

Math Sheet

Name _____ Score _____ / 12 Teacher _____ Date _____

Rational Root Theorem

List all possible rational zeros. For the final six problems, also find every actual rational zero and its multiplicity.

A. List all possible rational zeros

1. $2x^3 - 38x - 60$

2. $x^4 - 16x^3 + 77x^2 - 134x + 72$

3. $7x^2 - 36x + 32$

4. $x^2 + 21x + 80$

5. $x^3 + 11x^2 + 26x + 16$

6. $2x^4 - 13x^3 - 139x^2 + 78x + 72$

B. List possible zeros, then find actual zeros

7. $2x^4 + 2x^3 - 38x^2 + 22x + 60$

8. $x^2 + 30x + 81$

9. $2x^3 + 29x^2 + 99x + 90$

10. $x^4 - 12x^3 + 51x^2 - 92x + 60$

11. $x^3 - 15x^2 + 47x - 33$

12. $3x^2 - 29x - 44$

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Rational Root Theorem

Answer key

List all possible rational zeros. For the final six problems, also find every actual rational zero and its multiplicity.

A. List all possible rational zeros

1. $2x^3 - 38x - 60$

Possible: $\pm 1/2, \pm 1, \pm 3/2, \pm 2, \pm 5/2, \pm 3, \pm 4, \pm 5, \pm 6, \pm 15/2, \pm 10, \pm 12, \pm 15, \pm 20, \pm 30, \pm 60$

2. $x^4 - 16x^3 + 77x^2 - 134x + 72$

Possible: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 9, \pm 12, \pm 18, \pm 24, \pm 36, \pm 72$

3. $7x^2 - 36x + 32$

Possible: $\pm 1/7, \pm 2/7, \pm 4/7, \pm 1, \pm 8/7, \pm 2, \pm 16/7, \pm 4, \pm 32/7, \pm 8, \pm 16, \pm 32$

4. $x^2 + 21x + 80$

Possible: $\pm 1, \pm 2, \pm 4, \pm 5, \pm 8, \pm 10, \pm 16, \pm 20, \pm 40, \pm 80$

5. $x^3 + 11x^2 + 26x + 16$

Possible: $\pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

6. $2x^4 - 13x^3 - 139x^2 + 78x + 72$

Possible: $\pm 1/2, \pm 1, \pm 3/2, \pm 2, \pm 3, \pm 4, \pm 9/2, \pm 6, \pm 8, \pm 9, \pm 12, \pm 18, \pm 24, \pm 36, \pm 72$

B. List possible zeros, then find actual zeros

7. $2x^4 + 2x^3 - 38x^2 + 22x + 60$

Possible: $\pm 1/2, \pm 1, \pm 3/2, \pm 2, \pm 5/2, \pm 3, \pm 4, \pm 5, \pm 6, \pm 15/2, \pm 10, \pm 12, \pm 15, \pm 20, \pm 30, \pm 60$

Actual: -5 (multiplicity 1), -1 (multiplicity 1), 2 (multiplicity 1), 3 (multiplicity 1)

8. $x^2 + 30x + 81$

Possible: $\pm 1, \pm 3, \pm 9, \pm 27, \pm 81$

Actual: -27 (multiplicity 1), -3 (multiplicity 1)

9. $2x^3 + 29x^2 + 99x + 90$

Possible: $\pm 1/2, \pm 1, \pm 3/2, \pm 2, \pm 5/2, \pm 3, \pm 9/2, \pm 5, \pm 6, \pm 15/2, \pm 9, \pm 10, \pm 15, \pm 18, \pm 45/2, \pm 30, \pm 45, \pm 90$

Actual: -10 (multiplicity 1), -3 (multiplicity 1), -3/2 (multiplicity 1)

10. $x^4 - 12x^3 + 51x^2 - 92x + 60$

Possible: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 5, \pm 6, \pm 10, \pm 12, \pm 15, \pm 20, \pm 30, \pm 60$

Actual: 2 (multiplicity 2), 3 (multiplicity 1), 5 (multiplicity 1)

11. $x^3 - 15x^2 + 47x - 33$

Possible: $\pm 1, \pm 3, \pm 11, \pm 33$

Actual: 1 (multiplicity 1), 3 (multiplicity 1), 11 (multiplicity 1)

12. $3x^2 - 29x - 44$

Possible: $\pm 1/3, \pm 2/3, \pm 1, \pm 4/3, \pm 2, \pm 11/3, \pm 4, \pm 22/3, \pm 11, \pm 44/3, \pm 22, \pm 44$

Actual: -4/3 (multiplicity 1), 11 (multiplicity 1)