

Advanced Math

SAT · SAT · SAT

Scope and prerequisites

Digital SAT framework; original paper practice is nonadaptive and gives no scaled-score prediction.

- Transform equivalent polynomial and rational expressions
- Solve nonlinear equations and systems
- Interpret quadratic and exponential functions

Prerequisites: Distributive law; difference of squares; real square roots.

Explain and choose the method

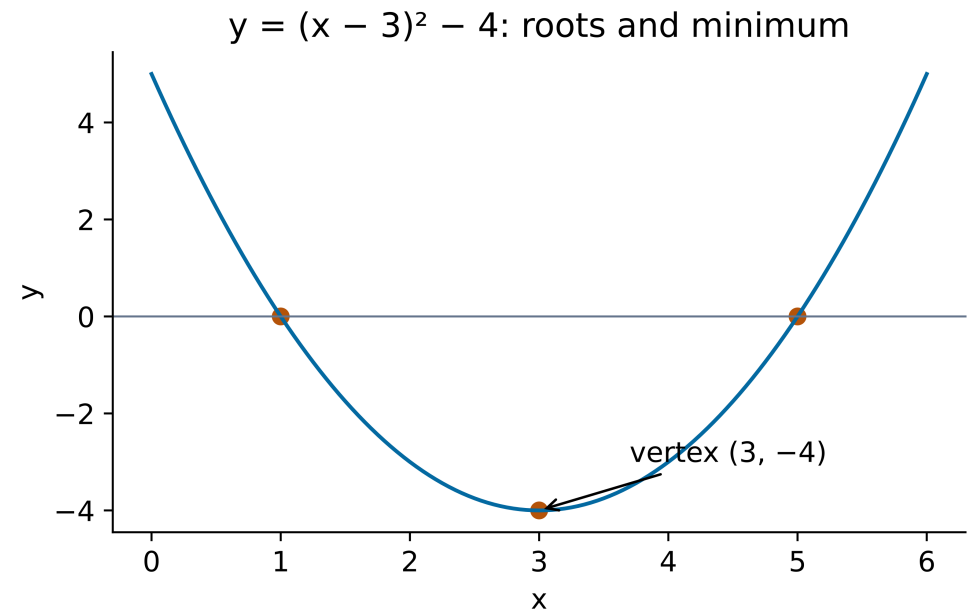
Factor a quadratic when possible. The zero-product rule applies to a product equal to zero.

Completing the square reveals a vertex: $x^2 - 6x + 5 = (x - 3)^2 - 4$.

For rational expressions, record excluded denominator values before cancelling factors.

An exponential model multiplies by a fixed factor per interval. A 20% increase means multiply by 1.2, not add 0.2.

Equivalent expressions must agree on the stated domain. $E(x) = (x^2 - 25)/(x - 5) = (x + 5)$ only for $x \neq 5$. Cancellation removes a factor, but it cannot restore an excluded input. Also $\sqrt{x^2} = |x|$, because the principal square root cannot be negative.



Original worked example from existing native teaching; transfer tasks use their own data.

Existing worked example: Solve $x^2 - 5x + 6 = 0$. Factor: $(x - 2)(x - 3) = 0$. Thus $x = 2$ or 3. If instead $(x^2 - 5x + 6)/(x - 2) = 0$, $x = 2$ is excluded; only 3 remains.

Complete original context

Every transfer question states all data it needs.

Independent practice and checked reasoning

This overview is completed through the detailed skill sequence: 10, 11, 12. Work those references and sheets in order; this orientation does not replace them.

■ Transfer 1

Simplify $F(x) = (x^2 - 4x)/(x^2 - 16)$. State every original restriction and explain why F is not identical to $x/(x + 4)$ on that latter formula's whole domain.

Reasoning: Factor numerator $x(x - 4)$ and denominator $(x - 4)(x + 4)$. The original domain excludes $x = 4, -4$. Cancellation gives $F(x) = x/(x + 4)$ for $x \neq 4, -4$. The latter formula alone permits 4, where it gives $1/2$, while $F(4)$ is undefined.

■ Transfer 2

Find the coefficient of x in $(3x - 2)(x + 5)$ and evaluate $\sqrt{(x - 5)^2}$ when $x = 1$.

Reasoning: Expansion gives $3x^2 + 15x - 2x - 10 = 3x^2 + 13x - 10$, so the coefficient is 13. The root is $|x - 5|$; at $x = 1$, it is $|-4| = 4$, not -4 or 16.

■ Transfer 3

A student tests $x = 2$ and concludes that x^2 and $2x$ are equivalent. Refute the conclusion and solve where they actually agree.

Reasoning: At $x = 3$ the outputs are 9 and 6, so one matching test is not proof. Solve $x^2 = 2x$ as $x(x - 2) = 0$, giving only $x = 0, 2$.

Limits and next use

Squaring an equation can add extraneous roots. Substitute into the original equation, not just the transformed one.

All tasks here are public original practice with authored guidance. They are not official questions or fresh diagnostics. Existing protected tests and mocks remain separate.