Revised Scaffolded Questions for Algebra 2 Assessment (Questions 17–20)

This document provides revised scaffolded questions to help students prepare for questions 17 through 20 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 17: Factoring Quadratics and Finding Zeros

The original question asks to factor $x^2 - 33x + 32$ to find the zeros of $f(x) = x^2 - 33x + 32$. The following questions build understanding of factoring quadratics.

17.1 **Basic Factoring**: Factor by finding two numbers that multiply to the constant term and add to the middle coefficient:

a) $x^2 + 7x + 10$: Numbers multiply to 10, add to 7: 2, 5.
Factored: $(x + 2)(x + 5)$

b) $x^2 - 9x + 20$: Numbers multiply to 20, add to -9: -4, -5.
Factored: $(x - 4)(x - 5)$

c) Why does factoring find zeros? __________________

17.2 **Finding Zeros**: Find zeros by setting factors to zero:

a) $f(x) = (x - 3)(x + 6)$: Zeros: $x = 3$, $x = -6$

b) $f(x) = (x - 2)(x - 8)$: Zeros: $x =$ ______, $x =$ ______

c) Verify one zero: For $x = 2$, compute $f(2) = (2 - 2)(2 - 8) =$ ______.

17.3 **Larger Coefficients**: Factor $x^2 - 14x + 45$:

a) Factors of 45: 1×45, 3×15, 5×9.
Add to -14: -5, -9.
Factored: $(x - 5)(x - 9)$

b) Zeros: $x = 5$, $x = 9$

c) Practice: Factor $x^2 - 16x + 60$: Numbers: ______, ______.
Factored: ______. Zeros: ______, ______.

17.4 **Applying to the Original Problem**: Factor $x^2 - 33x + 32$:

a) Factors of 32: 1×32, 2×16, 4×8.
Add to -33: ______, ______.

b) Factored: $(x$______$)(x$______$)$

c) Zeros: $x =$ ______, $x =$ ______

Question 18: Arithmetic Sequences

The original question involves determining if the sequence (Monday: 240, Tuesday: 290, Friday: 440) is arithmetic and predicting Saturday's attendance. The following questions build understanding of arithmetic sequences.

18.1 **Identifying Arithmetic Sequences**: A sequence is arithmetic if differences between consecutive terms are constant:

   a) $4, 7, 10, 13, \ldots$: Differences: $7 - 4 = 3$, $10 - 7 = 3$.
      Arithmetic? Yes. Common difference: $d = 3$.

   b) $8, 6, 4, 2, \ldots$: Differences: $6 - 8 =$ ______, $4 - 6 =$ ______.
      Arithmetic? ______. Common difference: ______.

   c) Why constant differences? __________________

18.2 **Finding Common Differences**: Given festival attendance:

   a) Monday = 200, Tuesday = 250: $d = 250 - 200 =$ ______

   b) Monday = 240, Tuesday = 290: $d =$ ______

c) If Wednesday = 340, check: $340 - 290 =$ ______$. Is it consistent?$______.

18.3 **Recursive Formulas**: For an arithmetic sequence, $a_n = a_{n-1} + d$:

   a) Sequence: $5, 9, 13, 17, \ldots$: $a_1 = 5$, $d = 4$.
      Formula: $a_1 = 5$, $a_n = a_{n-1} + 4$

b) Sequence: 240, 290, 340, ...: $a_1 =$ ______, $d =$ ______.
   $Formula:$ ______.

18.4 **Applying to the Original Problem**: Monday = 240, Tuesday = 290, Friday = 440:

   a) Common difference: $d = 290 - 240 =$ ______.

   b) Recursive formula: $a_1 =$ ______, $a_n =$ ______.

   c) Predict terms: Wednesday = ______, Thursday = ______, Friday = ______.
      Check Friday: Matches 440? ______.

   d) Saturday: ______ people.

Question 19: Solving Equations Graphically

The original question asks to solve $(x - 2)^2 - 1 = (x - 2)^3 + 1$ graphically. The following questions build understanding of graphical solutions.

19.1 **Simple Graphical Solutions**: Solve $x + 2 = 5$:

   a) Graph: $y = x + 2$, $y = 5$.

   b) Intersection: $(3, 5)$. Solution: $x = 3$.

c) Practice: Solve $3x = 9$: Intersection: ______. Solution: ______.

19.2 **Quadratic Equations**: Solve $(x-1)^2 = 9$:

a) Graph: $y = (x-1)^2$, $y = 9$.

b) Intersections: $(-2, 9)$, $(4, 9)$. Solutions: $x = -2$, $x = 4$.

c) Practice: Solve $x^2 = 4$: Solutions: ______, ______.

19.3 **Complex Functions**: Solve $(x-1)^2 = x - 1$:

a) Graph: $y = (x-1)^2$, $y = x - 1$.

b) Move to one side: $(x-1)^2 - (x-1) = 0$.
Factor: $(x-1)(x-2) = 0$. Zeros: $x = 1$, $x = 2$.

c) Practice: Solve $(x-1)^2 = 2x - 2$: Zeros: ______, ______.

19.4 **Applying to the Original Problem**: Solve $(x-2)^2 - 1 = (x-2)^3 + 1$:

a) Set: $(x-2)^2 - 1 - (x-2)^3 - 1 = 0$.

b) Simplify: $(x-2)^2 - (x-2)^3 - 2 = 0$.

c) Let $u = x - 2$: $u^2 - u^3 - 2 = 0$.
Graph $y = u^2 - u^3 - 2$. Find zeros: Test $u = 1$: $1 - 1 - 2 = -2$.
Try numerically or graphically to find $u \approx -1.52$.

d) Solve: $x - 2 \approx -1.52$, so $x \approx 0.48$.

Question 20: Completing the Square

The original question asks for the constant to add to both sides of $3x^2 + 4x = 5$ to complete the square. The following questions build understanding of completing the square.

20.1 **Perfect Square Trinomials**: Complete to form a perfect square:

a) $x^2 + 10x +$ ______ $= (x+5)^2$: Half of 10: 5, squared: 25.

b) $x^2 - 6x +$ ______ $= (x -$ ______$)^2$: Half of -6: -3, squared: 9.

c) $x^2 + 12x +$ ______ $= (x +$ ______$)^2$: ______, ______.

20.2 **Completing the Square ($a = 1$)**: For $x^2 + 8x = 3$:

a) Half of 8: 4, squared: 16.

b) Add: $x^2 + 8x + 16 = 3 + 16$.

c) Factor: $(x+4)^2 = 19$.

d) Practice: For $x^2 + 10x = 6$: Constant: ______. Result: ______.

20.3 **Completing the Square ($a \neq 1$)**: For $2x^2 + 12x = 8$:

a) Factor: $2(x^2 + 6x) = 8$.

b) Complete inside: Half of 6: 3, squared: 9.
$2(x^2 + 6x + 9) = 8 + 2 \cdot 9 = 26$.

c) Simplify: $2(x + 3)^2 = 26$.

d) Constant added to right: $2 \cdot 9 = 18$.

e) Practice: For $4x^2 + 8x = 12$: Constant: ______. Result: ______.

20.4 **Applying to the Original Problem**: For $3x^2 + 4x = 5$:

a) Factor: $3(x^2 + \frac{4}{3}x) = 5$.

b) Complete: Half of $\frac{4}{3}$: $\frac{2}{3}$, squared: $\frac{4}{9}$.
$3\left(x^2 + \frac{4}{3}x + \frac{4}{9}\right) = 5 + 3 \cdot \frac{4}{9}$.

c) Simplify: $3\left(x + \frac{2}{3}\right)^2 = 5 + \frac{12}{9} = 5 + \frac{4}{3} = \frac{19}{3}$.

d) Constant added: $3 \cdot \frac{4}{9} = \frac{4}{3}$. Matches choice (B).