解答

1 (1) $x^2+2ax^3+5-3ax=2ax^3+x^2-3ax+5$

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

(3) $x^2+y^2+xy+2x+4=x^2+(yx+2x)+y^2+4=x^2+(y+2)x+(y^2+4)$

(4) $x^2+xy+3y+x+x^2y+2=(x^2+yx^2)+(yx+x)+3y+2$
$=(y+1)x^2+(y+1)x+(3y+2)$

2 (1) $2x^3+2xy^2+x^2y+1=2xy^2+x^2y+(2x^3+1)$

(2) $ax^3-x^2+a-1=(x^3a+a)-x^2-1=(x^3+1)a+(-x^2-1)$

(3) $ax^3+a^2x-2x^2-a^3-3ax^3+4a^3=(4a^3-a^3)+xa^2+(x^3a-3x^3a)-2x^2$
$=3a^3+xa^2-2x^3a-2x^2$

3 (1) $A+B=(5x^2+2x+1)+(2x^2+3x+1)=5x^2+2x+1+2x^2+3x+1$
$=(5x^2+2x^2)+(2x+3x)+(1+1)$
$=7x^2+5x+2$
$A-B=(5x^2+2x+1)-(2x^2+3x+1)=5x^2+2x+1-2x^2-3x-1$
$=(5x^2-2x^2)+(2x-3x)+(1-1)$
$=3x^2-x$

(2) $A+B=(3x+5-x^2)+(8x-x^2+5)=3x+5-x^2+8x-x^2+5$
$=(-x^2-x^2)+(3x+8x)+(5+5)$
$=-2x^2+11x+10$
$A-B=(3x+5-x^2)-(8x-x^2+5)=3x+5-x^2-8x+x^2-5$
$=(-x^2+x^2)+(3x-8x)+(5-5)$
$=-5x$

4 (1) $a\times a^4=a^{1+4}=a^5$

(2) $2x\times 3x^2=(2\times 3)\times x^{1+2}=6x^3$

(3) $3y^2\times(-5y^2)=\{3\times(-5)\}\times y^{2+2}=-15y^4$

(10) $(-5ab)^2\times a^3b=(-5)^2\times a^2\times b^2\times a^3b=25\times a^{2+3}\times b^{2+1}=25a^5b^3$

(11) $a^2b^3\times(-3ab)^3=a^2b^3\times(-3)^3\times a^3\times b^3=-27\times a^{2+3}\times b^{3+3}=-27a^5b^6$

(12) $(-2ab^3)^3\times(-2a^2b)^4=(-2)^3\times a^3\times(b^3)^3\times(-2)^4\times(a^2)^4\times b^4$
$=(-2)^{3+4}\times a^3\times b^{3\times3}\times a^{2\times4}\times b^4$
$=(-2)^7\times a^3\times b^9\times a^8\times b^4$
$=-128\times a^{3+8}\times b^{9+4}=-128a^{11}b^{13}$

5 (1) $2(3x-5)=2\times3x+2\times(-5)=6x-10$

(2) $(2x-4)\times3=2x\times3+(-4)\times3=6x-12$

(3) $-5(3x^2-2x)=-5\times3x^2+(-5)\times(-2x)=-15x^2+10x$

(4) $(2x^2-5x-2)\times(-3)=2x^2\times(-3)+(-5x)\times(-3)+(-2)\times(-3)=-6x^2+15x+6$

6 (1) $a(a^2+a+1)=a\cdot a^2+a\cdot a+a\cdot1=a^3+a^2+a$

(2) $(6-x+3x^2)x=(3x^2-x+6)x=3x^2\cdot x+(-x)\cdot x+6\cdot x=3x^3-x^2+6x$

(3) $2y^2(y+1-y^3)=2y^2(-y^3+y+1)=2y^2\cdot(-y^3)+2y^2\cdot y+2y^2\cdot1=-2y^5+2y^3+2y^2$

(4) $(3x-x^2+8)\times4x^3=(-x^2+3x+8)\times4x^3=(-x^2)\cdot4x^3+3x\cdot4x^3+8\cdot4x^3$
$=-4x^5+12x^4+32x^3$

(5) $-3b(2b^2+6b+1)=-3b\cdot2b^2+(-3b)\cdot6b+(-3b)\cdot1=-6b^3-18b^2-3b$

(6) $(1-x^2-3x)\times(-8x)=(-x^2-3x+1)\times(-8x)$
$=(-x^2)\cdot(-8x)+(-3x)\cdot(-8x)+1\cdot(-8x)$
$=8x^3+24x^2-8x$

7 (1) $(2x+1)(x-3)=2x(x-3)+1\cdot(x-3)=2x\cdot x+2x\cdot(-3)+x-3$
$=2x^2-6x+x-3$
$=2x^2-5x-3$

(2) $(-x+3)(4x+1)=-x(4x+1)+3(4x+1)=-x\cdot4x+(-x)\cdot1+3\cdot4x+3\cdot1$
$=-4x^2-x+12x+3$
$=-4x^2+11x+3$

(3) $(5x-2)(3x-1)=5x(3x-1)+(-2)\cdot(3x-1)$
$=5x\cdot3x+5x\cdot(-1)+(-2)\cdot3x+(-2)\cdot(-1)$
$=15x^2-5x-6x+2$
$=15x^2-11x+2$

(4) $(x+y)(2x-y)=x(2x-y)+y(2x-y)=x\cdot2x+x\cdot(-y)+y\cdot2x+y\cdot(-y)$
$=2x^2-xy+2xy-y^2$
$=2x^2+xy-y^2$

8 (1) $(x-2)(x^2+3x-4)=x(x^2+3x-4)-2(x^2+3x-4)=x^3+3x^2-4x-2x^2-6x+8$
$=x^3+x^2-10x+8$

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

(3) $(3x+1)(2x^2-5x+1)=3x(2x^2-5x+1)+(2x^2-5x+1)$
$=6x^3-15x^2+3x+2x^2-5x+1$
$=6x^3-13x^2-2x+1$

(4) $(4x-3)(3x^2-x+2)=4x(3x^2-x+2)-3(3x^2-x+2)$
$=12x^3-4x^2+8x-9x^2+3x-6$
$=12x^3-13x^2+11x-6$

9 (1) $3A+B=3(x^2-4x+3)+(-2x^2+2x+1)=3x^2-12x+9-2x^2+2x+1$
$=x^2-10x+10$

(2) $2A-3B=2(x^2-4x+3)-3(-2x^2+2x+1)=2x^2-8x+6+6x^2-6x-3$
$=8x^2-14x+3$

(3) $A+2(2A-B)=A+4A-2B=5A-2B$
$=5(x^2-4x+3)-2(-2x^2+2x+1)$
$=5x^2-20x+15+4x^2-4x-2$
$=9x^2-24x+13$

(4) $-5A+3B-2(-3A+4B)=-5A+3B+6A-8B=A-5B$
$=x^2-4x+3-5(-2x^2+2x+1)$
$=x^2-4x+3+10x^2-10x-5$
$=11x^2-14x-2$

10 (1) $(x+1)^2=x^2+2\cdot x\cdot 1+1^2=x^2+2x+1$

(2) $(x-3)^2=x^2-2\cdot x\cdot 3+3^2=x^2-6x+9$

(3) $(2x+1)^2=(2x)^2+2\cdot 2x\cdot 1+1^2=4x^2+4x+1$

(4) $(3x-4)^2=(3x)^2-2\cdot 3x\cdot 4+4^2=9x^2-24x+16$

(5) $(3a+2b)^2=(3a)^2+2\cdot 3a\cdot 2b+(2b)^2=9a^2+12ab+4b^2$

(6) $(5x-2y)^2=(5x)^2-2\cdot 5x\cdot 2y+(2y)^2=25x^2-20xy+4y^2$

11 (1) $(x+1)(x-1)=x^2-1^2=x^2-1$

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

(3) $(1-3x)(1+3x)=1^2-(3x)^2=1-9x^2$

(4) $(y-2x)(y+2x)=y^2-(2x)^2=y^2-4x^2$

(5) $(a+b)(b-a)=-(a+b)(a-b)=-(a^2-b^2)=-a^2+b^2$

(6) $(2b-3a)(3a+2b)=-(3a-2b)(3a+2b)=-\{(3a)^2-(2b)^2\}$
$=-(9a^2-4b^2)=-9a^2+4b^2$

12 (1) $(x+1)(x+2)=x^2+(1+2)x+1\cdot 2=x^2+3x+2$

(2) $(x+3)(x+2)=x^2+(3+2)x+3\cdot 2=x^2+5x+6$

(3) $(x+1)(x-3)=x^2+(1-3)x+1\cdot(-3)=x^2-2x-3$

(4) $(x-2)(x+4)=x^2+(-2+4)x+(-2)\cdot 4=x^2+2x-8$

(5) $(x-6)(x-5)=x^2+(-6-5)x+(-6)\cdot(-5)=x^2-11x+30$

(6) $(x-3)(x-8)=x^2+(-3-8)x+(-3)\cdot(-8)=x^2-11x+24$

13 (1) $(2x+1)(3x+2)=2\cdot 3x^2+(2\cdot 2+1\cdot 3)x+1\cdot 2=6x^2+7x+2$

(2) $(4x+3)(6x+1)=4\cdot 6x^2+(4\cdot 1+3\cdot 6)x+3\cdot 1=24x^2+22x+3$

(3) $(3x-5)(4x+1)=3\cdot 4x^2+\{3\cdot 1+(-5)\cdot 4\}x+(-5)\cdot 1=12x^2-17x-5$

(10) $(5x-y)(3x+4y)=5\cdot 3x^2+\{5\cdot 4+(-1)\cdot 3\}xy+(-1)\cdot 4y^2=15x^2+17xy-4y^2$

(11) $(2x+7y)(3x-2y)=2\cdot 3x^2+\{2\cdot(-2)+7\cdot 3\}xy+7\cdot(-2)y^2=6x^2+17xy-14y^2$

(12) $(4x+3y)(2x-5y)=4\cdot 2x^2+\{4\cdot(-5)+3\cdot 2\}xy+3\cdot(-5)y^2=8x^2-14xy-15y^2$

14 (1) $(x^2+2)^2=(x^2)^2+2\cdot x^2\cdot 2+2^2=x^4+4x^2+4$

(2) $(x^2-y^2)^2=(x^2)^2-2\cdot x^2\cdot y^2+(y^2)^2=x^4-2x^2y^2+y^4$

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

(4) $(y^2+5)(y^2-2)=(y^2)^2+(5-2)y^2+5\cdot(-2)=y^4+3y^2-10$

15 (1) $a-b=A$ とおくと
$(a-b+c)^2=(A+c)^2=A^2+2Ac+c^2=(a-b)^2+2(a-b)c+c^2$
$=(a^2-2ab+b^2)+(2ac-2bc)+c^2$
$=a^2+b^2+c^2-2ab-2bc+2ca$

(2) $-a+b=A$ とおくと
$(-a+b+c)^2=(A+c)^2=A^2+2Ac+c^2=(-a+b)^2+2(-a+b)c+c^2$
$=(a^2-2ab+b^2)+(-2ac+2bc)+c^2$
$=a^2+b^2+c^2-2ab+2bc-2ca$

(3) $x+y=A$ とおくと
$(x+y+1)^2=(A+1)^2=A^2+2A+1=(x+y)^2+2(x+y)+1$
$=(x^2+2xy+y^2)+(2x+2y)+1$
$=x^2+2xy+y^2+2x+2y+1$

16 (1) $x+y=A$ とおくと

$$(x+y+z)(x+y-z)=(A+z)(A-z)=A^2-z^2$$
$$=(x+y)^2-z^2$$
$$=x^2+2xy+y^2-z^2$$
$$=x^2+y^2-z^2+2xy$$

(2) $x+y=A$ とおくと

$$(x+y+1)(x+y+4)=(A+1)(A+4)=A^2+5A+4$$
$$=(x+y)^2+5(x+y)+4$$
$$=(x^2+2xy+y^2)+(5x+5y)+4$$
$$=x^2+2xy+y^2+5x+5y+4$$

(3) $a-2b=A$ とおくと

$$(a-2b+3c)(a-2b-3c)=(A+3c)(A-3c)=A^2-9c^2$$
$$=(a-2b)^2-9c^2$$
$$=a^2-4ab+4b^2-9c^2$$
$$=a^2+4b^2-9c^2-4ab$$

(4) $2a-b=A$ とおくと

$$(2a-b+3)(2a-b-2)=(A+3)(A-2)=A^2+A-6$$
$$=(2a-b)^2+(2a-b)-6$$
$$=(4a^2-4ab+b^2)+2a-b-6$$
$$=4a^2-4ab+b^2+2a-b-6$$

17 (1) $x^2+x=A$ とおくと

$$(x^2+x+1)(x^2+x-1)=(A+1)(A-1)=A^2-1=(x^2+x)^2-1$$
$$=(x^2)^2+2\cdot x^2\cdot x+x^2-1$$
$$=x^4+2x^3+x^2-1$$

(2) $x^2+2x=A$ とおくと

$$(x^2+2x+3)(x^2+2x-1)=(A+3)(A-1)=A^2+2A-3$$
$$=(x^2+2x)^2+2(x^2+2x)-3$$
$$=\{(x^2)^2+2\cdot x^2\cdot 2x+(2x)^2\}+(2x^2+4x)-3$$
$$=(x^4+4x^3+4x^2)+2x^2+4x-3$$
$$=x^4+4x^3+6x^2+4x-3$$

18 (1) $(x^2+9)(x+3)(x-3)=(x^2+9)\{(x+3)(x-3)\}=(x^2+9)(x^2-9)=(x^2)^2-9^2=x^4-81$

(2) $(4x^2+1)(2x-1)(2x+1)=(4x^2+1)\{(2x-1)(2x+1)\}=(4x^2+1)(4x^2-1)$
$$=(4x^2)^2-1^2=16x^4-1$$

(3) $(x+2)^2(x-2)^2=\{(x+2)(x-2)\}^2=(x^2-4)^2=(x^2)^2-8x^2+16=x^4-8x^2+16$

(4) $(2x+y)^2(2x-y)^2=\{(2x+y)(2x-y)\}^2=\{(2x)^2-y^2\}^2$
$$=(4x^2-y^2)^2=(4x^2)^2-8x^2y^2+(y^2)^2$$
$$=16x^4-8x^2y^2+y^4$$

19 (1) $mn+m=m\cdot n+m\cdot 1=m(n+1)$

(2) $p^2q^3+pq=pq\cdot pq^2+pq\cdot 1=pq(pq^2+1)$

(3) $ab+ac-ad=a\cdot b+a\cdot c-a\cdot d=a(b+c-d)$

(4) $2xy+3x^2y+6y^3=y\cdot 2x+y\cdot 3x^2+y\cdot 6y^2=y(2x+3x^2+6y^2)=y(3x^2+6y^2+2x)$

20 (1) $x(x+1)+(x+1)=x(x+1)+1\cdot(x+1)=(x+1)(x+1)=(x+1)^2$

(2) $(a-1)x-(a-1)=(a-1)x-(a-1)\cdot 1=(a-1)(x-1)$

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

(4) $5x^2(2x-1)-2x(1-2x)=5x^2(2x-1)+2x(2x-1)=5x\cdot x(2x-1)+2\cdot x(2x-1)$
$$=x(2x-1)(5x+2)$$

21 (1) $x^2+2x+1=x^2+2\cdot x\cdot 1+1^2=(x+1)^2$

(2) $x^2-4x+4=x^2-2\cdot x\cdot 2+2^2=(x-2)^2$

(7) $4a^2+4ab+b^2=(2a)^2+2\cdot 2a\cdot b+b^2=(2a+b)^2$

(8) $9a^2-12ab+4b^2=(3a)^2-2\cdot 3a\cdot 2b+(2b)^2=(3a-2b)^2$

22 (1) $a^2-1=a^2-1^2=(a+1)(a-1)$

(2) $4a^2-9=(2a)^2-3^2=(2a+3)(2a-3)$

(3) $a^2-16b^2=a^2-(4b)^2=(a+4b)(a-4b)$

(4) $b^2-36a^2=b^2-(6a)^2=(b+6a)(b-6a)$

23 (1) $x^2+4x+3=x^2+(1+3)x+1\cdot 3=(x+1)(x+3)$

(2) $x^2+6x+5=x^2+(1+5)x+1\cdot 5=(x+1)(x+5)$

(3) $x^2+5x+6=x^2+(2+3)x+2\cdot 3=(x+2)(x+3)$

(4) $x^2+7x+6=x^2+(1+6)x+1\cdot 6=(x+1)(x+6)$

(5) $x^2+7x+12=x^2+(3+4)x+3\cdot 4=(x+3)(x+4)$

(6) $x^2+9x+14=x^2+(2+7)x+2\cdot 7=(x+2)(x+7)$

24 (1) $x^2+6xy+8y^2=x^2+(2y+4y)x+2y\cdot 4y=(x+2y)(x+4y)$

(2) $x^2+9xy+8y^2=x^2+(y+8y)x+y\cdot 8y=(x+y)(x+8y)$

(3) $x^2+5xy-6y^2=x^2+(-y+6y)x+(-y)\cdot 6y=(x-y)(x+6y)$

(4) $x^2-2xy-15y^2=x^2+(3y-5y)x+3y\cdot(-5y)=(x+3y)(x-5y)$

25 (1) $6x^2+5x+1=(2x+1)(3x+1)$

(2) $6x^2+7x+1=(x+1)(6x+1)$

(1)

$$\begin{array}{rccc} 2 & \times & 1 & \longrightarrow & 3 \\ 3 & & 1 & \longrightarrow & 2 \\ \hline 6 & & 1 & & 5 \end{array}$$

(2)

$$\begin{array}{rccc} 1 & \times & 1 & \longrightarrow & 6 \\ 6 & & 1 & \longrightarrow & 1 \\ \hline 6 & & 1 & & 7 \end{array}$$

(3) $12x^2+7x+1=(3x+1)(4x+1)$

(4) $12x^2+8x+1=(2x+1)(6x+1)$

(3)

$$\begin{array}{rccc} 3 & \times & 1 & \longrightarrow & 4 \\ 4 & & 1 & \longrightarrow & 3 \\ \hline 12 & & 1 & & 7 \end{array}$$

(4)

$$\begin{array}{rccc} 2 & \times & 1 & \longrightarrow & 6 \\ 6 & & 1 & \longrightarrow & 2 \\ \hline 12 & & 1 & & 8 \end{array}$$

26 (1) $3x^2+4xy+y^2=(x+y)(3x+y)$

(2) $6x^2+7xy+2y^2=(2x+y)(3x+2y)$

(1)

$$\begin{array}{rccc} 1 & \times & y & \longrightarrow & 3y \\ 3 & & y & \longrightarrow & y \\ \hline 3 & & y^2 & & 4y \end{array}$$

(2)

$$\begin{array}{rccc} 2 & \times & y & \longrightarrow & 3y \\ 3 & & 2y & \longrightarrow & 4y \\ \hline 6 & & 2y^2 & & 7y \end{array}$$

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

(4) $3x^2-5xy+2y^2=(x-y)(3x-2y)$

(3)

$$\begin{array}{rccc} 1 & \times & 2y & \longrightarrow & 4y \\ 2 & & -3y & \longrightarrow & -3y \\ \hline 2 & & -6y^2 & & y \end{array}$$

(4)

$$\begin{array}{rccc} 1 & \times & -y & \longrightarrow & -3y \\ 3 & & -2y & \longrightarrow & -2y \\ \hline 3 & & 2y^2 & & -5y \end{array}$$

27 (1) $2x^2-2y^2=2(x^2-y^2)=2(x+y)(x-y)$

(2) $3x^2-9x+6=3(x^2-3x+2)=3\{x^2+(-1-2)x+(-1)\cdot(-2)\}=3(x-1)(x-2)$

(3) $x^2y-10xy+25y=y(x^2-10x+25)=y(x^2-2\cdot x\cdot 5+5^2)=y(x-5)^2$

(4) $x^3y-3x^2y+2xy=xy(x^2-3x+2)=xy\{x^2+(-1-2)x+(-1)\cdot(-2)\}$
$=xy(x-1)(x-2)$

28 (1) $x-y=A$ とおくと

$(x-y)^2+3(x-y)=A^2+3A=A(A+3)=(x-y)(x-y+3)$

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

よって，$5x+3=A$ とおくと

$(5x+3)^2-5x-3=A^2-A=A(A-1)=(5x+3)\{(5x+3)-1\}=(5x+2)(5x+3)$

(5) $xy=A$ とおくと

$(xy)^2+3xy+2=A^2+3A+2=(A+1)(A+2)=(xy+1)(xy+2)$

(6) $xy=A$ とおくと

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

29 (1) $(x-1)^2-y^2=\{(x-1)+y\}\{(x-1)-y\}=(x+y-1)(x-y-1)$

(2) $(x+y)^2-9=\{(x+y)+3\}\{(x+y)-3\}=(x+y+3)(x+y-3)$

(5) $x^2+2x+1-4y^2=(x^2+2x+1)-4y^2=(x+1)^2-4y^2$
$=\{(x+1)+2y\}\{(x+1)-2y\}=(x+2y+1)(x-2y+1)$

(6) $x^2-6xy+9y^2-1=(x^2-6xy+9y^2)-1=(x-3y)^2-1$
$=\{(x-3y)+1\}\{(x-3y)-1\}$
$=(x-3y+1)(x-3y-1)$

30 (1) $a^2+ab-2a+b-3=(a+1)b+(a^2-2a-3)=(a+1)b+(a+1)(a-3)$
$=(a+1)\{b+(a-3)\}=(a+1)(a+b-3)$

(2) $a^2+2ab+4b+3a+2=(2a+4)b+(a^2+3a+2)=2(a+2)b+(a+1)(a+2)$
$=(a+2)\{2b+(a+1)\}=(a+2)(a+2b+1)$

31 (1) $x^2+(2y+3)x+(y+1)(y+2)=\{x+(y+1)\}\{x+(y+2)\}=(x+y+1)(x+y+2)$

$$\begin{array}{rccc} 1 & \times & y+1 & \longrightarrow & y+1 \\ 1 & & y+2 & \longrightarrow & y+2 \\ \hline 1 & & (y+1)(y+2) & & 2y+3 \end{array}$$

(2)　$x^2-x-(y-2)(y-3)=\{x-(y-2)\}\{x+(y-3)\}=(x-y+2)(x+y-3)$

1	$-(y-2)$	$\longrightarrow$	$-y+2$
1	$y-3$	$\longrightarrow$	$y-3$
1	$-(y-2)(y-3)$		-1

(3)　$x^2+(-y-1)x-(2y^2-5y+2)=x^2+(-y-1)x-(y-2)(2y-1)$
$=\{x+(y-2)\}\{x-(2y-1)\}$
$=(x+y-2)(x-2y+1)$

1	$y-2$	$\longrightarrow$	$y-2$
1	$-(2y-1)$	$\longrightarrow$	$-2y+1$
1	$-(y-2)(2y-1)$		$-y-1$

(4)　$x^2-(5y-2)x+6y^2-5y+1=x^2-(5y-2)x+(6y^2-5y+1)$
$=x^2+(-5y+2)x+(2y-1)(3y-1)$
$=\{x-(2y-1)\}\{x-(3y-1)\}$
$=(x-2y+1)(x-3y+1)$

1	$-(2y-1)$	$\longrightarrow$	$-2y+1$
1	$-(3y-1)$	$\longrightarrow$	$-3y+1$
1	$(2y-1)(3y-1)$		$-5y+2$

32 (1)　$|6|=6$

(2)　$|-1|=1$

(3)　$\left|-\frac{1}{8}\right|=\frac{1}{8}$

(4)　$|-4.5|=4.5$

(5)　$|7-5|=|2|=2$

(6)　$|-5+2|=|-3|=3$

(7)　$|-5|+|4|=5+4=9$

(8)　$|-2|-|-7|=2-7=-5$

33 (1)　$x=4$ のとき
$|x-3|+|2x+1|=|4-3|+|2\cdot4+1|=|1|+|9|=1+9=10$

(2)　$x=1$ のとき
$|x-3|+|2x+1|=|1-3|+|2\cdot1+1|=|-2|+|3|=2+3=5$

(3)　$x=-2$ のとき
$|x-3|+|2x+1|=|-2-3|+|2\cdot(-2)+1|=|-5|+|-3|=5+3=8$

34 (1)　$-\sqrt{25}=-\sqrt{5^2}=-5$

(2)　$(\sqrt{7})^2=7$

(3)　$(-\sqrt{6})^2=6$

(4)　$\sqrt{(-2)^2}=\sqrt{4}=\sqrt{2^2}=2$

35 (1)　$\sqrt{3}\times\sqrt{7}=\sqrt{3\times7}=\sqrt{21}$

(2)　$-\sqrt{5}\times\sqrt{3}=-(\sqrt{5}\times\sqrt{3})=-\sqrt{5\times3}=-\sqrt{15}$

(3)　$\sqrt{2}\times\sqrt{5}\times\sqrt{7}=\sqrt{2\times5\times7}=\sqrt{70}$

(4)　$\frac{\sqrt{35}}{\sqrt{5}}=\sqrt{\frac{35}{5}}=\sqrt{7}$

(5)　$\frac{\sqrt{39}}{\sqrt{3}}=\sqrt{\frac{39}{3}}=\sqrt{13}$

(6)　$\frac{\sqrt{14}\times\sqrt{3}}{\sqrt{6}}=\frac{\sqrt{14\times3}}{\sqrt{6}}=\sqrt{\frac{14\times3}{6}}=\sqrt{7}$

36 (1)　$\sqrt{8}=\sqrt{2^2\times2}=\sqrt{2^2}\times\sqrt{2}=2\sqrt{2}$

(2)　$\sqrt{24}=\sqrt{2^2\times6}=\sqrt{2^2}\times\sqrt{6}=2\sqrt{6}$

(3)　$\sqrt{32}=\sqrt{4^2\times2}=\sqrt{4^2}\times\sqrt{2}=4\sqrt{2}$

(4)　$\sqrt{45}=\sqrt{3^2\times5}=\sqrt{3^2}\times\sqrt{5}=3\sqrt{5}$

(5)　$\sqrt{48}=\sqrt{4^2\times3}=\sqrt{4^2}\times\sqrt{3}=4\sqrt{3}$

(6)　$\sqrt{50}=\sqrt{5^2\times2}=\sqrt{5^2}\times\sqrt{2}=5\sqrt{2}$

37 (1)　$\sqrt{3}\times\sqrt{15}=\sqrt{3\times15}=\sqrt{45}=\sqrt{3^2\times5}=\sqrt{3^2}\times\sqrt{5}=3\sqrt{5}$

(2)　$\sqrt{6}\times\sqrt{14}=\sqrt{6\times14}=\sqrt{84}=\sqrt{2^2\times21}=\sqrt{2^2}\times\sqrt{21}=2\sqrt{21}$

(3)　$\frac{\sqrt{24}}{\sqrt{3}}=\sqrt{\frac{24}{3}}=\sqrt{8}=\sqrt{2^2\times2}=\sqrt{2^2}\times\sqrt{2}=2\sqrt{2}$

(4)　$\frac{\sqrt{90}}{\sqrt{5}}=\sqrt{\frac{90}{5}}=\sqrt{18}=\sqrt{3^2\times2}=\sqrt{3^2}\times\sqrt{2}=3\sqrt{2}$

38 (1)　$2\sqrt{5}+6\sqrt{5}-4\sqrt{5}=(2+6-4)\sqrt{5}=4\sqrt{5}$

(2)　$2\sqrt{5}-4\sqrt{2}-3\sqrt{2}+\sqrt{5}=(2+1)\sqrt{5}+(-4-3)\sqrt{2}=3\sqrt{5}-7\sqrt{2}$

(3)　$\sqrt{18}=\sqrt{3^2\times2}=3\sqrt{2}$，$\sqrt{50}=\sqrt{5^2\times2}=5\sqrt{2}$ であるから
$\sqrt{18}+\sqrt{50}=3\sqrt{2}+5\sqrt{2}=(3+5)\sqrt{2}=8\sqrt{2}$

(4) $\sqrt{45}=\sqrt{3^2\times5}=3\sqrt{5}$, $\sqrt{20}=\sqrt{2^2\times5}=2\sqrt{5}$ であるから

$\sqrt{45}-\sqrt{20}=3\sqrt{5}-2\sqrt{5}=(3-2)\sqrt{5}=\sqrt{5}$

39 (1) $(\sqrt{7}+\sqrt{2})(2\sqrt{7}+3\sqrt{2})=\sqrt{7}\times2\sqrt{7}+\sqrt{7}\times3\sqrt{2}+\sqrt{2}\times2\sqrt{7}+\sqrt{2}\times3\sqrt{2}$

$=2\times(\sqrt{7})^2+3\sqrt{14}+2\sqrt{14}+3\times(\sqrt{2})^2$

$=20+5\sqrt{14}$

(2) $(2\sqrt{3}+\sqrt{2})(3\sqrt{3}+2\sqrt{2})=2\sqrt{3}\times3\sqrt{3}+2\sqrt{3}\times2\sqrt{2}+\sqrt{2}\times3\sqrt{3}+\sqrt{2}\times2\sqrt{2}$

$=6\times(\sqrt{3})^2+4\sqrt{6}+3\sqrt{6}+2\times(\sqrt{2})^2$

$=22+7\sqrt{6}$

(3) $(3\sqrt{2}+\sqrt{6})^2=(3\sqrt{2})^2+2\times3\sqrt{2}\times\sqrt{6}+(\sqrt{6})^2$

$=9\times(\sqrt{2})^2+6\sqrt{12}+6$

$=24+12\sqrt{3}$

(4) $(2\sqrt{6}-\sqrt{3})^2=(2\sqrt{6})^2-2\times2\sqrt{6}\times\sqrt{3}+(\sqrt{3})^2$

$=4\times(\sqrt{6})^2-4\sqrt{18}+(\sqrt{3})^2$

$=27-12\sqrt{2}$

40 (1) $\dfrac{1}{\sqrt{5}}=\dfrac{\sqrt{5}}{\sqrt{5}\times\sqrt{5}}=\dfrac{\sqrt{5}}{(\sqrt{5})^2}=\dfrac{\sqrt{5}}{5}$

(2) $\dfrac{3}{\sqrt{2}}=\dfrac{3\times\sqrt{2}}{\sqrt{2}\times\sqrt{2}}=\dfrac{3\sqrt{2}}{(\sqrt{2})^2}=\dfrac{3\sqrt{2}}{2}$

(3) $\dfrac{5\sqrt{2}}{\sqrt{7}}=\dfrac{5\sqrt{2}\times\sqrt{7}}{\sqrt{7}\times\sqrt{7}}=\dfrac{5\sqrt{2}\times\sqrt{7}}{(\sqrt{7})^2}=\dfrac{5\sqrt{14}}{7}$

(4) $\dfrac{\sqrt{5}}{3\sqrt{2}}=\dfrac{\sqrt{5}\times\sqrt{2}}{3\sqrt{2}\times\sqrt{2}}=\dfrac{\sqrt{5}\times\sqrt{2}}{3\times(\sqrt{2})^2}=\dfrac{\sqrt{10}}{6}$

(5) $\dfrac{1}{\sqrt{3}+\sqrt{2}}=\dfrac{\sqrt{3}-\sqrt{2}}{(\sqrt{3}+\sqrt{2})(\sqrt{3}-\sqrt{2})}=\dfrac{\sqrt{3}-\sqrt{2}}{(\sqrt{3})^2-(\sqrt{2})^2}=\sqrt{3}-\sqrt{2}$

(6) $\dfrac{\sqrt{3}}{2-\sqrt{3}}=\dfrac{\sqrt{3}(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}=\dfrac{2\sqrt{3}+(\sqrt{3})^2}{2^2-(\sqrt{3})^2}=2\sqrt{3}+3$

41 (1) $(1-\sqrt{2}+\sqrt{3})^2=\{(1-\sqrt{2})+\sqrt{3}\}^2=(1-\sqrt{2})^2+2(1-\sqrt{2})\sqrt{3}+(\sqrt{3})^2$

$=1^2-2\sqrt{2}+(\sqrt{2})^2+2\sqrt{3}-2\sqrt{6}+3$

$=6-2\sqrt{2}+2\sqrt{3}-2\sqrt{6}$

別解 $(a+b+c)^2=a^2+b^2+c^2+2ab+2bc+2ca$ を利用すると

$(1-\sqrt{2}+\sqrt{3})^2$

$=1^2+(-\sqrt{2})^2+(\sqrt{3})^2+2\times1\times(-\sqrt{2})+2\times(-\sqrt{2})\times\sqrt{3}+2\times\sqrt{3}\times1$

$=6-2\sqrt{2}+2\sqrt{3}-2\sqrt{6}$

(2) $(1+\sqrt{3}+\sqrt{5})(1+\sqrt{3}-\sqrt{5})=(1+\sqrt{3})^2-(\sqrt{5})^2=1^2+2\sqrt{3}+(\sqrt{3})^2-5$

$=2\sqrt{3}-1$

(3) $\dfrac{\sqrt{48}}{\sqrt{6}}+\sqrt{18}=\sqrt{\dfrac{48}{6}}+\sqrt{18}=\sqrt{8}+\sqrt{18}$

$=2\sqrt{2}+3\sqrt{2}=5\sqrt{2}$

(4) $\dfrac{14}{\sqrt{28}}-\sqrt{28}=\dfrac{14}{2\sqrt{7}}-2\sqrt{7}=\dfrac{7}{\sqrt{7}}-2\sqrt{7}=\dfrac{(\sqrt{7})^2}{\sqrt{7}}-2\sqrt{7}=\sqrt{7}-2\sqrt{7}=-\sqrt{7}$

42 (1) $\sqrt{3}=1.732\cdots\cdots$ であるから $5+\sqrt{3}=6.732\cdots\cdots$

よって $a=6$

別解 $1<\sqrt{3}<2$ であるから $6<5+\sqrt{3}<7$

よって $a=6$

(2) $a+b=5+\sqrt{3}$ であるから $b=(5+\sqrt{3})-a=(5+\sqrt{3})-6=\sqrt{3}-1$

(3) $a^2+b^2=6^2+(\sqrt{3}-1)^2=36+\{(\sqrt{3})^2-2\cdot\sqrt{3}\cdot1+1^2\}=36+(4-2\sqrt{3})=40-2\sqrt{3}$

43 (1) $x+y=(3-2\sqrt{2})+(3+2\sqrt{2})=6$

(2) $xy=(3-2\sqrt{2})(3+2\sqrt{2})=3^2-(2\sqrt{2})^2=9-8=1$

(3) $x^2+y^2=(x+y)^2-2xy=6^2-2\cdot1=36-2=34$

(4) $x^2y+xy^2=xy(x+y)=1\cdot6=6$