

1. Factor into the product of two binomials.

a) $s^2 - 18s + 81 =$

b) $x^2 + 11x + 30 =$

c) $k^2 - 9k + 20$

d) $x^2 + 2x + 1$

e) $x^4 - 8x^2 + 16$

f) $x^2 + 12xy + 36y^2$

g) $a^{12} + 4a^6 + 4$

h) $p^2 - 2pq^4 + q^8$

i) $c^2 - 4cd - 21d^2$

j) $m^2 + 14mn + 45n^2$

k) $a^2b^2 - 18ab + 81$

l) $m^2n^2 + 22mnp + 121p^2$

m) $m^{20} + m^{10} - 42$

n) $y^2 - yz^3 - 20z^6$

o) $x^2 + 2xy + y^2$

p) $x^2 + xy - 2y^2$

2. Factor into a common factor and a product of binomials. *Show at least one middle step!*

a) $3y^2 + 3y - 90 =$
 $=$

b) $2x^2 + 18x + 28 =$
 $=$

c) $wx^2 + 7wx - 30w$

d) $2w^3 - 10w^2 - 72w$

e) $-3t^2 + 12t + 36$

f) $-2x^2 - 10x - 12$

g) $-x^2 - 5x - 6$

h) $-y^4 - 5y^2 - 4$

i) $-n^2 + 4n - 4$

j) $-x^3 + 4x^2 + 32x$

k) $5e^5 - 40e^4f + 35e^3f^2$

l) $-n^4 + 3n^3 + 40n^2$

3. First rearrange the terms into their usual sequence, then factor each expression as much as possible.

a) $7x+12+x^2$

b) $25-10t+t^2$

c) $14y^2+x^2-9xy$

d) x^2+25y^2-10xy

e) $440-150x+10x^2$

f) $12xy-12y^2-3x^2$

g) $x^3-18x-3x^2$

h) $2+t-t^2$

i) $-8st^2+s^2-9t^4$

j) $-8t-16-t^2$

k) $8x^2-7x^3-x^4$

l) $12x-18-2x^2$

Answers:

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|---------------------------|-----------------------|----------------------|----------------------|
| 1. a) $(s-9)^2$ | b) $(x+5)(x+6)$ | c) $(k-4)(k-5)$ | d) $(x+1)^2$ |
| e) $(x^2-4)^2$ | f) $(x+6y)^2$ | g) $(a^6+2)^2$ | h) $(p-q^4)^2$ |
| i) $(c-7d)(c+3d)$ | j) $(m+9n)(m+5n)$ | k) $(ab-9)^2$ | l) $(mn+11p)^2$ |
| m) $(m^{10}+7)(m^{10}-6)$ | n) $(y+4z^3)(y-5z^3)$ | o) $(x+y)^2$ | p) $(x-y)(x+2y)$ |
| 2. a) $3(y+6)(y-5)$ | b) $2(x+7)(x+2)$ | c) $w(x+10)(x-3)$ | d) $2w(w-9)(w+4)$ |
| e) $-3(t-6)(t+2)$ | f) $-2(x+3)(x+2)$ | g) $-(x+2)(x+3)$ | h) $-(y^2+1)(y^2+4)$ |
| i) $-(n-2)^2$ | j) $-x(x-8)(x+4)$ | k) $5e^3(e-7f)(e-f)$ | l) $-n^2(n-8)(n+5)$ |
| 3. a) $(x+4)(x+3)$ | b) $(t-5)^2$ | c) $(x-7y)(x-2y)$ | d) $(x-5y)^2$ |
| e) $10(x-11)(x-4)$ | f) $-3(x-2y)^2$ | g) $x(x-6)(x+3)$ | h) $-(t+1)(t-2)$ |
| i) $(s-9t^2)(s+t^2)$ | j) $-(t+4)^2$ | k) $-x^2(x+8)(x-1)$ | l) $-2(x-3)^2$ |