Year 9 factorising worksheet

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Name: _____ Date: _____

Question 1

Factorise fully:

(a) 15x - 25 (b) 12ab + 18a (c) -4m² - 10m

Answer: _____

Question 2

Factorise:

(a) x² - 36 (b) 49 - a² (c) 4m² - 25

Answer: _____

Question 3

Factorise x² + 3x + 2x + 6 by grouping in pairs.

Answer: _____

Question 4

Factorise x² - x - 12.

Answer: _____

Question 5

Factorise 2x² + 7x + 3.

Answer: _____

Question 6

Factorise 8x²y - 12xy².

Answer: _____

Question 7

Factorise 9x² - 16y².

Answer: _____

Question 8

Factorise ab + 4a + 3b + 12.

Answer: _____

Question 9

Factorise $x^2 - 3x - 18$.

Answer: _____

Question 10

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

Answer: _____

Year 9 factorising: answers and worked solutions

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Question 1

Key idea: Take out the highest common factor (HCF) of the numbers and the pronumerals. If the first term is negative, take out a negative factor.

1. (a) HCF = 5: 15x - 25 = 5(3x - 5) 2. (b) HCF = 6a: 12ab + 18a = 6a(2b + 3) 3. (c) HCF = -2m: -4m² - 10m = -2m(2m + 5)

Answer: (a) 5(3x - 5) (b) 6a(2b + 3) (c) -2m(2m + 5)

Question 2

Key idea: A difference of two squares factorises as a² - b² = (a - b)(a + b).

1. (a) x² - 6² = (x - 6)(x + 6) 2. (b) 7² - a² = (7 - a)(7 + a) 3. (c) (2m)² - 5² = (2m - 5)(2m + 5)

Answer: (a) (x - 6)(x + 6) (b) (7 - a)(7 + a) (c) (2m - 5)(2m + 5)

Question 3

Key idea: Group the four terms into two pairs, take out a common factor from each pair, then take out the common bracket.

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

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

Question 4

Key idea: Find two integers that multiply to the constant term and add to the coefficient of x. Write the expression as a product of two binomial factors.

1. Find two numbers that multiply to -12 and add to -1. 2. Test factor pairs of -12: 3 × (-4) = -12 and 3 + (-4) = -1. ✓ 3. Write the factorised form: (x + 3)(x - 4) 4. Check by expanding: (x + 3)(x - 4) = x² - 4x + 3x - 12 = x² - x - 12 ✓

Answer: (x + 3)(x - 4)

Question 5

Key idea: For ax² + bx + c, find two numbers that multiply to ac and add to b, split the middle term, then group in pairs.

1. ac = 2 × 3 = 6; the numbers 6 and 1 multiply to 6 and add to 7 2. 2x² + 6x + x + 3 = 2x(x + 3) + 1(x + 3) 3. = (x + 3)(2x + 1)

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

Question 6

Key idea: Find the HCF of the numbers (4) and of the pronumerals (xy).

1. HCF = 4xy 2. $8x^2y \div 4xy = 2x$ and $12xy^2 \div 4xy = 3y$ 3. $8x^2y - 12xy^2 = 4xy(2x - 3y)$

Answer: 4xy(2x - 3y)

Question 7

Key idea: Write each term as a perfect square, then use $a^2 - b^2 = (a - b)(a + b)$.

1. $9x^2 = (3x)^2$ and $16y^2 = (4y)^2$ 2. $9x^2 - 16y^2 = (3x - 4y)(3x + 4y)$

Answer: (3x - 4y)(3x + 4y)

Question 8

Key idea: Group the first two terms and the last two terms, and factorise each pair.

1. a(b + 4) + 3(b + 4) 2. (b + 4)(a + 3)

Answer: (b + 4)(a + 3)

Question 9

Key idea: To factorise a monic quadratic $x^2 + bx + c$, find two numbers that multiply to c and add to b.

1. Identify b = -3 and c = -18. 2. List factor pairs of -18: (1, -18),, (-1, 18),, (2, -9),, (-2, 9),, (3, -6),, (-6, 3). 3. Find the pair that adds to -3: -6 + 3 = -3. ✓ 4. Write the factorised form: $x^2 - 3x - 18 = (x - 6)(x + 3)$. 5. **Check** by expanding: $(x-6)(x+3) = x^2 + 3x - 6x - 18 = x^2 - 3x - 18$. ✓

Answer: (x-6)(x+3)

Question 10

Key idea: Find two numbers with product ac = 24 and sum b = -10, then split the middle term.

1. -6 and -4 multiply to 24 and add to -10 2. $3x^2 - 6x - 4x + 8 = 3x(x - 2) - 4(x - 2)$ 3. $= (x - 2)(3x - 4)$

Answer: (3x - 4)(x - 2)