Factorisation
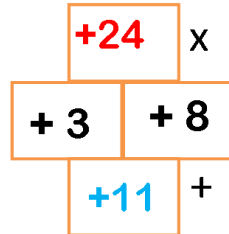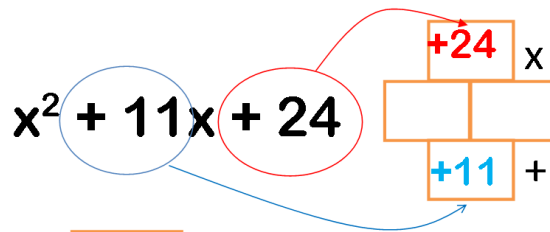## Ex 7A

(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!

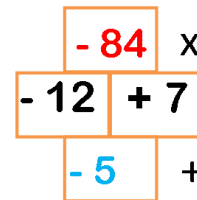| Question	Strategy	Answer
$m^2 + 10m + 16$	Both signs are positive, so both signs in answer are positive.	$(m+2)(m+8)$
$n^2 - 8n - 48$	Two negatives, so in our answer, one will be positive (the smaller number) and one will be negative (the larger number)	$(n-12)(n+4)$
$y^2 - 15y + 56$	Second term negative, 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 $x^2 + 11x + 24$

$x^2 + 11x + 24$

+24	x
+11	+

+24	x
+ 3	+ 8
+11	+

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

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

Factorise $x^2 - 5x - 84$

$-12 \times +7 = -84$

$-12 + +7 = -5$

- 84	x
- 12	+ 7
- 5	+

Final answer: $(x - 12)(x + 7)$
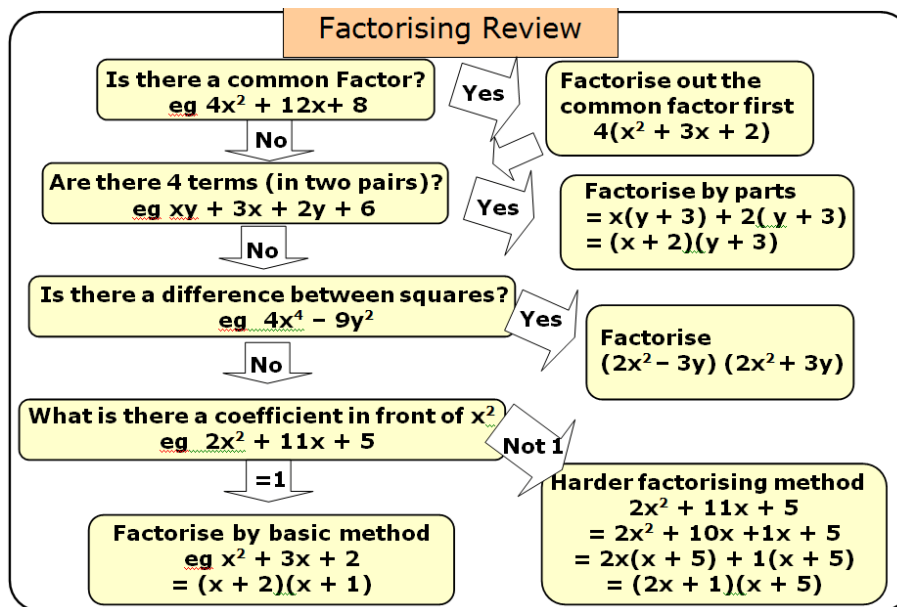
$$3x^2 + 7x + 2$$

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

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

Factorising Review

Is there a common Factor?
eg $4x^2 + 12x + 8$ — **Yes** → **Factorise out the common factor first**
$4(x^2 + 3x + 2)$

No

Are there 4 terms (in two pairs)?
eg $xy + 3x + 2y + 6$ — **Yes** → **Factorise by parts**
$= x(y + 3) + 2(y + 3)$
$= (x + 2)(y + 3)$

No

Is there a difference between squares?
eg $4x^4 - 9y^2$ — **Yes** → **Factorise**
$(2x^2 - 3y)(2x^2 + 3y)$

No

What is there a coefficient in front of x^2
eg $2x^2 + 11x + 5$ — **Not 1** → **Harder factorising method**
$2x^2 + 11x + 5$
$= 2x^2 + 10x + 1x + 5$
$= 2x(x + 5) + 1(x + 5)$
$= (2x + 1)(x + 5)$

=1

Factorise by basic method
eg $x^2 + 3x + 2$
$= (x + 2)(x + 1)$

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 $3x$.

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

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

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

(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 $7x^2$.

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

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

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

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:
$x^3(2a-b) + x^2(2a-b) = (2a-b)\left(x^3 + x^2\right) = x^2(x+1)(2a-b)$

Q9

Answer:

We have:

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

Q10

Answer:

We have:

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

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

Q11

Answer:

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

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

Q12

Answer:

We have:

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

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

Q13

Answer:

We have:

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

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

Q14

Answer:

We have:

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

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

Q15

Answer:

We have:

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

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

Q16

Answer :

We have:

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

Q17

Answer :

By grouping the terms:

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

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

Q18

Answer :

By suitably arranging the terms:

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

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

Q19

Answer :

By suitably arranging the terms:

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

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

Q20

Answer :

By suitably arranging the terms:

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

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

Q21

Answer :

By suitably arranging the terms:

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

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

Q22

Answer :

We have:

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

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

Q23

Answer :

We have:

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

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

Q24

Answer :

We have:

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

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

Q25

Answer :

We have:

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

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

Q26

Answer :

We have:

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

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

Q27

Answer :

We have:

$$ab(x^2 + y^2) - xy(a^2 + b^2) = abx^2 + aby^2 - a^2xy - b^2xy$$

$$= abx^2 - a^2xy + aby^2 - b^2xy$$
$$= ax(bx - ay) + by(ay - bx)$$
$$= ax(bx - ay) - by(bx - ay)$$
$$= (bx - ay)(ax - by)$$

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

Q28

Answer :

We have:

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

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

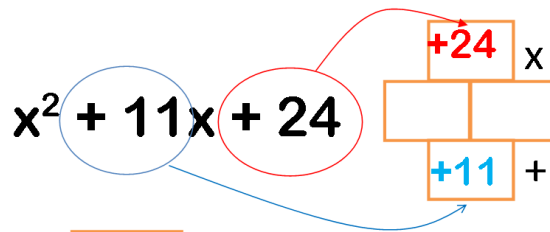$$\therefore x^2 - x(a + 2b) + 2ab = (x - 2b)(x - a)$$

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

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

Factoring Help!

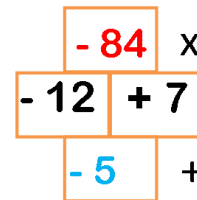| Question	Strategy	Answer
m²+10m+16	Both signs are positive, so both signs in answer are positive.	(m+2)(m+8)
n²-8n-48	Two negatives, so in our answer, one will be positive (the smaller number) and one will be negative (the larger number)	(n-12)(n+4)
y²-15y+56	Second term negative, third term positive; both signs in the answer will be negative	(y-8)(y-7)
p²+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 $x^2 + 11x + 24$

$x^2 + 11x + 24$

	+24	x
	+11	+

	+24	x
+ 3	+ 8	
	+11	+

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

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

Factorise $x^2 - 5x - 84$

$-12 \times +7 = -84$

$-12 + +7 = -5$

	- 84	x
- 12	+ 7	
	- 5	+

Final answer: (x - 12)(x + 7)
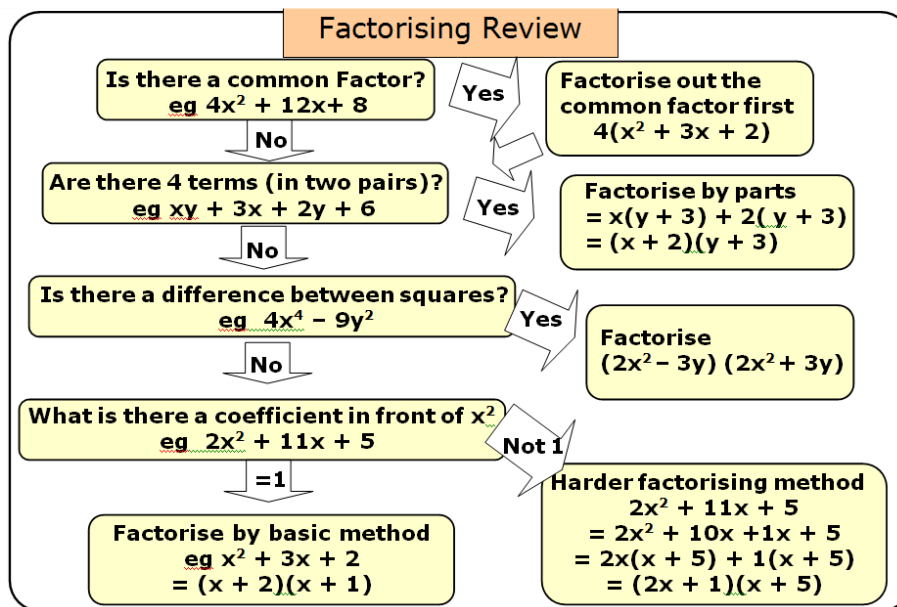
$$3x^2 + 7x + 2$$

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

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

Factorising Review

Is there a common Factor? eg $4x^2 + 12x + 8$	**Yes** →	Factorise out the common factor first $4(x^2 + 3x + 2)$

No ↓

Are there 4 terms (in two pairs)? eg $xy + 3x + 2y + 6$	**Yes** →	Factorise by parts $= x(y + 3) + 2(y + 3)$ $= (x + 2)(y + 3)$

No ↓

Is there a difference between squares? eg $4x^4 - 9y^2$	**Yes** →	Factorise $(2x^2 - 3y)(2x^2 + 3y)$

No ↓

What is there a coefficient in front of x^2 eg $2x^2 + 11x + 5$	**Not 1** →	Harder factorising method $2x^2 + 11x + 5$ $= 2x^2 + 10x + 1x + 5$ $= 2x(x + 5) + 1(x + 5)$ $= (2x + 1)(x + 5)$

=1 ↓

Factorise by basic method eg $x^2 + 3x + 2$ $= (x + 2)(x + 1)$

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:

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

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

Q9

Answer :

We have:

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

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

Q10

Answer :

We have:

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

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

Q11

Answer :

We have:

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

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

Q12

Answer :

We have:

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

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

Q13

Answer :

We have:

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

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

Q14

Answer :

We have:

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

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

Q15

Answer :

We have:

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

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

Q16

Answer :

We have:

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

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

Q17

Answer :

We have:

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

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

Q18

Answer :

We have:

$$(l + m)^2 - (l - m)^2 = \{(l + m) + (l - m)\}\{(l + m) - (l - m)\}$$
$$= (l + m + l - m)(l + m - l + m)$$
$$= (2l)(2m)$$

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

Q19

Answer :

We have:

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

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

Q20

Answer :

We have:

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

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

Q21

Answer :

We have:

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

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

Q22

Answer :

We have:

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

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

Q23

Answer :

We have:

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

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

Q24

Answer :

We have:

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

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

Q25

Answer :

We have:

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

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

Q26

Answer :

We have:

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

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

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:

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

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

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;
$$9 + 6z + z^2 = z^2 + 6z + 9$$
$$= z^2 + 2 \times x \times 3 + (3)^2$$
$$= (z + 3)^2$$

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

Q5

Answer :

We have:
$$x^2 + 6ax + 9a^2 = x^2 + 2 \times x \times 3a + (3a)^2$$
$$= (x + 3a)^2$$

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

Q6

Answer :

We have:
$$4y^2 + 20y + 25 = (2y)^2 + 2 \times 2y \times 5 + (5)^2$$
$$= (2y + 5)^2$$

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

Q7

Answer :

We have:
$$36a^2 + 36a + 9 = (6a)^2 + 2 \times 6a \times 3 + (3)^2$$
$$= (6a + 3)^2$$

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

Q8

Answer :

We have:
$$9m^2 + 24m + 16 = (3m)^2 + 2 \times 3m \times 4 + (4)^2$$
$$= (3m + 4)^2$$

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

Q9

Answer :

We have:
$$z^2 + z + \tfrac{1}{4} = z^2 + 2 \times z \times \tfrac{1}{2} \times \left(\tfrac{1}{2}\right)^2$$
$$= \left(z + \tfrac{1}{2}\right)^2$$

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

Q10

Answer :

We have:
$$49a^2 + 84ab + 36b^2 = (7a)^2 + 2 \times 7a \times 6b + (6b)^2$$
$$= (7a + 6b)^2$$

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

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:

$$m^4 + 2m^2n^2 + n^4 = \left(m^2\right)^2 + 2 \times m^2 \times n^2 + \left(n^2\right)^2$$
$$= \left(m^2 + n^2\right)^2$$

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

Q19

Answer :

We have:

$$(l+m)^2 - 4lm = \left(l^2 + m^2 + 2lm\right) - 4lm$$
$$= l^2 + m^2 + 2lm - 4lm$$
$$= l^2 + m^2 - 2lm$$
$$= (l)^2 + (m)^2 - 2 \times l \times m$$
$$= (l-m)^2$$

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

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.

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

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.

$$y^2 + 10y + 24 = y^2 + 6y + 4y + 24$$
$$= y(y+6) + 4(y+6)$$
$$= (y+6)(y+4)$$

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.

$$z^2 + 12z + 27 = z^2 + 9z + 3z + 27$$
$$= z(z+9) + 3(z+9)$$
$$= (z+9)(z+3)$$

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.

$$p^2 + 6p + 8 = p^2 + 4p + 2p + 8$$
$$= p(p+4) + 2(p+4)$$
$$= (p+4)(p+2)$$

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.

$$x^2 + 15x + 56 = x^2 + 8x + 7x + 56$$
$$= x(x+8) + 7(x+8)$$
$$= (x+8)(x+7)$$

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.

$$y^2 + 19y + 60 = y^2 + 15y + 4y + 60$$
$$= y(y+15) + 4(y+15)$$
$$= (y+15)(y+4)$$

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.

$$x^2 + 13x + 40 = x^2 + 8x + 5x + 40$$
$$= x(x+8) + 5(x+8)$$
$$= (x+8)(x+5)$$

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.

$$q^2 - 10q + 21 = q^2 - 7q - 3q + 21$$
$$= q(q-7) - 3(q-7)$$
$$= (q-7)(q-3)$$

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.

$$p^2 + 6p - 16 = p^2 + 8p - 2p - 16$$
$$= p(p + 8) - 2(p + 8)$$
$$= (p + 8)(p - 2)$$

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.

$$x^2 - 10x + 24 = x^2 - 6x - 4x + 24$$
$$= x(x - 6) - 4(x - 6)$$
$$= (x - 6)(x - 4)$$

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.

$$x^2 - 23x + 42 = x^2 - 21x - 2x + 42$$
$$= x(x - 21) - 2(x - 21)$$
$$= (x - 21)(x - 2)$$

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.

$$x^2 - 17x + 16 = x^2 - 16x - x + 16$$
$$= x(x - 16) - 1(x - 16)$$
$$= (x - 16)(x - 1)$$

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.

$$y^2 - 21y + 90 = y^2 - 15y - 6y + 90$$
$$= y(y - 15) - 6(y - 15)$$
$$= (y - 15)(y - 6)$$

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.
$$x^2 - 22x + 117 = x^2 - 13x - 9x + 117$$
$$= x(x - 13) - 9(x - 13)$$
$$= (x - 13)(x - 9)$$

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

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.
$$x^2 + x - 132 = x^2 + 12x - 11x - 132$$
$$= x(x + 12) - 11(x + 12)$$
$$= (x + 12)(x - 11)$$

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.
$$x^2 + 5x - 104 = x^2 + 13x - 8x - 104$$
$$= x(x + 13) - 8(x + 13)$$
$$= (x + 13)(x - 8)$$

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.
$$y^2 + 7y - 144 = y^2 + 16y - 9y - 144$$
$$= y(y + 16) - 9(y + 16)$$
$$= (y + 16)(y - 9)$$

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.
$$z^2 + 19z - 150 = z^2 + 25z - 6z - 150$$
$$= z(z + 25) - 6(z + 25)$$
$$= (z + 25)(z - 6)$$

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.
$$y^2 + y - 72 = y^2 + 9y - 8y - 72$$
$$= y(y + 9) - 8(y + 9)$$
$$= (y + 9)(y - 8)$$

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.
$$a^2 + 6a - 91 = a^2 + 13a - 7a - 91$$
$$= a(a + 13) - 7(a + 13)$$
$$= (a + 13)(a - 7)$$

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.*
$$p^2 - 4p - 77 = p^2 - 11p + 7p - 77$$
$$= p(p - 11) + 7(p - 11)$$
$$= (p - 11)(p + 7)$$

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.*
$$x^2 - 7x - 30 = x^2 - 10x + 3x - 30$$
$$= x(x - 10) + 3(x - 10)$$
$$= (x - 10)(x + 3)$$

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.

$$x^2 - 11x - 42 = x^2 - 14x + 3x - 42$$
$$= x(x - 14) + 3(x - 14)$$
$$= (x - 14)(x + 3)$$

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.

$$x^2 - 5x - 24 = x^2 - 8x + 3x - 24$$
$$= x(x - 8) + 3(x - 8)$$
$$= (x - 8)(x + 3)$$

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.

$$y^2 - 6y - 135 = y^2 - 15y + 9y - 135$$
$$= y(y - 15) + 9(y - 15)$$
$$= (y - 15)(y + 9)$$

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.

$$z^2 - 12z - 45 = z^2 - 15z + 3z - 45$$
$$= z(z - 15) + 3(z - 15)$$
$$= (z - 15)(z + 3)$$

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.

$$x^2 - 4x - 12 = x^2 - 6x + 2x - 12$$
$$= x(x - 6) + 2(x - 6)$$
$$= (x - 6)(x + 2)$$

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.

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

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.

$$3y^2 + 14y + 8 = 3y^2 + 12y + 2y + 8$$
$$= 3y(y + 4) + 2(y + 4)$$
$$= (3y + 2)(y + 4)$$

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.

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

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.

$$2x^2 + x - 45 = 2x^2 + 10x - 9x - 45$$
$$= 2x(x + 5) - 9(x + 5)$$
$$= (2x - 9)(x + 5)$$

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.

$$6p^2 + 11p - 10 = 6p^2 + 15p - 4p - 10$$
$$= 3p(2p + 5) - 2(2p + 5)$$
$$= (2p + 5)(3p - 2)$$

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.
$$2x^2 - 17x - 30 = 2x^2 - 20x + 3x - 30$$
$$= 2x(x - 10) + 3(x - 10)$$
$$= (2x + 3)(x - 10)$$

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.
$$7y^2 - 19y - 6 = 7y^2 - 21y + 2y - 6$$
$$= 7y(y - 3) + 2(y - 3)$$
$$= (7y + 2)(y - 3)$$

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.
$$28 - 31x - 5x^2 = 28 + 4x - 35x - 5x^2$$
$$= 4(x + 7) - 5x(7 + x)$$
$$= (x + 7)(4 - 5x)$$

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

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.
$$6x^2 - 5x - 6 = 6x^2 - 9x + 4x - 6$$
$$= 3x(2x - 3) + 2(2x - 3)$$
$$= (2x - 3)(3x + 2)$$

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.

$$3m^2 + 24m + 36 = 3m^2 + 18m + 6m + 36$$
$$= 3m(m+6) + 6(m+6)$$
$$= (3m+6)(m+6) = 3(m+2)(m+6)$$

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.

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

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.

$$6x^2 - 17x - 3 = 6x^2 - 18x + x - 3$$
$$= 6x(x-3) + 1(x-3)$$
$$= (6x+1)(x-3)$$

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.

$$7x^2 - 19x - 6 = 7x^2 - 21x + 2x - 6$$
$$= 7x(x-3) + 2(x-3)$$
$$= (7x+2)(x-3)$$

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:

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

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

$$\left(2x - 32x^3\right)$$
$$= 2x\left(1 - 16x^2\right)$$
$$= 2x\left(1 - 4x\right)\left(1 + 4x\right)$$

Q3

Answer:

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

$$x^3 - 144x$$
$$= x\left(x^2 - 144\right)$$
$$= x\left(x - 12\right)\left(x + 12\right)$$

Q4

Answer:

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

$$2 - 50x^2$$
$$= 2\left(1 - 25x^2\right)$$
$$= 2\left(1 - 5x\right)\left(1 + 5x\right)$$

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)(2x + 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*)

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