Solution Key

Sec 3

Factoring & Solving Equations

Polynomials

1. Reduce each of the following expressions to a single monomial.

a) $2x^3 - 5x^3 + 7x^3$ 4x³

b) $4x^2y - 6x^2y + x^2y$ -x²y

c) $\frac{3}{4}x^2 + \frac{2}{3}x^2 - x^2$ 5/12x²

d) $-\frac{2}{3}xy^2 + \frac{3}{4}xy^2 - \frac{5}{6}xy^2$ -3/4 xy²

2. Perform the following operations.

a) $-3x^2 \times 4x^3$ -12x⁵

b) $2x^2y^3 \times -3xy^2$ -6x³y⁵

c) $-17x^2 \times -3x$ 51x³

d) $-7x^2y \times 5x^2y^2$ -35x⁴y³

e) $3x^2y \times -5xy \times -2xy^2$ 30x⁴y⁴

f) $20x^2y^2 \times -0.5x \times -1.2y^2$ 12x³y⁴

g) $\frac{3}{4}x^2y \times \frac{2}{5}xy^2 \times \frac{10}{9}x$ 1/3 x⁴y³

g) $\frac{-3}{5}x^2y^3 \times \frac{2}{3}xy \times \frac{-5}{2}xy^2$ x⁴y⁶

3. Perform the following operations.

a) $(3x^2y)^2$ 9x⁴y²

b) $(-2xy^3)^2$ 4x²y⁶

c) $(-2x^2y^3)^3$ -8x⁶y⁹

d) $\left(-\frac{3}{4}x^2y^3\right)^2$ 9/16 x⁴y⁶

e) $3x^2(-2x)^3$ -24x⁵

f) $(-2x^2)^2 \times (3x^3)^2$ 36x¹⁰

4. Perform the following operations, and indicate if the result is a monomial.

a) $-12x^4 \div 3x^6$ -4x⁻² NO

b) $18x^6 \div 12x^4$ 3/2 x², Yes

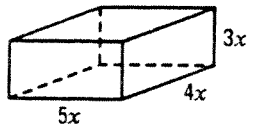
c) $18x^6y^4 \div 9x^2y^2$ 2x⁴y² yes

d) $-12x^2y^4 \div 6x^3y$ -2x⁻¹y³ No

e) $(-5x^3)^2 \div 10x^4$ 5/2 x², yes

f) $(4x^2y^3)^3 \div (2xy^2)^4$ 4x²y³ Yes

5. Consider the prism on the right.



a) Use a monomial to express:
1. the total area; 94x²
2. the volume. 60x³

b) If $x = 2$ cm, evaluate:
1. the total area; 376 cm²
2. the volume. 480 cm³

6. Using the following algebraic expressions, identify which ones are polynomials, order them in decreasing order of the powers of the variable and determine their degree.

a) $2x + 3x^2 - 1$ 3x²+2x-1 deg 2

b) $2x^2 + 2\sqrt{x}$ Not a poly

c) $3y - 2y^3 + \frac{1}{2}y^4 - 4y^2 + 1$ 1/2y⁴-2y³-4y²+3y+1 deg 4

d) $x^{-1} + 5x + x^2$ Not a poly

7. Reduce the following polynomials and determine their degree.

a) $P(x) = 3x^2 + 2x - 5x^2 - 3x + 1$ -2x²-x+1 deg 2

b) $P(x, y) = 3x^3y - 2xy^2 + 4x^3y - xy^2$ 7x³y-3xy² deg 4

c) $P(z) = 4z^3 - 5z^2 + 8z^3 - z^2 + 4z - 5 + 6z^2 - 12z^3$ -4z-5 deg 1

d) $P(x) = \frac{3}{2}x^2 + 5x^3 - \frac{2}{3}x^2 - \frac{3}{2}x^3 + \frac{3}{4}x - \frac{5}{2}x$ 7/2 x³ + 5/6 x² - 7/4 x deg 3

8. Evaluate the following polynomials.

a) $P(x) = 3x^2 + 5x$ for $x = -2$ 2

b) $P(x) = x^2 - 5x + 3$ for $x = 0$ 3

c) $P(x) = 3x^2 + 2x - 5$ for $x = -1.5$ -1,25

d) $P(x) = 2x^2 - 7x - 15$ for $x = -\frac{3}{2}$ 0

9. Given the polynomial $P(x, y) = 3x^2y - 2xy^2 + xy - 2$. Calculate

a) $P(2, 3)$ 4

b) $P(-3, 1)$ 28

c) $P(-1, -2)$ 2

d) $P\left(-\frac{2}{3}, \frac{3}{2}\right)$ 2

10. Given the polynomial $P(x) = 2x^2 - x - 6$. Determine the zeros among the following real numbers.

a) $x = -1$ y=-3 NO

b) $x = 2$ y=0 Yes

c) $x = 0$ y=-6 NO

d) $x = -\frac{3}{2}$ y=0 Yes

11. The following algebraic expressions are first degree binomials. Determine the zero of each of these binomials.

a) $P(x) = 3x - 2$ 2/3

b) $P(y) = -2y + 5$ 5/2

c) $P(z) = -2z + 1$ 1/2

d) $P(x) = -3x + \frac{1}{2}$ 1/6

e) $P(y) = -\frac{2}{3}x + 4$ 6

f) $P(z) = -\frac{2}{5}x + \frac{3}{4}$ 15/8

12. From the top of a bridge, Eric throws a stone straight down toward the water. The formula $d(t) = 4{,}9\ t^2 + 3t$ expresses the distance $d(t)$, in metres, traveled by the stone as a function of the elapsed time, in seconds, since it was thrown. If the stone enters the water after 3 seconds, what is the height of the bridge?

53,1 m

13. Neena buys x notebooks at \$2.50 each and y pens at \$1.75 each.

a) Express, using a polynomial, the total cost of these purchases. 2,5x + 1,75y

b) Determine the total cost if she buys 6 notebooks and 2 pens. 18,50$

14. Given $P(x) = 4x^2 - 5x + 1$ and $Q(x) = -x^2 + 4x$.

a) Express, using a polynomial $S(x)$, the sum of the polynomials $P(x)$ and $Q(x)$. $3x^2 - x + 1$

b) Verify that $S(-2) = P(-2) + Q(-2)$. _____

15. Given $P(x) = 3x^2 - 2x + 1$ and $Q(x) = 2x^2 - 3x$.

a) Express, using a polynomial $D(x)$, the difference of the polynomials $P(x)$ and $Q(x)$.

$x^2 + x + 1$

b) Verify that $D(1) = P(1) - Q(1)$. _____

16. Given $P = 3x^2 - 2x + 1$, $Q = -x^2 - 3x + 2$ and $R = -2x + 5$. Determine:

a) $P + Q + R$ $2x^2 - 7x + 8$ b) $P - Q + R$ $4x^2 - x + 4$

c) $P - Q - R$ $4x^2 + 3x - 6$ d) $-P + Q - R$ $-4x^2 + x - 4$

17. Given $P = \frac{2}{3}x^2 - \frac{3}{2}x + 1$, $Q = \frac{3}{2}x^2 + \frac{5}{6}x - \frac{1}{3}$ and $R = \frac{3}{2}x - \frac{1}{6}$. Determine:

a) $P + Q + R$ $\frac{13}{6}x^2 + \frac{5}{6}x + \frac{1}{2}$ b) $P - Q + R$ $-\frac{5}{6}x^2 - \frac{5}{2}x + \frac{7}{6}$

c) $P - Q - R$ $-\frac{5}{6}x^2 - \frac{23}{6}x + \frac{3}{2}$ d) $-P + Q - R$ $\frac{5}{6}x^2 + \frac{5}{2}x - \frac{7}{6}$

18. Perform the following operations.

a) $(4x^2 - 8x + 1) - (2x^2 - 3x + 5)$ $2x^2 - 5x - 4$

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

c) $(3a^2b - 5ab^2) - (2a^2b + 3ab^2)$ $a^2b - 8ab^2$

d) $(3x^2y - 2xy + 4xy^2) - (-3xy^2 + 4xy) + 2x^2y$ $5x^2y - 6xy + 7xy^2$

e) $(3x^3 - 5x^2 - 4x - 1) - [(x^3 - 5x^2) - (x^2 - 4x + 1)]$ $2x^3 + x^2 - 8x$

19. Given $A(x) = 3x^2 - 2x + 1$ and $B(x) = 2x - 5$.

a) Express, using a polynomial $P(x)$, the product of the polynomials $A(x)$ and $B(x)$.

$6x^3 - 19x^2 + 12x - 5$

b) Verify that $P(2) = A(2) \times B(2)$. _____

20. Determine the following products.

a) $3x^2(2x - 5)$ $6x^3 - 15x^2$ b) $-3y(y^2 - 2y)$ $-3y^3 + 6y^2$

c) $-2x^2(3xy^2 + 5x^2y)$ $-6x^3y^2 - 10x^4y$ d) $(2xy - 5x)(-3x^2y)$ $-6x^3y^2 + 15x^3y$

e) $\frac{3}{4}x^2\left(\frac{2}{3}x - 8x^2\right)$ $\frac{1}{2}x^3 - 6x^4$ f) $(4x^2 - 8x + 12)\left(-\frac{3}{4}x\right)$ $-3x^3 + 6x^2 - 9x$

21. Determine the following products.

a) $(x + 3)(x - 2)$ $x^2 + x - 6$ b) $(x - 5)(3 - x)$ $-x^2 + 8x - 15$

c) $(2a + b)(3a - 2b)$ $6a^2 - ab - 2b^2$ d) $(5 - 2x)(3x - 4)$ $-6x^2 + 23x - 20$

e) $(-2x + 5)(3x - 2)$ $-6x^2 + 19x - 10$ f) $(-5x - 3)(-2x + 4)$ $10x^2 - 14x - 12$

22. Perform the following operations.

a) $5x(3x + 2y) - 3x(2x - 4y)$ (3x+2y)(5x+3x)=(3x+2y)(8x)

b) $(2x - 3y)(3x + 2y) + (5x - y)(2x + 3y)$ (2x+3y)(7x-4y)

c) $(3a - 2b)(2a + b) - (2a + 3b)(3a - b)$ (3a-2

d) $(2a + 3)(3a - 2)(2a - 5)$

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

23. Simplify the following expressions.

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

b) $(3x + 5y)(3x + 5y) - x(2x + 3y) + y(3x - 2y)$ $7x^2+30xy+23y^2$

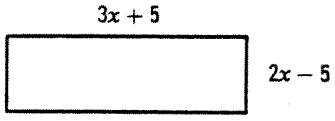
c) $a(a - b) + b(a + b) + (a + b)(a - b)$ $2a^2$

d) $(4a + 3b)(4a - 3b) - (4a + b)(4a + 3b)$ $-16ab-12b^2$

e) $m(m + 2) + 3(m^2 - 2m - 1) - (m + 2)(m - 2)$ $3m^2-4m+1$

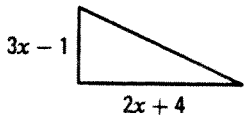
24. Use a polynomial to express the area of the following figures.

a)



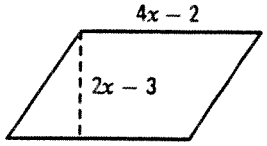
$6x^2-5x-25$

b)



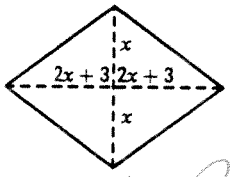
$3x^2+5x-2$

c)



$8x^2-16x+6$

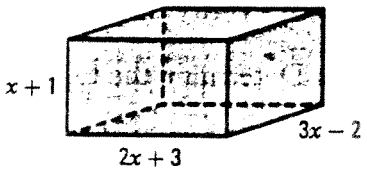
d)



$4x^2+6x$

25. a) Use a polynomial to express the total area A of the following right prism.

$22x^2+22x-10$



b) Use a polynomial to express the volume V of the prism.

$6x^3+11x^2-x-6$

c) Evaluate the total area and volume when $x = 2$ cm. A=132 cm² V=84 cm³

Remarkable Identities

1. a) Calculate the following products using the distributive property.

1. $(3x + 5)^2$ $9x^2+30x+25$ 2. $(2x - 7)^2$ $4x^2-28x+49$ 3. $(2x + 5)(2x - 5)$ $4x^2-25$

b) Calculate the following products using the appropriate remarkable identity.

1. $(3x + 5)^2$ $9x^2+30x+25$ 2. $(2x - 7)^2$ $4x^2-28x+49$ 3. $(2x + 5)(2x - 5)$ $4x^2-25$

2. Calculate the following products using the identity $(a + b)^2 = a^2 + 2ab + b^2$.

a) $(x + 5)^2$ $x^2+10x+25$ b) $(3x + 4)^2$ $9x^2+24x+16$

c) $(2x + 5y)^2$ $4x^2+20xy+25y^2$ d) $\left(\frac{1}{2}x + 7\right)^2$ $\frac{1}{4}x^2+7x+49$

e) $(3x^2y + xy^2)^2$ $9x^4y^2+6x^3y^3+x^2y^4$ f) $\left(\frac{3}{4}x^2 + \frac{2}{9}y^2\right)^2$ $\frac{9}{16}x^4+\frac{1}{3}x^2y^2+\frac{4}{81}y^4$

3. Calculate the following products using the identity $(a - b)^2 = a^2 - 2ab + b^2$.

a) $(2x - 7)^2$ $4x^2-28x+49$ b) $(4a - b)^2$ $16a^2-8ab+b^2$

c) $(3x^2 - 2x)^2$ $9x^4-12x^3+4x^2$ d) $(-3x - 4y)^2$ $9x^2+24xy+16y^2$

e) $\left(\frac{3}{4}x - \frac{5}{6}\right)^2$ $\frac{9}{16}x^2-\frac{5}{4}x+\frac{25}{36}$ f) $\left(\frac{2}{3}x^2 - \frac{3}{4}x\right)^2$ $\frac{4}{9}x^4-x^3+\frac{9}{16}x^2$

4. Calculate the following products using the identity $(a + b)(a - b) = a^2 - b^2$.

a) $(2x + 7)(2x - 7)$ $4x^2-49$ b) $(4x + 3y)(4x - 3y)$ $16x^2-9y^2$

c) $(2 - 3x)(2 + 3x)$ $4-9x^2$ d) $(-2x + 3y)(-2x - 3y)$ $4x^2-9y^2$

e) $\left(\frac{2}{3}x + \frac{3}{4}\right)\left(\frac{2}{3}x - \frac{3}{4}\right)$ $\frac{4}{9}x^2-\frac{9}{16}$ f) $(5x^2y + 3x^3)(5x^2y - 3x^3)$ $25x^4y^2-9x^6$

Long Division

2. Determine the quotient $Q(x)$ and the remainder $R(x)$ in the division of $A(x) = 2x^2 + 5x - 3$ by $B(x) = x - 1$. 2x+7 R=4

3. In each of the following cases, determine the quotient $Q(x)$ and the remainder $R(x)$ in the division of $A(x)$ by $B(x)$.

a) $A(x) = 2x^2 - x - 6$; $B(x) = 2x + 3$ x-2 R0

b) $A(x) = 3x^2 - 2x + 1$; $B(x) = x - 2$ 3x+4 R9

c) $A(x) = 2x^3 + 3x^2 + 2x + 4$; $B(x) = x + 1$ 2x²+x+1 R3

d) $A(x) = x^3 - 2x + 1$; $B(x) = x - 1$ x²+x-1 R0

e) $A(x) = x^4 - 1$; $B(x) = x + 1$ x3-x²+x-1 R0

f) $A(x) = x^3 + 27$; $B(x) = x + 3$ x²-3x+9 R=0

4. Given $P(x) = 2x^3 + 3x^2 - 4x - 1$.
Determine the remainder in the division of $P(x)$ by:
1. $(x - 2)$ 19 2. $(x + 2)$ 3 3. $(x - 1)$ 0

5. Given $P(x) = x^3 + 2x^2 - 5x - 6$.

a) Show that $P(x)$ is divisible by:
1. $(x + 3)$ 0 2. $(x - 2)$ 0 3. $(x + 1)$ 0

b) Show that $P(x)$ is not divisible by:
1. $(x - 1)$ ≠0 2. $(x + 2)$ ≠0 3. $(x - 3)$ 0

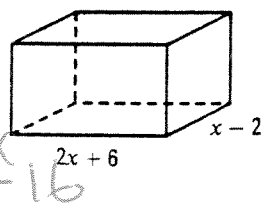
6. The area of a parallelogram is $A(x) = 10x^2 + 19x - 15$.
The height is represented by the binomial $5x - 3$. Use a polynomial to express the parallelogram's base. 2x+5

7. The area of a rectangle is given by the polynomial $A(x) = 6x^2 - 13x - 5$.
The width is represented by the binomial $3x + 1$. Use a polynomial to express the perimeter of this rectangle.
10x-8

8. The following right prism has the volume $V(x) = 2x^3 + 4x^2 - 10x - 12$.
The dimensions of the prism's base are $(2x + 6)$ and $(x - 2)$.

a) Determine the height of the prism. x+1

b) Use a polynomial to express the total area of the prism. 10x²+18x-16



9. The area of a triangle is $A(x) = x^2 + x - 6$. The base is represented by the binomial $2x + 6$. Use a polynomial to express the height of this triangle.
x-2

Factoring Polynomials

1. Find the greatest common factor of the following algebraic expressions.

a) $18x^4; 24x^3; 12x^5$ $6x^3$

b) $18x^3y^2z^4; 24x^4y^3z^4; 36x^2y^4z^3$ $6x^2y^2z^2$

c) $15x^2(a+b)^3; 18x^3(a+b)^2$ $3x^2(a+b)^2$

d) $24x^3y^2(a-b)^3; 36x^2y^4(a-b)^2$ $12x^2y^2(a-b)^2$

2. Factor the following polynomials.

a) $5x - 10$ $5(x-2)$

b) $18x + 24y - 12z$ $6(3x+4y-2z)$

c) $4x^2 + 6x$ $2x(2x+3)$

d) $12x + x^2 - 5x^3$ $x(12+x-5x^2)$

e) $12a^2b + 18a^2b^2$ $6a^2b(2+3b)$

f) $-3x^4 + 6x^3 - 9x^2$ $-3x^2(x^2-2x+3)$

g) $a^2 + ab + a$ $a(a+b+1)$

h) $x^4 - x^3y - x^2$ $x^2(x^2-xy-1)$

i) $24x^3y^2 - 16x^2y^3 + 28x^3y^4$ $4x^2y^2(6x-4y+7xy^2)$

j) $21x^3y^2z - 14x^2y^3z^2 + 28x^2y^2z^2$ $7x^2y^2z$

3. Factor the following polynomials.

a) $12x^3 - 16x^2$ $4x^2(3x-4)$

b) $6x^2y^3 + 4x^3y^2$ $2x^2y^2(3y+2x)$

c) $18x^2y^3z^4 - 12xy^4z^3$ $6xy^3z^3(3xz-2y)$

d) $12x^2y^3 - 18x^3y^2 + 24x^2y^2$ $6x^2y^2(2y-3x+4)$

e) $-14x^3 + 21x^2 - 7x$ $-7x(2x^2-3x+1)$

f) $-25m^4n^3 + 50m^3n^4$ $25m^3n^3(m-2n)$

g) $2x(x+1) + 3y(x+1)$ $(x+1)(2x+3y)$

h) $2(x-3) - x(x-3)$ $(x-3)(2-x)$

4. Factor the following polynomials.

a) $x(x+2) + 5(x+2)$ $(x+2)(x+5)$

b) $3(x-2) - x(x-2)$ $(x-2)(3-x)$

c) $a(b+c) - d(b+c)$ $(b+c)(a-d)$

d) $x(3-y) + y(3-y)$ $(3-y)(x+y)$

e) $(x+3)(x+2) + (x+3)(x-1)$ $(x+3)(2x+1)$

f) $(x+y)(x-2) - (x+y)(2x-3)$ $(x+y)(-x+1)$

g) $(x+y)^2 + x(x+y)$ $(x+y)(2x+y)$

h) $(x-y)^2 + (x-y)(x+y)$ $2x(x-y)$

5. Factor the following polynomials.

a) $x(x-1) - 3(1-x)$ $(x-1)(x+3)$

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

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

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

e) $(2x+3y)(x+y) + (4x+6y)(x-y)$ $(2x+3y)(3x-y)$

f) $(x+1)(2x+6) - (x-2)(3x+9)$ $(x+3)(-x+8)$

Factor by Grouping

1. Factor the following polynomials.

a) $x^2 + 5xy + 3x + 15y$ $(x+3)(x+5y)$

b) $2x^2 + 3xy - 10x - 15y$ $(x-5)(2x+3y)$

c) $6a^2 - 15a + 2ab - 5b$ $(3a+b)(2a-5)$

d) $6x^2 - 8x - 9xy + 12y$ $(2x-3)(3x-4)$

e) $10xy + 2x + 15y + 3$ $(2x+3)(5y+1)$

f) $x^3 - x^2 + x - 1$ $(x^2+1)(x-1)$

2. Factor the following polynomials.

a) $2x^2y + 3x^2 + 10y + 15$ $(x^2+5)(2y+3)$

b) $15x^4y^2 + 35x^2y^2 - 9x^2 - 21$ $(3x^2+7)(5x^2y^2-3)$

c) $2x^3 + 4x^2y - 2x^2 - 4xy$ $2x(x-1)(x+2y)$

d) $3x^3y - 9x^3 + 6x^2y - 18x^2$ $3x^2(x+2)(y-3)$

e) $30x^4y - 10x^3y^2 + 15x^3y - 5x^2y^2$ $5x^2y(2x+1)(3x-y)$

f) $2x^4 - 2x^3 + 6x^2 - 6x$ $2x(x^2+3)(x-1)$

3. Factor the following polynomials.

a) $ax - ay + bx - by + cx - cy$ $(a+b+c)(x-y)$

b) $6ax - 3ay + 10bx - 5by - 4x + 2y$ $(3a+5b-2)(2x-y)$

c) $a^3 - 2ab + ac^2 - a^2b + 2b^2 - bc^2 + a^2c - 2bc + c^3$ $(a^2-2b+c^2)(a-b+c)$

d) $ab(x^2 + y^2) - xy(a^2 + b^2)$ $(ax-by)(bx-ay)$

Difference of Squares

1. Factor the following differences of squares.

a) $x^2 - 25$ $(x+5)(x-5)$

b) $16x^2 - 9$ $(4x-3)(4x+3)$

c) $49x^2 - 36y^2$ $(7x-6y)(7x+6y)$

d) $36x^4 - 25y^6$ $(6x^2-5y^3)(6x^2+5y^3)$

e) $100 - x^2$ $(10-x)(10+x)$

f) $\frac{x^2}{16} - \frac{y^2}{9}$ $(\frac{x}{4}-\frac{y}{3})(\frac{x}{4}+\frac{y}{3})$

g) $x^2 - 3$ $(x-\sqrt{3})(x+\sqrt{3})$

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

i) $16x^2 - \frac{1}{9}$ $(4x-\frac{1}{3})(4x+\frac{1}{3})$

j) $\frac{25}{16}x^2y^4 - \frac{4}{9}z^6$ $(\frac{5}{4}xy^2-\frac{2}{3}z^3)(\frac{5}{4}xy^2+\frac{2}{3}z^3)$

2. Factor the following differences of squares.

a) $(3x-1)^2 - 9$

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

c) $(2x+5)^2 - 16x^2$

d) $25x^2 - (2x-5)^2$

e) $16x^2 - (3x+2)^2$

f) $36x^2 - (2-x)^2$

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

h) $(3x-5y)^2 - (2x-3y)^2$

i) $4(x+5)^2 - 1$

j) $25(x-3)^2 - 9(2x+1)^2$

3. Factor the following differences of squares.

a) $(3x-1)^2 - 9$ $(3x-10)(3x+8)$

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

c) $(2x+5)^2 - 16x^2$ $(2x+5-4x)(2x+5+4x)$

d) $25x^2 - (2x-5)^2$

e) $16x^2 - (3x+2)^2$

f) $36x^2 - (2-x)^2$

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

h) $(3x-5y)^2 - (2x-3y)^2$

i) $4(x+5)^2 - 1$

j) $25(x-3)^2 - 9(2x+1)^2$

Perfect Square Trinomials

4. Factor the following perfect square trinomials.

a) $x^2 + 10x + 25$ $(x+5)(x+5)$

b) $x^2 - 14x + 49$ $(x-7)^2$

c) $4x^2 + 12xy + 9y^2$ $(2x+3y)^2$

d) $25x^2 - 20xy + 4y^2$ $(5x-2)^2$

e) $9x^4 - 30x^2 + 25$ $(3x^2-5)^2$

f) $25x^4 + 30x^2y^3 + 9y^6$ $(5x^2+3y^3)^2$

g) $x^2 - x + \frac{1}{4}$ $(x-\frac{1}{2})^2$

h) $\frac{9}{16}x^2 + x + \frac{4}{9}$ $(\frac{3}{4}x+\frac{2}{3})^2$

Second Degree Trinomials

1. Factor the following trinomials using the "product and sum" method.

a) $2x^2 + 9x + 4$ _____

b) $4x^2 - 5x - 21$ _____

c) $12x^2 + 13x + 3$ _____

d) $6x^2 + 11x - 10$ _____

e) $x^2 + 10x + 24$ _____

f) $6x^2 - 19x + 10$ _____

g) $5x^2 - 32x - 21$ _____

h) $16x^2 - 26x + 3$ _____

i) $8x^2 + 2x - 15$ _____

j) $x^2 - 11x + 30$ _____

2. Factor the following trinomials.

a) $x^2 - 10x + 21$ _____

b) $x^2 - 7x + 12$ _____

c) $2x^2 + 7x + 3$ $(2x+1)(x+3)$

d) $6x^2 + x - 2$ _____

e) $x^2 - 5x - 14$ $(x+5)(x-9)$

f) $x^2 - 9x + 20$ $(x-4)(x-5)$

g) $3x^2 + 5x - 2$ $(3x-1)(x+2)$

h) $10x^2 - 19x + 6$ $(5x-2)(2x-3)$

3. Factor the following trinomials.

a) $x^2 + 8x + 15$ $(x+3)(x+5)$

b) $x^2 + 5x - 14$ $(x+7)(x-2)$

c) $6x^2 + 19x + 15$ $(3x+5)(2x+3)$

d) $3x^2 - x - 4$ $(3x-4)(x+1)$

e) $x^2 - 8x + 15$ $(x-5)(x-3)$

f) $x^2 + 9x + 14$ $(x+7)(x+2)$

g) $2x^2 - 7x - 15$ $(2x+3)(x-5)$

h) $5x^2 - 17x + 6$ $(5x-2)(x-3)$

4. Completely factor the following polynomials.

a) $x^3 + 3x^2 + 2x =$ _____

b) $x^3 - 2x^2 + x =$ _____

c) $x^3 - 16x =$ _____

d) $x^4 - 2x^2 + 1 =$ _____

e) $x^4 - 1 =$ _____

5. Completely factor the following polynomials.

a) $6x^4 + 9x^3 + 3x^2 =$ _____

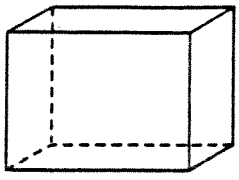
b) $3x^3 - 12x =$ _____

c) $16x^4 - 8x^2 + 1 =$ _____

d) $-x^2 + 6x - 9 =$ _____

e) $(x^2 - 1) + (x - 1)^2 =$ _____

6. The prism on the right has a volume of $V = 2x^3 + 6x^2 + 4x$. What could the dimensions of this prism be?



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