Name: _____ Student #:_____

Date:_____ T.A. #:_____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 5 TEST – POLYNOMIAL FUNCTIONS

*NO GRAPHING CALCULATORS PERMITTED ON THIS TEST

/29

***Full marks will NOT be given for the final answer only.**

When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. Write an example of a polynomial function. Explain why it is a polynomial function. (2 marks)

EXAMPLE: $f(x) = 3x^2 - 2x + 1$

EXPONENTS ON X ARE WHOLE #'S.

2. For the polynomial function $f(x) = 7x - 3 - 8x^3$ state: (2 marks)

   a) The degree: 3

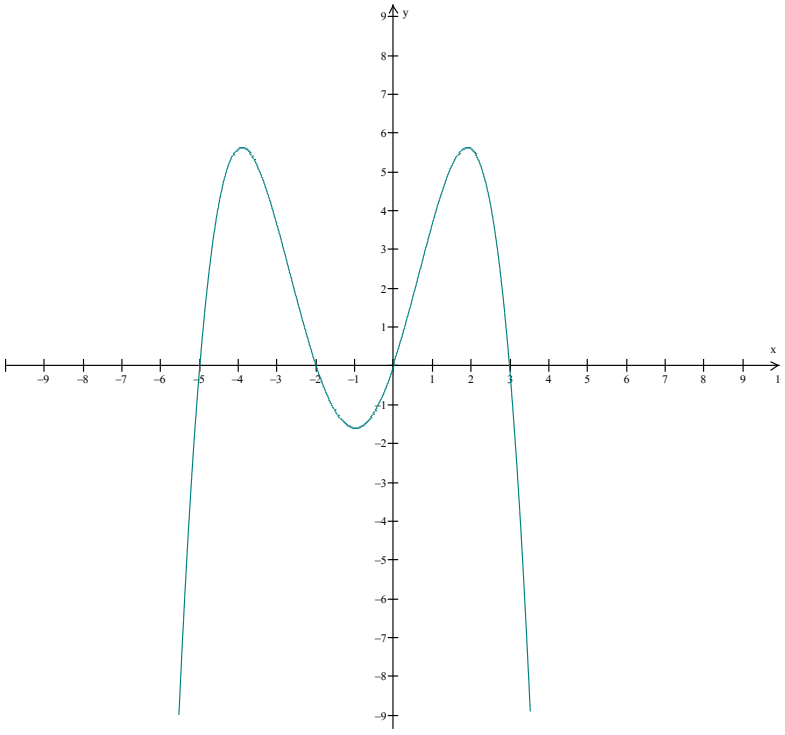
   b) Name of the polynomial function: CUBIC

   c) Leading coefficient: -8

   d) Constant term: -3

/4

3. Given the graph below:



a) What degree is this function? 4 (1 mark each)

b) Is the leading coefficient positive or negative? NEGATIVE

c) How many roots does this function have? 4

4. Given the function $y = ax^n + 2x + b$, what are the conditions on *a, n,* and *b* for this function to have a minimum value with a negative *y* intercept? (3 marks)

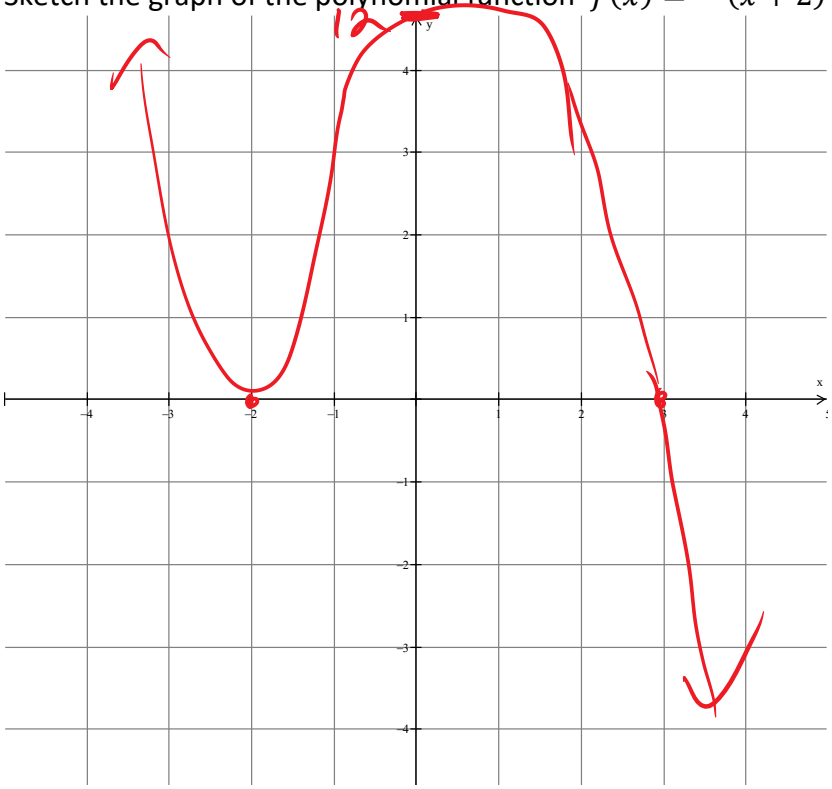
$a > 0$

n IS EVEN NATURAL NUMBER (ie 2, 4, 6, ...)

$b < 0$

/6

5. Sketch the graph of the polynomial function $f(x) = -(x+2)^2(x-3)$. (3 marks)



6. Given the function $f(x) = x^4 - 16x^2$ $f(x) = x^2(x^2-16)$ (4 marks)

a) Degree and end- behavior: 4, LEFT: UP QUAD 2 RIGHT: UP QUAD 1

b) The zeros and their multiplicity: 0 (MULT OF 2), 4, -4 (EACH MULT OF 1)

c) The y-intercept: 0

/7

7. Determine the quotient: (3 marks)

$$(2x^3 + 3x^2 - 9x - 10) \div (x - 2)$$

-2	2	3	-9	-10
	$\downarrow$	-4	-14	-10
x	2	7	5	0

$2x^2 + 7x + 5$

8. Use the remainder theorem to determine the remainder when $2x^2 - 7x + 4$ is divided by $x + 2$. (1 mark)

$2(-2)^2 - 7(-2) + 4$

$8 + 14 + 4 = 26$

9. When $x^3 - kx^2 + 6$ is divided by $x - 3$, the remainder is 4. Determine k. (2 marks)

$3^3 - k(3)^2 + 6 = 4$

$27 - 9k + 6 = 4$

$-9k = -29$

$k = \frac{29}{9}$

/6

10. For the function $f(x) = x^3 - 2x^2 - 9x + 18$

a) List the possible integral factors. (1 mark)

$\pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18$

b) Factor fully. (2 marks)

$x + 2$ IS A FACTOR

	1	-2	-9	18
-2	↓	-2	18	
x	1	0	-9	0

$(x-2)(x^2-9) = (x-2)(x-3)(x+3)$

11. Show that $x + a$ is a factor of the polynomial:

$$P(x) = (x+a)^2 + (x+c)^2 - (a-c)^2$$ (3 marks)

IF $x+a$ IS A FACTOR, THEN $-a$ IS A ROOT.

$P(-a) = (-a+a)^2 + (-a+c)^2 - (a-c)^2$

$= 0 + (a^2 - 2ac + c^2) - (a^2 - 2ac + c^2)$

$= 0.$

SINCE $P(-a) = 0$, $x+a$ IS A FACTOR

/6