

Factoring Polynomials with Patterns and Grouping

Grade 9 – Algebra 1 math · Test Answer Key · Standards: A-SSE.A.2, A-SSE.B.3a

Use this answer key to score the test out of 20 points. Each solution shows the factoring steps and where points are earned. Accept equivalent factorizations written in a different order.

Standards: A-SSE.A.2, A-SSE.B.3a · **Level:** Grade 9 Algebra 1

Question 1 Greatest Common Factor (2 points)

GCF: $5x^2y$. Dividing gives $4x$ and $7y$.

$$5x^2y(4x - 7y)$$

Scoring: 1 point for the correct GCF, 1 point for the second factor.

Question 2 Two Trinomials (2 points)

- a. Product 36, sum -13 : -4 and -9 . $(x - 4)(x - 9)$
- b. Product -45 , sum 4 : 9 and -5 . $(x + 9)(x - 5)$

Scoring: 1 point per part.

Question 3 Difference of Squares (2 points)

- a. $(9x + 4)(9x - 4)$
- b. $(5 + 7y)(5 - 7y)$

Scoring: 1 point per part.

Question 4 Perfect Squares (2 points)

- a. $(2x)^2$, 7^2 and $2(2x)(7) = 28x$: $(2x + 7)^2$
- b. x^2 , 9^2 and $-2(x)(9) = -18x$: $(x - 9)^2$

Scoring: 1 point per part.

Question 5 Leading Coefficient Not 1 (3 points)

$ac = -60$ and the sum is -11 : -15 and 4 . Split: $6x^2 - 15x + 4x - 10 = 3x(2x - 5) + 2(2x - 5)$.

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

Scoring: 1 point for the correct pair of numbers, 1 point for grouping, 1 point for the final factors.

Question 6 Factor by Grouping (2 points)

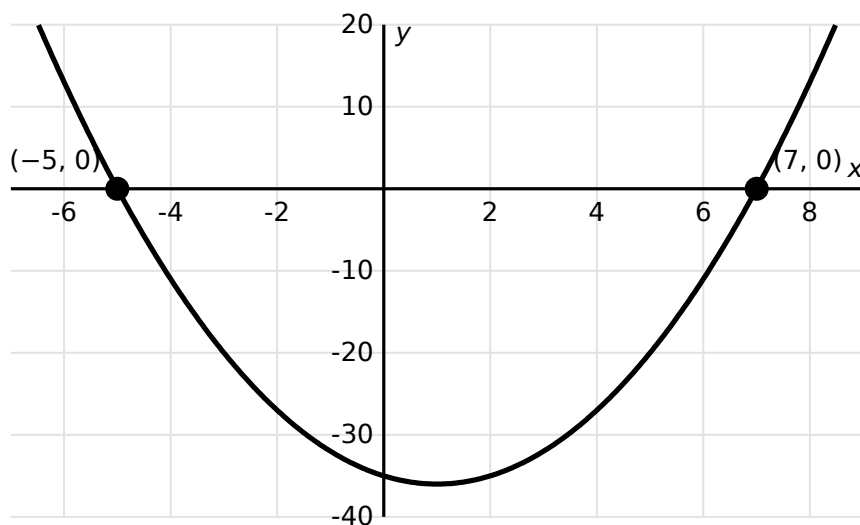
$4x^2(x + 3) - 5(x + 3)$.

$(4x^2 - 5)(x + 3)$

Scoring: 1 point for grouping correctly, 1 point for the final factors.

Question 7 Zeros from a Graph (3 points)

- Product -35 , sum -2 : -7 and 5 . **$f(x) = (x - 7)(x + 5)$**
- Set each factor to 0: **$x = 7$ and $x = -5$** .
- They are the x-intercepts: the graph crosses the x-axis at $(-5, 0)$ and $(7, 0)$.



The zeros are -5 and 7 .

Scoring: 1 point per part.

Question 8 Garden Dimensions (2 points)

Factor: $2x^2 + 13x + 15 = (2x + 3)(x + 5)$.

Length $2x + 3$ feet

Scoring: 1 point for factoring the area, 1 point for identifying the length.

Question 9 Factor Completely (2 points)

$$5x^2 - 45 = 5(x^2 - 9) = 5(x + 3)(x - 3).$$

$5(x + 3)(x - 3)$. Each binomial is linear, so none can be factored further.

Scoring: 1 point for the factorization, 1 point for the explanation.