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Long division to synthetic division

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New back-to-school issue

Look for the first August issue of the *Mathematics Teacher*, which will be coming to you in late July. This shift in journal schedule meets the needs of increasing numbers of teachers who return to the classroom in early August. The journal will be there while you plan your school year. Since the December and January issues will be combined, you will continue to receive nine issues of the *Mathematics Teacher* each year.

Long division to synthetic division

Using synthetic division allows us to easily find the quotient and remainder when we divide a polynomial by a linear divisor $x - a$. Naturally, we can ask where the synthetic division comes from. What is the relationship between it and long division? We use an example to explain how synthetic division evolved from long division. In the example, we find the quotient $Q(x)$ and the remainder r , if we

divide $2x^4 - 5x^3 - 7x^2 + 10x + 14$ by $x - 3$, as shown in **figure 1 (Feng)**.

In the last representation, we only perform multiplication and addition. The quotient $Q(x)$ is $2x^3 + x^2 - 4x - 2$, and the remainder r is 8. The process illustrates why the division is called *synthetic*.

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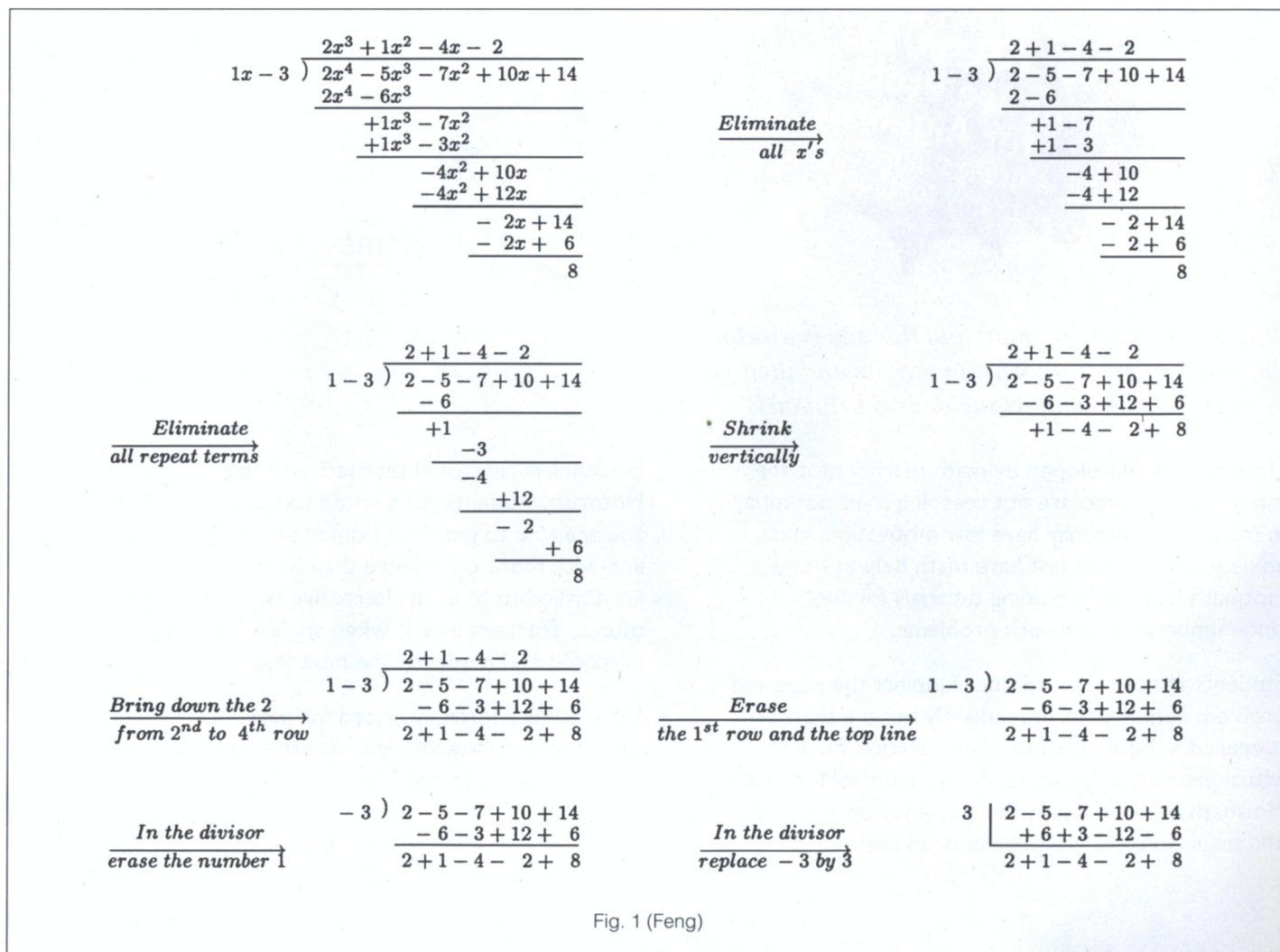


Fig. 1 (Feng)