7. Factorisation

Exercise 7A

1. Question

Factories:

(i) 12x + 15

(ii) 14m – 21

(iii) 9n – 12n^2

Answer

(i) 12x + 15

Taking 3 as common from the whole, we get,

12x + 15 = 3(4x + 5).

(ii) 14m – 21,

Taking 7 as common from the whole, we get,

14m – 21 = 7(2m – 3)

(iii) 9n – 12n^2,

Taking 3n as common from the whole, we get,

9n – 12n^2 = 3n (3 – 4n).

2. Question

Factories:

i. 16a^2 – 24ab

ii. 15ab^2 – 20a^{2}b

iii. 12x^{2}y^3 – 21x^{3}y^2

Answer

(i) Let's take HCF of 16a^2 – 24ab

Taking 8a as common from the whole, we get,

16a^2 – 24ab = 8a(2a – 3b).

(ii) 15ab^2 – 20a^{2}b,

Taking 5ab as common from the whole, we get,

15ab^2 – 20a^{2}b = 5ab(3b – 4a)

(iii) 12x^{2}y^3 – 21x^{3}y^2,

Taking 3x^{2}y^2 as common from the whole, we get,

12x^{2}y^3 – 21x^{3}y^2 = 3x^{2}y^2(4y – 7x)

3. Question

Factories:

(i) 24x^3 – 36x^{2}y

(ii) 10x^3 – 15x^2

(iii) $36x^3y - 60x^2y^3z$

Answer

(i) $24x^3 - 36x^2y$,

Taking $12x^2$ as common from the whole, we get,

$24x^3 - 36x^2y = 12x^2(2x - 3y)$

(ii) $10x^3 - 15x^2$

Taking $5x^2$ as common from the whole, we get,

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

(iii) $36x^3y - 60x^2y^3z$

Taking $12x^2y$ as common from the whole, we get,

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

4. Question

Factories:

i. $9x^3 - 6x^2 + 12x$

ii. $8x^3 - 72xy + 12x$

iii. $18a^3b^3 - 27a^2b^3 + 36a^3b^2$

Answer

(i) Let's find out the HCF of $9x^3$, $6x^2$, $12x$

$$
\begin{array}{c|l}
3x & 9x^3 \,,\; 6x^2 \,,\; 12x \\
\hline
& 3x^2 \,,\; 2x \,,\; 4
\end{array}
$$

$3x$ is the highest common factor which divides $9x^3$, $6x^2$ and $12x$.

So,

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

(ii) Let's find out the HCF of $8x^3$, $72xy$ and $12x$

$$
\begin{array}{c|l}
4x & 8x^3,\; 72xy,\; 12x \\
\hline
& 2x,\; 18y,\; 3
\end{array}
$$

$4x$ is the highest common factor which divides $8x^3$, $72xy$ and $12x$.

So,

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

(iii) Let's find out the HCF of $18a^3b^3$, $27a^2b^3$, $36a^3b^2$

$$9a^2b^2 \, \big| \, 18a^3b^3, \, 27a^2b^3, \, 36a^3b^2$$
$$\overline{ 2ab, \, 3b, \, 4a}$$

$9a^2b^2$ is the highest common factor which divides $18a^3b^3$, $27a^2b^3$, $36a^3b^2$.

So,

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

5. Question

Factories:

i. $14x^3 + 21x^4y - 28x^2y^2$

ii. $- 5 - 10t + 20t^2$

Answer

(i) Let's find out the HCF of $14x^3$, $21x^4y$ and $28x^2y^2$

$$7x^2 \, \big| \, 14x^3, \, 21x^4y, \, 28x^2y^2$$
$$\overline{ 2x, \, 3x^2y, \, 4y^2}$$

$7x^2$ is the highest common factor of $14x^3$, $21x^4y$, $28x^2y^2$

So,

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

(ii) Let's find out the HCF of 5, 10t and $20t^2$,

$$5 \, \big| \, 5, \, 10t, \, 20t^2$$
$$\overline{ 1, \, 2t, \, 4t^2}$$

5 is the highest common factor of 5, 10t and $20t^2$.

So,

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

(Note: As we have learned in the previous chapter when we multiplied – sign with – sign it become +)

6. Question

Factorise:

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

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

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

Answer

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

Taking x + 3 as common from the whole, we get,

$(x + 3)(x + 5)$.

Hence, $x(x + 3) + 5(x + 3) = (x + 3)(x + 5)$

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

Taking x – 4 as common from the whole, we get,

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

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

Taking 1 – n as common from the whole, we get,

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

7. Question

Factories:

$6a(a - 2b) + 5b(a - 2b)$

Answer

$6a(a - 2b) + 5b(a - 2b)$

Taking a – 2b as common from the whole, we get,

$= (a - 2b)(6a + 5b)$.

8. Question

Factories:

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

Answer

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

Taking 2a – b as common from the whole, we get,

$= (2a - b)(x^3 + x^2)$.

9. Question

Factories:

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

Answer

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

Taking 3a – 5b as common from the whole, we get,

= (3a – 5b)(9a – 12a^2).

10. Question

Factorize:

(x + 5)^2 – 4(x + 5)

Answer

(x + 5)^2 – 4(x + 5)

Taking (x + 5) as common from the whole, we get,

= (x + 5){(x + 5) – 4}

= (x + 5)(x + 5 – 4)

= (x + 5)(x + 1)

So,

The factors of (x + 5)^2 – 4(x + 5) are: (x + 5) and (x + 1)

11. Question

Factories:

3(a – 2b)^2 -5(a – 2b)

Answer

3(a – 2b)^2 -5(a – 2b)

= (a – 2b) {3(a – 2b) – 5}

= (a – 2b){(3a – 6b) – 5}

= (a – 2b)(3a – 6b – 5)

So,

We get,

3(a – 2b)^2 -5(a – 2b) = (a – 2b)(3a – 6b – 5)

12. Question

Factories:

2a + 6b – 3(a + 3b)^2

Answer

2a + 6b – 3(a + 3b)^2= 2(a + 3b) - 3(a + 3b)^2

= (a + 3b){2 - 3(a + 3b)}

= (a + 3b){2 - 3a - 9b}

13. Question

Factories:

16(2p – 3q)^2 – 4(2p – 3q)

Answer

16(2p – 3q)^2 – 4(2p – 3q)

= (2p – 3q){16(2p – 3q) – 4}

= (2p – 3q){(32p – 48q) – 4}

= (2p – 3q)(32p – 48q – 4)

= 4(2p – 3q)(8p – 12q -1)

So,

We get,

16(2p – 3q)^2 – 4(2p – 3q) = 4(2p – 3q)(8p – 12q -1)

14. Question

Factories:

x(a – 3) + y(3 – a)

Answer

x(a – 3) + y(3 – a)

= x(a – 3) – y(a – 3)

= (a – 3)(x – y)

15. Question

Factories:

12(2x – 3y)^2 – 16(3y – 2x)

Answer

12(2x – 3y)^2 – 16(3y – 2x)

= 12(2x – 3y)^2 + 16(2x -3y)

[Taking (2x - 3y) common from the expression]

= (2x – 3y) {12(2x – 3y) + 16}

= (2x – 3y)(24x – 36y + 16)

[Taking 4 common from the expression]

= 4(2x - 3y)(6x – 9y + 4)

So,

We get,

12(2x – 3y)^2 – 16(3y – 2x) = 4(2x - 3y)(6x – 9y + 4)

16. Question

Factories:

(x + y)(2x + 5) – (x + y)(x + 3)

Answer

(x + y)(2x + 5) – (x + y)(x + 3)

= (x + y){(2x + 5) – (x + 3)}

= (x + y)(2x + 5 – x – 3)

= (x + y)(2x – x + 5 – 3)

= (x + y)(x + 2)

So,

We get,

$(x + y)(2x + 5) – (x + y)(x + 3) = (x + y)(x + 2)$

17. Question

Factories:

$ar + br + at + bt$

Answer

$ar + br + at + bt$

First group the terms together;

$= (ar + br) + (at + bt)$

$= r(a + b) + t(a + b)$

$= (a + b)(r + t)$

So,

We get,

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

18. Question

Factories:

$x^2 – ax – bx + ab$

Answer

$x^2 – ax – bx + ab$

Let's arrange the terms in a suitable form;

$x^2 – ax – bx + ab$

$= x^2 – bx – ax + ab$

$= (x^2 – bx) – (ax – ab)$

$= x(x – b) – a(x – b)$

$= (x – b)(x –a)$

So we get,

$x^2 – ax – bx + ab = (x – b)(x –a)$

19. Question

Factories:

$ab^2 – bc^2 – ab + c^2$

Answer

$ab^2 – bc^2 – ab + c^2$

Let's first arrange the terms in a suitable form;

$ab^2 – bc^2 – ab + c^2$

$= ab^2 – ab – bc^2 + c^2$

$= (ab^2 – ab) – (bc^2 - c^2)$

$= ab(b – 1) – c^2(b - 1)$

$= (b – 1)(ab – c^2)$

So we get,

$ab^2 – bc^2 – ab + c^2 = (b – 1)(ab – c^2)$

20. Question

Factories:

$x^2 – xz + xy – yz$

Answer

Let's first arrange the terms in a suitable form;

$x^2 – xz + xy – yz$

$= x^2 + xy – xz – yz$

$= (x^2 + xy) – (xz + yz)$

$= x(x + y) – z(x + y)$

$= (x + y)(x – z)$

So we get,

$x^2 – xz + xy – yz = (x + y)(x – z)$

21. Question

Factories:

$6ab – b^2 + 12ac – 2bc$

Answer

$6ab – b^2 + 12ac – 2bc$

$= 6ab + 12ac – b^2 – 2bc$

$= (6ab + 12ac) – (b^2 + 2bc)$

$= 6a(b + 2c) – b(b + 2c)$

$= (b + 2c)(6a – b)$

So we get,

$6ab – b^2 + 12ac – 2bc = (b + 2c)(6a – b)$

22. Question

Factories:

$(x – 2y)^2 + 4x – 8y$

Answer

$(x – 2y)^2 + 4x – 8y$

$= (x – 2y)^2 + 4(x – 2y)$

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

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

$= (x – 2y)(x – 2y + 4)$

So we get,

$(x – 2y)^2 + 4x – 8y = = (x – 2y)(x – 2y + 4)$

23. Question

Factories:

$y^2 – xy(1 – x) – x^3$

Answer

$y^2 – xy(1 – x) – x^3$

$= y^2 – xy + x^2y – x^3$

$= (y^2 – xy) + (x^2y – x^3)$

$= y(y – x) + x^2(y – x)$

$= (y –x)(y + x^2)$

So we get,

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

24. Question

Factories:

$(ax + by)^2 + (bx – ay)^2$

Answer

$(ax + by)^2 + (bx – ay)^2$

By using the formulas;

$(a + b)^2 = a^2 + b^2 + 2ab$ and

$(a – b)^2 = a^2 + b^2 – 2ab$

$= (a^2x^2 + b^2y^2 + 2axby) + (b^2x^2 + a^2y^2 – 2bxay)$

$= a^2x^2 + a^2y^2 + b^2y^2 + b^2x^2 + 2axby – 2bxay$

$= a^2(x^2 + y^2) + b^2x^2 + b^2y^2 + 2axby – 2axby$

$= a^2(x^2 + y^2) + b^2(x^2 + y^2)$

$= (x^2 + y^2)(a^2 + b^2)$

So we get,

$(ax + by)^2 + (bx – ay)^2 = (x^2 + y^2)(a^2 + b^2)$

25. Question

Factories:

$ab^2 + (a – 1)b -1$

Answer

$ab^2 + (a – 1)b -1$

$= ab^2 + ba – b – 1$

$= (ab^2 + ba) - (b + 1)$

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

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

So we get,

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

26. Question

Factories:

$x^3 - 3x^2 + x - 3$

Answer

$x^3 - 3x^2 + x - 3$

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

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

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

So we get,

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

27. Question

Factories:

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

Answer

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

$= abx^2 + aby^2 - a^2xy - b^2xy$

$= abx^2 - a^2xy + aby^2 - b^2xy$

$= ax(bx - ay) + by(ay - bx)$

$= ax(bx - ay) - by(bx - ay)$

$= (bx - ay)(ax - by)$

So we get,

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

28. Question

Factories:

$x^2 - x(a + 2b) + 2ab$

Answer

$x^2 - x(a + 2b) + 2ab$

$= x^2 - ax - 2bx + 2ab$

$= x^2 - 2bx - ax + 2ab$

$= (x^2 - 2bx) - (ax - 2ab)$

$= x(x - 2b) - a(x - 2b)$

= (x – 2b)(x – a)

So we get,

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

Exercise 7B

1. Question

Factories:

$x^2 – 36$

Answer

We have,

$x^2 – 36$

Which is,

$= (x)^2 – (6)^2$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

$x^2 – 36 = (x)^2 – (6)^2$

$= (x + 6)(x – 6)$

2. Question

Factories:

$4a^2 – 9$

Answer

We have,

$4a^2 – 9$

$= (2a)^2 – (3)^2$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

$4a^2 – 9 = (2a)^2 – (3)^2$

$= (2a + 3)(2a – 3)$

3. Question

Factories:

$81 – 49x^2$

Answer

We have,

$81 – 49x^2$

$= (9)^2 – (7x)^2$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

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

$= (9 + 7x)(9 - 7x)$

4. Question

Factories:

$4x^2 - 9y^2$

Answer

We have,

$4x^2 - 9y^2$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

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

5. Question

Factories:

$16a^2 - 225b^2$

Answer

We have,

$16a^2 - 225b^2$

$= (4a)^2 - (15b)^2$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

$= (4a + 15b)(4a - 15b)$

6. Question

Factories:

$9a^2b^2 - 25$

Answer

We have,

$9a^2b^2 - 25$

$= (3ab)^2 - (5)^2$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

$= (3ab + 5)(3ab - 5)$

7. Question

Factories:

$16a^2 - 144$

Answer

We have,

$16a^2 - 144$

$= (4a)^2 - (12)^2$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$16a^2 - 144 = (4a)^2 - (12)^2$

$= (4a + 12)(4a - 12)$

$= 4(a + 3)\ 4(a - 3)$

$= 16(a + 3)(a - 3)$

8. Question

Factories:

$63a^2 - 112b^2$

Answer

We have,

$63a^2 - 112b^2$

$= 7(9a^2 - 16b^2)$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$63a^2 - 112b^2 = 7(9a^2 - 16b^2)$

$= 7\{(3a)^2 - (4b)^2\}$

$= 7(3a + 4b)(3a - 4b)$

9. Question

Factories:

$20a^2 - 45b^2$

Answer

We have,

$20a^2 - 45b^2$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$20a^2 - 45b^2 = 5(4a^2 - 9b^2)$

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

$= 5(2a + 3b)(2a - 3b)$

10. Question

Factories:

$12x^2 - 27$

Answer

We have,

$12x^2 - 27$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

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

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

11. Question

Factories:

$x^3 - 64x$

Answer

We have,

$x^3 - 64x$

$= x(x^2 - 64)$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$x^3 - 64x = x(x^2 - 64)$

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

$= x(x + 8)(x - 8)$

12. Question

Factories:

$16x^5 - 144x^3$

Answer

We have,

$16x^5 - 144x^3$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$16x^5 - 144x^3 = 3x^3(x^2 - 9)$

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

$= 16x^3(x + 3)(x - 3)$

13. Question

Factories:

$3x^5 - 48x^3$

Answer

We have,

$3x^5 - 48x^3$

$= 3x^3(x^2 - 16)$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$3x^5 - 48x^3 = 3x^3(x^2 - 16)$

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

$= 3x^3(x + 4)(x - 4)$

14. Question

Factories:

$16p^3 - 4p$

Answer

We have,

$16p^3 - 4p$

$= 4p(4p^2 - 1)$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

$= 4p\{(2p)^2 - (1)^2\}$

$= 4p(2p + 1)(2p - 1)$

15. Question

Factories:

$63a^2b^2 - 7$

Answer

We have,

$63a^2b^2 - 7$

$= 7(9a^2b^2 - 1)$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$63a^2b^2 - 7 = 7(9a^2b^2 - 1)$

$= 7\{(3ab)^2 - (1)^2\}$

$= 7(3ab + 1)(3ab - 1)$

16. Question

Factories:

$1 - (b - c)^2$

Answer

We have,

$1 - (b - c)^2$

$= (1)^2 - (b - c)^2$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$1 - (b - c)^2 = (1)^2 - (b - c)^2$

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

$= (1 + b - c)(1 - b + c)$

17. Question

Factories:

$(2a + 3b)^2 - 16c^2$

Answer

Given,

$(2a + 3b)^2 - 16c^2$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

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

$= (2a + 3b + 4c)(2a + 3b - 4c)$

18. Question

Factories:

$(l + m)^2 - (l - m)^2$

Answer

We have,

$(l + m)^2 - (l - m)^2$

By using the formula $a^2 - b^2 = (a + b)(a - b)$ Here, $a = (l + m)$ and $b = (l - m)$

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

$= (l + m + l - m)(l + m - l + m)$ $\qquad = (2l)(2m)$

$= 4lm$

19. Question

Factories:

$(2x + 5y)^2 – 1$

Answer

Given,

$(2x + 5y)^2 – (1)^2$

$= (2x + 5y)^2 – (1)^2$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

$(2x + 5y)^2 – (1)^2 = (2x + 5y)^2 – (1)^2$

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

$= (2x + 5y + 1)(2x + 5y – 1)$

20. Question

Factories:

$36c^2 – (5a + b)^2$

Answer

Given,

$36c^2 – (5a + b)^2$

$= (6c)^2 – (5a + b)^2$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

$36c^2 – (5a + b)^2 = (6c)^2 – (5a + b)^2$

$= \{(6c) + (5a + b)\}\{(6c) – (5a + b)\}$

$= (6c + 5a + b)(6c – 5a – b)$

21. Question

Factories:

$(3x – 4y)^2 – 25z^2$

Answer

Given,

$(3x – 4y)^2 – 25z^2$

$= (3x – 4y)^2 – (5z)^2$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

$(3x – 4y)^2 – 25z^2 = (3x – 4y)^2 – (5z)^2$

$=\{(3x – 4y) + 5z\}\{(3x – 4y) – 5z\}$

$= (3x – 4y + 5z)(3x – 4y – 5z)$

22. Question

Factories:

$x^2 - y^2 - 2y - 1$

Answer

Given,

$x^2 - y^2 - 2y - 1$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

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

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

$= (x + y + 1)(x - y - 1)$

23. Question

Factories:

$25 - a^2 - b^2 - 2ab$

Answer

Given,

$25 - a^2 - b^2 - 2ab$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

$= 25 - (a + b)^2$

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

$= \{5 + (a + b)\}\{5 - (a + b)\}$

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

24. Question

Factories:

$25a^2 - 4b^2 + 28bc - 49c^2$

Answer

Given,

$25a^2 - 4b^2 + 28bc - 49c^2$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

$= (5a)^2 - (2b - 7c)^2$

= {5a + (2b – 7c)}{5a – (2b – 7c)}

= (5a + 2b – 7c)(5a – 2b + 7c)

25. Question

Factories:

$9a^2 - b^2 + 4b - 4$

Answer

Given,

$9a^2 - b^2 + 4b - 4$

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

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

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

$= (3a)^2 - (b - 2)^2$

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

= (3a + b - 2)(3a – b + 2)

26. Question

Factories:

$100 - (x - 5)^2$

Answer

Given,

$100 - (x - 5)^2$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$100 - (x - 5)^2 = (10)^2 - (x - 5)^2$

$= \{10 + (x - 5)\}\{10 - (x - 5)\}$

= (10 + x - 5)(10 – x + 5)

= (5 + x)(15 – x)

27. Question

Evaluate $\{(405)^2 - (395)^2\}$

Answer

Given,

$\{(405)^2 - (395)^2\}$

By using the formula $a^2 - b^2 = (a + b)(a - b)$

We get,

$\{(405)^2 - (395)^2\} = (405 + 395)(405 - 395)$

$= (800 \times 10)$

= 8000

28. Question

Evaluate $\{(7.8)^2 – (2.2)^2\}$.

Answer

We have,

$\{(7.8)^2 – (2.2)^2\}$

By using the formula $a^2 – b^2 = (a + b)(a – b)$

We get,

$\{(7.8)^2 – (2.2)^2\} = (7.8 + 2.2)(7.8 – 2.2)$

$= (10 \times 5.6)$

$= 56$

So,

$\{(7.8)^2 – (2.2)^2\} = 56$

Exercise 7C

1. Question

Factorize:

$x^2 + 8x + 16$

Answer

Given,

$x^2 + 8x + 16$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

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

$= (x + 4)^2$

2. Question

Factorize:

$x^2 + 14x + 49$

Answer

Given;

$x^2 + 14x + 49$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

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

$= (x + 7)^2$

3. Question

Factorize:

$1 + 2x + x^2$

Answer

Given,

$1 + 2x + x^2 = x^2 + 2x + 1$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

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

$= (x + 1)^2$

$= (x + 1)(x + 1)$

4. Question

Factorize:

$9 + 6z + z^2$

Answer

Given,

$9 + 6z + z^2 = z^2 + 6z + 9$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

$= z^2 + 2 \times z \times 3 + (3)^2$

$= (3 + z)^2$

5. Question

Factorize:

$x^2 + 6ax + 9a^2$

Answer

Given;

$x^2 + 6ax + 9a^2$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

$= x^2 + 2 \times (x) \times 3a + (3a)^2$

$= (x + 3a)^2$

6. Question

Factorize:

$4y^2 + 20y + 25$

Answer

Given;

$4y^2 + 20y + 25$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

= $(2y)^2 + 2 \times 2y \times 5 + (5)^2$

= $(2y + 5)^2$

7. Question

Factorize:

$36a^2 + 36a + 9$

Answer

Given,

$36a^2 + 36a + 9$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

= $(6a)^2 + 2 \times 6a \times 3 + (3)^2$

= $(6a + 3)^2$

8. Question

Factorize:

$9m^2 + 24m + 16$

Answer

Given,

$9m^2 + 24m + 16$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

= $(3m)^2 + 2 \times 3m \times 4 + (4)^2$

= $(3m + 4)^2$

9. Question

Factorize:

$z^2 + z + \dfrac{1}{4}$

Answer

Given,

$z^2 + z + \dfrac{1}{4}$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

= $z^2 + 2 \times z \times \dfrac{1}{2} + \left(\dfrac{1}{2}\right)^2$

= $\left(z + \dfrac{1}{2}\right)$

10. Question

Factorize:

$49a^2 + 84ab + 36b^2$

Answer

Given,

$49a^2 + 84ab + 36b^2$

By using the formula $(a + b)^2 = a^2 + 2ab + b^2$

We get,

$= (7a)^2 + 2 \times 7a \times 6b + (6b)^2$

$= (7a + 6b)^2$

11. Question

Factorize:

$P^2 – 10p + 25$

Answer

Given,

$P^2 – 10p + 25$

By using the formula $(a - b)^2 = a^2 – 2ab + b^2$

We get,

$= p^2 – 2 \times p \times 5 + (5)^2$

$= (p – 5)^2$

12. Question

Factorize:

$121a^2 – 88ab + 16b^2$

Answer

Given,

$121a^2 – 88ab + 16b^2$

By using the formula $(a – b)^2 = a^2 – 2ab + b^2$

We get,

$= (11a)^2 – 2 \times 11a \times 4b + (4b)^2$

$= (11a – 4b)^2$

13. Question

Factorize:

$1 – 6x + 9x^2$

Answer

Given,

$1 – 6x + 9x^2 = 9x^2 – 6x + 1$

By using the formula $(a – b)^2 = a^2 – 2ab + b^2$

We get,

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

= $(3x - 1)^2$

14. Question

Factorize:

$9y^2 - 12y + 4$

Answer

Given,

$9y^2 - 12y + 4$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get,

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

= $(3y - z)^2$

15. Question

Factorize:

$16x^2 - 24x + 9$

Answer

Given,

$16x^2 - 24x + 9$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

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

= $(4x - 3)^2$

16. Question

Factorize:

$m^2 - 4mn + 4n^2$

Answer

Given,

$m^2 - 4mn + 4n^2$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

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

= $(m - 2n)^2$

17. Question

Factorize:

$a^2b^2 - 6ab + 9c^2$

Answer

Given,

$a^2b^2 - 6ab + 9c^2$

By using the formula $(a - b)^2 = a^2 + b^2 - 2ab$

We get,

$= (ab)^2 - 2 \times ab \times 3c + (3c)^2$

$= (ab - 3c)^2$

18. Question

Factorize:

$m^4 + 2m^2n^2 + n^4$

Answer

Given,

$m^4 + 2m^2n^2 + n^4$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get,

$= (m^2)^2 + 2 \times m^2 \times n^2 + (n^2)^2$

$= (m^2 + n^2)$

19. Question

Factorize:

$(l + m)^2 - 4lm$

Answer

Given,

$(l + m)^2 - 4lm$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get,

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

$= l^2 + m^2 + 2lm - 4lm$

$= l^2 + m^2 - 2lm$

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

$= (l - m)^2$

Exercise 7D

1. Question

Factorize:

$x^2 + 5x + 6$

Answer

Given,

$x^2 + 5x + 6$

Now first find the numbers whose-

Sum = 5 and

Product = 6

Required numbers are 2 and 3,

So we get;

$x^2 + 5x + 6$

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

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

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

2. Question

Factorize:

$y^2 + 10y + 24$

Answer

Given,

$y^2 + 10y + 24$

Now first find the numbers whose-

Sum = 10 and

Product = 24

Required numbers are 6 and 4,

So we get;

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

$= y(y + 6) + 4(y + 6)$

$= (y + 6)(y + 4)$

3. Question

Factorize:

$z^2 + 12z + 27$

Answer

$z^2 + 12z + 27$

Now first find the numbers whose-

Sum = 12 and

Product = 27

Required numbers are 9 and 3,

So we get;

$z^2 + 12z + 27$

$= z^2 + 9z + 3z + 27$

$= z(z + 9) + 3(z + 9)$

$= (z + 9)(z + 3)$

4. Question

Factorize:

$p^2 + 6p + 8$

Answer

Given,

$p^2 + 6p + 8$

Now first find the numbers whose-

Sum = 6 and

Product = 8

Required numbers are 4 and 2,

So we get;

$p^2 + 6p + 8$

$= p^2 + 4p + 2p + 8$

$= p(p + 4) + 2(p + 4)$

$= (p + 4)(p + 2)$

5. Question

Factorize:

$x^2 + 15x + 56$

Answer

Given,

$x^2 + 15x + 56$

Now first find the numbers whose-

Sum = 15 and

Product = 56

Required numbers are 7 and 8,

So we get;

$x^2 + 15x + 56$

$= x^2 + 7x + 8x + 56$

$= x(x + 7) + 8(x + 7)$

$= (x + 7)(x + 8)$

6. Question

Factorize:

$y^2 + 19y + 60$

Answer

$y^2 + 19y + 60$

Now first find the numbers whose-

Sum = 19 and

Product = 60

Required numbers are 15 and 4,

So we get;

$y^2 + 19y + 60$

$= y^2 + 15y + 4y + 60$

$= y(y + 15) + 4(y + 15)$

$= (y + 15)(y + 4)$

7. Question

Factorize:

$x^2 + 13x + 40$

Answer

Given,

$x^2 + 13x + 40$

Now first find the numbers whose-

Sum = 13 and

Product = 40

Required numbers are 8 and 5,

So we get;

$x^2 + 13x + 40$

$= x^2 + 8x + 5x + 40$

$= x(x + 8) + 5(x + 8)$

$= (x + 8)(x + 5)$

8. Question

Factorize:

$q^2 – 10q + 21$

Answer

Given,

$q^2 – 10q + 21$

Now first find the numbers whose-

Sum = - 10 and

Product = 21

Required numbers are 7 and 3,

So we get;

$q^2 – 10q + 21$

$= q^2 – 7q – 3q + 21$

$= q(q – 7) – 3(q – 7)$

= (q – 7)(q – 3)

9. Question

Factorize:

$p^2 + 6p – 16$

Answer

Given,

$p^2 + 6p – 16$

Now first find the numbers whose-

Sum = 6 and

Product = - 16

Required numbers are 8 and 2,

So we get;

$p^2 + 6p – 16$

$= p^2 + 8p – 2p – 16$

$= p(p + 8) – 2(p + 8)$

$= (p + 8)(p – 2)$

10. Question

Factorize:

$x^2 – 10x + 24$

Answer

Given,

$x^2 – 10x + 24$

Now first find the numbers whose-

Sum = - 10 and

Product = 24

Required numbers are 6 and 4,

So we get;

$x^2 – 10x + 24$

$= x^2 – 6x – 4x + 24$

$= x(x – 6) – 4(x – 6)$

$= (x – 6)(x – 4)$

11. Question

Factorize:

$x^2 – 23x + 42$

Answer

Given,

$x^2 – 23x + 42$

Now, first we have to find out the numbers whose-

Sum = - 23 and

Product = 42

The numbers are 21 and 2,

So,

$x^2 – 23x + 42 = x^2 – 21x – 2x + 42$

$= x(x – 21) – 2(x – 21)$

$= (x – 21)(x – 2)$

12. Question

Factorize:

$x^2 – 17x + 16$

Answer

Given,

$x^2 – 17x + 16$

Now, first we have to find out the numbers whose-

Sum = - 17 and

Product = 16

The numbers are 16 and 1,

So,

$x^2 – 17x + 16 = x^2 – 16x – 1x + 16$

$= x(x – 16) – 1(x – 16)$

$= (x – 16)(x – 1)$

13. Question

Factorize:

$y^2 – 21y + 90$

Answer

Given,

$y^2 – 21y + 90$

Now, first we have to find out the numbers whose-

Sum = - 21 and

Product = 90

The numbers are 15 and 6,

So,

$y^2 – 21y + 90 = y^2 – 15y – 6y + 90$

$= y(y – 15) – 6(y – 15)$

$= (y – 15)(y – 6)$

14. Question

Factorize:

$x^2 - 22x + 117$

Answer

Given,

$x^2 - 22x + 117$

Now, first we have to find out the numbers whose-

Sum = - 22 and

Product = 117

The numbers are 13 and 9,

So,

$x^2 - 22x + 117 = x^2 - 13x - 9x + 117$

$= x(x - 13) - 9(x - 13)$

$= (x - 13)(x - 9)$

15. Question

Factorize:

$x^2 - 9x + 20$

Answer

$x^2 - 9x + 20$

Now, first we have to find out the numbers whose-

Sum = - 9 and

Product = 20

The numbers are 5 and 4,

So,

$x^2 - 9x + 20 = x^2 - 5x - 4x + 20$

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

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

16. Question

Factorize:

$x^2 + x - 132$

Answer

$x^2 + x - 132$

Now, first we have to find out the numbers whose-

Sum = 1 and

Product = - 132

The numbers are 12 and 11,

So,

$x^2 + x – 132 = x^2 + 12x – 11x – 132$

$= x(x + 12) – 11(x + 12)$

$= (x + 12)(x – 11)$

17. Question

Factorize:

$x^2 + 5x – 104$

Answer

$x^2 + 5x – 104$

Now, first we have to find out the numbers whose-

Sum = 5 and

Product = - 104

The numbers are 13 and 8,

So,

$x^2 + 5x – 104 = x^2 + 13x – 8x – 104$

$= x(x + 13) – 8(x + 13)$

$= (x + 13)(x – 8)$

18. Question

Factorize:

$y^2 + 7y – 144$

Answer

$y^2 + 7y – 144$

Now, first we have to find out the numbers whose-

Sum = 7 and

Product = - 144

The numbers are 16 and - 9,

So,

$y^2 + 7y – 144$

$= y^2 + 16y – 9y – 144$

$= y(y + 16) – 9(y + 16)$

$= (y + 16)(y – 9)$

19. Question

Factorize:

$z^2 + 19z – 150$

Answer

Given,

$z^2 + 19z – 150$

Now, first we have to find out the numbers whose-

Sum = 19 and

Product = - 150

The numbers are 25 and 6,

So,

$z^2 + 19z – 150$

$= z^2 + 25z – 6z – 150$

$= z(z + 25) – 6(z + 25)$

$= (z + 25)(z – 6)$

20. Question

Factorize:

$y^2 + y – 72$

Answer

Given,

$y^2 + y – 72$

Now, first we have to find out the numbers whose-

Sum = 1 and

Product = - 72

The numbers are 9 and 8,

So,

$y^2 + y – 72$

$= y^2 + 9y – 9y – 72$

$= y(y + 9) – 9(y + 9)$

$= (y + 9)(y – 9)$

21. Question

Factorize:

$a^2 + 6a – 91$

Answer

$a^2 + 6a – 91$

Now, first we have to find out the numbers whose-

Sum = 6 and

Product = - 91

The numbers are 13 and 7,

So,

$a^2 + 6a – 91$

$= a^2 + 13a – 7a – 91$

= a(a + 13) – 7(a + 13)

= (a + 13) (a – 7)

22. Question

Factorize:

$p^2 – 4p – 77$

Answer

$p^2 – 4p – 77$

Now, first we have to find out the numbers whose-

Sum = - 4 and

Product = - 77

The numbers are 11 and 7,

So,

$p^2 – 4p – 77$

$= p^2 – 11p + 7p – 77$

$= p(p – 11) + 7(p – 11)$

$= (p – 11)(p + 7)$

23. Question

Factorize:

$x^2 – 7x – 30$

Answer

$x^2 – 7x – 30$

Now, first we have to find out the numbers whose-

Sum = - 7 and

Product = - 30

The numbers are 10 and 3,

So,

$x^2 – 7x – 30$

$= x^2 – 10x + 3x – 30$

$= x(x – 10) + 3(x – 10)$

$= (x – 10)(x + 3)$

24. Question

Factorize:

$x^2 – 11x – 42$

Answer

$x^2 – 11x – 42$

Now, first we have to find out the numbers whose-

Sum = - 11 and

Product = - 42

The numbers are 14 and 3,

So,

$x^2 - 11x - 42$

$= x^2 - 14x + 3x - 42$

$= x(x - 14) + 3(x + 14)$

$= (x - 14)(x + 3)$

25. Question

Factorize:

$x^2 - 5x - 24$

Answer

$x^2 - 5x - 24$

Now, first we have to find out the numbers whose-

Sum = - 5 and

Product = - 24

The numbers are - 8 and 3,

So,

$x^2 - 5x - 24$

$= x^2 - 8x + 3x - 24$

$= x(x - 8) + 3(x - 8)$

$= (x - 8)(x + 3)$

26. Question

Factorize:

$y^2 - 6y - 135$

Answer

Given;

$y^2 - 6y - 135$

Now first find the numbers whose-

Sum = - 6 and

Product = - 135

Required numbers are 15 and 9,

So we get;

$y^2 - 6y - 135$

$= y^2 - 15y + 9y - 135$

$= y(y - 15) + 9(y - 15)$

$= (y – 15)(y + 9)$

27. Question

Factorize:

$z^2 – 12z – 45$

Answer

Given

$z^2 – 12z – 45$

Now first find the numbers whose-

Sum = - 12 and

Product = - 45

Required numbers are 15 and 3,

So we get;

$z^2 – 12z – 45$

$= z^2 – 15z + 3z - 45$

$= z(z – 15) + 3(z – 15)$

$= (z – 15)(z + 3)$

28. Question

Factorize:

$x^2 – 4x – 12$

Answer

Given,

$x^2 – 4x – 12$

Now first find the numbers whose-

Sum = - 4 and

Product = - 12

Required numbers are 6 and 2,

So we get;

$x^2 – 4x – 12$

$= x^2 – 6x + 2x – 12$

$= x(x – 6) + 2(x – 6)$

$= (x – 6)(x + 2)$

29. Question

Factorize:

$3x^2 + 10x + 8$

Answer

Given,

$3x^2 + 10x + 8$

Now first find the numbers whose-

Sum = 10 and

Product = $3 \times 8 = 24$

Required numbers are 6 and 4,

So we get;

$3x^2 + 10x + 8$

$= 3x^2 + 6x + 4x + 8$

$= 3x(x + 2) + 4(x + 2)$

$= (x + 2)(3x + 4)$

30. Question

Factorize:

$3y^2 + 14y + 8$

Answer

Given,

$3y^2 + 14y + 8$

Now first find the numbers whose-

Sum = 14 and

Product = $3 \times 8 = 24$

Required numbers are 12 and 2,

So we get;

$3y^2 + 14y + 8 = 3y^2 + 12y + 2y + 8$

$= 3y(y + 4) + 2(y + 4)$

$= (y + 4)(3y + 2)$

31. Question

Factorize:

$3z^2 - 10z + 8$

Answer

Given,

$3z^2 - 10z + 8$

Now, first we have to find out the numbers whose-

Sum = - 10 and

Product = $3 \times 8 = 24$

The numbers are 6 and 4,

So,

$3z^2 - 10z + 8$

$= 3z^2 - 6z - 4z + 8$

$= 3z(z - 2) - 4(z - 2)$

$= (z - 2)(3z - 4)$

32. Question

Factorize:

$2x^2 + x - 45$

Answer

Given,

$2x^2 + x - 45$

Now first find the numbers whose-

Sum = 1 and

Product = - 45 × 2 = - 90

Required numbers are 10 and 9,

So we get;

$2x^2 + x - 45$

$= 2x^2 + 10x - 9x - 45$

$= 2x(x + 5) - 9(x + 5)$

$= (x + 5)(2x - 9)$

33. Question

Factorize:

$6p^2 + 11p - 10$

Answer

Given,

$6p^2 + 11p - 10$

Now first find the numbers whose-

Sum = 11 and

Product = - 10 × 6 = - 60

Required numbers are 15 and 4,

So we get;

$= 6p^2 + 15p - 4p - 10$

$= 3p(2p + 5) - 2(2p + 5)$

$= (2p + 5)(3p - 2)$

34. Question

Factorize:

$2x^2 - 17x - 30$

Answer

Given,

$2x^2 - 17x - 30$

Now first find the numbers whose-

Sum = - 17 and

Product = - 30 × 2 = - 60

Required numbers are 20 and 3,

So we get;

$2x^2 - 17x - 30$

$= 2x^2 - 20x + 3x - 30$

$= 2x(x - 10) + 3(x - 10)$

$= (x - 10)(2x + 3)$

35. Question

Factorize:

$7y^2 - 19y - 6$

Answer

Given,

$7y^2 - 19y - 6$

Now first find the numbers whose-

Sum = - 19 and

Product = - 6 × 7 = - 42

Required numbers are 21 and 2,

So we get;

$7y^2 - 19y - 6$

$= 7y^2 - 21y + 2y - 6$

$= 7y(y - 3) + 2(y - 3)$

$= (y - 3)(7y + 2)$

36. Question

Factorize:

$28 - 31x - 5x^2$

Answer

Given,

$28 - 31x - 5x^2$

Now first find the numbers whose-

Sum = - 31 and

Product = - 5 × 28 = 140

Required numbers are 35 and 4,

So we get;

$28 - 31x - 5x^2$

$= 28 + 4x - 35x - 5x^2$

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

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

37. Question

Factorize:

$3 + 23z - 8z^2$

Answer

Given,

$3 + 23z - 8z^2$

Now first find the numbers whose-

Sum = 23 and

Product = - 8 × 3 = 24

Required numbers are 24 and 1,

So we get;

$3 + 23z - 8z^2$

$= 3 + 24z - z - 8z^2$

$= 3(1 + 8z) - z(1 + 8z)$

$= (1 + 8z)(3 - z)$

38. Question

Factorize:

$6x^2 - 5x - 6$

Answer

Given,

$6x^2 - 5x - 6$

Now first find the numbers whose-

Sum = - 5 and

Product = - 6 × 6 = - 36

Required numbers are 9 and 4,

So we get;

$= 6x^2 - 9x + 4x - 6$

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

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

39. Question

Factorize:

$3m^2 + 24m + 36$

Answer

Given,

$3m^2 + 24m + 36$

Now first find the numbers whose-

Sum = 24 and

Product = 36 × 3 = 108

Required numbers are 18 and 6,

So we get;

$3m^2 + 24m + 36$

$= 3m^2 + 18m + 6m + 36$

$= 3m(m + 6) + 6(m + 6)$

$= (m + 6)(3m + 6)$

40. Question

Factorize:

$4n^2 – 8n + 3$

Answer

Given,

$4n^2 – 8n + 3$

Now first find the numbers whose-

Sum = - 8 and

Product = 4 × 3 = 12

Required numbers are 6 and 2,

So we get;

$4n^2 – 8n + 3$

$= 4n^2 – 2n – 6n + 3$

$= 2n(2n – 1) – 3(2n – 3)$

$= (2n – 1)(2n – 3)$

41. Question

Factorize:

$6x^2 – 17x – 3$

Answer

Given,

$6x^2 – 17x – 3$

Now, first we have to find out the numbers whose-

Sum = - 17 and

Product = 6 × - 3 = - 18

The numbers are 18 and 1,

So,

$6x^2 - 17x - 3$

$= 6x^2 - 18x + 1x - 3$

$= 6x(x - 3) + 1(x - 3)$

$= (x - 3)(6x + 1)$

42. Question

Factorize:

$7x^2 - 19x - 6$

Answer

Given,

$7x^2 - 19x - 6$

Now, first we have to find out the numbers whose-

Sum = - 19 and

Product = 7 × - 6 = - 42

The numbers are 21 and 2,

So,

$7x^2 - 19x - 6$

$= 7x^2 - 21x + 2x - 6$

$= 7x(x - 3) + 2(x - 3)$

$= (x - 3)(7x + 2)$

Exercise 7E

1. Question

$(7a^2 - 63b^2) = ?$

A. (7a – 9b) (9a + 7b)

B. (7a – 9b) (7a + 9b)

C. 9(a - 3b) (a + 3b)

D. 7(a - 3b) (a + 3b)

Answer

$(7a^2 - 63b^2) = 7(a^2 - 9b^2)$ (taking 7 as common from whole)

$= 7(a - 3b)(a + 3b)$ ∵ $a^2 - b^2 = (a - b)(a + b)$

2. Question

$(2x - 32x^3) = ?$

A. 2(x – 4) (x + 4)

B. $2x(1 - 2x)^2$

C. $2x(1 + 2x)^2$

D. 2(1 – 4x) (1 + 4x)

Answer

$(2x - 32x^3) = 2x(1 - 16x^2)$ (taking 2x as common from whole)

$= 2x(1 - 4x)(1 + 4x) \because a^2 - b^2 = (a - b)(a + b)$

3. Question

$X^3 - 144x = ?$

A. $x(x - 12)^2$

B. $x(x + 12)^2$

C. $x(x - 12)(x + 12)$

D. none of these

Answer

$X^3 - 144x = x(x^2 - 144)$ (taking x as common from whole)

$= x(x - 12)(x + 12) \because a^2 - b^2 = (a - b)(a + b)$

4. Question

$2 - 50x^2 = ?$

A. $2(1 - 5x)^2$

B. $2(1 + 5x)^2$

C. $(2 - 5x)(2 + 5x)$

D. $2(1 - 5x)(1 + 5x)$

Answer

$2 - 50x^2 = 2(1 - 25x^2)$ (taking 2 as common from whole)

$= 2(1 - 5x)(1 + 5x) \because a^2 - b^2 = (a - b)(a + b)$

5. Question

$a^2 + bc + ab + ac = ?$

A. $(a + b)(a + c)$

B. $(a + b)(b + c)$

C. $(b + c)(c + a)$

D. $a(a + b + c)$

Answer

$a^2 + bc + ab + ac = a^2 + ab + bc + ac$

Rearranging the terms and taking a and c as common respectively.

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

$= (a + c)(a + b).$

6. Question

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

A. $(pq + 1)(q - 1)$

B. $p(q + 1)(q - 1)$

C. q(p - 1) (q + 1)

D. (pq - 1) (q + 1)

Answer

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

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

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

7. Question

ab – mn + an – bm =?

A. (a-b)(m-n)

B. (a-m)(b+n)

C. (a-n)(m+b)

D. (m-a)(n-b)

Answer

= ab – mn + an – bm = ab + an – mn – bm

= a(b + n) – m(n + b)

= (a – m)(b + n).

8. Question

ab – a – b + 1= ?

A. (a-1)(b-1)

B. (1-a)(1-b)

C. (a-1)(1-b)

D. (1-a)(b-1)

Answer

ab – a – b + 1

= a(b – 1) – 1(b – 1) (taking a and – 1 as common)

= (a – 1)(b – 1).

9. Question

x^2 – xz + xy – yz=?

A. (x – z) (x + z)

B. (x – y) (x – z)

C. (x + y) (x – z)

D. (x – z) (z – x)

Answer

= x^2 – xz + xy – yz

= x(x – z) +y(x – z) (taking x and y as common resp.)

= (x + y)(x – z).

10. Question

$12m^2 - 27 = ?$

A. $(2m - 3)(3m - 9)$

B. $3(2m - 9)(3m - 1)$

C. $3(2m - 9)(2m + 1)$

D. none of these

Answer

$12m^2 - 27 = 3(4m^2 - 9)$ (taking 3 as common from whole)

$= 3(2m - 3)(2m + 3) \because a^2 - b^2 = (a - b)(a + b)$

11. Question

$x^3 - x = ?$

A. $x(x^2 - x)$

B. $x(x - x^2)$

C. $x(1 + x)(1 - x)$

D. $x(x + 1)(1 - x)$

Answer

$x^3 - x = x(x^2 - 1)$ (taking x as common from whole)

$= x(x - 1)(x + 1) \because a^2 - b^2 = (a - b)(a + b)$

12. Question

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

A. $(1 + a - b)(1 + a + b)$

B. $(1 + a + b)(1 - a + b)$

C. $(1 + a + b)(1 - a - b)$

D. $(1 + a - b)(1 - a + b)$

Answer

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

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

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

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

13. Question

$x^2 + 6x + 8 = ?$

A. $(x + 3)(x + 5)$

B. $x + 3)(x + 4)$

C. $(x + 2)(x + 4)$

D. $(x + 1)(x + 8)$

Answer

$x^2 + 6x + 8$

Factorizing the equation and taking x and 2 as common,

$= x^2 + 4x + 2x + 8$

$= x(x + 4) + 2(x + 4)$

$= (x + 2)(x + 4).$

14. Question

$x^2 + 4x - 21 = ?$

A. $(x - 7) (x + 3)$

B. $(x + 7) (x - 3)$

C. $(x - 7) (x - 3)$

D. $(x + 7) (x + 3)$

Answer

$x^2 + 4x - 21$

Factorizing the equation and taking x and – 3 as common,

$= x^2 + 7x - 3x - 21$

$= x(x + 7) - 3(x + 7)$

$= (x - 3)(x + 7).$

15. Question

$y^2 + 2y - 3 = ?$

A. $(y - 1) (y + 3)$

B. $(y + 1) (y - 3)$

C. $(y - 1) (y - 3)$

D. $(y + 2) (y - 3)$

Answer

$y^2 + 2y - 3$

Factorizing the equation and taking y and – 1 as common,

$= y^2 + 3y - y - 3$

$= y(y + 3) - 1(y + 3)$

$= (y + 3)(y - 1).$

16. Question

$40 + 3x - x^2 = ?$

A. $(5 + x) (x - 8)$

B. $(5 - x) (8 + x)$

C. $(5 + x) (8 - x)$

D. $(5 - x) (8 - x)$

Answer

$40 + 3x - x^2$

Factorizing the equation and taking 8 and – x as common,

$= 40 + 8x - 3x - x^2$

$= 8(5 + x) - x(5 + x)$

$= (8 - x)(5 + x).$

17. Question

$2x^2 + 5x + 3=?$

A. $(x + 3)(2x + 1)$

B. $(x + 1)(2x + 3)$

C. $(2x + 5)(x - 3)$

D. none of these

Answer

$2x^2 + 5x + 3$

Factorizing the equation and taking 2x and 3 as common,

$= 2x^2 + 2x + 3x + 3$

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

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

18. Question

$6a^2 - 13a + 6=?$

A. $(2a + 3)(3a - 2)$

B. $(2a - 3)(3a + 2)$

C. $(3a - 2)(2a - 3)$

D. $(3a + 1)(2a - 3)$

Answer

$6a^2 - 13a + 6$

Factorizing the equation and taking 3a and – 2 as common,

$= 6a^2 - 9a - 4a+ 6$

$= 3a(2a - 3) - 2(2a - 3)$

$= (3a - 2)(2a - 3).$

19. Question

$4z^2 - 8z + 3=?$

A. $(2z - 1)(2z - 3)$

B. $(2z + 1)(3 - 2z)$

C. $(2z + 3)(3z + 1)$

D. $(z - 1)(4z - 3)$

Answer

$4z^2 - 8z + 3$

Factorizing the equation and taking 2z and – 1 as common,

$= 4z^2 – 6z – 2z + 3$

$= 2z(2z – 3) – 1(2z – 3)$

$= (2z – 1)(2z – 3).$

20. Question

$3 + 23y – 8y^2 =?$

A. $(1 - 8y) (3 + y)$

B. $(1 + 8y) (3 - y)$

C. $(1 - 8y) (y - 3)$

D. $(8y - 1) (y + 3)$

Answer

$3 + 23y – 8y^2$

Factorizing the equation and taking 3 and – y as common,

$= 3 + 24y – y – 8y^2$

$= 3(1 + 8y) – y(1 + 8y)$

$= (3 – y)(1 + 8y).$