Practice Set – Fundamental Theorem of Algebra

OCCUR ON X-AXIS

1 What is the completely factored form of this expression?

$2x^3 - 9x^2 + 7x + 6$

A. $(x + 2)(2x + 1)(x - 3)$
B. $(x + 2)(2x - 1)(x - 3)$
C. $(x - 2)(2x + 1)(x - 3)$
D. $(x - 2)(2x - 1)(x + 3)$

GRAPHING SHOWS SOLUTIONS

$2 \quad 3 \quad -\frac{1}{2}$

$(x-2)(x-3)(2x+1)$

NOT JUST $x + \frac{1}{2}$

2 Given that $f(-3) = 0$, $f(-1) = 0$, completely factor $f(x) = x^4 + 5x^3 + 3x^2 - 13x - 12$.

A. $(x - 3)(x - 1)(x + 2)(x - 2)$
B. $(x + 3)(x + 1)(x + 2)(x - 2)$
C. $(x - 3)(x - 1)(x^2 + x - 4)$
D. $(x + 3)(x + 1)(x^2 + x - 4)$

USE SYNTHETIC DIVISION WITH -3 & -1

$x = -3 \rightarrow (x+3)$

$x = -1 \rightarrow (x+1)$

-3	1	5	3	-13	-12
		-3	-6	9	12
-1	1	2	-3	-4	0
		-1	-1	4	
	1	1	-4	0	

3RD FACTOR

$\rightarrow x^2 + x - 4$

3 What is the number of real roots of this equation?

OCCUR ON X-AXIS

$(x^4 + 1)(x - \sqrt{3}) = 0$

A. 1
B. 2
C. 4
D. 5

SET FACTORS EQUAL TO ZERO AND SOLVE

$x^4 + 1 = 0$
$-1 \quad -1$
$x^4 = -1$
↑ PRODUCES IMAGINARY SOLUTIONS

$x - \sqrt{3} = 0$
$x = \sqrt{3}$
↑ IRRATIONAL, BUT REAL

(OR) GRAPH & COUNT X-INT.'S

4 How many real zeros does $h(t)$ have?

$h(t) = 4t^3 - 2t^2 + t - 10$

A. 3
B. 2
C. 1
D. 0

GRAPH & COUNT X-INTERCEPTS

5 How many rational zeros does this polynomial function have?

$f(x) = (x^4 - 16)(3x^2 - 21)(4x^2 + 1)$

A. 8
B. 6
C. 4
D. 2

$x^4 - 16 = 0$
$(x^2 - 4)(x^2 + 4)$
$(x+2)(x-2)$
$x + 2 = 0 \quad x - 2 = 0$
$x = -2, 2$
BOTH RATIONAL

$3x^2 - 21 = 0$
$3x^2 = 21$
$x^2 = 7$
$x = \pm\sqrt{7}$
$\sqrt{7}$ IS IRRATIONAL

IMAGINARY SOLUTIONS

$4x^2 + 1 = 0$
$4x^2 = -1$
$x^2 = -\frac{1}{4}$
$x = \pm\sqrt{-\frac{1}{4}}$
↑ PRODUCES $\pm\frac{1}{2}i$

6 What is the nature of the zeros of the polynomial $f(x) = 2x^3 - x^2 - 18x + 9$?

A. 3 real rational
B. 3 real; 1 rational and 2 irrational
C. 1 real rational, 2 nonreal complex
D. 1 real irrational, 2 nonreal complex

1) GRAPH AND LOOK AT X-INT'S
2) FACTOR BY GROUPING AND SOLVE