Topic: Factorisation of Algebraic Expressions

Marks: 25 Time: 40 minutes Date: _____

Name: _____ Class: _____

Registration Number: _____ Note: Calculator is **NOT** allowed.

Q1. Factorise each of the following:

(a) $3x^2 + 9x$

.....[1]

(b) $a^2b^3 - a^5b^2 + 2a^4b^6$

.....[2]

(c) $14x - 56xy - 42xz$

.....[2]

Q2. Factorise each of the following:

(a) $6x^2 + 2x + 12x + 4$

.....[2]

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

.....[2]

(c) $6p^2 - 18p + 2pq - 6q$

.....[2]

Q3. Factorise each of the following:

(a) $x^2 - 16$

.....[1]

(b) $9a^2 - 4$

.....[1]

(c) $25m^2 - 49$

.....[1]

(d) $2x^2 - 18$

.....[2]

(e) $2p^2 - 50$

.....[2]

Q4. Factorise the following:

(a) $x^2 + x - 6$

.....[1]

(b) $2x^2 + 7x + 3$

.....[2]

(c) $2x^2 - 7x - 15$

.....[2]

(d) $x^2 - xy - 2y^2$

.....[2]

Answers

$Q1$: (a) $3x(x+3)$, (b) $a^2b^2(b - a^3 + 2a^2b^4)$, (c) $14x(1 - 4y - 3z)$

Q2: (a) $2(3x+1)(x+2)$, (b) $(x^2+1)(x-1)$, (c) $2(p-3)(3p+q)$

Q3: (a) $(x-4)(x+4)$, (b) $(3a-2)(3a+2)$, (c) $(5m-7)(5m+7)$, (d) $2(x-3)(x+3)$,
(e) $2(p-5)(p+5)$

Q4: (a) $(x+3)(x-2)$, (b) $(2x+1)(x+3)$, (c) $(2x+3)(x-5)$, (d) $(x+y)(x-2y)$

Solution

Q1. Factorise each of the following:

(a) $3x^2 + 9x$

$= 3x(x + 3)$

Answer: $3x(x + 3)$

(b) $a^2b^3 - a^5b^2 + 2a^4b^6$

Step 1: Find the greatest common factor (GCF) of all terms. GCF $= a^2b^2$

Step 2: Factor out a^2b^2

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

Answer: $a^2b^2(b - a^3 + 2a^2b^4)$

(c) $14x - 56xy - 42xz$

Step 1: Find the GCF of all terms. GCF $= 14x$

Step 2: Factor out $14x$

$= 14x(1 - 4y - 3z)$

Answer: $14x(1 - 4y - 3z)$

Q2. Factorise each of the following:

(a) $6x^2 + 2x + 12x + 4$

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

$= (6x + 2)(x + 2)$

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

Answer: $2(3x + 1)(x + 2)$

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

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

Answer: $(x^2 + 1)(x - 1)$

(c) $6p^2 - 18p + 2pq - 6q$

$= (6p^2 - 18p) + (2pq - 6q)$
$= 6p(p - 3) + 2q(p - 3)$
$= (6p + 2q)(p - 3) = 2(3p + q)(p - 3)$

Answer: $2(p - 3)(3p + q)$

Q3 Factorise each of the following:

(a) $x^2 - 16$

$= x^2 - 4^2$ Difference of squares:

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

Answer: $(x - 4)(x + 4)$

(b) $9a^2 - 4$

$= (3a)^2 - 4^2$ Difference of squares:

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

Answer: $(3a - 2)(3a + 2)$

(c) $25m^2 - 49$

$= (25m)^2 - 7^2$ Difference of squares:

$= (5m - 7)(5m + 7)$

Answer: $(5m - 7)(5m + 7)$

(d) $2x^2 - 18$

$= 2(x^2 - 9)$
$= 2(x^2 - 3^2)$ Difference of squares:

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

Answer: $2(x - 3)(x + 3)$

(e) $2p^2 - 50$

$= 2(p^2 - 25)$
$= 2(p^2 - 5^2)$ Difference of squares:

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

Answer: $2(p - 5)(p + 5)$

Q4. Factorise each of the following:

(a) $x^2 + x - 6$

Step 1: Find two numbers that multiply to -6 and add to 1: 3and -2

Step 2: Split middle term:

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

Step 3: Factor by grouping:

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

Answer: $(x + 3)(x - 2)$

(b) $2x^2 + 7x + 3$

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

Answer: $(2x + 1)(x + 3)$

(c) $2x^2 - 7x - 15$

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

Answer: $(2x + 3)(x - 5)$

(d) $x^2 - xy - 2y^2$

$= x^2 - 2xy + xy - 2y^2$

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

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

Answer: $(x - 2y)(x + y)$