

Factorizing Quadratic Expression.

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A quadratic expression will always be in the form

$$ax^2 + bx + c = 0, \text{ where } a, b, c \in \mathbb{Z} - \left\{ \begin{array}{l} \text{positive +} \\ \text{negative} \\ \text{whole numbers} \end{array} \right\}$$

Factorize $ax^2 + bx + c$
 $x^2 + 7x + 10$

$$(x + 5)(x + 2)$$

$a=1$ coefficient of x^2
 $b=7$ coefficient of x
 $c=10$ constant

$$\begin{array}{cc} x^2 & +10 \\ / \quad \backslash & / \quad \backslash \\ x \quad x & 5 \quad 2 \end{array} \quad \begin{array}{c} +2x \\ +5x \\ \hline +7x \end{array}$$

CIW

Pg 28

Q2 →

Q2 Factorize $x^2 + 5x + 6$

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

$$\begin{array}{cc} x^2 & +6 \\ / \quad \backslash & / \quad \backslash \\ x \quad x & 2 \quad 3 \end{array}$$

$$\begin{array}{c} +3x \\ +2x \\ \hline +5x \end{array}$$

Eg 3) $x^2 + 20x + 36$

$$(x + 18)(x + 2)$$

$$\begin{array}{cc} x^2 & +36 \\ / \quad \backslash & / \quad \backslash \\ x \quad x & 18 \quad 2 \end{array}$$

$$\begin{array}{c} +2x \\ +18x \\ \hline +20x \end{array}$$



Section 2.4 Factorising quadratic expressions

Example 1

Factorise $3x^2 + 10x + 8$.

Example 2

Find the factors of $2x^2 - 11x + 12$.

Example 3

Factorise (i) $8x^2 + 10x - 3$ (ii) $7x^2 - 19xy - 6y^2$

Exercise 2.4

Factorise each of the following:

1. $x^2 + 5x + 6$

2. $x^2 + 8x + 12$
 $(x + 6)(x + 2)$

$$\begin{array}{r} x^2 \quad +12 \quad +2x \\ / \quad \backslash \quad / \quad \backslash \\ x \quad x \quad 6 \quad 2 \quad +6x \\ \hline +8x \end{array}$$

3. $x^2 + 9x + 14$
 $(x + 7)(x + 2)$

$$\begin{array}{r} x^2 \quad +14 \quad +2x \\ / \quad \backslash \quad / \quad \backslash \\ x \quad x \quad 7 \quad 2 \quad +7x \\ \hline +9x \end{array}$$

Factorise each of the following:

4. $x^2 + 11x + 24$

$(x + 8)(x + 3)$

$$\begin{array}{r} x^2 \quad +24 \quad +3x \\ / \quad \backslash \quad / \quad \backslash \\ x \quad x \quad 8 \quad 3 \quad +8x \\ \hline +11x \end{array}$$

5. $x^2 + 12x + 20$

$(x + 2)(x + 10)$

$$\begin{array}{r} x^2 \quad +20 \quad +0x \\ / \quad \backslash \quad / \quad \backslash \\ x \quad x \quad 2 \quad 10 \quad +2x \\ \hline +12x \end{array}$$

6. $x^2 + 12x + 27$

$(x + 9)(x + 3)$

$$\begin{array}{r} x^2 \quad +27 \quad +3x \\ / \quad \backslash \quad / \quad \backslash \\ x \quad x \quad 9 \quad 3 \quad +9x \\ \hline +12x \end{array}$$

Factorise each of the following:

7. $x^2 + 11x + 30$

$(x + 5)(x + 6)$

$$\begin{array}{r} x^2 \quad +30 \quad +6x \\ / \quad \backslash \\ x \quad x \quad 56 \quad +11x \end{array}$$

8. $x^2 + 15x + 44$

$(x + 11)(x + 4)$

$$\begin{array}{r} x^2 \quad +44 \quad +4x \\ / \quad \backslash \\ x \quad x \quad 11 \quad 4 \quad +15x \end{array}$$

9. $x^2 + 20x + 36$

$(x + 18)(x + 2)$

$$\begin{array}{r} x^2 \quad +36 \quad +2x \\ / \quad \backslash \\ x \quad x \quad 18 \quad 2 \quad +20x \end{array}$$

Factorise each of the following:

10. $2x^2 + 5x + 2$

$(2x + 1)(x + 2)$

$$\begin{array}{r} 2x^2 \quad +2 \quad +4x \\ / \quad \backslash \\ 2x \quad x \quad 2 \quad 1 \quad +5x \end{array}$$

11. $2x^2 + 11x + 14$

12. $5x^2 + 21x + 4$

Factorise each of the following:

13. $x^2 - 7x + 12$

14. $x^2 - 9x + 18$

15. $x^2 - 9x + 20$

Factorise each of the following:

16. $x^2 - 14x + 24$

17. $x^2 - 12x + 27$

18. $x^2 - 13x + 36$

Factorise each of the following:

19. $2x^2 - 7x + 3$

20. $3x^2 - 17x + 10$

$(3x - 2)(x - 5)$

$$\begin{array}{r} 3x^2 \quad +10 \quad -15x \\ / \quad \backslash \quad / \quad \backslash \\ 3x \mid x \quad 5 \quad 2 \quad -17x \\ \quad \quad 10 \quad 1 \end{array}$$

H/W
Q22 → 24 Pg 28

21. $5x^2 - 17x + 6$

$(5x - 2)(x - 3)$

$$\begin{array}{r} 5x^2 \quad 6 \quad -15x \\ / \quad \backslash \quad / \quad \backslash \\ 5x \mid x \quad 3 \quad 2 \quad -17x \\ \quad \quad 6 \quad 1 \end{array}$$

Factorise each of the following:

22. $3x^2 - 17x + 20$

23. $5x^2 + 27x - 18$

24. $3x^2 - 14x + 15$

Factorise each of the following:

25. $x^2 - 4x - 12$

26. $x^2 - 3x - 10$

27. $x^2 + 7x - 18$

Factorise each of the following:

28. $x^2 + 7x - 30$

29. $x^2 - 13x - 30$

30. $x^2 - 18x - 40$

Factorise each of the following:

31. $2x^2 - 7x - 15$

32. $3x^2 + 11x - 20$

33. $5x^2 - 12x - 9$

Factorise each of the following:

34. $x^2 - 6x - 72$

35. $8x^2 + 10x - 3$

36. $2x^2 - 19x + 9$

Factorise each of the following:

37. $12x^2 - 11x - 5$

38. $6x^2 + x - 15$

39. $8x^2 - 14x + 3$

Factorise each of the following:

40. $3x^2 + 13x - 10$

41. $9x^2 + 24x + 16$

42. $5x^2 - 31x + 6$

Factorise each of the following:

43. $3x^2 - x - 14$

44. $6x^2 - 11x + 3$

45. $12x^2 - 23x + 10$

Factorise each of the following:

46. $9x^2 + 25x - 6$

47. $6x^2 + x - 22$

48. $9x^2 - x - 10$

Factorise each of the following:

49. $4x^2 - 11x + 6$

50. $10x^2 - 17x - 20$

51. $36x^2 - 7x - 4$

Factorise each of the following:

52. $12x^2 - 17x + 6$

53. $15x^2 - 14x - 8$

54. $24x^2 + 2x - 15$

Answers

Exercise 2.4

- | | |
|-----------------------|-----------------------|
| 1. $(x + 2)(x + 3)$ | 2. $(x + 2)(x + 6)$ |
| 3. $(x + 7)(x + 2)$ | 4. $(x + 3)(x + 8)$ |
| 5. $(x + 2)(x + 10)$ | 6. $(x + 3)(x + 9)$ |
| 7. $(x + 5)(x + 6)$ | 8. $(x + 4)(x + 11)$ |
| 9. $(x + 2)(x + 18)$ | 10. $(2x + 1)(x + 2)$ |
| 11. $(2x + 7)(x + 2)$ | 12. $(5x + 1)(x + 4)$ |
| 13. $(x - 3)(x - 4)$ | 14. $(x - 3)(x - 6)$ |
| 15. $(x - 4)(x - 5)$ | 16. $(x - 2)(x - 12)$ |
| 17. $(x - 3)(x - 9)$ | 18. $(x - 4)(x - 9)$ |
| 19. $(2x - 1)(x - 3)$ | 20. $(3x - 2)(x - 5)$ |
| 21. $(5x - 2)(x - 3)$ | 22. $(3x - 5)(x - 4)$ |
| 23. $(?x - ?)(? - ?)$ | 24. $(3x - 5)(x - 3)$ |
| 25. $(x + 2)(x - 6)$ | 26. $(x + 2)(x - 5)$ |
| 27. $(x - 2)(x + 9)$ | 28. $(x - 3)(x + 10)$ |
| 29. $(x + 2)(x - 15)$ | 30. $(x + 2)(x - 20)$ |

Answers

- | | |
|------------------------|------------------------|
| 31. $(2x + 3)(x - 5)$ | 32. $(3x - 4)(x + 5)$ |
| 33. $(5x + 3)(x - 3)$ | 34. $(x + 6)(x - 12)$ |
| 35. $(4x - 1)(2x + 3)$ | 36. $(2x - 1)(x - 9)$ |
| 37. $(4x - 5)(3x + 1)$ | 38. $(3x + 5)(2x - 3)$ |
| 39. $(4x - 1)(2x - 3)$ | 40. $(3x - 2)(x + 5)$ |
| 41. $(3x + 4)(3x + 4)$ | 42. $(5x - 1)(x - 6)$ |
| 43. $(3x - 7)(x + 2)$ | 44. $(3x - 1)(2x - 3)$ |
| 45. $(4x - 5)(3x - 2)$ | 46. $(9x - 2)(x + 3)$ |
| 47. $(6x - 11)(x + 2)$ | 48. $(9x - 10)(x + 1)$ |
| 49. $(4x - 3)(x - 2)$ | 50. $(5x + 4)(2x - 5)$ |
| 51. $(9x - 4)(4x + 1)$ | 52. $(4x - 3)(3x - 2)$ |
| 53. $(3x - 4)(5x + 2)$ | 54. $(6x + 5)(4x - 3)$ |