

Factor completely using long division.

1. $f(x) = x^3 + 9x^2 + 23x + 15$ if $x + 5$ is a factor
2. $g(x) = 5x^3 - 2x^2 - 80x + 32$ if $x + 4$ is a factor
3. $h(x) = 2x^3 + x^2 - 15x - 18$ if $x + 2$ is a factor
4. $j(x) = x^3 + 12x^2 + 47x + 60$ if -3 is a root
5. $k(x) = 2x^3 + 5x^2 - 19x - 42$ if $-\frac{7}{2}$ is a root
6. $m(x) = 6x^4 - x^3 - 56x^2 + 9x + 18$ if $\frac{2}{3}$ is a root

Divide.

7. $(x^2 + 9x - 2) \div (x + 2)$
8. $(8x^2 + 6x - 5) \div (2x + 1)$
9. $(x^3 + 6x^2 - 20x + 2) \div (x - 4)$
10. $(3x^3 + 2x^2 - 10x + 3) \div (3x - 1)$
11. $(2x^3 + 9x^2 - 12) \div (x + 3)$

Use long division to determine whether the statement is true or false.

12. $x - 2$ is a factor of $9x^2 - 14x - 1$
13. $x + 6$ is a factor of $3x^3 + 16x^2 - 11x + 6$
14. 5 is a root of $2x^3 + 3x^2 - 14x - 15$
15. $\frac{4}{3}$ is a root of $3x^4 + 2x^3 - 23x^2 + 2x + 24$

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