for $i^2 = -1$, $(4 + i)^2 = ?$ *Alg2T Day 4 WU*

F. 15
G. 17
H. $15 + 4i$
J. $15 + 8i$
K. $16 + 4i$

For the complex number i such that $i^2 = -1$, what is the value of $i^4 + 2i^2$?

A.   -2
B.   -1
C.   0
D.   1
E.   2

*Let's go over DLT

*Synthetic DLT as take home!

Warm-up

$$(3x^4 - 9x^3 + 5x - 15) \div (x - 3) =$$

$= 0$

1.) Use long division. ~~What should we use?~~

2.) Use synthetic division.

③ | 3 −9   0   5 −15
  | 9   0   0   15
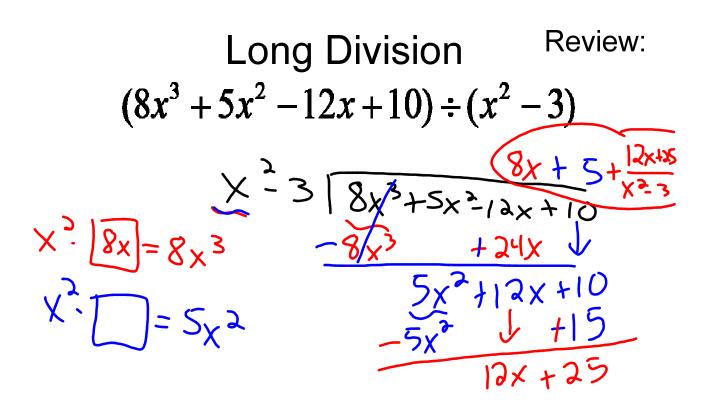 ------------------------
    3   0   0   5 | 0

$3x^3 + 5 = 0$

$x = 3$

1.) Use long division.　　　　　Warm-up

$$(3x^4 - 9x^3 + 5x - 15) \div (x - 3) =$$

2.) Use synthetic division.
What should we use?

$$x - 3 \overline{\smash{\big)}\ 3x^4 - 9x^3 + 0x^2 + 5x - 15} \qquad 3x^3 \qquad + 5$$

$$-3x^4 + 9x^3$$

$$5x - 15$$

$$-5x + 15$$

$$\bigcirc$$

$$x \cdot \boxed{3x^3} = 3x^4$$

Long Division   Review:

$$(8x^3 + 5x^2 - 12x + 10) \div (x^2 - 3)$$

$$x^2 \cdot \boxed{8x} = 8x^3$$

$$x^2 \cdot \boxed{} = 5x^2$$

$$x^2 - 3 \,\big)\, \overline{8x^3 + 5x^2 - 12x + 10}$$

$$\boxed{8x + 5 + \frac{12x + 25}{x^2 - 3}}$$

$$-8x^3 \qquad\qquad +24x$$

$$\overline{\; 5x^2 + 12x + 10}$$

$$-5x^2 \qquad +15$$

$$\overline{\; 12x + 25}$$

Long Division   Review:

$$\left(5x^4 + 2x^3 - 9x + 12\right) \div \left(x^2 - 3x + 4\right)$$

More Long Division Practice

Homework Questions?

look at #34, #36 and #40

$$\frac{11 \pm \sqrt{41}}{10}$$

pg. 366 # 6) 2x+9 +8/4x-1

8) 7x+11 + -6/x^2+1

30) -4, 1/4

32) -8, 2/3

34) $(11 \pm \sqrt{41})$ /2

36) 2x+5

40) max 3032

dim 18.6 , 28.6, 5.7

Algebra 2 Trig Daily Learning Target Quiz
Unit 3 - Synthetic Division & Long Division

Alg2T Extra Credit

If $a = 5$ and $b = -3$, that $a^3 - 3a^2b + 3ab^2 - b^3 = ?$

A.   8
B.   26
C.   62
D.   458
E.   512

What is the value of $f(2)$ where $f(x) = (2x - 7)(x^2 - 3x + 6)$?

F.   -176
G.   -48
H.   -42
J.   -18
K.   -12

Example 3 Page 389

*calculator practice (max & min)

CH 5
Polynomial Functions
(5.6)Finding Rational Zeros

I. Rational Zero Theorem

$$\frac{p}{q} = \frac{\text{factors of the constant term}}{\text{factors of the leading coefficient}}$$

$$\pm\frac{5}{2} : \frac{1, 5}{1, 2}$$

$$2x^2 + 3x + 5$$

$$\pm 1, \frac{1}{2}, 5, \frac{5}{2}$$

I. Rational Zero Theorem   Example

List all the possible rational zeros.

1.) $f(x) = 2x^5 + x^4 - 32x - 16$

$$\pm \frac{16 : 1 \ 2 \ 4 \ 4 \ 8 \ 16}{2 : 1, 2}$$

$$= \pm 1, \frac{1}{2}, 2, 4, 8, 16$$

I. Rational Zero Theorem   Example

Find all the rational zeros of the function.

1.) $f(x) = x^3 - 8x^2 - 23x + 30$

List $\dfrac{\text{constant}}{\text{leading C.}}$ $\dfrac{30}{1} : \dfrac{1\ 2\ 3\ 5\ 6\ 10\ 15\ 30}{1}$

$\pm 1, 2, 3, 5, 6, 10, 15, 30$

$2\,\rfloor\ 1\quad -8\quad -23\quad 30$
$\ \ \ 2\quad -12\quad -70$
$\ 1\quad -6\quad -35\quad \cancel{-40}$

$1\,\rfloor\ 1\quad -8\quad -23\quad 30$
$\ \ 1\quad -7\quad -30$
$\ 1\quad -7\quad -30\quad \boxed{0}$

$x^2 - 7x - 30$

$(x-10)(x+3) = 0$

$\boxed{x = 10 \quad x = -3 \quad x = 1}$

I. Rational Zero Theorem   TOYO:

Find all the rational zeros of the function.

2.) $f(x) = x^3 + 2x^2 - 11x - 12$

$$\frac{12}{1} = \frac{: 1 \; 2 \; 3 \; 4 \; 6 \; 12}{1}$$

$$\pm 1, 2, 3, 4, 6, 12$$

③

$$\begin{array}{c|ccc} 1 & 1 & 2 & -11 & -12 \\ & & 3 & 15 & 12 \\ \hline & 1 & 5 & 4 & 0 \end{array}$$

$$x^2 + 5x + 4$$

$$(x+4)(x+1)$$

$$\boxed{x=-4 \quad x=-1 \quad x=3}$$

I. Rational Zero Theorem   TOYO:

Find all the zeros of the function.

3.) $f(x) = x^4 - x^3 - 7x^2 + x + 6$

$$\frac{6}{1} = \frac{1 \quad 2 \quad 3 \quad 6}{1} \qquad \pm 1, 2, 3, 6$$

①
$$\begin{array}{c|ccccc} 1 & 1 & -1 & -7 & 1 & 6 \\ & & 1 & 0 & -7 & -6 \\ \hline & 1 & 0 & -7 & -6 & \boxed{0} \end{array}$$

③
$$\begin{array}{c|ccccc} & 1 & 0 & -7 & -6 \\ & & 3 & 9 & 6 \\ \hline & 1 & 3 & 2 & \boxed{0} \end{array}$$

$x^2 + 3x + 2$

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

$\boxed{x = -2 \quad x = -1 \quad x = 1 \quad x = 3}$

I. Rational Zero Theorem   TOYO:

Find all the zeros of the function.

4.) $f(x) = x^4 - 11x^2 + 18x - 8$

I. Rational Zero Theorem   TOYO:

Find all the rational zeros of the function.

5.) $f(x) = x^5 + x^4 + 5x^3 + 5x^2 - 36x - 36$

$$\frac{36}{1} = \frac{1 \ 2 \ 36 \ 12 \ 8 \ 36}{1}$$

$\pm 1, 2, 3, 6, 12, 18, 36$

$$-1 \quad \begin{array}{c} 1 \quad 1 \quad 5 \quad 5 \quad -36 \quad -36 \\ \downarrow \quad -1 \quad 0 \quad -5 \quad 0 \quad 36 \\ \hline 1 \quad 0 \quad 5 \quad 0 \quad -36 \quad \boxed{0} \end{array}$$

$1x^4 \quad 0x^3 \quad 5x^2 \quad 0x \quad -36$

$x^4 + 5x^2 - 36$

$(x^2 + 9)(x^2 - 4)$

$x^2 + 9 = 0$
$\sqrt{x^2} = \sqrt{-9}$
$x = \pm 3$

2 imag.

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

$(X^4 + 9x^2)(4x^2 - 36)$
$x^2(x^2+9) - 4(x^2+9)$
$(x^2-4)(x+9)$

$\boxed{X = -2 \quad X = 2 \quad X = -1}$

3 real zeros

And the homework:
*Day 4 Unit Plan

*Purple ws-due next week Wednesday/ Thursday.