LESSON MAKER PRO

Polynomial Division Lab

Divide expressions with synthetic division, long division, and factoring.

HIGH SCHOOL · MA.912.AR.1.5

MA.912.AR.1.5 "Divide polynomial expressions using long division, synthetic division or algebraic manipulation."

NAME _____ DATE _____

CHOOSE A DIVISION METHOD

For a divisor x - c, synthetic division uses c, not -c. Include zero coefficients for any missing powers, then write a nonzero final value as a remainder. You can also use long division or factor first when a common factor is visible.

WORKED EXAMPLE

Divide $x^3 + 11x^2 + 30x + 8$ by $x + 4$.

1. Use -4 in synthetic division: -4 | 1, 11, 30, 8.
2. Bring down 1. Multiply and add across to get 1, 7, 2, 0.
3. Use the first three results as the quotient coefficients.

Answer: $x^2 + 7x + 2$

PRACTICE 6 problems

1 Divide $x^2 + 9x + 18$ by $x + 3$.

ANSWER _____

2 Divide $5x^3 - 27x^2 - 27x + 54$ by $x - 6$.

ANSWER _____

3 Simplify $(x^2 - 25)/(x - 5)$. State any restriction.

ANSWER _____

4 Divide $x^3 - 216$ by $x - 6$.

ANSWER _____

5 Divide $3x^2 + 32x + 57$ by $x + 9$. Write the quotient and remainder.

ANSWER _____

6 Simplify $(x^2 - 81)/(x - 9)$. State any restriction.

ANSWER _____

APPLY IT Show your work

1 The esports club is making $x + 6$ identical digital prize packs. Its model for the total number of prize credits is $5x^2 + 45x + 90$. Write an expression for the number of credits in each pack.

WORK SPACE

ANSWER _____

2 A coding club models its total project points across $x - 9$ teams as $6x^3 - 49x^2 - 33x - 108$. Write an expression for the points per team.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use long division to divide $x^4 + 14x^3 + 70x^2 + 177x + 156$ by $x^2 + 9x + 12$.

WORK SPACE AND ANSWER

ANSWER KEY # Polynomial Division Lab

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Divide $x^2 + 9x + 18$ by $x + 3$.	**$x + 6$**
2	Divide $5x^3 - 27x^2 - 27x + 54$ by $x - 6$.	**$5x^2 + 3x - 9$**
3	Simplify $(x^2 - 25)/(x - 5)$. State any restriction.	**$x + 5, x \neq 5$**
4	Divide $x^3 - 216$ by $x - 6$.	**$x^2 + 6x + 36$**
5	Divide $3x^2 + 32x + 57$ by $x + 9$. Write the quotient and remainder.	**Quotient: $3x + 5$; remainder: 12**
6	Simplify $(x^2 - 81)/(x - 9)$. State any restriction.	**$x + 9, x \neq 9$**

PART 2 · APPLY IT

1. **$5x + 15$** Divide $5x^2 + 45x + 90$ by $x + 6$. The quotient is $5x + 15$, with no remainder.
2. **$6x^2 + 5x + 12$** Divide $6x^3 - 49x^2 - 33x - 108$ by $x - 9$. The quotient is $6x^2 + 5x + 12$, with no remainder.

CHALLENGE

$x^2 + 5x + 13$

Accept equivalent quotient forms. For a remainder, accept either quotient and remainder notation or quotient + remainder/(divisor). For simplified rational expressions, the stated restrictions must be included.