Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Discriminant and Real Roots

Discriminant and Real Roots | A1-U09-P11

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Discriminant and Real Roots.

8 PDFs and a README; 89 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Algebra 1

Discriminant and Real Roots

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Consider $x^2 - 5x + 6 = 0$. The coefficients are real. Compute only the discriminant and state the number of distinct real roots. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____	Consider $x^2 + 4x + 4 = 0$. The coefficients are real. Classify the real roots from b squared minus $4ac$, without finding the root. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____
Consider $x^2 + 2x + 5 = 0$. The coefficients are real. Use the sign of the formula radicand to classify this equation. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____	Consider $2x^2 - 3x - 2 = 0$. The coefficients are real. Determine the distinct real-root count from the discriminant alone. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____
Consider $2x^2 + x + 2 = 0$. The coefficients are real. Calculate the discriminant sign and interpret it over the reals. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____	Consider $x^2 - 9 = 0$. The coefficients are real. Insert the absent linear coefficient and classify by discriminant sign. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____
Consider $x^2 + 9 = 0$. The coefficients are real. Make $b = 0$ explicit before determining the real-root count. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____	Consider $-2x^2 - 3x - 5 = 0$. The coefficients are real. Track all three signs and classify the roots without multiplying by -1. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: _____

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Consider $0x^2 + 5x - 1 = 0$. The coefficients are real. Explain why the quadratic discriminant classification is unavailable here.	Consider $-x^2 + 4x - 4 = 0$. The coefficients are real. Retain the negative leading coefficient and evaluate the discriminant.
Consider $4x^2 - 12x + 9 = 0$. The coefficients are real. Check whether the two discriminant terms cancel for this scaled equation.	Consider $(\frac{1}{3})x^2 + (\frac{2}{3})x + \frac{1}{3} = 0$. The coefficients are real. Compute the rational discriminant exactly and classify distinct roots.
Consider $7x^2 = 0$. The coefficients are real. Account for both missing terms and count distinct real roots.	Consider $3(x - 2)^2 = 6x - 15$. The coefficients are real. Expand the square, collect the external linear expression, and classify the resulting contact.

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: D = 41; two distinct irrational roots.

Consider $4x^2 + 3x - 1 = x^2 - 2x + 1$. The coefficients are rational. Collect both polynomials and classify the two exact roots arithmetically. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots.

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Consider $x^2 + 4x + k = 0$. Let k be real. Partition all real k by the number of distinct real roots. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Consider $2x^2 + 3x + k = 0$. Let k be real. Find the exact constant threshold for zero, one, and two real roots. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Consider $3x^2 - 6x + k = 0$. Let k be real. Use the discriminant to classify every real k without solving any quadratic. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Consider $-x^2 + 2x + k = 0$. Let k be real. Track the inequality direction for a parameter with negative leading coefficient. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

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Full Worked Solutions - excerpt

Worked example

Problem. Consider $-3x^2 + x + 1 = 0$. The coefficients are rational. Use the positive nonsquare discriminant to classify exact root type. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots.

Answer. D = 13; two distinct irrational roots.

Explanation and check.

The discriminant calculation is $(1)^2 - 4(-3)(1) = 13$. Its square root is $\sqrt{13}$. The coefficients are rational, but $\sqrt{13}$ is not, so both real roots are irrational. The discriminant is 13; its square root is $\sqrt{13}$, so the equation has two distinct irrational roots.

Worked example

Problem. Consider $2x^2 - 8 = 0$. The coefficients are rational. Insert $b = 0$ and determine whether the symmetric roots are rational. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots.

Answer. D = 64; two distinct rational roots.

Explanation and check.

The discriminant calculation is $(0)^2 - 4(2)(-8) = 64$. Its square root is 8. The discriminant 64 has rational radical 8. The discriminant is 64; its square root is 8, so the equation has two distinct rational roots.