translated 4 units left and 3 units up.
- D** The graph is translated 4 units right and 3 units up.

EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

- 14** Every year the Nguyen's host a family picnic. They know that the cost for each person, C , varies inversely as n , the total number of people who attend the picnic. When 20 people attend the picnic, the cost for each person is \$50. Which equation correctly relates the cost for each person to the total number of people who attend the picnic?

- A** $C = 0.40n$
- B** $C = 2.5n$
- C** $C = \frac{1000}{n}$
- D** $C = 1000n$

- 15** What is the exponential form of the equation $\log_5 10 = 2x - 1$?

- A** $10^{2x-1} = 5$
- B** $10^5 = 2x - 1$
- C** $5^{10} = 2x - 1$
- D** $5^{2x-1} = 10$

- 16** What value of x makes the equation $\log_3(2x + 1) + \log_3(x - 3) = 2$ true?

Record the answer and fill in the bubbles on the grid provided. Be sure to use the correct place value.

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EXAMPLE ITEMS Algebra II Pre-AP, Sem 2

- 17** The city of Newtown has seen an increase in population for several years. City planners have recorded the data in the table shown.

Years Since 2010, x	0	1	2	3	4	5	6
Population, y	18,940	21,150	23,490	27,570	29,610	35,480	38,190

Which function best represents the data in the table?

- A** $f(x) = 3,304.6x + 17,861.8$
- B** $f(x) = 191.3x^2 + 2,156.8x + 18,818.3$
- C** $f(x) = 18,803.5(1.13)^x$
- D** $f(x) = 16,241.5x^{1.62}$
- 18** What values of x makes the equation $\frac{2x^2}{x-4} + \frac{19x}{x^2-16} = \frac{7x-3x^2}{x^2-16}$ true?

A $x = \left\{-4, -\frac{3}{2}, 0\right\}$

B $x = \left\{-\frac{3}{2}, 0\right\}$

C $x = \{0, 4\}$

D $x = \left\{0, \frac{3}{2}, 4\right\}$

- 19** What is the domain of the function $f(x) = \frac{2x^2 + 5x + 3}{2x^2 - 13x - 24}$?

A $(-\infty, 8) \cup (8, \infty)$

B $(-\infty, -8) \cup (-8, \infty)$

C $(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, 8) \cup (8, \infty)$

D $(-\infty, -8) \cup (-8, \frac{3}{2}) \cup (\frac{3}{2}, \infty)$

EXAMPLE ITEMS Algebra II Pre-AP Key, Sem 2

Item#	Key	SE	SE Justification
1	B	2A.2C	Analyze the relationship between a function and its inverse (logarithmic and exponential).
2	0.25	2A.7H	Solve equations involving rational exponents.
3	D	2A.2A	Analyze the key attributes such as asymptotic behavior of the function $f(x) = bx$.
4	A	2A.6G	Analyze the effect on the graph of $f(x) = 1/x$ when $f(x)$ is replaced by $af(x)$, $f(x - c)$, and $f(x) + d$ for specific positive and negative real values of a , c , and d .
5	D	2A.7F	Determine the product and quotient of rational expressions with integral exponents of degree one and of degree two.
6	B	2A.8C	Predict and make decisions and critical judgments from a given set of data using quadratic models.
7	C	2A.2A	Graph the functions $f(x) = x^3$, $f(x) = \sqrt[3]{x}$, $f(x) = bx$, and $f(x) = \log_b(x)$ where b is 2, 10, and e , and analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum.
8	26	2A.6B	Solve cube root equations that have real roots.
9	A	2A.7F	Determine the difference of rational expressions with integral exponents of degree one and of degree two.
10	A	2A.5A	Determine the effects on the key attributes on the graphs of $f(x) = \log_b(x)$ where b is e when $f(x)$ is replaced by $af(x)$ and $f(x) + d$ for specific positive real values of a and d .
11	D	2A.2B	Write the inverse of a function using notation such as $f^{-1}(x)$.
12	A	2A.6A	Analyze the effect on the graph of $f(x) = \sqrt[3]{x}$ when $f(x)$ is replaced by $f(x - c)$ and $f(x) + d$ for specific negative real values of c and d .
13	B	2A.5A	Determine the effects on the key attributes on the graphs of $f(x) = bx$ where b is 2 and e when $f(x)$ is replaced by $f(x) + d$ and $f(x - c)$ for specific negative real values of c and d .
14	C	2A.6L	Formulate equations involving inverse variation.
15	D	2A.5C	Rewrite logarithmic equations as their corresponding exponential equations.
16	4	2A.5D	Solve single logarithmic equations having real solutions.
17	C	2A.8A	Analyze data to select the appropriate model from among linear, quadratic, and exponential models.
18	B	2A.6I	Solve rational equations that have real solutions.
19	C	2A.6K	Determine the asymptotic restrictions on the domain of a rational function and represent domain using set notation.