Factorising non-monic quadratics: 10 practice questions

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Name: _____ Date: _____

Attempt all questions and show your working. Suggested time: 15 to 20 minutes.

Section A: Consolidating (Questions 1-4)

Question 1

Factorise:

(a) $x^2 + 8x + 15$

(b) $x^2 - 2x - 24$

Question 2

Factorise using the difference of two squares:

(a) $x^2 - 64$

(b) $4a^2 - 25$

Question 3

Solve:

(a) $x^2 - 7x + 12 = 0$

(b) $x^2 = 5x$

Question 4

Expand and simplify:

(a) $(4x - 3)(x + 2)$

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

Section B: Standard (Questions 5-10)

Question 5

Factorise each non-monic quadratic.

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

(b) $3x^2 - 10x + 8$

(c) $5x^2 + 13x - 6$

(d) $6x^2 - x - 2$

Question 6

Factorise fully. Look for a common factor first.

(a) $4x^2 - 6x - 4$

(b) $-x^2 + 3x + 10$

(c) $12x^2 - 27$

Question 7

Solve by factorising.

(a) $2x^2 - 5x - 3 = 0$

(b) $3x^2 + 11x = 4$

(c) $4x^2 = 9$

Question 8

Solve by completing the square.

(a) $x^2 + 6x - 7 = 0$

(b) $x^2 - 4x - 1 = 0$ (give exact answers)

Question 9

Use the quadratic formula to solve each equation. Give exact answers, then answers correct to two decimal places.

(a) $x^2 + 3x - 5 = 0$

(b) $2x^2 - 4x - 3 = 0$

Question 10

Use the discriminant to state how many real solutions each equation has.

(a) $x^2 - 6x + 9 = 0$

(b) $2x^2 + 3x + 5 = 0$

(c) $3x^2 - 2x - 4 = 0$

Factorising non-monic quadratics: answers

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Question 1

Answer: (a) $(x + 3)(x + 5)$ (b) $(x - 6)(x + 4)$ (factors may be in either order)

Question 2

Answer: (a) $(x - 8)(x + 8)$ (b) $(2a - 5)(2a + 5)$

Question 3

Answer: (a) $x = 3$ or $x = 4$ (b) $x = 0$ or $x = 5$ ($x(x - 5) = 0$; dividing by x loses $x = 0$)

Question 4

Answer: (a) $4x^2 + 5x - 6$ (b) $4x^2 - 4x + 1$

Question 5

Answer: (a) $(2x + 1)(x + 3)$ (b) $(3x - 4)(x - 2)$ (c) $(5x - 2)(x + 3)$ (d) $(2x + 1)(3x - 2)$ (factors may be in either order)

Question 6

Answer: (a) $2(2x + 1)(x - 2)$ (b) $-(x - 5)(x + 2)$ (also accept $(5 - x)(x + 2)$) (c) $3(2x - 3)(2x + 3)$

Question 7

Answer: (a) $x = -\frac{1}{2}$ or $x = 3$ ($(2x + 1)(x - 3) = 0$) (b) $x = \frac{1}{3}$ or $x = -4$ ($(3x - 1)(x + 4) = 0$) (c) $x = \pm 3/2$

Question 8

Answer: (a) $x = 1$ or $x = -7$ ($(x + 3)^2 = 16$) (b) $x = 2 \pm \sqrt{5}$ ($(x - 2)^2 = 5$)

Question 9

Answer: (a) $x = (-3 \pm \sqrt{29})/(2)$, so $x \approx 1.19$ or $x \approx -4.19$ (b) $x = (4 \pm \sqrt{40})/(4) = (2 \pm \sqrt{10})/(2)$, so $x \approx 2.58$ or $x \approx -0.58$

Question 10

Answer: (a) $\Delta = 0$: one solution (b) $\Delta = -31$: no real solutions (c) $\Delta = 52$: two solutions