Algebra 2 Fall 2019 Name KEY

Final Exam Study Guide

Date _____ Period ____

Unit 1 Topics include:
adding/subtracting fractions + solving a multi-step equation + laws of exponents + operations with complex numbers + powers of i

Solve each equation.

1) $25 + 7x = -2(-2 - 5x)$

$25+7x = 4+10x$
$-4 \quad -4$
$21+7x = 10x$
$-7x \quad -7x$
$\frac{21}{3} = \frac{3x}{3}$
$7 = x$

Simplify.

2) This answer should only contain positive exponents.
$(u^{-1}v^4)^2 \cdot uv^4$

$u^{-2}v^8 \cdot uv^4$
$u^{-2}u\,v^8v^4$
$u^{-1}v^{12} \rightarrow \frac{v^{12}}{u}$

remember $y^{-m} = \frac{1}{y^m}$

3) $\frac{8i}{-10+9i} \cdot \frac{-10-9i}{-10-9i}$ *conjugate

$\frac{8i(-10-9i)}{(-10+9i)(-10-9i)} = \frac{-80i-72i^2}{100-81i^2}$ ← FOIL

$= \frac{-80i+72}{100+81}$

$= \frac{-80i+72}{181}$

4) Find the result from i^{73}.

$4\overline{)73}$ R 1

$i^{73} = i^1 = i$

5) Add. $\frac{2}{3} + \frac{1}{7}$

$\frac{14}{21} + \frac{3}{21}$

$\frac{14+3}{21} = \frac{17}{21}$

Unit 2 Topics include:
characteristics of function graphs + composition of functions + function inverses + function transformations + evaluate functitons

Evaluate each function.

6) $g(x) = 2x + 1$; Find $g(4)$

$g(4) = 2(4)+1$
$g(4) = 9$

7) $g(x) = 3x - 5$
$f(x) = 3x - 1$
Find $g(f(x))$

$g(f(x))$
$g(3x-1) = 3(3x-1) - 5$
$= 9x - 3 - 5$
$= 9x - 8$

$g(f(x)) = 9x - 8$

8) Find the inverse of the function.

$f(x) = \frac{x-3}{3}$ swap x & y

$y = \frac{x-3}{3}$

$3 \cdot x = \frac{y-3}{3} \cdot 3$

$3x = y - 3$
$+3 \quad +3$
$3x + 3 = y$

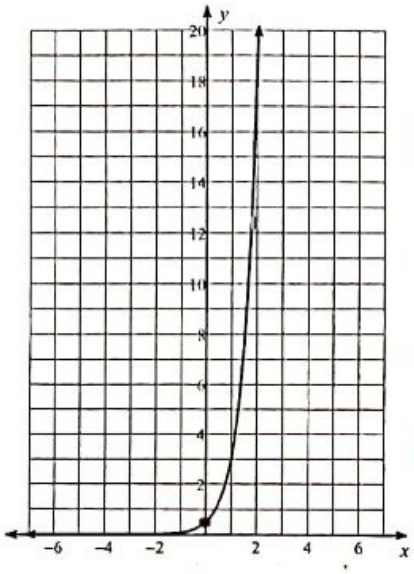
$f^{-1}(x) = 3x + 3$

9) Describe the transformations that map f(x) to g(x).
$f(x) = x^2$
$g(x) = \frac{1}{2}x^2 - 5$
$a \quad k$

v. shrink of $\frac{1}{2}$
shift down 5

For the graph below, give the domain, range, y-intercept, x-intercept and end behavior.

10)



Domain : $(-\infty, \infty)$ set of x-values

Range : $(0, \infty)$ set of y-values

y-int : $(0, \frac{1}{2})$ touches y-axis

x-int : NONE touches x-axis

EB : As $x \to -\infty$, $y \to 0$

As $x \to \infty$, $y \to \infty$

Unit 3 Topics include:
factoring by grouping + factoring a sum of cubes + solve by quadratic formula + solve by square roots + evaluate a discriminant and describe the number and type of roots

11) Factor by grouping.

$(35n^3 - 28n^2) + (15n - 12)$

GCF: $7n^2$ GCF: 3

$7n^2(5n-4) + 3(5n-4)$

$(5n-4)(7n^2+3)$

12) Factor. $8x^3 + 1$

sum of cubes $a^3+b^3 = (a+b)(a^2-ab+b^2)$

$\sqrt[3]{8x^3}$ $\sqrt[3]{1}$

a = 2x b = 1

$(2x+1)(4x^2-2x+1)$

13) Solve by using quadratic formula.

$5x^2 + 7x = 138$

$-138 \quad -138$

$5x^2+7x-138=0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-7 \pm \sqrt{(7)^2-4(5)(-138)}}{2(5)}$

$= \frac{-7 \pm \sqrt{2809}}{10}$

$= \frac{-7 \pm 53}{10}$

$x = \frac{-7+53}{10} = 4.6$ $x = \frac{-7-53}{10} = -6$

14) Solve by using square roots.

$7n^2 + 1 = -83$

$7n^2 + 1 = -83$

$-1 \quad -1$

$\frac{7n^2}{7} = \frac{-84}{7}$

$n^2 = -12$

$\sqrt{n^2} = \pm\sqrt{-12}$

$n = \pm i\sqrt{12}$ or $\pm 2i\sqrt{3}$

15) Find the discriminant and then state the number and type of solutions.

$-9p^2 - 3p - 5 = 0$

discriminant: b^2-4ac

$a = -9$

$b = -3$

$c = -5$

$(-3)^2 - 4(-9)(-5)$

-171 * negative #

2 imaginary solutions

Unit 4 Topics include:
simplifying a cube root + mutliplying radical expressions + adding radical expressions + converting between rational exponents and radicals + solving a radical equation.

Simplify.

16) $\sqrt[3]{-216u^2v^8}$

$\sqrt[3]{-1 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot u \cdot u \cdot v \cdot v \cdot v \cdot v \cdot v \cdot v}$

$-1 \cdot 2 \cdot 3 v \cdot v \sqrt[3]{u^2 v^2}$

$-6v^2\sqrt[3]{u^2v^2}$

17) $5\sqrt{12p} \cdot \sqrt{6p^3}$

multiply outside together
" inside together

$5\sqrt{72p^4}$

$5\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot p \cdot p \cdot p \cdot p}$

$5 \cdot 2 \cdot 3 \cdot p \cdot p\sqrt{2} = 30p^2\sqrt{2}$

simplify all radicals

18) $-3\sqrt{20} + 3\sqrt{45} - 3\sqrt{18}$

$-3 \cdot 2\sqrt{5} + 3 \cdot 3\sqrt{5} - 3 \cdot 3\sqrt{2}$

$-6\sqrt{5} + 9\sqrt{5} - 9\sqrt{2}$

$3\sqrt{5} - 9\sqrt{2}$

19) Write in exponential form.

$(\sqrt[3]{3x})^5$

$(3x)^{\frac{5}{3}}$

$\sqrt[n]{a^m} = a^{\frac{m}{n}}$

20) Write in radical form.

$(2b)^{\frac{2}{3}}$

$(\sqrt[3]{2b})^2$ or $\sqrt[3]{(2b)^2}$

Solve the equation. Remember to check for extraneous solutions.

21) $\sqrt{14x - 3} + 6 = 15$

$-6 \quad -6$

$\sqrt{14x-3} = 9$

$(\sqrt{14x-3})^2 = (9)^2$

$14x - 3 = 81$

$+3 \quad +3$

$\frac{14x}{14} = \frac{84}{14}$

$x = 6$

check

$\sqrt{14(6)-3} + 6 \stackrel{?}{=} 15$

$15 = 15$ ✓

Unit 5 Topics include:
solve exponential equations using same base + convert between logarithmic and exponential forms + condense a logarithmic expression + expand a logarithmic expression + solve a logarithmic equation

Solve each equation.

$\log_b M + \log_b N = \log_b MN$

22) $2^{2n} = \frac{1}{32}$

$2^{2n} = 2^{-5}$

bases match
so exponents equal

$\frac{2n}{2} = \frac{-5}{2}$

$n = -\frac{5}{2}$

23) $\log_2 x + \log_2 7 = 2$

$\log_2 7x = 2$

LOG = # type

$7x = 2^2$

$\frac{7x}{7} = \frac{4}{7}$

$x = \frac{4}{7}$

Rewrite each equation in exponential form.

$b^x = a \leftrightarrow \log_b a = x$

24) $\log_6 6 = 1$

$6 = 6^1$

Rewrite each equation in logarithmic form.

25) $\left(\frac{8}{19}\right)^{y} = x$

$\log_{\left(\frac{8}{19}\right)} x = y$

Condense each expression to a single logarithm.

26) $12\log_6 a - 2\log_6 b$

$\log_6 a^{12} - \log_6 b^2$

$\log_6\left(\frac{a^{12}}{b^2}\right)$

$x \log_b M = \log_b M^x$

$\log_b M - \log_b N = \log_b\left(\frac{M}{N}\right)$

Expand each logarithm.

27) $\log_8 (u \cdot v \cdot w^4)$

$\log_8 u + \log_8 v + \log_8 w^4$

$\log_8 u + \log_8 v + 4\log_8 w$

Unit 6/7 Topics include:
multiply or subtract polynomials + use synthetic division to divide a polynomial by a linear binomial + simplify a rational expression + divide two rational expressions

Find each product.

28) $(6n-8)(4n+6)$ FOIL

$24n^2 + 36n - 32n - 48$

$24n^2 + 4n - 48$

Simplify each difference.

29) $(7p - 8p^3 - 2) - (4p^3 - 2 - 6p)$ Keep change add

$7p - 8p^3 - 2 + -4p^3 + 2 + 6p$

$-12p^3 + 13p$

Divide.

30) $(k^3 - 3k^2 - 14k - 9) \div (k+2)$

-2	1	-3	-14	-9
		-2	10	8
	1	-5	-4	-1

$k^2 - 5k - 4 + \frac{-1}{k+2}$

Simplify each expression.

31) $\frac{r^2 + 8r - 9}{r^2 + 13r + 36}$ factor / factor

$\frac{(r-1)(r+9)}{(r+9)(r+4)}$

$\frac{r-1}{r+4}$

$-1, -9, 1, 8$ | $9, 36, 1, 13$

32) $\frac{n^2 + 17n + 70}{n-9} \div \frac{n^2 + 5n - 50}{n-5}$ KEEP CHANGE FLIP

factor / factor

$\frac{n^2+17n+70}{n-9} \cdot \frac{n-5}{n^2+5n-50}$

$7, 70, 1, 17$ | $10, -50, 1, -5$

$\frac{(n+7)(n+10)}{n-9} \cdot \frac{n-5}{(n+10)(n-5)} = \frac{n+7}{n-9}$