Name: KEY
Date: _____

A2.U6.TR

# ALGEBRA 2 UNIT 6 REVIEW

## *Polynomials and Polynomial Functions*

Combine like terms if necessary and write each polynomial in standard form. Then classify each by circling the degree and the number of terms. (**3 *points each***)

**1.** $4x + x + 2$

$5x + 2$

(***Circle one***)

Constant, linear, quadratic, cubic

(***Circle one***)

Monomial, binomial, trinomial

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

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

(***Circle one***)

Constant, linear, quadratic, cubic

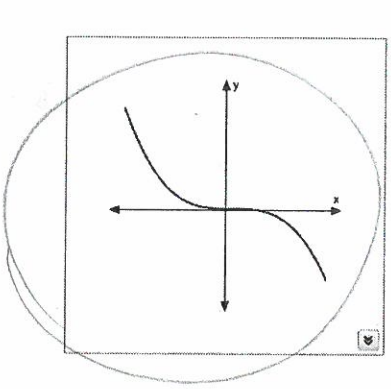
(***Circle one***)

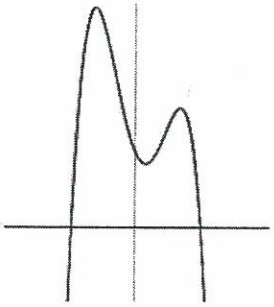
Monomial, binomial, trinomial

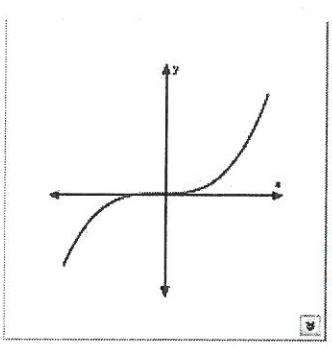
Circle the correct graph based on the end behavior of the polynomial function. (**1 *point***)
Be sure to write the function in standard form.

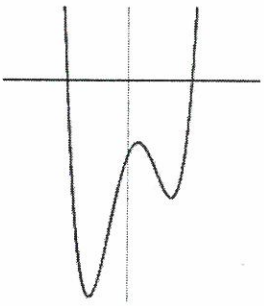
**3.** $y = 50 - 3x^3 + 5x^2$ → $-3x^3 + 5x^2 + 50$

leading term: $-3x^3$ ← negative, odd → up & down







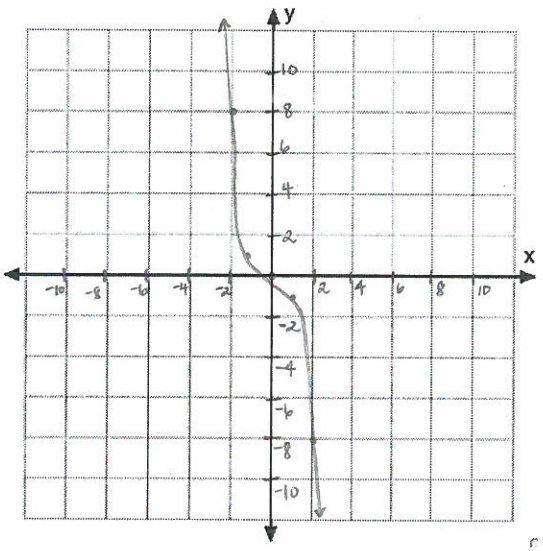


**4.** Make a table of values and graph the following function. (**9 *points***)

$f(x) = -x^3$

| $x$ | $f(x)$ |
|---|---|
| -2 | 8 |
| -1 | 1 |
| 0 | 0 |
| 1 | -1 |
| 2 | -8 |

$f(-2) = -(-2)^3 = -(-8) = 8$
$f(-1) = -(-1)^3 = -(-1) = 1$
$f(0) = -(0)^3 = -0 = 0$
$f(1) = -(1)^3 = -1$
$f(2) = -(2)^3 = -8$



Write each polynomial in factored form. **(4 *points each*)**

**5.** $x^3 + 5x^2 + 6x$

$x\left(\frac{x^3}{x} + \frac{5x^2}{x} + \frac{6x}{x}\right) = x(x^2+5x+6)$

$x(x+3)(x+2)$

| mult | add |
|---|---|
| 6 | 5 |

**6.** $x^2 + 4x - 21$

$(x-3)(x+7)$

| mult | add |
|---|---|
| -21 | 4 |

Find the zeros of each function. Plot the $x$-intercepts. Find the end behavior by multiplying the factors and writing the equation in standard form. Plot the $y$-intercept. Plot two extra points between the $x$-intercepts. Sketch the function. **(9 *points each*)**

**7.** $y = (x + 2)(x - 3)$

$x+2=0 \quad x-3=0$

zeros $x=-2$ $x=3$

x-intercepts $(-2,0)$ $(3,0)$

y-intercept $x=0$

$y = (0+2)(0-3) = 2(-3) = -6$

$(0,-6)$

extra pts. $y = (1+2)(1-3) = 3(-2) = -6$

$(1,-6)$

$y = (-1+2)(-1-3) = 1(-4) = -4$

$(-1,-4)$

END BEHAVIOR

standard form

$(x+2)(x-3)$

$= x^2 - 3x + 2x - 6$

$= x^2 - x - 6$

positive | even

up and up

**8.** $y = x(x-2)(x-4)$

$x=0 \quad x-2=0 \quad x-4=0$

zeros $x=0$ $x=2$ $x=4$

x-intercepts $(0,0)$ $(2,0)$ $(4,0)$

y-intercept $x=0$

$y = 0(0-2)(0-4) = 0(0)(0) = 0$

$(0,0)$

extra pts $y = 1(1-2)(1-4) = 3$

$(1,3)$

$y = 3(3-2)(3-4) = -3$

$(3,-3)$

END BEHAVIOR

standard form

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

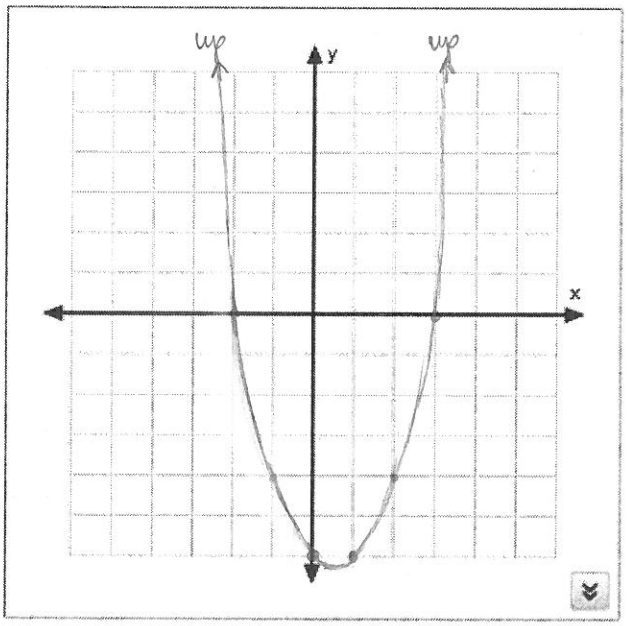
$= x(x^2 - 4x - 2x + 8)$

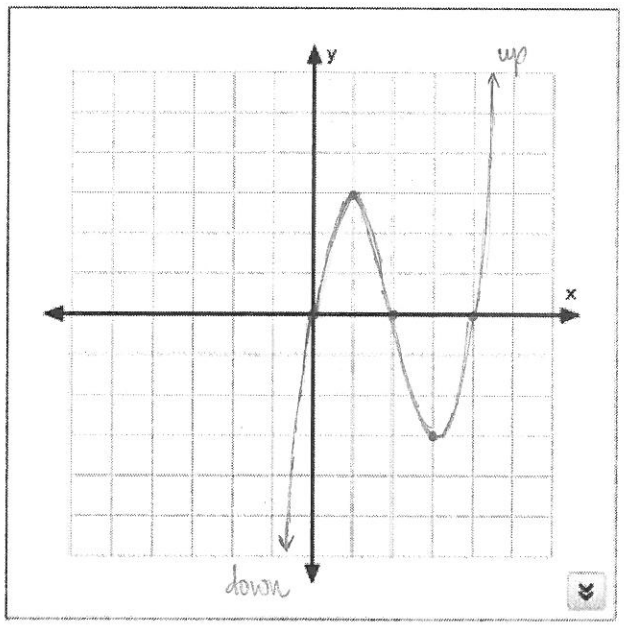
$= x^3 - 4x^2 - 2x^2 + 8x$

$= x^3 - 6x^2 + 8x$

positive & odd

down and up



Write a polynomial function in standard form with the given zeros. **(6 *points*)**

**9.** $x = 3$ *and* $x = 4$

$x=3$ $\quad$ $x=4$

$-3\ -3$ $\quad$ $-4\ -4$

set = 0 ~ $x-3=0$ $\quad$ $x-4=0$

$y = (x-3)(x-4)$ ~ foil

$y = x^2-4x-3x+12$ ~ combine like terms

$\boxed{y = x^2-7x+12}$

Find the real solutions of each equation by factoring. **(6 *points each*)**

**10.** $x^2 + 4x - 45 = 0$

| mult | add |
|---|---|
| −45 | 4 |

factor ~ $(x+9)(x-5)=0$

set = 0 ~ $x+9=0$ $\quad$ $x-5=0$

$-9\ -9$ $\quad$ $+5\ +5$

solve for x ~ $\boxed{x=-9}$ $\quad$ $\boxed{x=5}$

**11.** $x^3 + 6x^2 - 7x = 0$

| mult | add |
|---|---|
| −7 | 6 |

factor GCF ~ $x(x^2+6x-7)=0$

factor inside ~ $x(x+7)(x-1)=0$

set = 0 ~ $x=0$ $\quad$ $x+7=0$ $\quad$ $x-1=0$

$-7\ -7$ $\quad$ $+1\ +1$

solve for x ~ $\boxed{x=0}$ $\quad$ $\boxed{x=-7}$ $\quad$ $\boxed{x=1}$

Find the solutions of the equations using the quadratic formula. **(6 *points each*)**

**12.** $x^2 + 3x + 3 = 0$ $\quad$ $A=1\ B=3\ C=3$

$\frac{-B \pm \sqrt{B^2-4AC}}{2A}$

$\frac{-3 \pm \sqrt{3^2-4(1)(3)}}{2(1)} = \frac{-3 \pm \sqrt{9-12}}{2}$ simplify √

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

make 2 branches

$= \boxed{\frac{-3+i\sqrt{3}}{2}, \frac{-3-i\sqrt{3}}{2}}$

**13.** $x^2 - 4x - 8 = 0$

$\frac{-B \pm \sqrt{B^2-4AC}}{2A}$

$= \frac{-(-4) \pm \sqrt{(-4)^2-4(1)(-8)}}{2(1)} = \frac{4 \pm \sqrt{16+32}}{2}$ simplify √

$= \frac{4 \pm \sqrt{48}}{2} = \frac{4 \pm \sqrt{16 \cdot 3}}{2}$

$= \frac{4 \pm 4\sqrt{3}}{2}$

make 2 branches

$\frac{4}{2} + \frac{4}{2}\sqrt{3}$ $\quad$ $\frac{4}{2} - \frac{4}{2}\sqrt{3}$

simplify fractions

$\boxed{2+2\sqrt{3};\ 2-2\sqrt{3}}$

Find the three solutions of the cubic equation by factoring. **(6 *points*)**

**14.** $x^3 + 4x^2 - 12x = 0$

factor GCF ~ $x(x^2+4x-12)=0$

factor $x(x+6)(x-2)=0$

set = 0 $\quad$ $x=0$ $\quad$ $x+6=0$ $\quad$ $x-2=0$

$-6\ -6$ $\quad$ $+2\ +2$

solve for x ~ $\boxed{x=0}$ $\quad$ $\boxed{x=-6}$ $\quad$ $\boxed{x=2}$

Divide using long division. (**6 *points each***)

**15.** $(x^2 - 13x - 48) \div (x + 3)$

$x - 16$

$x+3 \overline{)\, x^2 - 13x - 48}$

change signs → $-x^2 - 3x$ ↓

$-16x - 48$

change signs → $+16x + 48$

$0$

D: $\frac{x^2}{x} = x$ over

M: $x(x+3)$

$= x^2 + 3x$ under

D: $\frac{-16x}{x} = -16$ over

M: $-16(x+3)$

$= -16x - 48$ under

quotient: $x - 16$

**16.** $(2x^2 + x - 7) \div (x - 5)$

$2x + 11$

$x-5 \overline{)\, 2x^2 + x - 7}$

change signs → $-2x^2 + 10x$

$11x - 7$

change signs → $-11x + 55$

$48$

quotient: $2x + 11$ R 48

D: $\frac{2x^2}{x} = 2x$ over

M: $2x(x-5)$

$= 2x^2 - 10x$ under

D: $\frac{11x}{x} = 11$ over

M: $11(x-5)$

$= 11x - 55$ under

*Extra Credit*: Determine whether each binomial is a factor of $x^3 + 3x^2 - 10x - 24$: Circle ***yes*** or ***no***. Report the quotient and any remainders. (**6 *points***)

**17.** $x + 4$