RS Aggarwal Solutions Class 8 Mathematics

Factorisation

Ex 7A

(i) $(x+y)^2 = x^2 + 2xy + y^2$

(ii) $(x-y)^2 = x^2 - 2xy + y^2$

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

(iv) $(x+a)(x+b) = x^2 + (a+b)x + ab$

(v) $(x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

(vi) $(x+y)^3 = x^3 + y^3 + 3xy\,(x+y)$

(vii) $(x-y)^3 = x^3 - y^3 - 3xy(x-y)$

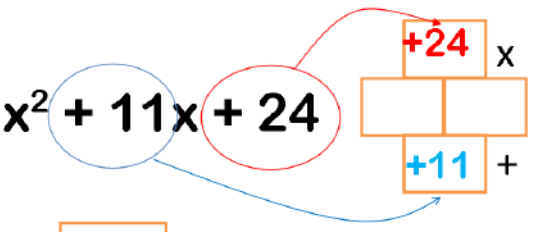
(viii) $x^3 + y^3 + z^3 - 3xyz = (x+y+z)(x^2 + y^2 + z^2 - xy - yz - zx)$

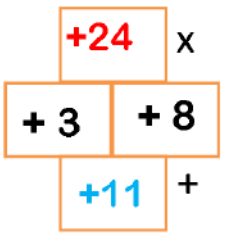
$x^3 + y^3 + z^3 = 3xyz \quad if \; x+y+z = 0$

Factoring Help!

Question	Strategy	Answer
$m^2+10m+16$	Both signs are positive, so both signs in answer are positive.	$(m+2)(m+8)$
$n^2-8n-48$	Two negatives, so in our answer, one will be positive (the smaller number) and one will be negative (the larger number)	$(n-12)(n+4)$
$y^2-15y+56$	Second term negative, third term positive; both signs in the answer will be negative	$(y-8)(y-7)$
p^2+p-20	Second term positive, third term negative; one will be positive (the larger number) and one will be negative (the smaller number)	$(p+5)(p-4)$

Factorise $x^2 + 11x + 24$





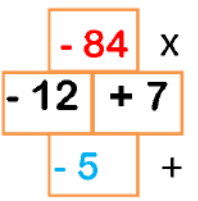
Find two numbers that multiply to get +24 and add to get +11

Final answer: $(x + 8)(x + 3)$

Factorise $x^2 - 5x - 84$

$-12 \times +7 = -84$

$-12 + +7 = -5$



Final answer: $(x - 12)(x + 7)$

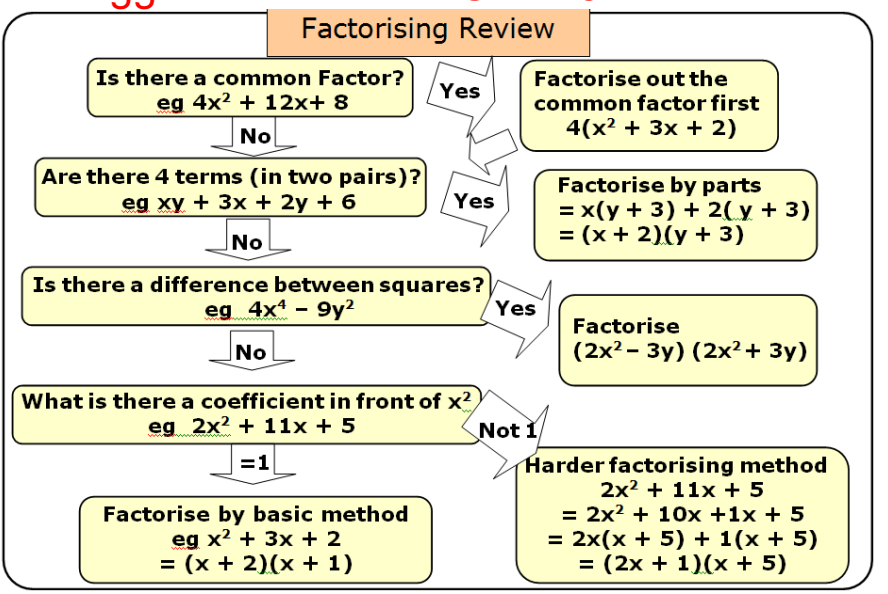
$$3x^2 + 7x + 2$$

$2 \times 3 = 6$ Factors 1,6 2,3

$$= 3x^2 + 1x + 6x + 2$$

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

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



Q1

Answer :

(i) $12x + 15 = 3(4x + 5)$
(ii) $14m - 21 = 7(2m - 3)$
(iii) $9n - 12n^2 = 3n(3 - 4n)$

Q2

Answer :

(i) H.C.F. of $16a^2$ and $24ab$ is $8a$.

$\therefore 16a^2 - 24ab = 8a(2a - 3b)$

(ii) H.C.F. of $15ab^2$ and $20a^2b$ is $5ab$.

$\therefore 15ab^2 - 20a^2b = 5ab(3b - 4a)$

(iii) H.C.F. of $12x^2y^3$ and $21x^3y^2$ is $3x^2y^2$.

$\therefore 12x^2y^3 - 21x^3y^2 = 3x^2y^2(4y - 7x)$

Q3

Answer :

(i) H.C.F. of $24x^3$ and $36x^2y$ is $6x^2$.

$\therefore 24x^3 - 36x^2y = 6x^2(4x - 6y)$

(ii) H.C.F. of $10x^3$ and $15x^2$ is $5x^3$.

$\therefore 10x^3 - 15x^2 = 5x^2(2x - 3)$

(iii) H.C.F. of $36x^3y$ and $60x^2y^3z$ is $12x^2y$.

$\therefore 36x^3y - 60x^2y^3z = 12x^2y(3x - 5y^2z)$

Q4

Answer :

(i) H.C.F. of $9x^3$, $6x^2$ and $12x$ is $3x$.

$\therefore 9x^3 - 6x^2 + 12x = 3x(3x^2 - 2x + 4)$

(ii) H.C.F. of $8x^3$, $72xy$ and $12x$ is $4x$.

$\therefore 8x^3 - 72xy + 12x = 4x(2x^2 - 18y + 3)$

(iii) H.C.F. of $18a^3b^3$, $27a^2b^3$ and $36a^3b^2$ is $9a^2b^2$.

$\therefore 18a^3b^3 - 27a^2b^3 + 36a^3b^2 = 9a^2b^2(2ab - 3b + 4a)$

Q5

Answer :

(i) H.C.F. of $14x^3$, $21x^4y$ and $28x^2y^2$ is $7x^2$.

$\therefore 14x^3 + 21x^4y - 28x^2y^2 = 7x^2(2x + 3x^2y - 4y^2)$

(ii) H.C.F. of -5, $-10t$ and $20t^2$ is 5.

$\therefore -5 - 10t + 20t^2 = 5(-1 - 2t + 4t^2)$

Q6

Answer :

(i) $x(x+3) + 5(x+3) = (x+3)(x+5)$

(ii) $5x(x-4) - 7(x-4) = (x-4)(5x-7)$

(iii) $2m(1-n) + 3(1-n) = (1-n)(2m+3)$

Q7

Answer :

We have:
$6a(a-2b) + 5b(a-2b) = (a-2b)(6a+5b)$

Q8

Answer :

We have:
$x^3(2a-b) + x^2(2a-b) = (2a-b)(x^3+x^2) = x^2(x+1)(2a-b)$

Q9

Answer :

We have:

$9a(3a-5b)-12a^2(3a-5b)=(3a-5b)\left(9a-12a^2\right)=3a(3a-5b)(3-4a)$

Q10

Answer :

We have:

$$\begin{aligned}(x+5)^2-4(x+5)&=(x+5)\{(x+5)-4\}\\&=(x+5)(x+5-4)\\&=(x+5)(x+1)\end{aligned}$$

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

Q11

Answer :

$$\begin{aligned}3(a-2b)^2-5(a-2b)&=(a-2b)\{3(a-2b)-5\}\\&=(a-2b)(3a-6b-5)\end{aligned}$$

$\therefore 3(a-2b)^2-5(a-2b)=(a-2b)(3a-6b-5)$

Q12

Answer :

We have:

$$\begin{aligned}2a+6b-3(a+3b)^2&=2(a+3b)-3(a+3b)^2\\&=(a+3b)\{2-3(a+3b)\}\\&=(a+3b)(2-3a-9b)\end{aligned}$$

$\therefore 2a+6b-3(a+3b)^2=(a+3b)(2-3a-9b)$

Q13

Answer :

We have:

$$\begin{aligned}16(2p-3q)^2-4(2p-3q)&=(2p-3q)\{16(2p-3q)-4\}\\&=(2p-3q)(32p-48q-4)\end{aligned}$$

$\therefore 16(2p-3q)^2-4(2p-3q)=(2p-3q)(32p-48q-4)$

Q14

Answer :

We have:

$$\begin{aligned}x(a-3)+y(3-a)&=x(a-3)-y(a-3)\\&=(a-3)(x-y)\end{aligned}$$

$\therefore x(a-3)+y(3-a)=(a-3)(x-y)$

Q15

Answer :

We have:

$$\begin{aligned}12(2x-3y)^2-16(3y-2x)&=12(2x-3y)^2+16(2x-3y)\\&=(2x-3y)\{12(2x-3y)+16\}\\&=(2x-3y)(24x-36y+16)\end{aligned}$$

$\therefore\ 12(2x-3y)^2-16(3y-2x)=(2x-3y)(24x-36y+16)$

Q16

Answer :

We have:

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

Q17

Answer :

By grouping the terms:

$$\begin{aligned}ar+br+at+bt &= (ar+br)+(at+bt)\\ &= r(a+b)+t(a+b)\\ &= (a+b)(r+t)\end{aligned}$$

$\therefore ar+br+at+bt=(a+b)(r+t)$

Q18

Answer :

By suitably arranging the terms:

$$\begin{aligned}x^2-ax-bx+ab &= x^2-bx-ax+ab\\ &= (x^2-bx)-(ax-ab)\\ &= x(x-b)-a(x-b)\\ &= (x-b)(x-a)\end{aligned}$$

$\therefore x^2-ax-bx+ab=(x-b)(x-a)$

Q19

Answer :

By suitably arranging the terms:

$$\begin{aligned}ab^2-bc^2-ab+c^2 &= ab^2-ab-bc^2+c^2\\ &= \left(ab^2-ab\right)-\left(bc^2-c^2\right)\\ &= ab(b-1)-c^2(b-1)\\ &= (b-1)\left(ab-c^2\right)\end{aligned}$$

$\therefore ab^2-bc^2-ab+c^2=(b-1)\left(ab-c^2\right)$

Q20

Answer :

By suitably arranging the terms:

$$\begin{aligned}x^2-xz+xy-yz &= x^2+xy-xz-yz\\ &= \left(x^2+xy\right)-(xz+yz)\\ &= x(x+y)-z(x+y)\\ &= (x+y)(x-z)\end{aligned}$$

$\therefore x^2-xz+xy-yz=(x+y)(x-z)$

Q21

Answer :

By suitably arranging the terms:

$$\begin{aligned}6ab-b^2+12ac-2bc &= 6ab+12ac-b^2-2bc\\ &= (6ab+12ac)-\left(b^2+2bc\right)\\ &= 6a(b+2c)-b(b+2c)\\ &= (b+2c)(6a-b)\end{aligned}$$

$\therefore 6ab-b^2+12ac-2bc=(b+2c)(6a-b)$

Q22

Answer :

We have:

$$\begin{aligned}(x-2y)^2+4x-8y &= (x-2y)^2+4(x-2y)\\ &= (x-2y)(x-2y)+4(x-2y)\\ &= (x-2y)\{(x-2y)+4\}\\ &= (x-2y)(x-2y+4)\end{aligned}$$

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

Q23

Answer :

We have:

$$\begin{aligned}y^2-xy(1-x)-x^3 &= y^2-xy+x^2y-x^3\\ &= (y^2-xy)+(x^2y-x^3)\\ &= y(y-x)+x^2(y-x)\\ &= (y-x)(y+x^2)\end{aligned}$$

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

Q24

Answer :

We have:

$$\begin{aligned}(ax+by)^2+(bx-ay)^2 &= \left(a^2x^2+b^2y^2+2axby\right)+\left(b^2x^2+a^2y^2-2bxay\right)\\ &= a^2x^2+a^2y^2+b^2y^2+b^2x^2+2axby-2bxay\\ &= a^2\left(x^2+y^2\right)+b^2x^2+b^2y^2+2axby-2axby\\ &= a^2\left(x^2+y^2\right)+b^2\left(x^2+y^2\right)\\ &= \left(x^2+y^2\right)\left(a^2+b^2\right)\end{aligned}$$

$$\therefore (ax+by)^2+(bx-ay)^2 = \left(x^2+y^2\right)\left(a^2+b^2\right)$$

Q25

Answer :

We have:

$$\begin{aligned}ab^2+(a-1)b-1 &= ab^2+ba-b-1\\ &= \left(ab^2+ba\right)-(b+1)\\ &= ab(b+1)-1(b+1)\\ &= (b+1)(ab-1)\end{aligned}$$

$$\therefore ab^2+(a-1)b-1 = (b+1)(ab-1)$$

Q26

Answer :

We have:

$$\begin{aligned}x^3-3x^2+x-3 &= \left(x^3-3x^2\right)+(x-3)\\ &= x^2(x-3)+1(x-3)\\ &= (x-3)\left(x^2+1\right)\end{aligned}$$

$$\therefore x^3-3x^2+x-3 = (x-3)\left(x^2+1\right)$$

Q27

Answer :

We have:

$$ab(x^2+y^2)-xy\left(a^2+b^2\right)=abx^2+aby^2-a^2xy-b^2xy$$
$$=abx^2-a^2xy+aby^2-b^2xy$$
$$=ax(bx-ay)+by(ay-bx)$$
$$=ax(bx-ay)-by(bx-ay)$$
$$=(bx-ay)(ax-by)$$

$$\therefore ab(x^2+y^2)-xy\left(a^2+b^2\right)=(bx-ay)(ax-by)$$

Q28

Answer :

We have:

$$x^2-x(a+2b)+2ab=x^2-ax-2bx+2ab$$
$$=x^2-2bx-ax+2ab$$
$$=\left(x^2-2bx\right)-(ax-2ab)$$
$$=x(x-2b)-a(x-2b)$$
$$=(x-2b)(x-a)$$

$$\therefore x^2-x(a+2b)+2ab=(x-2b)(x-a)$$

RS Aggarwal Solutions Class 8 Mathematics

Factorisation

Ex 7B

(i) $(x+y)^2 = x^2 + 2xy + y^2$

(ii) $(x-y)^2 = x^2 - 2xy + y^2$

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

(iv) $(x+a)(x+b) = x^2 + (a+b)x + ab$

(v) $(x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

(vi) $(x+y)^3 = x^3 + y^3 + 3xy\,(x+y)$

(vii) $(x-y)^3 = x^3 - y^3 - 3xy(x-y)$

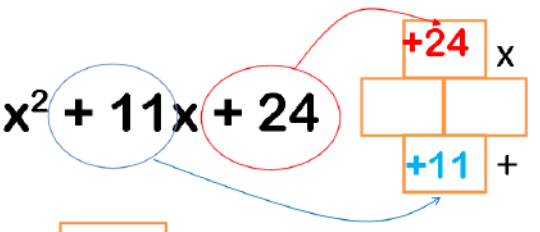
(viii) $x^3 + y^3 + z^3 - 3xyz = (x+y+z)(x^2 + y^2 + z^2 - xy - yz - zx)$

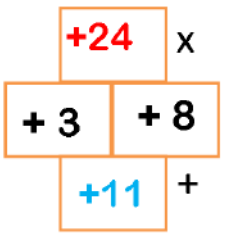
$x^3 + y^3 + z^3 = 3xyz \quad if \; x+y+z = 0$

Factoring Help!

Question	Strategy	Answer
$m^2+10m+16$	Both signs are positive, so both signs in answer are positive.	$(m+2)(m+8)$
$n^2-8n-48$	Two negatives, so in our answer, one will be positive (the smaller number) and one will be negative (the larger number)	$(n-12)(n+4)$
$y^2-15y+56$	Second term negative, third term positive; both signs in the answer will be negative	$(y-8)(y-7)$
p^2+p-20	Second term positive, third term negative; one will be positive (the larger number) and one will be negative (the smaller number)	$(p+5)(p-4)$

Factorise $x^2 + 11x + 24$





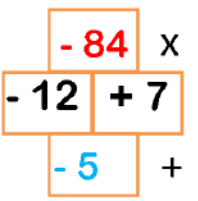
Find two numbers that multiply to get +24 and add to get +11

Final answer: $(x + 8)(x + 3)$

Factorise $x^2 - 5x - 84$

$-12 \times +7 = -84$

$-12 + +7 = -5$



Final answer: $(x - 12)(x + 7)$

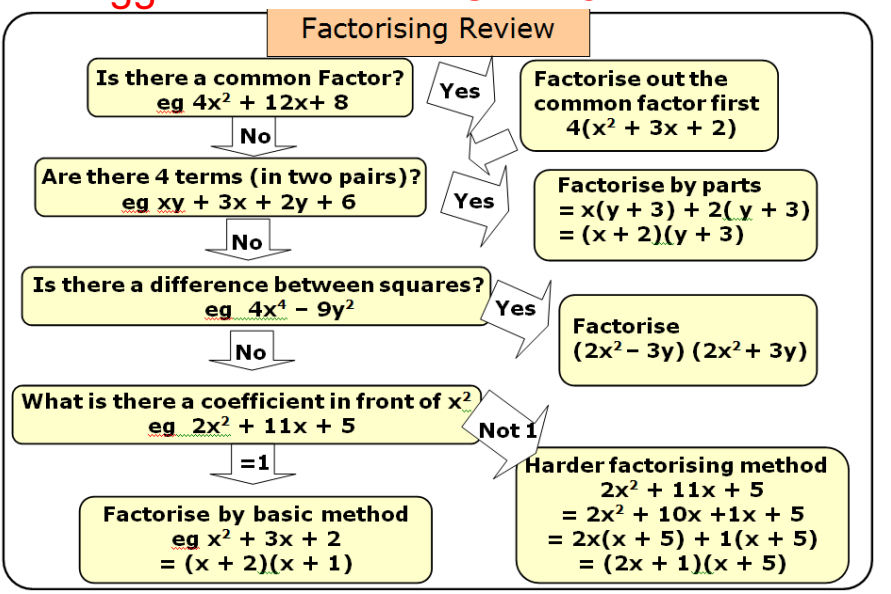
$$3x^2 + 7x + 2$$

$2 \times 3 = 6$ Factors 1,6 2,3

$$= 3x^2 + 1x + 6x + 2$$

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

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



Q1

Answer :

We have:

$$x^2 - 36 = (x)^2 - (6)^2$$
$$= (x+6)(x-6)$$

$$\therefore x^2 - 36 = (x+6)(x-6)$$

Q2

Answer :

We have:

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

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

Q3

Answer :

We have:

$$81 - 49x^2 = (9)^2 - (7x)^2$$
$$= (9+7x)(9-7x)$$

$$\therefore 81 - 49x^2 = (9+7x)(9-7x)$$

Q4

Answer :

We have:

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

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

Q5

Answer :

We have:

$$16a^2 - 225b^2 = (4a)^2 - (15b)^2$$
$$= (4a + 15b)(4a - 15b)$$

$$\therefore 16a^2 - 225b^2 = (4a + 15b)(4a - 15b)$$

Q6

Answer :

We have:

$$9a^2b^2 - 25 = (3ab)^2 - (5)^2$$
$$= (3ab + 5)(3ab - 5)$$

$$\therefore 9a^2b^2 - 25 = (3ab + 5)(3ab - 5)$$

Q7

Answer :

We have:

$$16a^2 - 144 = (4a)^2 - (12)^2$$
$$= (4a + 12)(4a - 12)$$
$$= 4(a + 3)\,4(a - 3) = 16(a + 3)(a - 3)$$

$$\therefore 16a^2 - 144 = 16(a + 3)(a - 3)$$

Q8

Answer :

We have:

$$63a^2 - 112b^2 = 7(9a^2 - 16b^2)$$
$$= 7\{(3a)^2 - (4b)^2\}$$
$$= 7(3a + 4b)(3a - 4b)$$

$$\therefore 63a^2 - 112b^2 = 7(3a + 4b)(3a - 4b)$$

Q9

Answer :

We have:

$$\begin{aligned}20a^2 - 45b^2 &= 5\left(4a^2 - 9b^2\right)\\ &= 5\left\{(2a)^2 - (3b)^2\right\}\\ &= 5(2a+3b)(2a-3b)\end{aligned}$$

$$\therefore 20a^2 - 45b^2 = 5(2a+3b)(2a-3b)$$

Q10

Answer :

We have:

$$\begin{aligned}12x^2 - 27 &= 3\left(4x^2 - 9\right)\\ &= 3\left\{(2x)^2 - (3)^2\right\}\\ &= 3(2x+3)(2x-3)\end{aligned}$$

$$\therefore 12x^2 - 27 = 3(2x+3)(2x-3)$$

Q11

Answer :

We have:

$$\begin{aligned}x^3 - 64x &= x\left(x^2 - 64\right)\\ &= x\left\{(x)^2 - (8)^2\right\}\\ &= x(x+8)(x-8)\end{aligned}$$

$$\therefore x^3 - 64x = x(x+8)(x-8)$$

Q12

Answer :

We have:

$$\begin{aligned}16x^5 - 144x^3 &= 16x^3\left(x^2 - 9\right)\\ &= 16x^3\left\{(x)^2 - (3)^2\right\}\\ &= 16x^3(x+3)(x-3)\end{aligned}$$

$$\therefore 16x^5 - 144x^3 = 16x^3(x+3)(x-3)$$

Q13

Answer :

We have:

$$\begin{aligned}3x^5 - 48x^3 &= 3x^3\left(x^2 - 16\right)\\ &= 3x^3\left\{(x)^2 - (4)^2\right\}\\ &= 3x^3(x+4)(x-4)\end{aligned}$$

$$\therefore 3x^5 - 48x^3 = 3x^3(x+4)(x-4)$$

Q14

Answer :

We have:

$$\begin{aligned}16p^3 - 4p &= 4p\left(4p^2 - 1\right)\\ &= 4p\left\{(2p)^2 - (1)^2\right\}\\ &= 4p(2p+1)(2p-1)\end{aligned}$$

$$\therefore 16p^3 - 4p = 4p(2p+1)(2p-1)$$

Q15

Answer :

We have:

$$\begin{aligned}63a^2b^2-7 &= 7\left(9a^2b^2-1\right)\\ &= 7\left\{(3ab)^2-(1)^2\right\}\\ &= 7(3ab+1)(3ab-1)\end{aligned}$$

$$\therefore 63a^2b^2-7 = 7(3ab+1)(3ab-1)$$

Q16

Answer :

We have:

$$\begin{aligned}1-(b-c)^2 &= (1)^2-(b-c)^2\\ &= \{1+(b-c)\}\{1-(b-c)\}\\ &= (1+b-c)(1-b+c)\end{aligned}$$

$$\therefore 1-(b-c)^2 = (1+b-c)(1-b+c)$$

Q17

Answer :

We have:

$$\begin{aligned}(2a+3b)^2-16c^2 &= (2a+3b)^2-(4c)^2\\ &= \{(2a+3b)+4c\}\{(2a+3b)-4c\}\\ &= (2a+3b+4c)(2a+3b-4c)\end{aligned}$$

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

Q18

Answer :

We have:

$$\begin{aligned}(l+m)^2-(l-m)^2 &= \{(l+m)+(l-m)\}\{(l+m)-(l-m)\}\\ &= (l+m+l-m)(l+m-l+m)\\ &= (2l)(2m)\end{aligned}$$

$$\therefore (l+m)^2-(l-m)^2 = (2l)(2m)$$

Q19

Answer :

We have:

$$\begin{aligned}(2x+5y)^2-1 &= (2x+5y)^2-(1)^2\\ &= \{(2x+5y)+1\}\{(2x+5y)-1\}\\ &= (2x+5y+1)(2x+5y-1)\end{aligned}$$

$$\therefore (2x+5y)^2-1 = (2x+5y+1)(2x+5y-1)$$

Q20

Answer :

We have:

$$\begin{aligned}36c^2-(5a+b)^2 &= (6c)^2-(5a+b)^2\\ &= \{(6c)+(5a+b)\}\{(6c)-(5a+b)\}\\ &= (6c+5a+b)(6c-5a-b)\end{aligned}$$

$$\therefore 36c^2-(5a+b)^2 = (6c+5a+b)(6c-5a-b)$$

Q21

Answer :

We have:

$$\begin{aligned}(3x-4y)^2-25z^2 &= (3x-4y)^2-(5z)^2\\ &= \{(3x-4y)+5z\}\{(3x-4y)-5z\}\\ &= (3x-4y+5z)(3x-4y-5z)\end{aligned}$$

$$\therefore (3x-4y)^2-25z^2 = (3x-4y+5z)(3x-4y-5z)$$

Q22

Answer :

We have:

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

$$\therefore x^2-y^2-2y-1 = (x+y+1)(x-y-1)$$

Q23

Answer :

We have:

$$\begin{aligned}25-a^2-b^2-2ab &= 25-\left(a^2+b^2+2ab\right)\\ &= 25-(a+b)^2\\ &= (5)^2-(a+b)^2\\ &= \{5+(a+b)\}\{5-(a+b)\}\\ &= (5+a+b)(5-a-b)\end{aligned}$$

$$\therefore 25-a^2-b^2-2ab = (5+a+b)(5-a-b)$$

Q24

Answer :

We have:

$$\begin{aligned}25a^2-4b^2+28bc-49c^2 &= 25a^2-\left(4b^2-28bc+49c^2\right)\\ &= (5a)^2-(2b-7c)^2\\ &= \{5a+(2b-7c)\}\{5a-(2b-7c)\}\\ &= (5a+2b-7c)(5a-2b+7c)\end{aligned}$$

$$\therefore 25a^2-4b^2+28bc-49c^2 = (5a+2b-7c)(5a-2b+7c)$$

Q25

Answer :

We have:

$$\begin{aligned}9a^2-b^2+4b-4 &= 9a^2-\left(b^2-4b+4\right)\\ &= (3a)^2-(b-2)^2\\ &= \{3a+(b-2)\}\{3a-(b-2)\}\\ &= (3a+b-2)(3a-b+2)\end{aligned}$$

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

Q26

Answer :

We have:

$$\begin{aligned}100-(x-5)^2 &= (10)^2-(x-5)^2\\ &= \{10+(x-5)\}\{10-(x-5)\}\\ &= (10+x-5)(10-x+5)\\ &= (5+x)(15-x)\end{aligned}$$

$$\therefore 100-(x-5)^2 = (5+x)(15-x)$$

Q27

Answer :

We have:

$$\left\{(405)^2-(395)^2\right\}=(405+395)(405-395)$$
$$=(800\times 10)$$
$$=8000$$

$$\therefore \left\{(405)^2-(395)^2\right\}=8000$$

Q28

Answer :

We have:

$$\left\{(7.8)^2-(2.2)^2\right\}=(7.8+2.2)(7.8-2.2)$$
$$=(10\times 5.6)$$
$$=56$$

$$\therefore \left\{(7.8)^2-(2.2)^2\right\}=56$$

RS Aggarwal Solutions Class 8 Mathematics

Factorisation

Ex 7C

Q1

Answer :

We have:

$$x^2+8x+16 = x^2+2\times x\times 4+(4)^2$$
$$= (x+4)^2$$

$$\therefore x^2+8x+16 = (x+4)^2$$

Q2

Answer :

We have:

$$x^2+14x+49 = x^2+2\times x\times 7+(7)^2$$
$$= (x+7)^2$$

$$\therefore x^2+14x+49 = (x+7)^2$$

Q3

Answer :

We have:

$$1+2x+x^2 = x^2+2x+1$$
$$= x^2+2\times x\times 1+(1)^2$$
$$= (x+1)^2$$

$$\therefore 1+2x+x^2 = (x+1)^2$$

Q4

Answer :

We have;

$$\begin{aligned} 9+6z+z^2 &= z^2+6z+9 \\ &= z^2+2\times z\times 3+(3)^2 \\ &= (z+3)^2 \end{aligned}$$

$$\therefore 9+6z+z^2=(z+3)^2$$

Q5

Answer :

We have:

$$\begin{aligned} x^2+6ax+9a^2 &= x^2+2\times x\times 3a+(3a)^2 \\ &= (x+3a)^2 \end{aligned}$$

$$\therefore x^2+6ax+9a^2=(x+3a)^2$$

Q6

Answer :

We have:

$$\begin{aligned} 4y^2+20y+25 &= (2y)^2+2\times 2y\times 5+(5)^2 \\ &= (2y+5)^2 \end{aligned}$$

$$\therefore 4y^2+20y+25=(2y+5)^2$$

Q7

Answer :

We have:

$$\begin{aligned} 36a^2+36a+9 &= (6a)^2+2\times 6a\times 3+(3)^2 \\ &= (6a+3)^2 \end{aligned}$$

$$\therefore 36a^2+36a+9=(6a+3)^2$$

Q8

Answer :

We have:

$$\begin{aligned} 9m^2+24m+16 &= (3m)^2+2\times 3m\times 4+(4)^2 \\ &= (3m+4)^2 \end{aligned}$$

$$\therefore 9m^2+24m+16=(3m+4)^2$$

Q9

Answer :

We have:

$$\begin{aligned} z^2+z+\tfrac{1}{4} &= z^2+2\times z\times \tfrac{1}{2}\times\left(\tfrac{1}{2}\right)^2 \\ &= \left(z+\tfrac{1}{2}\right)^2 \end{aligned}$$

$$\therefore z^2+z+\tfrac{1}{4}=\left(z+\tfrac{1}{2}\right)^2$$

Q10

Answer :

We have:

$$\begin{aligned} 49a^2+84ab+36b^2 &= (7a)^2+2\times 7a\times 6b+(6b)^2 \\ &= (7a+6b)^2 \end{aligned}$$

$$\therefore 49a^2+84ab+36b^2=(7a+6b)^2$$

Q11

Answer :

We have:

$$p^2 - 10p + 25 = p^2 - 2 \times p \times 5 + (5)^2$$
$$= (p-5)^2$$

$$\therefore p^2 - 10p + 25 = (p-5)^2$$

Q12

Answer :

We have:

$$121a^2 - 88ab + 16b^2 = (11a)^2 - 2 \times 11a \times 4b + (4b)^2$$
$$= (11a - 4b)^2$$

$$\therefore 121a^2 - 88ab + 16b^2 = (11a - 4b)^2$$

Q13

Answer :

We have:

$$1 - 6x + 9x^2 = 9x^2 - 6x + 1$$
$$= (3x)^2 - 2 \times 3x \times 1 + (1)^2$$
$$= (3x - 1)^2$$

$$\therefore 1 - 6x + 9x^2 = (3x - 1)^2$$

Q14

Answer :

We have:

$$9y^2 - 12y + 4 = (3y)^2 - 2 \times 3y \times 2 + (2)^2$$
$$= (3y - 2)^2$$

$$\therefore 9y^2 - 12y + 4 = (3y - 2)^2$$

Q15

Answer :

We have:

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

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

Q16

Answer :

We have:

$$m^2 - 4mn + 4n^2 = m^2 - 2 \times m \times 2n + (2n)^2$$
$$= (m - 2n)^2$$

$$\therefore m^2 - 4mn + 4n^2 = (m - 2n)^2$$

Q17

Answer :

We have:

$$a^2b^2 - 6abc + 9c^2 = (ab)^2 - 2 \times ab \times 3c + (3c)^2$$
$$= (ab - 3c)^2$$

Q18

Answer :

We have:

$$\begin{aligned} m^4 + 2m^2n^2 + n^4 &= (m^2)^2 + 2 \times m^2 \times n^2 + (n^2)^2 \\ &= (m^2 + n^2)^2 \end{aligned}$$

$$\therefore m^4 + 2m^2n^2 + n^4 = (m^2 + n^2)^2$$

Q19

Answer :

We have:

$$\begin{aligned} (l+m)^2 - 4lm &= \left(l^2 + m^2 + 2lm\right) - 4lm \\ &= l^2 + m^2 + 2lm - 4lm \\ &= l^2 + m^2 - 2lm \\ &= (l)^2 + (m)^2 - 2 \times l \times m \\ &= (l-m)^2 \end{aligned}$$

$$\therefore (l+m)^2 - 4lm = (l-m)^2$$

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.

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

Factorisation Ex 7E

Q1

Answer :

(d) $7(a - 3b)(a + 3b)$

$$\left(7a^2 - 63b^2\right) = 7\left(a^2 - 9b^2\right)$$

Q2

Answer :

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

$$\begin{aligned}&\left(2x - 32x^3\right)\\&= 2x\left(1 - 16x^2\right)\\&= 2x\left(1 - 4x\right)\left(1 + 4x\right)\end{aligned}$$

Q3

Answer :

(c) $x(x - 12)(x + 12)$

$$\begin{aligned}&x^3 - 144x\\&= x\left(x^2 - 144\right)\\&= x\left(x - 12\right)\left(x + 12\right)\end{aligned}$$

Q4

Answer :

(d) $2(1 - 5x)(1 + 5x)$

$$\begin{aligned}&2 - 50x^2\\&= 2\left(1 - 25x^2\right)\\&= 2\left(1 - 5x\right)\left(1 + 5x\right)\end{aligned}$$

Q5

Answer :

(a) $(a + b)(a + c)$

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

Q6

Answer :

(d) $(pq - 1)(q + 1)$

$$pq^2 + q(p - 1) - 1$$
$$= pq^2 + qp - q - 1$$
$$= pq(q + 1) - 1(q + 1)$$
$$= (pq - 1)(q + 1)$$

Q7

Answer :

(b) $(a - m)(b + n)$

$$ab - mn + an - bm$$
$$= ab + an - mn - bm$$
$$= a(b + n) - m(n + b)$$
$$= (a - m)(b + n)$$

Q8

Answer :

(a) $(a - 1)(b - 1)$

$$ab - a - b + 1$$
$$= a(b - 1) - 1(b - 1)$$
$$= (a - 1)(b - 1)$$

Q9

Answer :

(c) $(x + y)(x - z)$

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

Q10

Answer :

(c) $3(2m - 3)(2m + 3)$

$$12m^2 - 27$$
$$= 3(4m^2 - 9)$$
$$= 3(2m - 3)(2m + 3)$$

Q11

Answer :

(d) $x(x + 1)(x - 1)$

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

Q12

Answer :

(c) (1 + *a* + *b*)(1 − *a* − *b*)

$$1-2ab-\left(a^2+b^2\right)$$
$$=1-2ab-a^2-b^2$$
$$=1-\left(2ab+a^2+b^2\right)$$
$$=1-\left(a+b\right)^2$$
$$=\left(1-a-b\right)\left(1+a+b\right)$$

Q13

Answer :

(c) (*x* + 2)(*x* + 4)

$$x^2+6x+8$$
$$=x^2+4x+2x+8$$
$$=x\left(x+4\right)+2\left(x+4\right)$$
$$=\left(x+2\right)\left(x+4\right)$$

Q14

Answer :

(b) (*x* + 7)(*x* − 3)

$$x^2+4x-21$$
$$=x^2+7x-3x-21$$
$$=x\left(x+7\right)-3\left(x+7\right)$$
$$=\left(x-3\right)\left(x+7\right)$$

Q15

Answer :

(a) (*y* − 1)(*y* + 3)

$$y^2+2y-3$$
$$=y^2+3y-y-3$$
$$=y\left(y+3\right)-1\left(y+3\right)$$
$$=\left(y-1\right)\left(y+3\right)$$

Q16

Answer :

(c) (5 + *x*)(8 − *x*)

$$40+3x-x^2$$
$$=40+8x-5x-x^2$$
$$=8\left(5+x\right)-x\left(5+x\right)$$
$$=\left(8-x\right)\left(x+5\right)$$

Q17

Answer :

(b) (*x* + 1)(2*x* + 3)

$$2x^2+5x+3$$
$$=2x^2+2x+3x+3$$
$$=2x\left(x+1\right)+3\left(x+1\right)$$
$$=\left(2x+3\right)\left(x+1\right)$$

Q18

Answer :

(c) (3*a* − 2)(2*a* − 3)

$$6a^2 - 13a + 6$$
$$= 6a^2 - 9a - 4a + 6$$
$$= 3a(2a - 3) - 2(2a - 3)$$
$$= (3a - 2)(2a - 3)$$

Q19

Answer :

(a) (2*z* − 1)(2*z* − 3)

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

Q20

Answer :

(b) (1 + 8*y*)(3 − *y*)

$$3 + 23y - 8y^2$$
$$= 3 + 24y - y - 8y^2$$
$$= 3(1 + 8y) - y(1 + 8y)$$
$$= (3 - y)(1 + 8y)$$