

Factoring By Grouping

Factor each completely.

1) $12a^3 - 9a^2 + 4a - 3$

$$(3a^2 + 1)(4a - 3)$$

2) $2p^3 + 5p^2 + 6p + 15$

$$(p^2 + 3)(2p + 5)$$

3) $3n^3 - 4n^2 + 9n - 12$

$$(n^2 + 3)(3n - 4)$$

4) $12n^3 + 4n^2 + 3n + 1$

$$(4n^2 + 1)(3n + 1)$$

5) $m^3 - m^2 + 2m - 2$

$$(m^2 + 2)(m - 1)$$

6) $5n^3 - 10n^2 + 3n - 6$

$$(5n^2 + 3)(n - 2)$$

7) $35xy - 5x - 56y + 8$

$$(5x - 8)(7y - 1)$$

8) $224az + 56ac - 84yz - 21yc$

$$7(8a - 3y)(4z + c)$$

9) $mz - 5mh^2 - 5nz + 25nh^2$

$$(m - 5n)(z - 5h^2)$$

10) $12xy - 28x - 15y + 35$

$$(4x - 5)(3y - 7)$$

$11) 40xy + 30x - 100y - 75$

$5(2x - 5)(4y + 3)$

$12) 75a^2c - 45a^2d - 30bc + 18bd$

$3(5a^2 - 2b)(5c - 3d)$

$13) 192x^2y + 72x^3 - 24rxy - 9rx^2$

$3x(8x - r)(8y + 3x)$

$14) 90au - 36av - 150yu + 60yv$

$6(3a - 5y)(5u - 2v)$

$15) 140ab - 60a^2 + 168b - 72a$

$4(5a + 6)(7b - 3a)$

$16) 105ab - 90a - 21b + 18$

$3(5a - 1)(7b - 6)$

$17) 16x^2c + 8xyd - 16x^2d - 8xyc$

$8x(2x - y)(c - d)$

$18) 150m^2nz + 20mn^2c - 120m^2nc - 25mn^2z$

$5mn(6m - n)(5z - 4c)$

$19) 105xuv + 60xv - 70xu - 90xv^2$

$5x(7u - 6v)(3v - 2)$

$20) 112xy - 16x + 128x^2 - 14y$

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