Algebra 2 Name Mikey

Final REVIEW

Hour____

Solve each equation by any method.

1) $k^2 + 8k + 96 = 0$

$X = \frac{-8 \pm \sqrt{8^2 - 4(1)(96)}}{2}$

$X = \frac{-8 \pm \sqrt{-320}}{2} = \frac{-8 \pm 8i\sqrt{5}}{2}$

$\boxed{X = -4 \pm 4i\sqrt{5}}$

2) $x^2 - 14x + 45 = 0$

$(x-5)(x-9) = 0$

$\boxed{x = 5 \quad x = 9}$

Divide.

3) $(x^4 - 3x^3 + 6x^2 + 5x - 6) \div (x + 1)$

$-1 \mid 1 \quad -3 \quad 6 \quad 5 \quad -6$

$\downarrow \quad -1 \quad 4 \quad -10 \quad 5$

$1 \quad -4 \quad 10 \quad -5 \quad -1$

$\boxed{x^3 - 4x^2 + 10x - 5 - \frac{1}{x+1}}$

4) $(n^2 - 4n + 7) \div (n - 4)$

$4 \mid 1 \quad -4 \quad 7$

$\downarrow \quad 4 \quad 0$

$1 \quad 0 \quad 7$

$\boxed{n + \frac{7}{n-4}}$

Find all roots.

5) $2x^3 + 13x^2 + 19x + 2 = 0$

$-2 \mid 2 \quad 13 \quad 19 \quad 2$

$\downarrow \quad -4 \quad -18 \quad -2$

$2 \quad 9 \quad 1 \quad 0$

$2x^2 + 9x + 1 = 0$

$X = \frac{-9 \pm \sqrt{9^2 - 4(2)(1)}}{2(2)}$

$\boxed{X = \frac{-9 \pm \sqrt{73}}{4}}$ $\boxed{X = -2}$

6) $(3x^3 - x^2)(3x + 1) = 0$

$x^2(3x-1) - 1(3x-1) = 0$

$(3x-1)(x^2-1) = 0$

$(3x-1)(x+1)(x-1) = 0$

$\boxed{x = \frac{1}{3}, 1, -1}$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

7) 4, –2, 0

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

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

$x^3 + 2x^2 - 4x^2 - 8x$

$x^3 - 2x^2 - 8x$

$\boxed{f(x) = x^3 - 2x^2 - 8x}$

8) 5, –5, –4

$(x+5)(x-5)(x+4)$

$(x^2-25)(x+4)$

$x^3 + 4x^2 - 25x - 100$

$\boxed{f(x) = x^3 + 4x^2 - 25x - 100}$

Simplify each expression.

9) $\frac{90b^5}{81b^2} = \frac{9\cdot 10\cdot b\cdot b\cdot b\cdot b\cdot b}{9\cdot 9\cdot b\cdot b}$

$\boxed{\frac{10b^3}{9}}$

10) $\frac{4x^3+28x^2}{3x^3+21x^2} = \frac{4x^2(x+7)}{3x^2(x+7)}$

$\boxed{\frac{4}{3}}$

11) $\frac{b^2-4b+3}{b^2-6b+5} = \frac{(b-3)(b-1)}{(b-1)(b-5)}$

$\boxed{\frac{(b-3)}{(b-5)}}$

12) $\frac{2v}{4v^2+4v} + \frac{-v+1}{4v^2+4v}$

$\frac{(v+1)}{4v(v+1)} = \boxed{\frac{1}{4v}}$

13) $\frac{3}{3v} + \frac{v-6}{3v^2-9v}$ LCM: $3v(v-3)$

$3v(v-3)$

$\frac{3(v-3)+v-6}{3v(v-3)} = \frac{3v-9+v-6}{\text{LCM}}$

$\boxed{\frac{4v-15}{3v(v-3)}}$

14) $\frac{3}{4} - \frac{x-3}{x-2}$ LCM $= 4(x-2)$

$\frac{3(x-2)-4(x-3)}{4(x-2)} = \frac{3x-6-4x+12}{4(x-2)}$

$\boxed{\frac{-x+6}{4(x-2)}}$

15) $\frac{v^2-3v-40}{v-8} \div \frac{1}{v+5}$

$\frac{(v-8)(v+5)}{(v-8)} \cdot \frac{(v+5)}{1} = \boxed{(v+5)(v+5) \text{ or } (v+5)^2}$

16) $\frac{5x^3+10x^2}{x-5} \cdot \frac{1}{x+2}$

$\frac{5x^2(x+2)}{(x-5)} \cdot \frac{1}{(x+2)} = \boxed{\frac{5x^2}{x-5}}$

Solve each equation. Remember to check for extraneous solutions.

17) $\frac{2}{v+6} - \frac{4}{v+6} = \frac{v+2}{v^2+2v-24}$ LCM: $(v+6)(v-4)$

$(v+6)(v-4)$

$(v-4)(2) - 4(v+6) = v+2$

$2v-8-4v+16 = v+2$

$-2v+8 = v+2$

$6 = 3v$

$\boxed{v=2}$

18) $\frac{1}{x-1} = \frac{x+3}{x^2-x} - \frac{x+1}{x^2-x}$ LCM: $x(x-1)$

$x(x-1)$

$x = x+3-(x+1)$

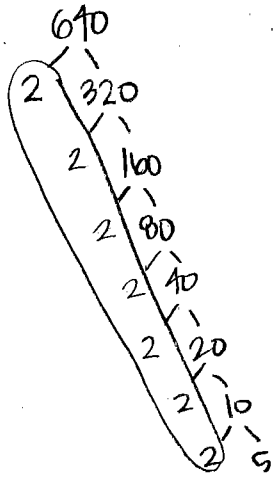
$x = x+3-x-1$

$\boxed{x=2}$

Simplify.

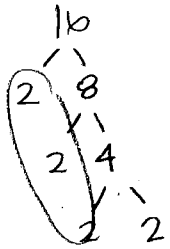
19) $\sqrt[7]{-640p^2}$

$-2\sqrt[7]{5p^2}$



20) $\sqrt[3]{16a^4}$

$2a\sqrt[3]{2a}$



21) $-2\sqrt{27}+3\sqrt{3}$

$-2\sqrt{9}\cdot\sqrt{3}+3\sqrt{3}$

$-6\sqrt{3}+3\sqrt{3}$

$-3\sqrt{3}$

22) $3\sqrt{12}-2\sqrt{12}$

$\sqrt{12} \rightarrow \sqrt{4}\cdot\sqrt{3}$

$2\sqrt{3}$

Solve each equation. Remember to check for extraneous solutions.

23) $v=\left(\sqrt{110-v}\right)^2$

$v^2=110-v$

$v^2+v-110=0$

$(v+11)(v-10)=0$

$v=-11$ extraneous

10

24) $\left(\sqrt{7-n}\right)^2=\left(\sqrt{3n-9}\right)^2$

$7-n=3n-9$

$16=4n$

$n=4$

Simplify.

25) $125^{\frac{2}{3}}$

$\left(\sqrt[3]{125}\right)^2 \rightarrow (5)^2$

25

26) $16^{\frac{3}{2}}$

$\left(\sqrt{16}\right)^3$

$(4)^3$

64

Rewrite each equation in exponential form.

27) $\log_x 28 = y$

$x^y = 28$

28) $\log_a c = b$

$a^b = c$

Rewrite each equation in logarithmic form.

29) $n^{-13} = 70$

$\log_n 70 = -13$

30) $20^2 = 400$

$\log_{20} 400 = 2$

Evaluate each expression.

31) $\log_5 \frac{1}{25} = x$

$5^x = \frac{1}{25}$

$\boxed{x = -2}$

32) $\log_5 125 = x$

$5^x = 125$

$\boxed{x = 3}$

Condense each expression to a single logarithm.

33) $6 \ln x - \ln y$

$\ln x^6 - \ln y$

$\boxed{\ln\left(\frac{x^6}{y}\right)}$

34) $\log_2 x + 3\log_2 y$

$\boxed{\log_2(xy^3)}$

Solve each equation.

35) $\log_5 x^2 - \log_5 3 = 1$

$\log_5 \frac{x^2}{3} = 1$

$5^1 = \frac{x^2}{3}$

$15 = x^2$

$\boxed{x = \pm\sqrt{15}}$

36) $\log_6 x - \log_6 7 = 1$

$\log_6 \frac{x}{7} = 1$

$6^1 = \frac{x}{7}$

$\boxed{x = 42}$

Identify the x-intercepts, vertical asymptotes and horizontal asymptote of each.

37) $f(x) = \frac{x^2 + 5x + 4}{2x^2 + 6x + 4} = \frac{(x+4)(x+1)}{2(x^2+3x+2)} = \frac{(x+4)(x+1)}{2(x+1)(x+2)}$

hole

x-int: $(-4, 0)$

V.A.: $x = -2$

H.A.: $y = \frac{1}{2}$

38) $f(x) = \frac{1}{3x^2 - 6x - 9} = \frac{1}{3(x^2-2x-3)} = \frac{1}{3(x-3)(x+1)}$

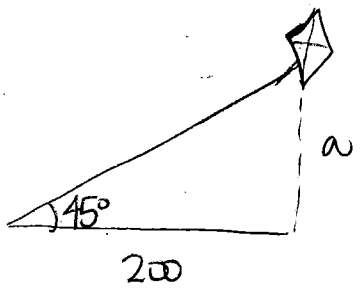
x-int: None

V.A.: $x = 3$, $x = -1$

H.A.: $y = 0$

Final Review – Application and Graphing Problems

39. You are viewing a kite flying in the air. You are standing 200 feet from the spot on the ground that the kite is flying directly above and are looking up at an angle of 45°. How high up in the air is the kite?

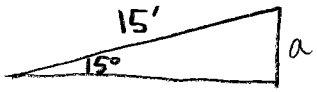


$\tan 45 = \frac{a}{200}$

$a = 200 \tan 45$

$a = 200$ ft

40. You are building a skateboard ramp to do some sick jumps off of with your longboard. The board you use for the ramp is 15 feet long and you prop it up so the end is rising at an angle of 15 degrees from the ground. What height will the ramp be at its highest point?



$\sin 15 = \frac{a}{15}$

$15 \sin 15 = a$

$a = 3.9$ ft

41. The time t in seconds required for an object to fall from a certain height can be modeled by the function $t = \frac{\sqrt{h}}{4}$ where h is the initial height of the object in feet. To the nearest tenth of a second, how much longer will it take for a piece of an iceberg to fall to the ocean from a height of 240 feet than from a height of 100 feet?

$t_1 = \frac{\sqrt{240}}{4}$ vs. $t_2 = \frac{\sqrt{100}}{4} = \frac{10}{4}$

$t_1 = 3.87$ $\quad$ $t_2 = 2.5$

$3.87 - 2.50 = 1.37$ seconds

42. The speed s in miles per hour that a car is traveling when it goes into a skid can be estimated by using the formula $s = \sqrt{30fd}$ where f is the coefficient of friction, and d is the length of the skid marks in feet. Suppose a car skids to a stop on a street with a speed limit of 30 mph. The skid marks measure 35 feet (d) and the coefficient of friction was 0.7 (f). Was the car speeding? Explain.

$S = \sqrt{30(0.7)(35)} = 27.11$ mph

No it was not speeding.

43. The area of a rectangle is $x^3 - 2x^2 + 4x - 8$ square meters. The length of the base is $x - 2$ meters. Write an expression for the height.

$A = b \cdot h$

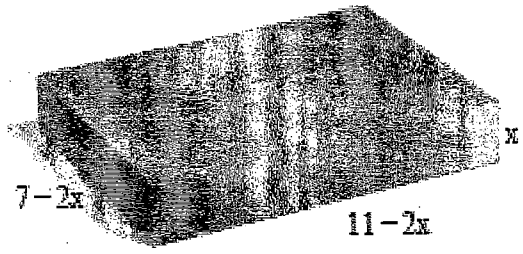
$x^3 - 2x^2 + 4x - 8 = (x-2)h$

$h = \frac{x^3 - 2x^2 + 4x - 8}{x-2}$

2	1	-2	4	-8
	↓	2	0	8
	1	0	4	0

$h = x^2 + 4$ meters

44. Write an expression in standard form for the volume of the box.



$V = b \cdot w \cdot h$

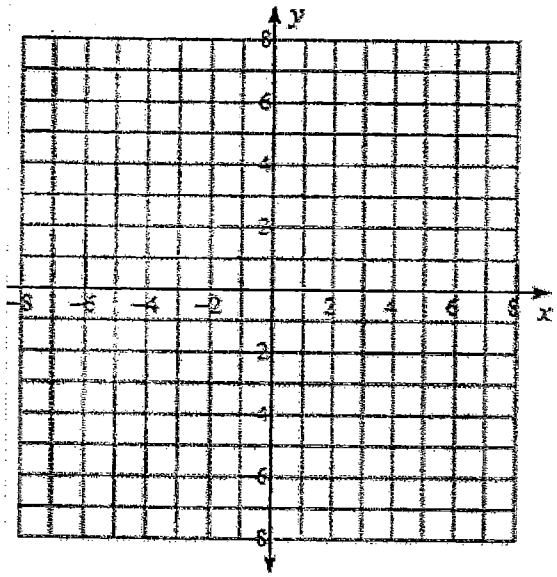
$(7-2x)(11-2x)(x)$

$(77 - 14x - 22x + 4x^2)(x)$

$(77 - 36x + 4x^2)(x)$

$4x^3 - 36x^2 + 77x = V$

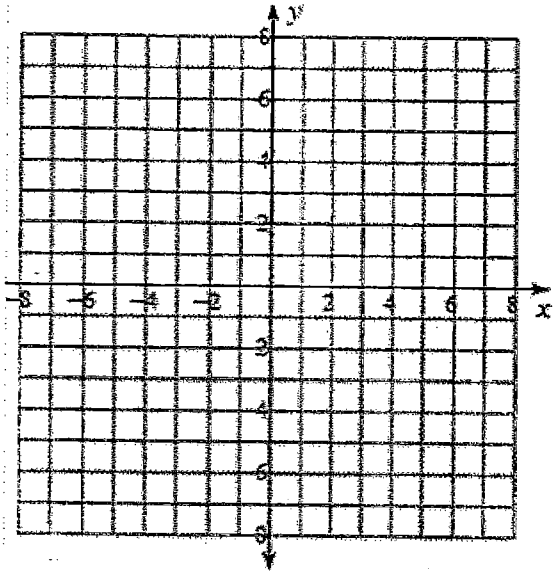
45. $f(x) = x^3 + 8x^2 + 16x + 2$



Name the function (2 words)	cubic polynomial
# of turning points	2
Local Max (x, y)	(-4, 2)
Local Min (x, y)	(-1.3, -7.5)
Intervals Increase	$(-\infty, -4)$, $(-1.3, \infty)$
Intervals Decrease	$(-4, -1.3)$
End Behavior	As $x \to +\infty$ $f(x) \to \infty$
End Behavior	As $x \to -\infty$ $f(x) \to -\infty$
Zeros (nearest tenth)	(-4.7, 0) (-3.2, 0) (-.1, 0)

46.

$f(x) = x^4 + 3x^3 - 2x + 7$



Name the function (2 words)	Quartic Polynomial
# of turning points	3
Local Max (x, y)	(-0.5, 7.7)
Local Min (x, y)	(-2.1, 2.9) (0.4, 6.4)
Intervals Increase	(-2.1, -0.5) (0.4, ∞)
Intervals Decrease	$(-\infty, -2.1)$ (-0.5, 0.4)
End Behavior	As $x \to +\infty$ $f(x) \to \infty$
End Behavior	As $x \to -\infty$ $f(x) \to \infty$
Zeros (nearest tenth)	none