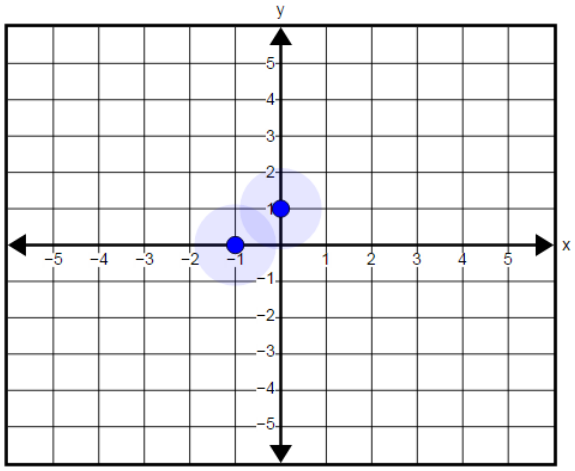
Released Test Answer and Alignment Document

Mathematics – Algebra 2

Spring 2016

Item Number	Answer Key	Evidence Statement Key	Integrated Course Alignment
1.	$x =$ 5.5	A-REI.2	Math 3
2.	$2n^t + 1$ or equivalent binomial expression	A-SSE.2-3	Math 3
3.	−6	F-IF.6-7	
4.	The solutions are −1.25 and −2.5 or The solutions are −2.5 and −1.25	A-Int.1	Math 3
5.	Value: -3 ☐, $-2i$ ☑, 5 ☐, i^2 ☐ i: ☐, ☑, ☐, ☐ -4: ☑, ☐, ☑, ☑	N-CN.2	Math 2
6.	Equal to 1: $i^2\left(i^{10}\right)$ Equal to -1: i^6 Neither: $(2+i)^2$, $-1i$	N-CN.1	Math 2
7.	Equations with no real solutions: $x^2 - 10x + 34 = 0$, $3x^2 = 4x - 10$	A-REI.4b-2	Math 2
8.	$x =$ 3	N-RN.2	Math 2
9.	D	N-RN.2	Math 2
10.	C	A-APR.2	Math 3
11.	D	A-SSE.3c-2	
12.	C, E	A-REI.11-2	Math 3

13.	(0.14, −7.32) (−1.72, 0.58) (1.46, −0.68)	A-REI.11-2	Math 3
14.	$c =$ 12 $d =$ 6	A-APR.6	Math 3
15.		F-IF.7e-2	Math 3
16.	Part A: The number of e-mails sent on day 7 will be 93312 . Part B: The total number of e-mails sent by the end of day 7 will be 139904 .	A-SSE.4-2	Math 3
17.	Part A: $a =$ 25000 $b =$ 0.96 Part B: The population in 2010 is indicated by the y-intercept .	F-IF.4-2	

<table>
<tr>
<td>18.</td>
<td>From the information provided, the half-life of the current is [60] ms.
The amount of current across the capacitor 180 ms after the capacitor begins charging is [1.25] mA.</td>
<td>F-LE.2-3</td>
<td>Math 1</td>
</tr>
<tr>
<td>19.</td>
<td>Part A: See Rubric
Part B: See Rubric</td>
<td>HS-C.18.4</td>
<td>Math 3</td>
</tr>
<tr>
<td>20.</td>
<td>Part A:
Results of Test R
<table>
<tr><th></th><th>Positive Result</th><th>Negative Result</th><th>Total</th></tr>
<tr><td>Number with Allergy</td><td>9</td><td>1</td><td>10</td></tr>
<tr><td>Number without Allergy</td><td>57</td><td>133</td><td>190</td></tr>
<tr><td>Total</td><td>66</td><td>134</td><td>200</td></tr>
</table>
Results of Test S
<table>
<tr><th></th><th>Positive Result</th><th>Negative Result</th><th>Total</th></tr>
<tr><td>Number with Allergy</td><td>8</td><td>2</td><td>10</td></tr>
<tr><td>Number without Allergy</td><td>38</td><td>152</td><td>190</td></tr>
<tr><td>Total</td><td>46</td><td>154</td><td>200</td></tr>
</table>
Part B: See Rubric
Part C: See Rubric</td>
<td>HS.D.3-5</td>
<td>Math 3</td>
</tr>
<tr>
<td>21.</td>
<td>See Rubric</td>
<td>HS-C.12.2</td>
<td>Math 2</td>
</tr>
</table>

#19 Rubric Part A	
Score	**Description**
2	Student response includes the following 2 elements. • **Reasoning component** = 2 points o Correctly explains that Diane will not meet her goal. o Correctly justifies the reasoning. Sample Student Response: We must determine what Diane's profit will be after selling 36 computers, and then determine if it is \$10,000 or more. $P(x) = x^3 - 22x^2 - 240x$ $P(36) = (36)^3 - 22(36)^2 - 240(36)$ $= 46,656 - 28,512 - 8,640$ $= 9,504$ So, Diane will not reach her goal because she will only make a profit of \$9,504 after selling 36 computers.
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

#19 Rubric Part B	
Score	**Description**
2	Student response includes the following 2 elements. • **Computation component** = 1 point o Correctly finds the 3 zeroes of the function. • **Reasoning component** = 1 point o Correctly eliminates one extraneous solution and provides justified reasoning. Sample Student Response: Find the zeroes of the function, since the zeroes indicate a profit of \$0.

	$P(x) = x^3 - 22x^2 - 240x = 0$ $= x(x^2 - 22x - 240) = 0$ $= x(x - 30)(x + 8) = 0$ Set each factor equal to 0 and solve for x: $x = 0$; $x - 30 = 0$, $x = 30$; $x + 8 = 0$, $x = -8$ So, the zeroes of the function are 0, 30, and -8. Eliminate the extraneous solution, $x = -8$, because it is impossible to sell a negative number of computers. So, Diane's store has a profit of \$0 at 2 possible values of x: When she sells zero computers ($x = 0$) and when she sells 30 computers ($x = 30$).
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

#20 Rubric Part A	
Score	**Description**
2	Student response includes the following 2 elements. • **Computation component** = 2 points o This part is machine-scored. Sample Student Response:

Results of Test R

	Positive Result	Negative Result	Total
Number with Allergy	9	1	10
Number without Allergy	57	133	190
Total	66	134	200

Results of Test S

	Positive Result	Negative Result	Total
Number with Allergy	8	2	10
Number without Allergy	38	152	190
Total	46	154	200

1	Student response includes 1 of the 2 correct tables.
0	Student response is incorrect or irrelevant.

#20 Rubric Part B

Score	**Description**
2	Student response includes the following 2 elements. • **Modeling component** = 2 points o Correct percent of false positives and negatives for Test R o Correct percent of false positives and negatives for Test S Sample Student Response: For Test R, the false positives are $\frac{57}{190} = 30\%$

	and the false negatives are $\frac{1}{10} = 10\%$ For Test S, the false positives are $\frac{38}{190} = 20\%$ and the false negatives are $\frac{2}{10} = 20\%$
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

#20 Rubric Part C	
Score	**Description**
2	Student response includes the following 2 elements. • **Modeling component** = 2 points o A valid decision that considers the relative frequency o A valid decision that considers how the error impacts the patient Sample Student Response: A Decision for Test R: R has a greater chance of detecting the allergy in someone who has the allergy than S (9 out of 10 vs. 8 out of 10). The chance of a false negative is less than the chance of a false positive with test R. (1 out of 10 vs. 57 out of 190) You get more false positives with R than with S, however, a false negative is a worse error to make because if you have the allergy, you want to know so that you can be treated. False positives aren't so bad because you can always be retested to be sure about the allergy. I would choose Test R. Or a Decision for Test S: More people get a correct result with S than with R (160 vs. 142). The chance of a false positive is the same as the chance for a false negative with test S. (2 out of 8 vs. 38 out of 190). It is always better to get a correct result than an incorrect result. I would choose Test S.
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

#21 Rubric	
Score	**Description**
3	Student response includes the following 3 elements. • **Reasoning component** = 2 points o Correct explanation for why the city council member's claim is not correct o Correct population equation $f(m) = 120{,}000(1.015)^{\frac{m}{12}}$ or equivalent • **Computation component** = 1 point o Correct population: approximately 127,680 people Sample Student Response: Based on the equation, population is expected to increase by 1.5% each year, so the amount the population increases changes as the population gets larger. The description given by the council member predicts an equal change each month, so it is not a valid way to predict the population. An appropriate equation would be $f(m) = 120{,}000(1.015)^{\frac{m}{12}}$ So an appropriate approximation would be $f(50) = 120{,}000(1.015)^{50}$, which is 127680 people.
2	Student response includes 2 of the 3 elements.
1	Student response includes 1 of the 3 elements.
0	Student response is incorrect or irrelevant.