Name: Date:
Teacher: Class/Period:

1) What is the completely simplified expression of $\frac{x^3-4x}{x^5-8x^2}$?

A. $\frac{x^3-4x}{x^5-8x^2}$

B. $\frac{1}{x(x+2)}$

C. $\frac{x^2-4}{x(x^3-8)}$

D. $\frac{x+2}{x(x^2+2x+4)}$

2) Evaluate this function for $x = -3$.

$$f(x) = 4x^3 - 5x^2 + 2x - 4$$

A. −163

B. −151

C. −73

D. 53

3) Simplify this expression:

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

A. $-5x^2 - 15x + 18$

B. $-5x^2 + 15x - 22$

C. $-9x^2 - 15x + 18$

D. $-9x^2 + 15x - 22$

4) Which is an equivalent form of this expression?

$$(3x + 2)(x - 5) - 6(x - 1)$$

A. $3x^2 - 6x - 9$

B. $3x^2 - 7x - 11$

C. $3x^2 - 9x - 16$

D. $3x^2 - 19x - 4$

5) The sum of two integers is 5. The sum of their cubes is 35. What is the sum of their squares?

A. 13

B. 17

C. 37

D. 53

6) If $f(x) = -9x^3 + x^2 + 3x$, find $f(-\frac{2}{3})$.

A. $-\frac{2}{3}$

B. $-\frac{1}{4}$

C. $-\frac{2}{9}$

D. $\frac{10}{9}$

7) What is the complete factorization of $16r^{3n} - 54q^{6a}$, where a, n, r, and q are integers?

A. $2(8r^{3n} - 27^{6a})$

B. $(4r^{2n} + 6q^{a})(4r^{n} - 9q^{5a})$

C. $2(4r^{2n} + 3q^{a})(2r^{n} - 9q^{5a})$

D. $2(2r^{n} - 3q^{2a})(4r^{2n} + 6r^{n}q^{2a} + 9q^{4a})$

8) Which expression is the completely factored form of $2x^5 - 58x^3 + 200x$?

A. $2x(x^4 - 29x^2 + 100)$

B. $2x(x^2 - 4)(x^2 - 25)$

C. $2(x + 2)(x - 2)(x + 5)(x - 5)$

D. $2x(x + 2)(x - 2)(x + 5)(x - 5)$

9) Completely factor this expression.

$$128x^7y + 32x^4y^4 + 2xy^7$$

A. $2xy(8x^3 + y^3)^2$

B. $2xy(64x^6 + 16x^3y^3 + y^6)$

C. $2xy(2x + y)^2(4x^2 - 2xy + y^2)^2$

D. $2xy(2x + y)^2(4x^2 + 2xy + y^2)^2$

10) The area of a right triangle is $\frac{1}{2}x^2 - 5x + 12$. If one leg is $x - 4$, what is the other leg?

A. $x - 3$

B. $x - 6$

C. $\frac{1}{2}x - 3$

D. $\frac{1}{2}x - 4 + \frac{4}{x-2}$

11) Given that $f(-3) = 0$, $f(-1) = 0$, completely factor $f(x) = x^4 + 5x^3 + 3x^2 - 13x - 12$ over the integers.

A. $(x - 3)(x - 1)(x + 2)(x - 2)$

B. $(x + 3)(x + 1)(x + 2)(x - 2)$

C. $(x - 3)(x - 1)(x^2 + x - 4)$

D. $(x + 3)(x + 1)(x^2 + x - 4)$

12) What is the completely factored form of this expression?

$$2x^3 - 9x^2 + 7x + 6$$

A. $(x + 2)(2x + 1)(x - 3)$

B. $(x + 2)(2x - 1)(x - 3)$

C. $(x - 2)(2x + 1)(x - 3)$

D. $(x - 2)(2x - 1)(x + 3)$

13) Where will the graph of $f(x) = 3x^3 - 6x^2 + 5x - 10$ cross the x-axis?

A. $x = \sqrt{\frac{5}{3}}, 2$

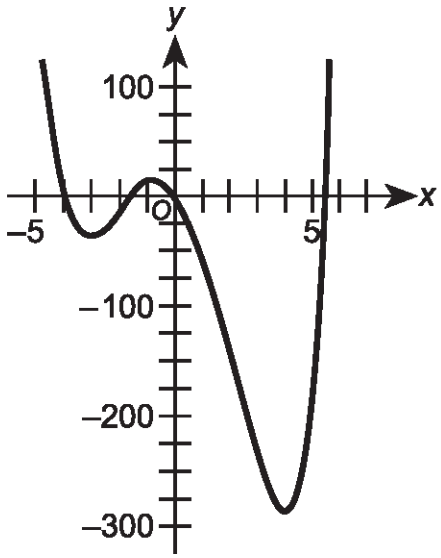
B. $x = -\sqrt{\frac{5}{3}}$

C. $x = 2$

D. $x = -\sqrt{\frac{5}{3}}, 2$

14) Use polynomial long division to find $\frac{3x^4 - x^5 + 4x^2 - 7 + 2x}{x^2 - 5x + 2}$. Show your work algebraically. Explain the approach you used to find your answer as if you were writing to a student who was not in class when the concept was taught.

15) Consider the graph of the function $f(x) = x^4 - 25x^2 - 36x$, which has one x-intercept at $(-4,0)$. Find all the other zeros of the function algebraically. Show your work, and explain the approach you used to find your answer.



Please use the space below to write your response(s) to the writing assignment provided by your teacher. If there are multiple tasks to the question, please clearly label the number or letter of each task in the column to the left of your answers. If you need additional pages for your response, your teacher can provide them.

Please write the name of the writing assignment here: _____

Task

QualityCore™

Reference Sheet for the QualityCore™ **Algebra II End-of-Course Assessment**

Equations of a Line

Standard Form	$Ax + By = C$	A, B, and C are constants with A and B not both equal to zero.
Slope-Intercept Form	$y = mx + b$	(x_1,y_1) is a point. m = slope b = y-intercept
Point-Slope Form	$y - y_1 = m(x - x_1)$	

Quadratics

Standard Form of a Quadratic Equation	$ax^2 + bx + c = 0$	a, b, and c are constants, where $a \neq 0$.
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	

Conic Sections

Circle	$(x - h)^2 + (y - k)^2 = r^2$	center (h,k) r = radius	
Parabola	$y = a(x - h)^2 + k$	axis of symmetry $x = h$ directrix $y = k - \frac{1}{4a}$	vertex (h,k) focus $\left(h, k + \frac{1}{4a}\right)$
Parabola	$x = a(y - k)^2 + h$	axis of symmetry $y = k$ directrix $x = h - \frac{1}{4a}$	vertex (h,k) focus $\left(h + \frac{1}{4a}, k\right)$
Ellipse	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$	foci $(h \pm c, k)$ where $c^2 = a^2 - b^2$, center (h,k)	
Ellipse	$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$	foci $(h, k \pm c)$ where $c^2 = a^2 - b^2$, center (h,k)	
Hyperbola	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	foci $(h \pm c, k)$ where $c^2 = a^2 + b^2$, center (h,k)	
Hyperbola	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$	foci $(h, k \pm c)$ where $c^2 = a^2 + b^2$, center (h,k)	

Lines and Points

Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$	(x_1,y_1) and (x_2,y_2) are 2 points. m = slope M = midpoint d = distance
Midpoint	$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$	
Distance	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	

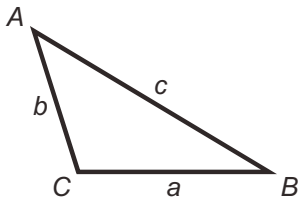
continued

Miscellaneous

Distance, Rate, Time	$D = rt$	D = distance r = rate t = time I = interest p = principal A = amount of money after t years n = number of times interest is compounded annually
Simple Interest	$I = prt$	
Compound Interest	$A = p\left(1 + \frac{r}{n}\right)^{nt}$	
Pythagorean Theorem	$a^2 + b^2 = c^2$	a and b = legs of right triangle c = hypotenuse

Laws of Sines and Cosines

Law of Sines	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
Law of Cosines	$a^2 = b^2 + c^2 - 2bc \cos A$



Sequences, Series, and Counting

Arithmetic Sequence	$a_n = a_1 + (n - 1)d$	$a_n = n^{\text{th}}$ term n = number of the term d = common difference s_n = sum of the first n terms r = common ratio k = number of objects in the set m = number of objects selected
Arithmetic Series	$s_n = \frac{n}{2}(a_1 + a_n)$	
Geometric Sequence	$a_n = a_1(r^{n-1})$	
Geometric Series	$s_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$	
Combinations	${}_kC_m = C(k,m) = \frac{k!}{(k-m)!\,m!}$	
Permutations	${}_kP_m = P(k,m) = \frac{k!}{(k-m)!}$	

Circumference, Area, and Volume

Triangle	$A = \frac{1}{2}bh$	A = area b = base h = height r = radius C = circumference d = diameter V = volume B = area of base $\pi \approx 3.14$
Parallelogram	$A = bh$	
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$	
Circle	$A = \pi r^2$ $C = \pi d$	
General Prism	$V = Bh$	
Right Circular Cylinder	$V = \pi r^2 h$	
Pyramid	$V = \frac{1}{3}Bh$	
Right Circular Cone	$V = \frac{1}{3}\pi r^2 h$	
Sphere	$V = \frac{4}{3}\pi r^3$	

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Answer Key

1) D
2) A
3) C
4) D
5) A
6) D
7) D
8) D
9) C
10) B
11) D
12) C
13) C

Scoring Criteria:

14)

A 4-point response may include, but is not limited to, the following points:

A. Correct quotient: $-x^3-2x^2-8x-32+\dfrac{-142x+57}{x^2-5x+2}$

Appropriate work needed to find the answer:

$$
\begin{array}{r|l}
 & \quad -x^3 - 2x^2 - 8x - 32 \\
\hline
x^2-5x+2 & -x^5+3x^4+0x^3+4x^2+2x-7 \\
 & -(-x^5+5x^4-2x^3) \\
\cline{2-2}
 & \quad -2x^4+2x^3+4x^2 \\
 & -(-2x^4+10x^3-4x^2) \\
\cline{2-2}
 & \quad -8x^3+8x^2+2x \\
 & -(-8x^3+40x^2-16x) \\
\cline{2-2}
 & \quad -32x^2+18x-7 \\
 & -(-32x^2+160x-64) \\
\cline{2-2}
 & \quad -142x+57
\end{array}
$$

Explanation of the approach used to find the answer: First, I put the numerator in standard form with a coefficient of 0 for the x^3 term. Then, I performed the polynomial long division. I found the first part of the answer by dividing the term of highest degree of the numerator by that of the denominator. I put $-x^3$ on top of the x^3 term in the answer. Then I multiplied $-x^3$ by x^2-5x+2 and lined the terms up under the corresponding terms of the numerator. Next, I subtracted and brought down the next term of the numerator. I continued this process until I was left with a remainder after getting a constant term in the answer.

Rubric:

4 **A response at this level provides evidence of thorough knowledge and understanding of the subject matter.**

- The response addresses all parts of the question or problem correctly.
- The response demonstrates efficient and accurate use of appropriate procedures.
- The explanation of strategies used in the response shows evidence of a good understanding of mathematical concepts and principles, and it does not contain any misconceptions.
- The explanation in the response is clear and coherent.

3 **A response at this level provides evidence of competent knowledge and understanding of the subject matter.**

- The response addresses most parts of the question or problem correctly.
- The response includes some minor errors but generally uses appropriate procedures accurately.
- The explanation of strategies used in the response shows some evidence of a good understanding of mathematical concepts and principles, and it contains few, if any, misconceptions.
- The explanation in the response is mostly clear and coherent.

2 **A response at this level provides evidence of a basic knowledge and understanding of the subject matter.**

- The response addresses some parts of the question or problem correctly.
- The response includes a number of errors but demonstrates some use of appropriate procedures.
- The explanation of strategies used in the response shows a little evidence of understanding of mathematical concepts and principles, but it may contain some evidence of misconceptions.
- The explanation in the response is partially clear, but some parts may be difficult to understand.

1 **A response at this level provides evidence of minimal knowledge and understanding of the subject matter.**

- The response addresses a few parts of the problem correctly, but the response is mostly incorrect.
- The response includes inappropriate procedures or simple manipulations that show little or no understanding of correct procedures.
- The explanation of strategies used in the response shows little or no evidence of understanding of mathematical concepts and principles, and it may contain evidence of significant misconceptions.
- Many parts of the explanation are difficult to understand.

0 **A response at this level is not scorable.** The response is off-topic, blank, hostile, or otherwise not scorable.

Scoring Criteria:

15)

A 4-point response may include, but is not limited to, the following points:

Correct additional zeros: $0,\ 2 \pm \sqrt{13}$

Appropriate work needed to find the answer:

$f(x) = x^4 - 25x^2 - 36x = x(x^3 - 25x - 36)$

$$\begin{array}{r|rrrr} -4 & 1 & 0 & -25 & -36 \\ & & -4 & 16 & 36 \\ \hline & 1 & -4 & -9 & 0 \end{array}$$

$x^2 - 4x - 9 = 0$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-9)}}{2(1)} = \frac{4 \pm \sqrt{16 + 36}}{2} = \frac{4 \pm \sqrt{52}}{2} = \frac{4 \pm 2\sqrt{13}}{2} = 2 \pm \sqrt{13}$$

Note: An examinee could also use polynomial long division instead of synthetic division to find the answer.

Explanation of the approach used to find the answer: First, I factored out an x. That gave me $x = 0$ as a zero of the function. Since $(-4,0)$ is an x-intercept of the graph of the function, $x = -4$ is a zero of the function. Since $x = -4$ is a zero of the function, I used synthetic division to find $\frac{x^3 - 25x - 36}{x + 4}$. I put in 0 for the coefficient of the x^2 term in the synthetic division process. Performing synthetic division told me that $\frac{x^3 - 25x - 36}{x + 4} = x^2 - 4x - 9$. Then, I used the quadratic formula to find the remaining zeros.

Rubric:

4 **A response at this level provides evidence of thorough knowledge and understanding of the subject matter.**

- The response addresses all parts of the question or problem correctly.
- The response demonstrates efficient and accurate use of appropriate procedures.
- The explanation of strategies used in the response shows evidence of a good understanding of mathematical concepts and principles, and it does not contain any misconceptions.
- The explanation in the response is clear and coherent.

3 **A response at this level provides evidence of competent knowledge and understanding of the subject matter.**

- The response addresses most parts of the question or problem correctly.
- The response includes some minor errors but generally uses appropriate procedures accurately.
- The explanation of strategies used in the response shows some evidence of a good understanding of mathematical concepts and principles, and it contains few, if any, misconceptions.
- The explanation in the response is mostly clear and coherent.

2 **A response at this level provides evidence of a basic knowledge and understanding of the subject matter.**

- The response addresses some parts of the question or problem correctly.
- The response includes a number of errors but demonstrates some use of appropriate procedures.
- The explanation of strategies used in the response shows a little evidence of understanding of mathematical concepts and principles, but it may contain some evidence of misconceptions.
- The explanation in the response is partially clear, but some parts may be difficult to understand.

1 **A response at this level provides evidence of minimal knowledge and understanding of the subject matter.**

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- Many parts of the explanation are difficult to understand.

0 **A response at this level is not scorable.** The response is off-topic, blank, hostile, or otherwise not scorable.