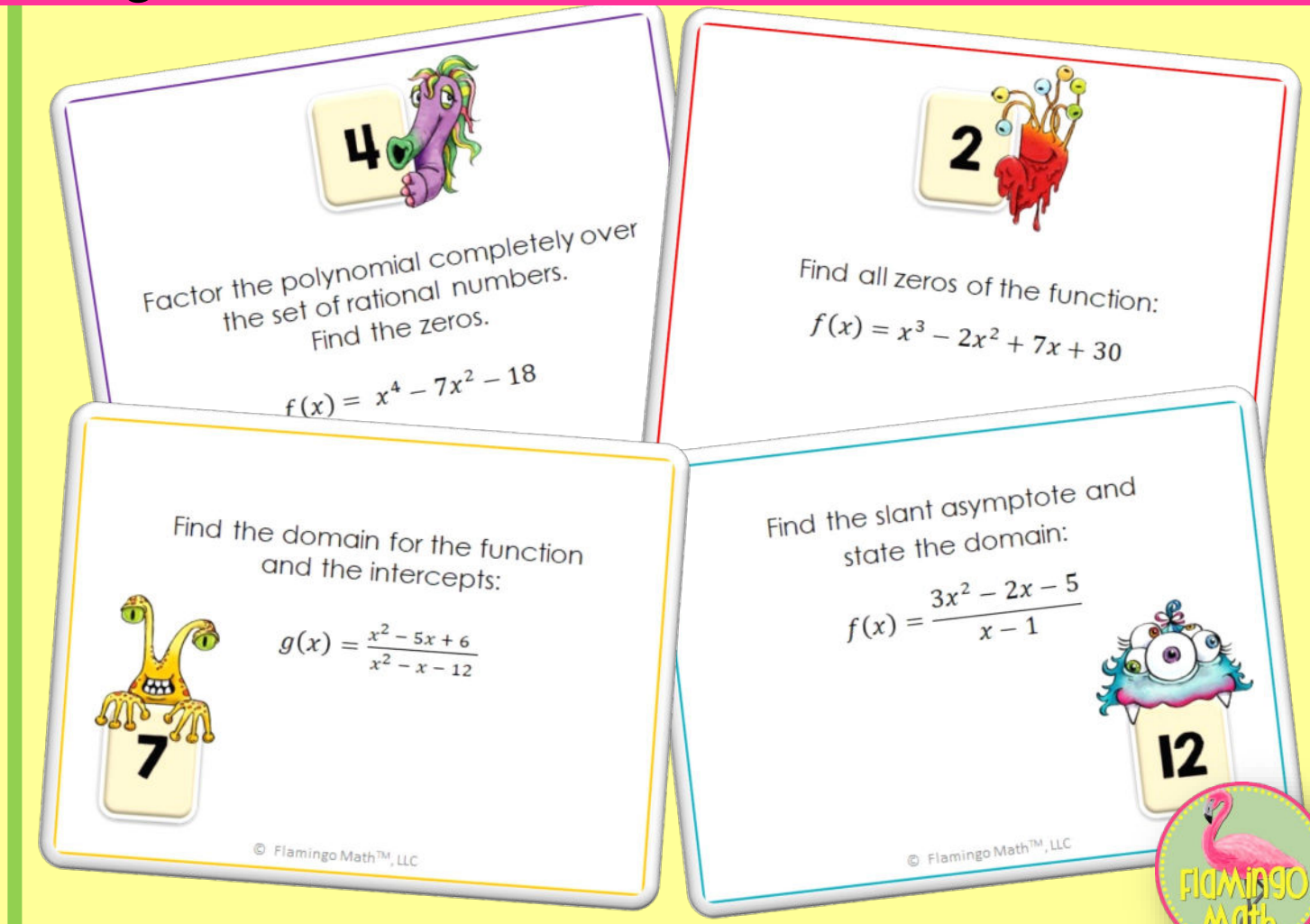
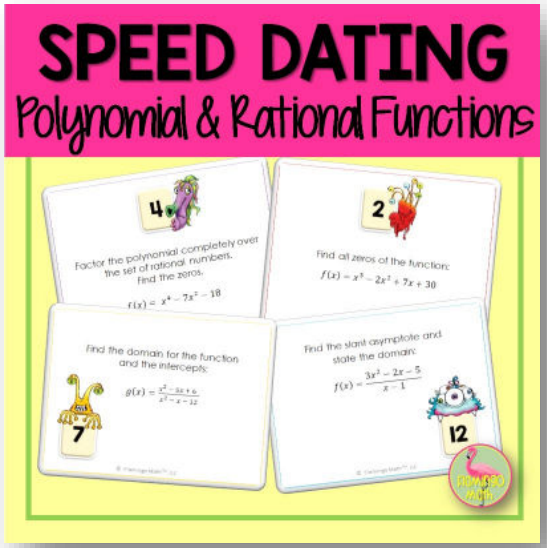
SPEED DATING

Polynomial & Rational Functions





SPEED DATING
Polynomial & Rational Functions

Your PreCalculus students will be actively involved in this fast-paced Speed Dating activity for Polynomial & Rational Functions.

This activity is designed to challenge your **PreCalculus** students by engaging them in conversations related to concepts for your Polynomial, Power & Rational Functions Unit.

Speed Dating for Polynomial & Rational Functions

Learning Goals and Objectives:

The **Speed Dating Strategy** is made to help students gain proficiency in their ability to work in an efficient manner and discuss the vocabulary of polynomial and rational functions with their peers.
You will find a **set of 16 task cards and a student recording sheet**. There is an answer key included for the activity.

Students will practice the following skills:

☑ Find zeros of a function
☑ Given zeros, write a polynomial function
☑ Factor polynomials over real numbers, rational numbers and complex numbers
☑ Find domain and zeros of a function
☑ Find domain and asymptotes of a function
☑ Find asymptotes and intercepts
☑ Find slant asymptotes and state the domain
☑ Given a factor, write the polynomial as a product of linear factors
☑ Use synthetic division to find quotient and remainder
☑ Use Intermediate Value Theorem
☑ Sketch a rational function and label intercepts and asymptotes
☑ Use Upper and Lower Bound Theorem

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Use the Rational Zero Test to list all possible rational zeros, then solve:

$f(x) = 2x^4 - x^3 - 14x^2 - 5x + 6$

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Find all zeros of the function:

$f(x) = x^3 - 2x^2 + 7x + 30$

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Find a polynomial with real coefficients that has the given zeros $4, -7, i\sqrt{3}$

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Factor the polynomial completely over the set of rational numbers.
Find the zeros.

$f(x) = x^{[illegible]}x^2 - 18$

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ANSWER:

Zeros: $\{-2, 2 + i\sqrt{19}, 2 - i\sqrt{19}\}$

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ANSWER:

$\frac{p}{q} = \left\{\pm 1, \pm 2, \pm 3, \pm 6, \pm\frac{1}{2}, \pm\frac{3}{2}\right\}$

Zeros: $\{-2, [illegible], 3\}$

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ANSWER:

$(x[illegible])(x - 3)(x^2 - 2)$

Zeros: $\{-3, i\sqrt{2}, -\sqrt{2}\}$

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ANSWER:

$x^4 + 3x^3 - 25x^2 + 9x + 84$

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Factor the polynomial completely over the set of real numbers.
Find the zeros.

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



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Find all the zeros of the function.

$x^3 - 5x^2 + 3x - 1 = 0$



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Find the domain for the function and the intercepts:

$g(x) = \frac{x^2 - 5x + 6}{x^2 - x - 12}$



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Write as a product of linear factors.
State the zeros of the function.

$f(x) = x^4 + 13x^2 + 36$



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ANSWER:

$\{1, 2 + i\sqrt{5}, 2 - i\sqrt{5}\}$

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ANSWER:

$(x + 3)(x - 3)\left(x + \sqrt{2}\right)\left(x - \sqrt{2}\right)$

Zeros: $\{-3, 3, -\sqrt{2}, \sqrt{2}\}$

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ANSWER:

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

Zeros: $\{-2i, 2i, -3i, 3i\}$

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ANSWER:

Domain: $(-\infty, -3) \cup (-3, \infty)$

Intercepts:
x-int: (2,0) (3,0)
y-int: $\left(0, -\frac{1}{2}\right)$

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PREVIEW

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Solve, given $(x+5)$ is a factor, then write the polynomial as a product of linear factors.

$$x^4 + 2x^3 - 22x^2 - 14x + 105 = 0$$

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Find the domain and asymptote(s):

[A.] $f(x) = \dfrac{2x-5}{x^2-2x+1}$

[B.] $f(x) = \dfrac{6-2x}{8-4x}$

Give a reason for your answers.

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Find the asymptote(s) and intercepts:

$$f(x) = \frac{x+2}{x^2-2x-15}$$

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Find the slant asymptote and state the domain:

$$f(x) = \frac{3x^2-2x-5}{x-1}$$

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ANSWER:

[A] $y = 0$ because denominator power is greater than numerator power. Domain: $(-\infty, 1) \cup (1, \infty)$

[B] $y = \frac{1}{2}$, because powers are equal. Domain: $(-\infty, 2) \cup (2, \infty)$

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ANSWER:

Zeros: $\{-5, 3, \sqrt{7}, -\sqrt{7}\}$

$f(x) = (x+5)(x-3)(x-\sqrt{7})(x+\sqrt{7})$

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ANSWER:

Slant Asymptote: $y = 3x + 1$

Domain: $(-\infty, 1) \cup (1, \infty)$

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ANSWER:

Horizontal Asymptote: $y = 0$

Vertical Asymptotes: $x = -3, x = 5$

x-intercept: $(-2, 0)$

y-intercept: $\left(0, -\frac{1}{15}\right)$

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Use the Intermediate Value Theorem to show that $f(x)$ has at least one zero for the function on the interval $[-5, -3]$.

$$f(x) = x^3 - 3x^2 - 5x + 7$$

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Sketch the graph:

$$f(x) = \frac{x-2}{x^2+3x-4}$$

Label all intercepts and asymptotes.

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Use the Upper and Lower Bound Theorem to prove that all of the real zeros of f lie on the interval $[-2, 2]$:

$$f(x) = x^4 - x^3 + x^2 + x - 12$$

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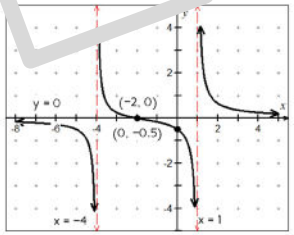
16

Use synthetic division to find the quotient and the remainder:

$$(2x^4 + 7x^3 + x - 12) \div (x+3)$$

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ANSWER:



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ANSWER:

$f(-5) = 18$ and $f(-3) = 22$.
$f(x)$ is a polynomial and continuous everywhere.
Since $f(-5) < 0$ and $f(-3) > 0$, there exists a value c on $[-5, -3]$ such that $f(c) = 0$.

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ANSWER:

$$P(x) = Q(x) + R(x)$$

$$P(x) = 2x^3 + x^2 - 3x + 10 - \frac{42}{x+3}$$

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ANSWER:

When $x = -2$, the values in synthetic division alternate signs, lower bound.

When $x = 2$, the values in synthetic division are all nonnegative (positive), upper bound.

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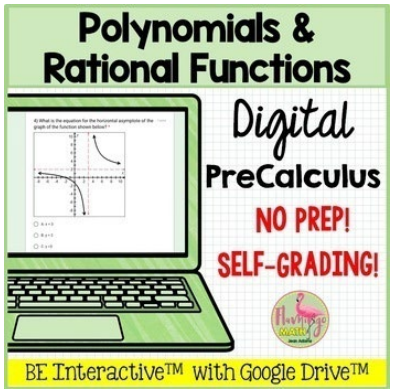
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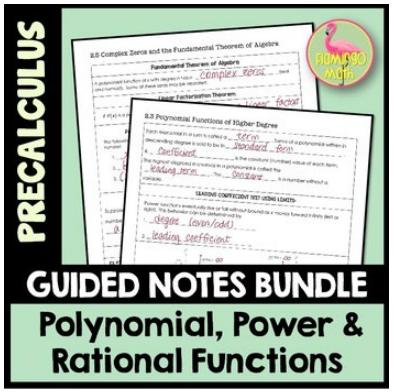


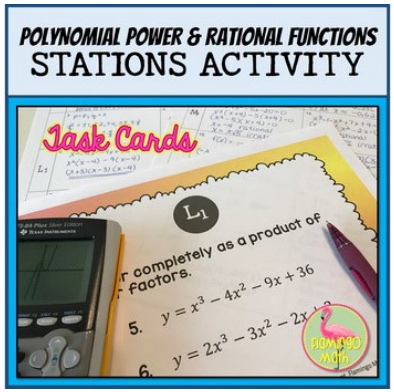
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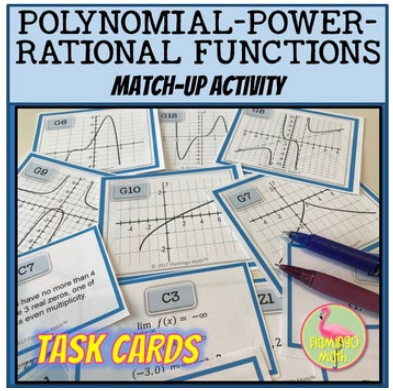
Jean

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NEWS LETTER