Revised Scaffolded Questions for Algebra 2 Assessment (Questions 33–38)

This document provides revised scaffolded questions to help students prepare for questions 33 through 38 of the enVision Algebra 2 Progress Monitoring Assessment Form C. Each question includes four scaffolded steps to build understanding from basic concepts to the level required by the assessment, with clear guidance for concept-naive students.

Question 33: Linear vs Exponential Growth Models

The original question involves modeling Lucia's linear (12 residents/day) and Caleb's exponential (4 people, each contacting 4 more daily) growth, combining them, applying a 35

33.1 **Linear Models**: Linear functions $f(x) = mx + b$ have a constant rate m:

a) 10 contacts/day: $f(x) = 10x$

b) 5 units/week, initial 20: $f(x) =$ ______$x +$ ______

c) Why constant rate? __________________

33.2 **Exponential Models**: Exponential functions $f(x) = ab^x$ model multiplicative growth:

a) Triples daily, starts at 5: $f(x) = 5 \cdot 3^x$

b) Starts at 2, each contacts 3 more daily: Day 1: 2, Day 2: 6, Day 3: 18 $\rightarrow$ $f(x) =$ ______

c) Why cumulative growth? __________________

33.3 **Combining Models**: Add linear and exponential contributions:

a) Linear: 8x, Exponential: 2^x: $g(x) = 8x + 2^x$

b) Linear: 10x, Exponential: 3^x, 30

c) For $x = 2$: $h(2) =$ ______

33.4 **Applying to the Original Problem**: Lucia: 12x, Caleb: 4^x, 35

a) Combined: $g(x) = 12x + 4^x$

b) Votes: $h(x) = 0.35(12x + 4^x)$

c) For $x = 7$: $12 \cdot 7 = 84$, $4^7 = 16384$, $h(7) = 0.35(84 + 16384) \approx$ ______

Question 34: Rational Equations and Extraneous Solutions

The original question asks to solve $\frac{x^2+4}{x-1} = \frac{5}{x-1}$ and identify extraneous solutions. The following questions build understanding of rational equations.

34.1 **Basic Rational Equations**: If denominators are equal, equate numerators:

a) $\frac{x+2}{x-3} = \frac{5}{x-3}$: $x + 2 = 5$, $x = 3$.
Check: $x = 3$ makes denominator zero (extraneous).

b) $\frac{2x}{x+1} = \frac{4}{x+1}$: $x =$ ______. Check: ______.

34.2 **Extraneous Solutions**: Solutions making denominators zero are extraneous:

a) $\frac{x}{x-4} = \frac{2}{x-4}$: Extraneous: $x =$ ______

b) Solve: $x = 2$. Check: ______.

34.3 **Solving Equations**: Solve $\frac{x^2+1}{x-2} = \frac{3}{x-2}$:

a) Restriction: $x \neq 2$

b) Equate: $x^2 + 1 = 3$, $x^2 = 2$, $x = \pm\sqrt{2}$

c) Check: Neither $\sqrt{2}$ nor $-\sqrt{2}$ equals 2 (valid).

34.4 **Applying to the Original Problem**: Solve $\frac{x^2+4}{x-1} = \frac{5}{x-1}$:

a) Restriction: $x \neq 1$

b) Equate: $x^2 + 4 = 5$, $x^2 = 1$, $x = \pm 1$

c) Check: $x = 1$ is extraneous, $x = -1$ is valid.

d) Answer: $x = -1$, extraneous: $x = 1$.

Question 35: Discontinuities in Rational Functions

The original question asks where discontinuities occur in $f(x) = \frac{x^2+5x}{x^2-2x-35}$. The following questions build understanding of discontinuities.

35.1 **Factoring Quadratics**: Factor to find zeros:

a) $x^2 - 6x + 8 = (x-2)(x-4)$: Zeros: $x = 2, 4$

b) $x^2 + 3x - 10$: Zeros: ______, ______

35.2 **Finding Discontinuities**: Discontinuities occur where denominator = 0:

a) $f(x) = \frac{x}{x-5}$: Discontinuity: $x = 5$

b) $f(x) = \frac{1}{x^2-4}$: Discontinuities: ______, ______

c) Why discontinuities? ____________________

35.3 **Removable Discontinuities**: Common factors may cancel:

a) $f(x) = \frac{x-1}{x^2-x} = \frac{x-1}{x(x-1)}$: Cancel $x - 1$, discontinuity at $x = 0$

b) $f(x) = \frac{x+2}{x^2+5x+6}$: Discontinuities: ______, ______.

35.4 **Applying to the Original Problem**: For $f(x) = \frac{x^2+5x}{x^2-2x-35}$:

a) Numerator: $x(x+5)$, zeros: $x = 0, -5$

b) Denominator: $(x-7)(x+5)$, zeros: $x = 7, -5$

c) Discontinuities: $x = 7, -5$. At $x = -5$, cancel $x+5$, but original function undefined. Answer: $x = -5, 7$.

Question 36: Set Operations and Probability

The original question asks whether the winning outcomes (odd number or 6) are the union, intersection, or complement of $\{1, 2, 3, 5, 6\}$ and $\{1, 3, 4, 5, 6\}$. The following questions build understanding of set operations.

36.1 **Set Operations**: For $A = \{1, 3, 5\}$, $B = \{2, 4, 6\}$:

a) Union: $A \cup B = \{1, 2, 3, 4, 5, 6\}$

b) Intersection: $A \cap B = \emptyset$

c) Why use union in probability? ____________________

36.2 **Probability Context**: Dice roll, win on 1 or 2:

a) Set: $\{1, 2\}$

b) Outcomes: $\{1, 2, 3, 4, 5, 6\}$. Win $= \{1, 2\}$.

36.3 **Analyzing Sets**: For $\{1, 3, 5\}$, $\{1, 2, 5\}$:

a) Union: $\{1, 2, 3, 5\}$

b) Intersection: $\{1, 5\}$

c) Practice: If win on 1 or 5, which operation? ______.

36.4 **Applying to the Original Problem**: Win on odd or 6:

a) Winning: $\{1, 3, 5, 6\}$

b) Sets: $\{1, 2, 3, 5, 6\}$, $\{1, 3, 4, 5, 6\}$

c) Intersection: $\{1, 3, 5, 6\}$. Answer: Intersection.

Questions 37–38: Conditional Probability and Data Analysis

The original questions involve calculating P(heavy metal | 12th grade) and comparing P(10th grade | rock) vs. P(rock | 10th grade) using a two-way table. The following questions build understanding of conditional probability.

37.1 **Reading Tables**:

	Rock	Hip-Hop	Heavy Metal	Total
10th	16	12	4	32
11th	18	10	12	40
12th	16	8	6	30
Total	50	30	22	102

a) 11th graders, hip-hop: 10

b) Total 10th graders: ______

c) Why use totals? ____________________

37.2 **Basic Probability**: $P(\text{event}) = \frac{\text{favorable}}{\text{total}}$:

a) P(11th grade): $\frac{40}{102}$

b) P(rock | 11th grade): $\frac{18}{40} = \frac{9}{20}$

37.3 **Conditional Probability**: $P(A|B) = \frac{\text{A and B}}{\text{B}}$:

a) P(hip-hop | 10th grade): $\frac{12}{32} = \frac{3}{8}$

b) P(10th grade | hip-hop): $\frac{12}{30} = \frac{2}{5}$. Compare: ______.

37.4 **Applying to the Original Problems**:

a) Q37: P(heavy metal | 12th grade): $\frac{6}{30} = \frac{1}{5} = 20\%$

b) Q38: P(10th grade | rock): $\frac{16}{50} = 0.32$.
P(rock | 10th grade): $\frac{16}{32} = 0.5$.
$0.32 < 0.5$, so P(10th grade | rock) is ______ P(rock | 10th grade).