Factorisation
Ex 7D

Q1

Answer :

The given expression is $x^2 + 5x + 6$.
Find two numbers that follow the conditions given below :
Sum $= 5$
Product $= 6$
Clearly, the numbers are 3 *and* 2.

$$\begin{aligned} x^2 + 5x + 6 &= x^2 + 3x + 2x + 6 \\ &= x(x+3) + 2(x+3) \\ &= (x+3)(x+2) \end{aligned}$$

Q2

Answer :

The given expression is $y^2 + 10y + 24$.
Find two numbers that follow the conditions given below :
Sum $= 10$
Product $= 24$
Clearly, the numbers are 6 *and* 4.

$$\begin{aligned} y^2 + 10y + 24 &= y^2 + 6y + 4y + 24 \\ &= y(y+6) + 4(y+6) \\ &= (y+6)(y+4) \end{aligned}$$

Q3

Answer :

The given expression is $z^2 + 12z + 27$.
Find two numbers that follow the conditions given below :
Sum $= 12$
Product $= 27$
Clearly, the numbers are 9 *and* 3.

$$\begin{aligned} z^2 + 12z + 27 &= z^2 + 9z + 3z + 27 \\ &= z(z+9) + 3(z+9) \\ &= (z+9)(z+3) \end{aligned}$$

Q4

Answer :

The given expression is $p^2 + 6p + 8$.
Find two numbers that follow the conditions given below :
Sum $= 6$
Product $= 8$
Clearly, the numbers are 4 *and* 2.

$$\begin{aligned} p^2 + 6p + 8 &= p^2 + 4p + 2p + 8 \\ &= p(p+4) + 2(p+4) \\ &= (p+4)(p+2) \end{aligned}$$

Q5

Answer :

The given expression is $x^2 + 15x + 56$.
Find two numbers that follow the conditions given below :
Sum $= 15$
Product $= 56$
Clearly, the numbers are 8 *and* 7.

$$\begin{aligned} x^2 + 15x + 56 &= x^2 + 8x + 7x + 56 \\ &= x(x+8) + 7(x+8) \\ &= (x+8)(x+7) \end{aligned}$$

Q6

Answer :

The given expression is $y^2 + 19y + 60$.
Find two numbers that follow the conditions given below :
Sum $= 19$
Product $= 60$
Clearly, the numbers are 15 *and* 4.

$$\begin{aligned} y^2 + 19y + 60 &= y^2 + 15y + 4y + 60 \\ &= y(y+15) + 4(y+15) \\ &= (y+15)(y+4) \end{aligned}$$

Q7

Answer :

The given expression is $x^2 + 13x + 40$.
Find two numbers that follow the conditions given below :
Sum $= 13$
Product $= 40$
Clearly, the numbers are 8 *and* 5.

$$\begin{aligned} x^2 + 13x + 40 &= x^2 + 8x + 5x + 40 \\ &= x(x+8) + 5(x+8) \\ &= (x+8)(x+5) \end{aligned}$$

Q8

Answer :

The given expression is $q^2 - 10q + 21$.
Find two numbers that follow the conditions given below :
Sum $= -10$
Product $= 21$
Clearly, the numbers are -7 *and* -3.

$$\begin{aligned} q^2 - 10q + 21 &= q^2 - 7q - 3q + 21 \\ &= q(q-7) - 3(q-7) \\ &= (q-7)(q-3) \end{aligned}$$

Q9

Answer :

The given expression is $p^2 + 6p - 16$.

Find two numbers that follow the conditions given below :

Sum $= 6$

Product $= -16$

Clearly, the numbers are 8 *and* -2.

$$\begin{aligned} p^2 + 6p - 16 &= p^2 + 8p - 2p - 16 \\ &= p(p+8) - 2(p+8) \\ &= (p+8)(p-2) \end{aligned}$$

Q10

Answer :

The given expression is $x^2 - 10x + 24$.

Find two numbers that follow the conditions given below :

Sum $= -10$

Product $= 24$

Clearly, the numbers are -6 *and* -4.

$$\begin{aligned} x^2 - 10x + 24 &= x^2 - 6x - 4x + 24 \\ &= x(x-6) - 4(x-6) \\ &= (x-6)(x-4) \end{aligned}$$

Q11

Answer :

The given expression is $x^2 - 23x + 42$.

Find two numbers that follow the conditions given below :

Sum $= -23$

Product $= 42$

Clearly, the numbers are -21 *and* -2.

$$\begin{aligned} x^2 - 23x + 42 &= x^2 - 21x - 2x + 42 \\ &= x(x-21) - 2(x-21) \\ &= (x-21)(x-2) \end{aligned}$$

Q12

Answer :

The given expression is $x^2 - 17x + 16$.

Find two numbers that follow the conditions given below :

Sum $= -17$

Product $= 16$

Clearly, the numbers are -16 *and* -1.

$$\begin{aligned} x^2 - 17x + 16 &= x^2 - 16x - x + 16 \\ &= x(x-16) - 1(x-16) \\ &= (x-16)(x-1) \end{aligned}$$

Q13

Answer :

The given expression is $y^2 - 21y + 90$.

Find two numbers that follow the conditions given below :

Sum $= -21$

Product $= 90$

Clearly, the numbers are -15 *and* -6.

$$\begin{aligned} y^2 - 21y + 90 &= y^2 - 15y - 6y + 90 \\ &= y(y-15) - 6(y-15) \\ &= (y-15)(y-6) \end{aligned}$$

Q14

Answer :

The given expression is $x^2 - 22x + 117$.
Find two numbers that follow the conditions given below :
Sum $= -22$
Product $= 117$
Clearly, the numbers are -13 *and* -9.

$$\begin{aligned} x^2 - 22x + 117 &= x^2 - 13x - 9x + 117 \\ &= x(x-13) - 9(x-13) \\ &= (x-13)(x-9) \end{aligned}$$

Q15

Answer :

The given expression is $x^2 - 9x + 20$.
Find two numbers that follow the conditions given below :
Sum $= -9$
Product $= 20$
Clearly, the numbers are -5 *and* -4.

$$\begin{aligned} x^2 - 9x + 20 &= x^2 - 5x - 4x + 20 \\ &= x(x-5) - 4(x-5) \\ &= (x-5)(x-4) \end{aligned}$$

Q16

Answer :

The given expression is $x^2 + x - 132$.
Find two numbers that follow the conditions given below :
Sum $= 1$ *and* p
Product $= -132$
Clearly, the numbers are 12 *and* -11.

$$\begin{aligned} x^2 + x - 132 &= x^2 + 12x - 11x - 132 \\ &= x(x+12) - 11(x+12) \\ &= (x+12)(x-11) \end{aligned}$$

Q17

Answer :

The given expression is $x^2 + 5x - 104$.
Find two numbers that follow the conditions given below :
Sum $= 5$
Product $= -104$
Clearly, the numbers are 13 *and* -8.

$$\begin{aligned} x^2 + 5x - 104 &= x^2 + 13x - 8x - 104 \\ &= x(x+13) - 8(x+13) \\ &= (x+13)(x-8) \end{aligned}$$

Q18

Answer :

The given expression is $y^2 + 7y - 144$.
Find two numbers that follow the conditions given below :
Sum $= 7$
Product $= -144$
Clearly, the numbers are 16 *and* -9.

$$\begin{aligned} y^2 + 7y - 144 &= y^2 + 16y - 9y - 144 \\ &= y(y+16) - 9(y+16) \\ &= (y+16)(y-9) \end{aligned}$$

Q19

Answer :

The given expression is $z^2 + 19z - 150$.
Find two numbers that follow the conditions given below :
Sum $= 19$
Product $= -150$
Clearly, the numbers are 25 *and* -6.

$$\begin{aligned} z^2 + 19z - 150 &= z^2 + 25z - 6z - 150 \\ &= z(z+25) - 6(z+25) \\ &= (z+25)(z-6) \end{aligned}$$

Q20

Answer :

The given expression is $y^2 + y - 72$.
Find two numbers that follow the conditions given below :
Sum $= 1$
Product $= -72$
Clearly, the numbers are 9 *and* -8.

$$\begin{aligned} y^2 + y - 72 &= y^2 + 9y - 8y - 72 \\ &= y(y+9) - 8(y+9) \\ &= (y+9)(y-8) \end{aligned}$$

Q21

Answer :

The given expression is $a^2 + 6a - 91$.
Find two numbers that follow the conditions given below :
Sum $= 6$
Product $= -91$
Clearly, the numbers are 13 *and* -7.

$$\begin{aligned} a^2 + 6a - 91 &= a^2 + 13a - 7a - 91 \\ &= a(a+13) - 7(a+13) \\ &= (a+13)(a-7) \end{aligned}$$

Q22

Answer :

The given expression is $p^2 - 4p - 77$.
Find two numbers that follow the conditions given below :
Sum $= -4$
Product $= -77$
Clearly, the numbers are -11 *and* 7.

$$\begin{aligned} p^2 - 4p - 77 &= p^2 - 11p + 7p - 77 \\ &= p(p-11) + 7(p-11) \\ &= (p-11)(p+7) \end{aligned}$$

Q23

Answer :

The given expression is $x^2 - 7x - 30$.
Find two numbers that follow the conditions given below :
Sum $= -7$
Product $= -30$
Clearly, the numbers are -10 *and* 3.

$$\begin{aligned} x^2 - 7x - 30 &= x^2 - 10x + 3x - 30 \\ &= x(x-10) + 3(x-10) \\ &= (x-10)(x+3) \end{aligned}$$

Q24

Answer :

The given expression is $x^2 - 11x - 42$.
Find two numbers that follow the conditions given below :
Sum $= -11$
Product $= -42$
Clearly, the numbers are -14 *and* 3.

$$\begin{aligned} x^2 - 11x - 42 &= x^2 - 14x + 3x - 42 \\ &= x(x-14) + 3(x-14) \\ &= (x-14)(x+3) \end{aligned}$$

Q25

Answer :

The given expression is $x^2 - 5x - 24$.
Find two numbers that follow the conditions given below :
Sum $= -5$
Product $= -24$
Clearly, the numbers are -8 *and* 3.

$$\begin{aligned} x^2 - 5x - 24 &= x^2 - 8x + 3x - 24 \\ &= x(x-8) + 3(x-8) \\ &= (x-8)(x+3) \end{aligned}$$

Q26

Answer :

The given expression is $y^2 - 6y - 135$.
Find two numbers that follow the conditions given below :
Sum $= -6$
Product $= -135$
Clearly, the numbers are -15 *and* 9.

$$\begin{aligned} y^2 - 6y - 135 &= y^2 - 15y + 9y - 135 \\ &= y(y-15) + 9(y-15) \\ &= (y-15)(y+9) \end{aligned}$$

Q27

Answer :

The given expression is $z^2 - 12z - 45$.
Find two numbers that follow the conditions given below :
Sum $= -12$
Product $= -45$
Clearly, the numbers are -15 *and* 3.

$$\begin{aligned} z^2 - 12z - 45 &= z^2 - 15z + 3z - 45 \\ &= z(z-15) + 3(z-15) \\ &= (z-15)(z+3) \end{aligned}$$

Q28

Answer :

The given expression is $x^2 - 4x - 12$.
Find two numbers that follow the conditions given below :
Sum $= -4$
Product $= -12$
Clearly, the numbers are -6 *and* 2.

$$\begin{aligned} x^2 - 4x - 12 &= x^2 - 6x + 2x - 12 \\ &= x(x-6) + 2(x-6) \\ &= (x-6)(x+2) \end{aligned}$$

Q29

Answer :

The given expression is $3x^2+10x\ +8$.
Find two numbers that follow the conditions given below :
Sum $=10$
Product $=3\times 8=24$
Clearly, the numbers are 6 *and* 4.

$$\begin{aligned}3x^2+10x\ +8 &= 3x^2+10x\ +8\\ &=3x^2+6x+4x\ +8\\ &=3x(x+2)+4\ (x+2)\\ &=(x+2)\ (3x\ +4\ )\end{aligned}$$

Q30

Answer :

The given expression is $3y^2+14y\ +8$
Find two numbers that follow the conditions given below :
Sum $=14$
Product $=24$
Clearly, the numbers are 12 *and* 2.

$$\begin{aligned}3y^2+14y\ +8 &= 3y^2+12y+2y\ +8\\ &=3y(y+4)+2\ (y+4)\\ &=(3y+2)\ (y+4\ )\end{aligned}$$

Q31

Answer :

The given expression is $3z^2-10z\ +8$.
Find two numbers that follow the conditions given below :
Sum $=-10$
Product $=3\times 8=24$
Clearly, the numbers are -6 *and* -4.

$$\begin{aligned}3z^2-10z\ +8 &= 3z^2-6z-4z\ +8\\ &=3z(z-2)-4(z\ -2)\\ &=(3z-4)(z-2)\end{aligned}$$

Q32

Answer :

The given expression is $2x^2+x\ -45$.
Find two numbers that follow the conditions given below :
Sum $=1$
Product $=-45\times 2=-90$
Clearly, the numbers are 10 *and* -9.

$$\begin{aligned}2x^2+x\ -45 &= 2x^2+10x-9x\ -45\\ &=2x(x\ +5)\ -9(x+5)\\ &=(2x-9)(x+5)\end{aligned}$$

Q33

Answer :

The given expression is $6p^2+11p\ -10$.
Find two numbers that follow the conditions given below :
Sum $=11$
Product $=6\times -10=-60$
Clearly, the numbers are 15 *and* -4.

$$\begin{aligned}6p^2+11p\ -10 &= 6p^2+15p\ -4p-10\\ &=3p(2p\ +5)\ -2(2p+5)\\ &=(2p+5)(3p-2)\end{aligned}$$

Q34

Answer :

The given expression is $2x^2 - 17x\ - 30$.
Find two numbers that follow the conditions given below :
Sum $= -17$
Product $= -30 \times 2 = -60$
Clearly, the numbers are -20 *and* 3.

$$\begin{aligned} 2x^2 - 17x\ - 30 &= 2x^2 - 20x + 3x\ - 30 \\ &= 2x(x\ - 10)\ + 3(x - 10) \\ &= (2x + 3)(x - 10) \end{aligned}$$

Q35

Answer :

The given expression is $7y^2 - 19y\ - 6$.
Find two numbers that follow the conditions given below :
Sum $= -19$
Product $= 7 \times -6 = -42$
Clearly, the numbers are -21 *and* 2.

$$\begin{aligned} 7y^2 - 19y\ - 6 &= 7y^2 - 21y + 2y\ - 6 \\ &= 7y(y\ - 3) + 2(y - 3) \\ &= (7y + 2)(y - 3) \end{aligned}$$

Q36

Answer :

The given expression is $28 - 31x - 5x^2$.
Find two numbers that follow the conditions given below :
Sum $= -31$
Product $= 28 \times -5 = -140$
Clearly, the numbers are -35 *and* 4.

$$\begin{aligned} 28 - 31x - 5x^2 &= 28 + 4x - 35x - 5x^2 \\ &= 4(x + 7) - 5x(7 + x) \\ &= (x + 7)\ (4 - 5x) \end{aligned}$$

Q37

Answer :

The given expression is $3 + 23z - 8z^2$.
Find two numbers that follow the conditions given below :
Sum $= 23$
Product $= 3 \times -8 = -24$
Clearly, the numbers are 24 *and* -1.

$$\begin{aligned} 3 + 23z - 8z^2 &= 3 + 24z - z - 8z^2 \\ &= 3(1 + 8z) - z(1 + 8z) \\ &= (1 + 8z)\ (3 - z) \end{aligned}$$

Q38

Answer :

The given expression is $6x^2 - 5x\ - 6$.
Find two numbers that follow the conditions given below :
Sum $= -5$
Product $= -6 \times 6 = -36$
Clearly, the numbers are -9 *and* 4.

$$\begin{aligned} 6x^2 - 5x\ - 6 &= 6x^2 - 9x + 4x\ - 6 \\ &= 3x(2x - 3) + 2(2x - 3) \\ &= (2x - 3)\ (3x + 2) \end{aligned}$$

Q39

Answer :

The given expression is $3m^2 + 24m + 36$.
Find two numbers that follow the conditions given below :
Sum $= 24$
Product $= 36 \times 3 = 108$
Clearly, the numbers are 18 *and* 6.

$$\begin{aligned} 3m^2 + 24m + 36 &= 3m^2 + 18m + 6m + 36 \\ &= 3m(m+6) + 6(m+6) \\ &= (3m+6)\ (m+6) = 3(m+2)(m+6) \end{aligned}$$

Q40

Answer :

The given expression is $4n^2 - 8n + 3$.
Find two numbers that follow the conditions given below :
Sum $= -8$
Product $= 4 \times 3 = 12$
Clearly, the numbers are -6 *and* -2.

$$\begin{aligned} 4n^2 - 8n + 3 &= 4n^2 - 2n - 6n + 3 \\ &= 2n(2n-1) - 3(2n-1) \\ &= (2n-1)\ (2n-3) \end{aligned}$$

Q41

Answer :

The given expression is $6x^2 - 17x - 3$.
Find two numbers that follow the conditions given below :
Sum $= -17$
Product $= 6 \times -3 = -18$
Clearly, the numbers are -18 *and* 1.

$$\begin{aligned} 6x^2 - 17x - 3 &= 6x^2 - 18x + x - 3 \\ &= 6x(x-3) + 1(x-3) \\ &= (6x+1)\ (x-3) \end{aligned}$$

Q42

Answer :

The given expression is $7x^2 - 19x - 6$.
Find two numbers that follow the conditions given below :
Sum $= -19$
Product $= 7 \times -6 = -42$
Clearly, the numbers are -21 *and* 2.

$$\begin{aligned} 7x^2 - 19x - 6 &= 7x^2 - 21x + 2x - 6 \\ &= 7x(x-3) + 2(x-3) \\ &= (7x+2)\ (x-3) \end{aligned}$$