

Grouping Polynomials

Expand and simplify. Look for patterns as you distribute that may help you factor these expressions in the near future!

1) $(x^2 - 6)(8x + 5)$

2) $(4x^2 - 7)(8x + 3)$

3) $(x^2 - 8)(3x - 5)$

4) $(x - 2)(x + 2)(8x - 3)$

5) $(5x^2 + 4)(6x + 5)$

6) $(2x - 1)(2x + 1)(8x + 7)$

Factor each completely.

7) $-5x^3 - 3x^2 + 35x + 21$

8) $40x^3 + 32x^2 + 5x + 4$

$$9) x^3 - 6x^2 - 6x + 36$$

$$10) -9x^3 - 6x^2 - 6x - 4$$

$$11) 28x^3 + 32x^2 - 35x - 40$$

$$12) 2x^3 + 2x^2 + 2x + 2$$

Factor each completely and solve for all real solutions where $f(x) = 0$.

$$13) f(x) = 28x^3 + 12x^2 + 49x + 21$$

$$14) f(x) = -6x^3 + x^2 + 42x - 7$$

$$15) f(x) = 20x^3 + 16x^2 - 35x - 28$$

$$16) f(x) = 36x^3 - 24x^2 - 27x + 18$$

$$17) f(x) = -20x^3 + 50x^2 - 16x + 40$$

$$18) f(x) = -120x^3 + 140x^2 + 90x - 105$$

Answers to Grouping Polynomials

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|--|---|--|
| 1) $8x^3 + 5x^2 - 48x - 30$ | 2) $32x^3 + 12x^2 - 56x - 21$ | 3) $3x^3 - 5x^2 - 24x + 40$ |
| 4) $8x^3 - 3x^2 - 32x + 12$ | 5) $30x^3 + 25x^2 + 24x + 20$ | 6) $32x^3 + 28x^2 - 8x - 7$ |
| 7) $-(x^2 - 7)(5x + 3)$ | 8) $(8x^2 + 1)(5x + 4)$ | 9) $(x^2 - 6)(x - 6)$ |
| 11) $(4x^2 - 5)(7x + 8)$ | 12) $2(x^2 + 1)(x + 1)$ | 10) $-(3x^2 + 2)(3x + 2)$ |
| | | 13) $f(x) = (4x^2 + 7)(7x + 3)$ |
| | | $x = -\frac{3}{7}$ |
| 14) $f(x) = -(x^2 - 7)(6x - 1)$ | 15) $f(x) = (4x^2 - 7)(5x + 4)$ | 16) $f(x) = 3(4x^2 - 3)(3x - 2)$ |
| $x = \frac{1}{6}, x = -\sqrt{7}, x = \sqrt{7}$ | $x = -\frac{4}{5}, x = -\frac{\sqrt{7}}{2}, x = \frac{\sqrt{7}}{2}$ | $x = \frac{2}{3}, x = -\frac{\sqrt{3}}{2}, x = \frac{\sqrt{3}}{2}$ |
| 17) $f(x) = -2(5x^2 + 4)(2x - 5)$ | 18) $f(x) = -5(4x^2 - 3)(6x - 7)$ | |
| $x = \frac{5}{2}$ | $x = \frac{7}{6}, x = -\frac{\sqrt{3}}{2}, x = \frac{\sqrt{3}}{2}$ | |