

1.11 Equivalent Representations of Polynomial and Rational Expressions

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS factored form 因式分解形式 • standard form 标准形式 • end behavior 末端行为 • hole 空洞
• zero 零点

Objective

Build the skills to answer exam questions on **equivalent representations of polynomial and rational expressions**.

You must be able to:

- use the **factored form** 因式分解形式 to read off zeros, intercepts, asymptotes, and holes
- use the **standard form** 标准形式 to read off end behavior

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Two useful forms

- **Factored form** shows the **real zeros** directly, revealing x -intercepts, vertical asymptotes, holes, and domain.
- **Standard form** (expanded) shows the **leading term**, revealing **end behavior**.

■ Example

$p(x) = (x - 1)(x + 3)$ has x -intercepts at 1 and -3 ; expanded, $p(x) = x^2 + 2x - 3$ shows an upward parabola (even degree, positive leading coefficient).

2 Practice

2.1 State what the factored form of a function reveals. [1]

2.2 State what the standard (expanded) form reveals. [1]

2.3 For $p(x) = (x - 1)(x + 3)$, state the x -intercepts. [2]

3 Exam-style questions

3.1 The factored form of a polynomial readily shows its [1]

- **A** end behavior
 - **B** real zeros / x -intercepts
 - **C** leading coefficient only
 - **D** nothing useful
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3.2 The standard form best reveals a function's [1]

- **A** holes
 - **B** end behavior
 - **C** x -intercepts
 - **D** domain
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3.3 $p(x) = (x - 2)(x + 5)$.

(a) State the x -intercepts. [1]

(b) Expand to standard form. [2]

Solutions

2.1 the real zeros, and hence x -intercepts, asymptotes, holes, and domain.

2.2 the end behavior (via the leading term).

2.3 $x = 1$ and $x = -3$.

3.1 B.

3.2 B.

3.3 (a) $x = 2$ and $x = -5$. (b) $x^2 + 3x - 10$.