

Why do you need this?



It's self-checking! Your students will know if they are correct or not.



2 differentiated versions for all students practice this essential math skill.

The Rational Root Theorem Circuit

Name: _____ Date: _____

THE RATIONAL ROOT THEOREM CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → _____ → _____ → _____ → _____

Previous Answer: $\pm \frac{1}{6}, \frac{1}{3}, \frac{2}{3}, \frac{1}{2}, 1, \frac{4}{3}, 2, 4$ # _____	Previous Answer: $\pm 1, 5$
1. Find the possible roots of the polynomial. $f(x) = 2x^4 - 7x^3 + x^2 + 8x - 6$	2. Find _____
Previous Answer: $\pm \frac{1}{2}, \frac{3}{4}, 1, \frac{3}{2}, 2, 3, 6$ # _____	Previous Answer: $\pm \frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, 2, 3, 4, 6, 12$ # _____
3. Find the possible roots of the polynomial. $f(x) = x^4 + 5x^3 - 11x^2 + x + 10$	7. Find the possible roots of the polynomial. $f(x) = 2x^5 - x^3 - 10$
Previous Answer: $\pm 1, 2, 3, 6$ # _____	Previous Answer: $\pm 1, 2, 4, 8$ # _____
5. Find the possible roots of the polynomial. $f(x) = 3x^5 - 4x^3 - x - 15$	9. Find the possible roots of the polynomial. $f(x) = x^3 - 4x^2 + x + 3$
Previous Answer: $\pm 1, 2, 3, 6$ # _____	Previous Answer: $\pm \frac{1}{2}, 1, \frac{3}{2}, 2, 3$ # _____
6. Find the possible roots of the polynomial.	10. Find the possible roots of the polynomial. $f(x) = 3x^3 - 4x^2 + x + 10$
8. Find the possible roots of the polynomial. $f(x) = x^4 - 6x^2 + 4$	

Helpful Hints: Use these hints to help you solve the problems.

Rational Root Theorem

$$f(x) = a_n x^n + a_{(n-1)} x^{(n-1)} + \dots + a_1 x + a_0$$

factors of the le
factors of the le

The Rational Root Theorem Circuit includes:

Challenge: Create a polynomial given requirements below.

Requirements:

- The polynomial you are creating must have at least 4 terms.
- The leading coefficient cannot be 1.
- The polynomial must have at least 3 of the following rational roots:
 $\pm \frac{2}{3}, 1, 2, \frac{5}{2}, 5, 9$
- Provide an answer key.

How are you feeling about this topic? Circle one:

Helpful Hints: Use these hints to help you solve the problems.

Rational Root Theorem

$$f(x) = a_n x^n + a_{(n-1)} x^{(n-1)} + \dots + a_1 x + a_0$$

Possible Rational Roots = $\pm \frac{\text{factors of the constant}}{\text{factors of the leading coefficient}}$

How are you feeling about this topic? Circle one:

✓ 10 self-checking problems

✓ a detailed answer key

✓ a standard version with an extension question

✓ a basic version with helpful hints section

✓ student self assessment

The Rational Root Theorem Circuit

standards covered:

CCSS: HSA-APR.B.3

TEKs: A2.7.D, A2.7.E

VA SOLs: EO.A1.1.c

THE RATIONAL ROOT THEOREM CIRCUIT

Previous Answer: $\pm \frac{1}{4}, \frac{1}{2}, 1, \frac{5}{2}, 2, 5, 10$ # **4**

7. Find the possible roots of the polynomial.

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

P: $\pm 1, 2, 3, 6$
Q: ± 1

Possible roots:
 $\pm 1, 2, 3, 6$

Previous Answer: $\pm \frac{1}{3}, 1, \frac{5}{3}, 3, 5, 15$ # **5**

8. Find the possible roots of the polynomial.

$$f(x) = 6x^4 - 13x^3 - x^2 + 12x - 4$$

P: $\pm 1, 2, 4$
Q: $\pm 1, 2, 3, 6$

Possible roots:
 $\pm \frac{1}{6}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, 1, \frac{4}{3}, 2, 4$

Previous Answer: $\pm 1, 2, 5, 10$ # **3**

9. Find the possible roots of the polynomial.

$$f(x) = 4x^4 - 15x^3 + 6x^2 - 6x + 2$$

P: $\pm 1, 2$
Q: $\pm 1, 2, 4$

Possible roots:
 $\pm \frac{1}{4}, \frac{1}{2}, 1, 2$

Previous Answer: $\pm \frac{1}{3}, \frac{2}{3}, 1, 2, 3, 6$ # **2**

10. Find the possible roots of the polynomial.

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

P: $\pm 1, 2, 3, 6$
Q: $\pm 1, 2, 4$

Possible roots:
 $\pm \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1, \frac{3}{2}, 2, 3, 6$

Challenge: Create a polynomial given requirements below.

Requirements:

- The polynomial you are creating must have at least 4 terms.
- The leading coefficient cannot be 1.

*** Answers**

how this circuit resource works

Then search for their answer on the worksheet. Once the answer is found, students complete the problem below it.

Students can track their path at the top.

Name: _____ Date: _____

THE RATIONAL ROOT THEOREM CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → _____ → _____ → _____ → _____ → _____ → _____ → _____ → _____ → _____ → 1

Previous Answer: $\pm \frac{1}{6}, \frac{1}{3}, \frac{2}{3}, \frac{1}{2}, 1, \frac{4}{3}, 2, 4$ # _____	Previous Answer: $\pm \frac{1}{2}, 1, \frac{3}{2}, 2, 3, 6$ # _____
1. Find the possible roots of the polynomial. $f(x) = 2x^4 - 7x^3 + x^2 + 8x - 6$	2. Find the possible roots of the polynomial. $f(x) = 3x^4 - 10x^3 + 9x^2 + x - 6$
Previous Answer: $\pm \frac{1}{2}, \frac{3}{5}, 1, \frac{3}{2}, 2, 3, 6$ # _____	Previous Answer: $\pm \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, 1, \frac{6}{5}, 2, \frac{12}{5}, 3, 4, 6, 10$ # _____
3. Find the possible roots of the polynomial. $f(x) = x^4 + 5x^3 - 11x^2 + x + 10$	4. Find the possible roots of the polynomial. $f(x) = 4x^4 - 11x^2 + 10$

Students start with the first question.

The last question they answer should lead back to problem #1 to "close" the circuit.

how to use this resource

Name: **Answer Key** Date: _____

THE RATIONAL ROOT THEOREM CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → **2** → **10** → **3** → **9** → **6** → **4** → **7** → **5** → **8** → 1

Previous Answer: $\pm \frac{1}{6}, \frac{1}{3}, \frac{2}{3}, \frac{1}{2}, 1, \frac{4}{3}, 2, 4$ # 8	Previous Answer: $\pm \frac{1}{2}, 1, \frac{3}{2}, 2, 3, 6$ # 1
1. Find the possible roots of the polynomial.	2. Find the possible roots of the polynomial.

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

$p: \pm 1, 2, 3, 6$
 $q: \pm 1, 2$

possible roots:
 $\pm \frac{1}{2}, 1, \frac{3}{2}, 2, 3, 6$

Previous Answer: $\pm \frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, 2, 3, 4, 6, 12$ # 4	Previous Answer: $\pm 1, 5$ # 5
7. Find the possible roots of the polynomial.	8. Find the possible roots of the polynomial.

$f(x) = 2x^5 - x^3 - 10$

$p: \pm 1, 2, 5, 10$
 $q: \pm 1, 2$

possible roots:
 $\pm \frac{1}{2}, 1, 2, \frac{5}{2}, 5, 10$

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

$p: \pm 1, 2, 4$ $q: \pm 1$

possible roots:
 $\pm 1, 2, 4$

Previous Answer: $\pm 1, 2, 4, 8$ # 3	Previous Answer: $\pm \frac{1}{2}, 1, \frac{3}{2}, 2, 3, 6$ # 2
9. Find the possible roots of the polynomial.	10. Find the possible roots of the polynomial.

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

$p: \pm 1, 3$ $q: \pm 1$

possible roots:
 $\pm 1, 3$

$f(x) = 3x^3 - 4x - 9$

$p: \pm 1, 3, 9$
 $q: \pm 1, 3$

possible roots: $\pm \frac{1}{3}, 1, 3, 9$

Previous Answer: $\pm 1, 2, 3, 6$	
5. Find the possible roots of the polynomial.	

$f(x) = 3x^5 - 4x^3 - x$

$p: \pm 1, 3, 5, 15$
 $q: \pm 1, 3$

possible roots:

This is a great activity to use when reviewing how to the rational root theorem before learning the fundamental theorem of algebra.

It can be used right after teaching the concept or as homework.

This is also a **substitute-friendly** assignment!

You may also enjoy ...

SYNTHETIC DIVISION OF POLYNOMIALS

Printable Maze

Self-checking

Synthetic Division of Polynomials Maze

Directions: Find the quotient of each problem. The answer will lead you to the next question. Don't forget to show your work!

START HERE!

Synthetic Division of Polynomials

Directions: Find the quotient of each problem. The answer will lead you to the next question. Don't forget to show your work!

Math with Ms. Rivera

Answer key included

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THE FUNDAMENTAL THEOREM OF ALGEBRA

Algebra 2 Guided Notes

THE FUNDAMENTAL THEOREM OF ALGEBRA

If $f(x)$ is a polynomial of degree n where $n > 0$, then $f(x) = 0$ has at least n solutions in the complex number system.

Descartes's Rule of Signs

The number of positive real zeros of a polynomial function is equal to the number of sign changes in the polynomial or less than that by an even number.

Complex Conjugates

Complex Conjugates: If $a + bi$ is a root of the polynomial, then its complex conjugate $a - bi$ is also a root.

Steps for writing polynomial questions with complex roots:
 Step 1: Identify the all real roots.
 Step 2: Write the polynomial function.
 Step 3: Multiply the factors.

Directions: Determine the possible numbers of positive real zeros, negative real zeros, and imaginary zeros.

$f(x) = x^6 - 2x^5 + 3x^4 - 10x^3 - 6x^2 - 8x - 8$

Math with Ms. Rivera

Answer key included

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POLYNOMIAL FUNCTIONS

Algebra 2 Guided Notes

CLASSIFYING POLYNOMIAL FUNCTIONS

Polynomial Function	Type of Polynomial
A monomial or the sum of monomials	
A polynomial written in the form $a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$	
The degree	
The leading coefficient	

COMPLEX CONJUGATES

Complex Conjugates: If $a + bi$ is a root of the polynomial, then its complex conjugate $a - bi$ is also a root.

Steps for writing polynomial questions with complex roots:
 Step 1: Identify the all real roots.
 Step 2: Write the polynomial function.
 Step 3: Multiply the factors.

Directions: Write a polynomial function $f(x)$ of leading coefficient of 1, and zeros: 2 and $3 + i$.

Descartes's Rule of Signs

The number of positive real zeros of a polynomial function is equal to the number of sign changes in the polynomial or less than that by an even number.

Graphical Function Characteristics

Points on the graph that help to determine which function is which. They are also called intervals.

Directions: Decide whether each function is a polynomial function. If it is, write the polynomial in standard form and state the degree.

1. $f(x) = -2x^3$

Math with Ms. Rivera

Answer key included

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Rational Expression Operations - Addition & Subtraction

Directions: Answer each question and type the question number with the matching answer in the answer column to the right.

#	Question	Answer	Type the matching question numbers here
1	$\frac{5}{x} + \frac{3}{x+1}$	$\frac{2x+1}{x+2}$	
2	$\frac{2}{x+4} - \frac{x^2}{x^2-16}$	$-\frac{1}{x^2-1}$	
3	$\frac{x+2}{x^2+4x+4} + \frac{2x}{x+2}$	$\frac{2x^2+2x+5}{x^2+x-2}$	
4	$\frac{x}{x-2} + \frac{3}{x-1}$	$-\frac{x^2+2x-8}{x^2-16}$	
5	$\frac{x}{4x+8} - \frac{1}{x^2+2x}$	$\frac{8x+5}{x^2+1}$	
6	$\frac{x+2}{x-1} + \frac{x-1}{x+2}$	$\frac{x^2-3x+7}{x^2-4}$	
7	$\frac{2x+1}{x^2-4} + \frac{x-3}{x+2}$	$\frac{x^2+2x-6}{x^2-3x+2}$	
8	$\frac{x^2+2x}{x^2-1} - \frac{x+1}{x-1}$	$\frac{x-2}{4x}$	

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hey there!

My name is Malia and I'm passionate about making learning and practicing math fun. I love creating engaging math resources for my students and I hope your students enjoy this activity too!

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