FACTORING – EXERCISES

(1) Factor out the greatest common factor:

(a) $10x + 20$

(b) $18x^3 - 9x$

(c) $28x^5 + 14x^4 - 21x^3$

(d) $50x^2y^2 - 10xy^2$

(e) $2x^3y - 6x^2y^2 + 14xy^3$

(f) $15x^5 - 18x^4 + 21x^3 - 48x^2$

(g) $56x^5y^4 + 21x^3y^2 - 35x^2y^3 - 49x^4y^5$

(h) $x(x+5) + 4(x+5)$

(i) $2x(x-1) - 3(x-1)$

(j) $7x^2(x+1)^2 + 8x(x+1)^2$

(2) Factor by grouping:

(a) $x^2 + 3x + 2x + 6$

(b) $x^2 - 5x + 4x - 20$

(c) $x^2 + 7x - 2x - 14$

(d) $2x^2 + 10x + 7x + 35$

(e) $3x^2 - 9x - 8x + 24$

(f) $5x^2 - 10x - x + 2$

(g) $4x^2 + 10x - 6x - 15$

(h) $x - 1 + xy - y$

(i) $3xy - y^2 + 3x - y$

(j) $3x^3 + 3x^2 - 2x - 2$

(3) Factor each trinomial:

(a) $x^2 + 4x + 3$

(b) $x^2 + 10x - 11$

(c) $x^2 + x - 20$

(d) $x^2 - 13x + 42$

(e) $x^2 + 5x - 36$

(f) $x^2 - 2x - 63$

FACTORING – EXERCISES

(3) (g) $x^2 - 9x + 20$

(h) $x^2 - 21x - 100$

(i) $x^2 - 25x + 126$

(j) $x^2 + 8x - 105$

(4) Factor each trinomial:

(a) $3x^2 + 8x + 5$

(b) $2x^2 + 5x - 3$

(c) $5x^2 - 7x - 6$

(d) $6x^2 + 7x - 10$

(e) $4x^2 - 12x + 5$

(f) $2x^2 - x - 6$

(g) $8x^2 + 14x + 5$

(h) $7x^2 - 27x - 4$

(i) $12x^2 + 8x - 15$

(j) $21x^2 + 25x - 4$

(k) $2x^2 + 5x - 18$

(l) $10x^2 - 23x + 12$

(m) $20x^2 - 39x - 11$

(n) $18x^2 - 9x - 5$

(5) Factor each perfect square trinomial:

(a) $x^2 + 10x + 25$

(b) $x^2 - 2x + 1$

(c) $x^2 - 22x + 121$

(d) $4x^2 + 20x + 25$

(e) $16x^2 - 56x + 49$

(f) $36x^2 - 60x + 25$

(g) $25x^2 + 10x + 1$

(h) $9x^2 - 24x + 16$

(i) $1 - 4x + 4x^2$

(j) $81x^2 + 180 + 100$

(6) Factor each difference of squares:

(a) $x^2 - 25$

(b) $x^2 - 49$

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(6) (c) $4x^2 - 81$

(d) $16x^2 - 1$

(e) $49x^2 - 36y^2$

(f) $9x^2 - 64y^2$

(g) $49 - 9x^2$

(h) $16x^2 - 121y^2$

(i) $64x^2 - 100$

(j) $x^4 - 1$

(7) Factor each difference or sum of cubes:

(a) $x^3 - 1$

(b) $x^3 + 27$

(c) $x^3 - 125$

(d) $x^3 + 64$

(e) $8x^3 - 27y^3$

(f) $64x^3 + 27$

(g) $27x^3 - 125$

(h) $8x^3 + 729y^3$

(i) $512x^3 - 343$

(j) $125x^3 + 1000$

(8) Factor completely:

(a) $27x^3 - 15x$

(b) $50x^3 - 100x^2 - 10x^2 + 20x$

(c) $2x^6 + 8x^5 - 42x^4$

(d) $15x^4 - 25x^3 + 10x^2$

(e) $16x^5 + 48x^4 + 36x^3$

(f) $3x^3 - 24x^2 + 48x$

(g) $10x^3 - 270$

(h) $16ax^3 + 54ay^3$

(i) $12x^5 + 12x^3 - 4x^4 - 4x^2$

(j) $x^6 - 64$

(k) $54x^4 + 2000x$

(l) $x^3 - 3x^2 - 4x + 12$

(m) $(x-2)^2 + 3(x-2)$

(n) $x^2(x-2) - (x-2)$

FACTORING – EXERCISES (ANSWERS)

(8) (o) $(5x+7)^2-16$ (p) $7x^4+7x^3-140x^2$ (q) $25x^3+65x^2-30x$
(r) $x^3-3x^2-4x+12$ (s) $120x^5+110x^4-50x^3$ (t) $(x+1)^2-(x+1)-6$
(u) $(x^2-9)^2+8x(x^2-9)$ (v) $(x-1)^3-8$

(9) Determine whether each trinomial is factorable over the integers or not.
(a) x^2+5x-3 (b) $x^2+3x-88$ (c) $3x^2-15x+16$
(d) $5x^2+13x-6$ (e) $2x^2+5x-5$ (f) $9x^2-3x-2$

ANSWERS

(1) (a) $10(x+7)$ (b) $9x(2x^2-1)$ (c) $7x^3(4x^2+2x-3)$ (d) $10xy^2(5xy-1)$ (e) $2xy(x^2-3xy+7y^2)$
(f) $3x^2(5x^3-6x^2+7x-16)$ (g) $7x^2y^2(8x^3y^2+3x-5y-7x^2y^3)$ (h) $(x+5)(x+4)$
(i) $(x-1)(2x-3)$ (j) $x(x+1)^2(7x+8)$

(2) (a) $(x+3)(x+2)$ (b) $(x-5)(x+4)$ (c) $(x+7)(x-2)$ (d) $(x+5)(2x+7)$ (e) $(x-3)(3x-8)$ (f) $(x-2)(5x-1)$
(g) $(2x+5)(2x-3)$ (h) $(x-1)(1+y)$ (i) $(y+1)(3x-y)$ (j) $(x+1)(3x^2-2)$

(3) (a) $(x+1)(x+3)$ (b) $(x+11)(x-1)$ (c) $(x+5)(x-4)$ (d) $(x-6)(x-7)$ (e) $(x+9)(x-4)$ (f) $(x-9)(x+7)$
(g) $(x-4)(x-5)$ (h) $(x-25)(x+4)$ (i) $(x-7)(x-18)$ (j) $(x+15)(x-7)$

(4) (a) $(x+1)(3x+5)$ (b) $(x+3)(2x-1)$ (c) $(x-2)(5x+3)$ (d) $(x+2)(6x-5)$ (e) $(2x-5)(2x+1)$ (f) $(x-2)(2x+3)$
(g) $(4x+5)(2x+1)$ (h) $(7x+1)(x-4)$ (i) $(6x-5)(2x+3)$ (j) $(7x-1)(3x+4)$ (k) $(x-2)(2x+9)$
(l) $(5x-4)(2x-3)$ (m) $(4x+1)(5x-11)$ (n) $(3x+1)(6x-5)$

(5) (a) $(x+5)^2$ (b) $(x-1)^2$ (c) $(x-11)^2$ (d) $(2x+5)^2$ (e) $(4x-7)^2$ (f) $(6x-5)^2$ (g) $(5x+1)^2$ (h) $(3x-4)^2$
(i) $(1-2x)^2$ (j) $(9x+10)^2$

(6) (a) $(x+5)(x-5)$ (b) $(x+7)(x-7)$ (c) $(2x+9)(2x-9)$ (d) $(4x+1)(4x-1)$ (e) $(7x+6y)(7x-6y)$
(f) $(3x+8y)(3x-8y)$ (g) $(7+3x)(7-3x)$ (h) $(4x+11y)(4x-11y)$ (i) $(8x+10)(8x-10)$ (j) $(x^2+1)(x+1)(x-1)$

(7) (a) $(x-1)(x^2+x+1)$ (b) $(x+3)(x^2-3x+9)$ (c) $(x-5)(x^2+5x+25)$ (d) $(x+4)(x^2-4x+16)$ (e) $(2x-3y)(4x^2+6xy+9y^2)$
(f) $(4x+3)(16x^2-12x+9)$ (g) $(3x-5)(9x^2+15x+25)$ (h) $(2x+9y)(4x^2-18xy+81y^2)$
(i) $(8x-7)(64x^2+56x+49)$ (j) $(5x+10)(25x^2-50x+100)$

(8) (a) $3x(9x^2-5)$ (b) $10x(x-2)(5x-1)$ (c) $2x^4(x+7)(\cancel{x+5})\ x-3$ (d) $5x^2(x-1)(3x-2)$ (e) $4x^3(2x+3)^2$ (f) $3x(x-4)^2$
(g) $10(x-3)(x^2+3x+9)$ (h) $2a(2x+3y)(4x^2-\cancel{16}\,6xy+9y^2)$ (i) $4x^2(x^2+1)(3x-1)$ (j) $(x+2)(x-2)(x^4+4x^2+16)$
(k) $2x(3x+10)(9x^2-30x+100)$ (l) $(x-3)(x+2)(x-2)$ (m) $(x-2)(x+1)$ (n) $(x-2)(x+1)(x-1)$ (o) $(5x+3)(5x+11)$
(p) $7x^2(x+5)(x-4)$ (q) $5x(5x-2)(x+3)$ (r) $(x-3)(x+2)(x-2)$ (s) $10x^3(3x-1)(4x+5)$
(t) $(x-2)(x+3)$ (u) $(x+3)(x-3)(x+9)(x-1)$ (v) $(x-3)(x^2+3)$

(9) (a) No (b) Yes (c) No (d) Yes (e) No (f) Yes