NAME: _____ BLOCK: _____ DATE: _____ (K)

PMATH 12 - CHAPTER 1 - PRETEST parent/guardian signature

Multiple Choice - PART 1 - NON-CALCULATOR - 10 MINUTES (#1-5)
Circle the choice that best completes the statement or answers the question.

1. Divide: $(-4x^2 + 22x + 12) \div (x - 6)$

$x-6 \overline{)-4x^2+22x+12}$ $\quad -4x-2$
$+4x^2-24x$
$-2x+12$
$-2x+12$
0

A. $4x + 6$
B. $4x - 48$
C. $-4x + 12$
D. $-4x - 2$

2. What is the remainder when $x^3 + 4 - 11x + 3x^2$ is divided by $6 + x$?

$x = -6$
$(-6)^3 + 4 - 11(-6) + 3(-6)^2$
$-216 + 4 + 66 + 108$

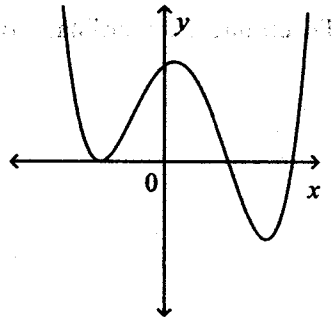
A. 70
B. –62
C. –38
D. 46

3. For the polynomial $P(x) = -3x^2 - 4x - 5$, what is the value of $P(-2)$?

$-3(-2)^2 - 4(-2) \cdot 5$
$-12 + 8 - 5$

A. –25
B. 15
C. –21
D. –9

4. The graph of a polynomial function of degree 4 is shown. Which statements are true?
   i) The function has an even degree. ✓
   ii) The function has a zero of multiplicity 2. ✓ (bounces off x-axis)
   iii) The equation of the function has a negative leading coefficient. ✗
   iv) The y-intercept is positive. ✓



A. i, ii, iii
B. i, iii, iv
C. ii, iii, iv
D. i, ii, iv

5. Determine the zeros of the polynomial function $f(x) = (x + 2)^4(x - 5)$. State the multiplicity of each zero.

$x = -2$ $\quad x = 5$

A. The zero 4 has multiplicity 2; the zero 1 has multiplicity –5.
B. The zero 4 has multiplicity –2; the zero 1 has multiplicity 5.
C. The zero –2 has multiplicity 4; the zero 5 has multiplicity 1.
D. The zero 2 has multiplicity 4; the zero –5 has multiplicity 1.

MULTIPLE CHOICE - PART 2 - CALCULATOR may be used after 10 minutes

6. Divide $-3x^3 - 2x^2 + 4x + 3$ by $x + 3$. Write the division statement.

$-3x^2+7x-17$
$x+3 \overline{)-3x^3-2x^2+4x+3}$
$+3x^2+9x^2$
$7x^2+4x$
$-7x^2+21x$
$-17x+3$
$+17x+51$
54

A. $-3x^3 - 2x^2 + 4x + 3 = (x+3)(-3x^2 - 11x + 25)$
B. $-3x^3 - 2x^2 + 4x + 3 = (x+3)(-3x^2 - 11x + 25) - 48$
C. $-3x^3 - 2x^2 + 4x + 3 = (x+3)(-3x^2 + 7x - 17)$
(D.) $-3x^3 - 2x^2 + 4x + 3 = (x+3)(-3x^2 + 7x - 17) + 54$

7. Which two binomials are factors of $x^4 + 8x^3 + 7x^2 - 40x - 60$?

G.C. use or subst eg $x=2$ $2^4+8(2)^3+7(2)^2-40(2)-60 \neq 0$

A. $x+2$ and $x-6$
B. $x-2$ and $x-6$
C. $x-2$ and $x+6$
(D.) $x+2$ and $x+6$

8. Use graphing technology. Graph the polynomial function $f(x) = x^3 - 7x^2 + 11x - 5$. Which characteristics apply to the graph?

A. Number of x-intercepts: 3
Number of hills: 1
Number of valleys: 1
B. Number of x-intercepts: 2 ✓
Number of hills: 2
Number of valleys: 1
(C.) Number of x-intercepts: 2 ✓
Number of hills: 1 ✓
Number of valleys: 1 ✓
D. Number of x-intercepts: 1
Number of hills: 1
Number of valleys: 2

9. Use a graphing calculator to graph the function $V(x) = x^3 - 7x^2 + 10x$. Determine the coordinates of the local maximum point to the nearest tenth.

A. (0.9, 8.2)
B. (3.8, 4.1)
C. (3.8, 8.2)
(D.) (0.9, 4.1)

SHOW YOUR WORK SECTIONS

1. Divide: $(-5x^5 - 20x^4 - 25x^3 - 12x^2 - 5x + 40) \div (x + 2)$
Write the quotient and the remainder.

$-5x^4-10x^3-5x^2-2x-1$
$x+2 \overline{)-5x^5-20x^4-25x^3-12x^2-5x+40}$
$+5x^5+10x^4$
$-10x^4-25x^3$
$+10x^4+20x^3$
$-5x^3-12x^2$
$+5x^3+10x^2$
$-2x^2-5x$
$+2x^2+4x$
$-x+40$
$+x+2$
42

$Q = -5x^4-10x^3-5x^2-2x-1$

$R = 42$

2. Write an equation in standard form for a cubic function with zeros 1, –2, and 4.

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

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

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

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

PROBLEM

1. A polynomial is divided by $x+2$. The quotient is $5x^2+5x+9$ and the remainder is 3. What is the original polynomial? Explain your work.

$(x+2)(5x^2+5x+9) + 3$

$= 5x^3 + 5x^2 + 9x$

$+10x^2 + 10x + 18$

$+3$

$= 5x^3 + 15x^2 + 19x + 21$

2. Is $3x - 1$ a factor of $3x^3 - x^2 - 15x + 10$? Justify your answer.

$$3x-1 \overline{)\,3x^3 - x^2 - 15x + 10}$$

$x^2 \quad +5$

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

$-15x + 10$

$+(15x - 5)$

5

NOT a factor since $R \neq 0$

3. Use graphing technology. Complete the table below for the graphs.

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

ii) $g(x) = -x^4 - 3x^3 - 2x^2 + 3x + 3$

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

iv) $j(x) = x^4 + 3x^3 - 2x^2 - 3x + 1$

Graph	Number of x-intercepts	Number of hills	Number of valleys	y-intercept
i	3	2	1	-2
ii	2	1	0	3
iii	2	0	1	3
iv	4	1	2	1

4. The volume, in cubic centimetres, of an expandable box can be represented by the polynomial function $V(x) = x^3 - 43x^2 + 432x$. The width of the box in centimetres is $16 - x$. Assume the length is greater than the width.

a) Determine the expressions for the height and width of the box in terms of x.

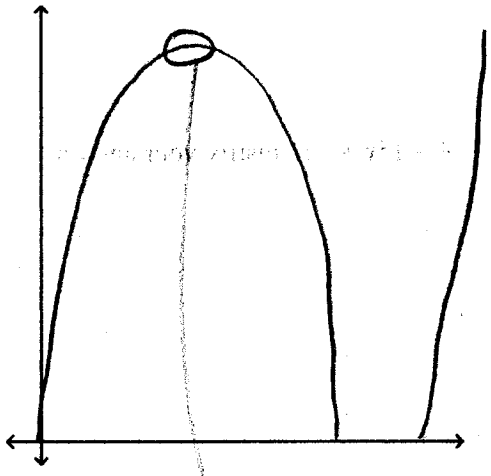
FACTOR $x(x^2 - 43x + 432)$

$= x(16 - x)(27 - x)$

b) Graph the function. Sketch the graph. What do the x-intercepts represent?

x = height

Will assist in finding l and w



c) To the nearest cubic centimetre, what is the approx. maximum volume of the box?

$\approx 1266\ cm^3$