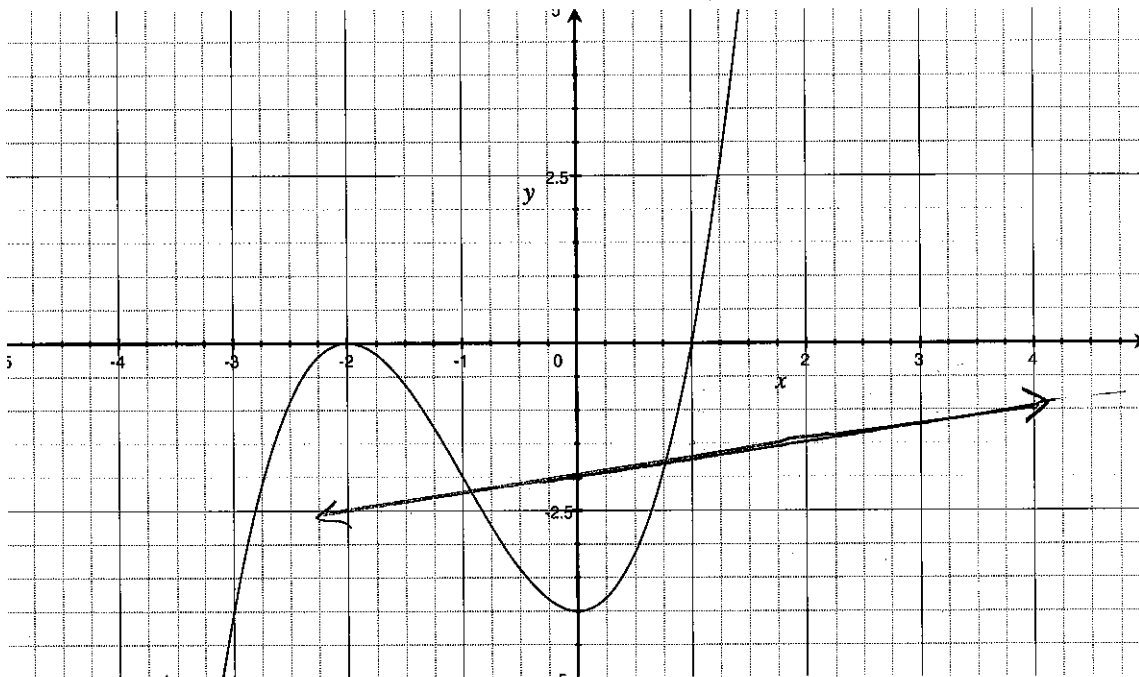


Name: KEY
Date: _____

Use the graph and information below for questions #1 – 4.

1) Write the equation in standard form of the graph of $f(x)$ shown below. (4pts) $f(x) = x^3 + 3x^2 - 4$



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

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

$$x^2 + 4x + 4$$

x	x^3	$+4x^2$	$4x$
-1	$-x^2$	$-4x$	-4

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

2) Find $f(-4)$ (2pts)

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

$$= -64 + 48 - 4$$

$$f(-4) = -20$$

3) A second function g is defined by $g(x) = \frac{1}{4}x - 2$. Select the phrase in each box to complete the sentence.

$f(1.5)$ is greater than $g(1.5)$ and $f(-2)$ is greater than $g(-2)$. (6pts)

$$f(1.5) = (1.5)^3 + 3(1.5)^2 - 4$$

$$= 6.125$$

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

$$= 0$$

$$g(1.5) = \frac{1}{4}(1.5) - 2$$

$$= -1.625$$

$$g(-2) = -2.5$$

Algebra 2H
Polynomials Test – Re-Test

4) Is $(x - 3)$ a factor of $4x^2 + 3x - 12$? (2pts) Tell why or why not (3pts)

$$\begin{array}{r} 3 \overline{) 4 \quad 3 \quad -12} \\ \underline{ 12 \quad 45} \\ 4 \quad 15 \quad 33 \end{array} \quad \text{no}$$

Use the information below to answer problems #6 – 9.

5) A designer is making a rectangular prism box with maximum volume, with the sum of its length, width and height equal to 8 inches. The length must be twice the width. Find an expression for the volume of the box in terms of h . (3pts)

$$V = lwh$$

$$V = (2w)(w)(8 - 3w)$$

$$\begin{cases} l + w + h = 8 \\ l = 2w \end{cases}$$

$$V = 2w^2(8 - 3w)$$

$$V = 16w^2 - 6w^3$$

$$\hookrightarrow 3w + h = 8 \Rightarrow h = 8 - 3w$$

$$V = -6w^3 + 16w^2$$

6) What is the domain of h in terms of this problem? (2pts)

$$0 < w < 2\frac{2}{3}$$

7) Find the length of the side h that would provide the maximum volume of the box. (6pts)

Acceptable: 1.765974 (calculator)

$\frac{4}{3}$ (halfway between zeroes)

8) Find the maximum volume of the box. (3pts)

$$\text{Calc: } -6(1.765974)^3 + 16(1.765974)^2$$

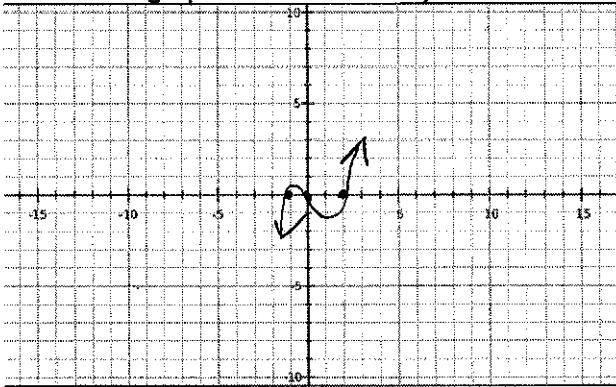
$$= 16.8537$$

$$\text{or } -6\left(\frac{4}{3}\right)^3 + 16\left(\frac{4}{3}\right)^2$$

$$= 14.22$$

Algebra 2H
Polynomials Test – Re-Test

9) Sketch the graph of the function $y = x^3 - x^2 - 2x$. (6pts)

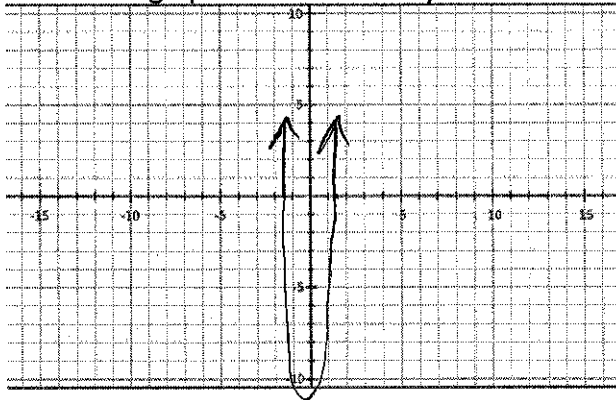


$$x^2 - x - 2$$

$$\begin{array}{r} -1 \quad | \quad 1 \quad -1 \quad -2 \\ \quad \quad | \quad \quad -1 \quad \quad 2 \\ \hline \quad \quad | \quad 1 \quad -2 \quad 0 \end{array}$$

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

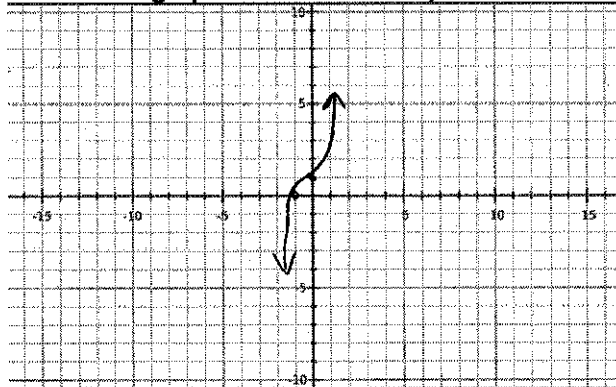
10) Sketch the graph of the function $y = x^4 + 7x^2 - 18$. (6pts)



$$(x^2 + 9)(x^2 - 2)$$

$$x = \pm 3i, \pm \sqrt{2}$$

11) Sketch the graph of the function $y = 3x^3 + x^2 - x + 1$. (6pts)



$$\begin{array}{r} -1 \quad | \quad 3 \quad 1 \quad -1 \quad 1 \\ \quad \quad | \quad \quad -3 \quad 2 \quad -1 \\ \hline \quad \quad | \quad 3 \quad -2 \quad 1 \quad 0 \end{array}$$

$$3x^2 - 2x + 1 = 0$$

12) The graphs of the above three functions look different. Choose one of the three functions and determine why that graph is unlike the other two. Use information from both the equations and the graphs to justify your reasoning. (6pts)

Algebra 2H
Polynomials Test – Re-Test

13) Find all **possible** rational roots of: $2x^4 + 5x^3 - 10x^2 + 6x + 12 = 0$.
(3pts)

$$\frac{\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12}{\pm \frac{1}{2}, \pm \frac{3}{2}}$$

14) Write in standard form the polynomial with rational coefficients that has the roots 4 and $1 + 2i$.

(3pts) $(x-4)(x-1+2i)(x-1-2i)$

$$\boxed{x^2 - 2x + 5}$$

			$x - 1 + 2i$
x	x^2	$-x$	$2i$
-1	$-x$	1	$-2i$
$-2i$	$2i$	$-4i^2$	

15) $8x^3 + 64 = 0$ (4pts)

$$x^3 + 8 = 0$$

$$\begin{array}{r|rrrr} -2 & 1 & 0 & 0 & 8 \\ & & -2 & 4 & -8 \\ \hline & 1 & -2 & 4 & 0 \end{array}$$

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

$$x = \frac{2 \pm \sqrt{4 - 4(4)}}{2}$$

$$x = \frac{2 \pm \sqrt{-12}}{2} = \frac{2 \pm 2i\sqrt{3}}{2}$$

$$\underline{-2, 1 \pm i\sqrt{3}}$$

16) $x^4 - 12x^2 - 64 = 0$ (4pts)

$$(x^2 - 16)(x^2 + 4) = 0$$

$$\underline{x = \pm 4, \pm 2i}$$

17) $5x^3 - 2x^2 + 5x - 10 = 0$ (4pts)

no rational roots