M2H Lesson 12 - Factoring

(A) Skills Review/Consolidation

1. Solve the following equations: (a) $0 = 6x^2 + 23x + 7$ (b) $x^2 = 15 - 2x$
2. Solve the following equations by factoring (a) $0 = 9x^2 - 1/9$ (b) $0 = 1/16x^2 - 3$
3. Factor (a) $4x^2 - 1$ (b) $121 - 16x^2$
4. Factor (a) $x^2 - 8x + 16$ (b) $4x^2 - 4x - 1$
5. Solve the system defined by $\begin{cases} y = x^2 \\ y = 15 - 2x \end{cases}$

(B) Skill Extension

6. Solve for b such that $1/16x^2 - bx + 3$ is a perfect square trinomial
7. Determine the relationship between b and c such that $x^2 + bx + c$ is a perfect square trinomial (HINT: $(x + d)^2$ or list examples and look for relationships)
8. If the roots of a quadratic function are 5 and -2, can you determine an equation for the quadratic function? If so, what is the equation? If not, why not?
9. In a quadratic equation with leading coefficient 1, Mr S reads the coefficient 16 of x wrongly as 19 and obtains the roots -15 and -4. Which of the following are the correct roots of the equation?
10. If the equations $x^2 - 6x + 5$ and $Ax^2 + Bx + 1$ have the same roots, find the value of A + B
11. Is the quadratic $x^2 - x - 6$ divisible by $x - 3$? Explain your answer.
12. If $k x^2 - kx - 6$ is divisible by both $x + 1$ and $x + m$, find the values of m.
13. Find the possible values for p such that $3x^2 + px + 5$ can be factored as a product of two first degree factors with integer coefficients
14. Determine all values of *t* such that all roots of $t(x - 1)(x - 2) = x$ are real

(C) Graphing Connection – Factoring

15. For the equations of parabolas listed below:

    (a) $f(x) = x^2 - x - 6$ (b) $f(x) = 2x^2 - 2x - 60$ (c) $f(x) = 3x^2 - 7x - 6$

    (i) Determine the ROOTS/ZEROES/X-INTERCEPTS
    (ii) Determine the equation of the axis of symmetry
    (iii) Determine the vertex
    (iv) Determine the y-intercept
    (v) Determine f(4)
    (vi) Sketch the parabola

16. Determine the range of the parabola defined by f(x) = (x – 2)(x – R)
17. What is the graphical significance of a perfect square trinomial?
18. What is the graphical significance a difference of squares trinomial?

(D) Applications

19. A projectile's height, *h*(t) in meters, varies with time, *t* in seconds, is modelled by: $h(t) = -5t^2 + 15t + 50$
    a. Determine the flight time of the projectile?
    b. What is a reasonable domain for this application?
    c. Determine the maximum height of the projectile?
    d. When does the projectile reach it maximum height?
    e. When does the projectile reach a height of 60m?

20. Sasha wants to build a walkway of uniform width around a rectangular flower bed that measures 20m x 30m. Her budget is $6000 and it will cost her $10/m² to construct the path. How wide will the walkway be?

(E) WHY Factoring Works

21. State the Zero Product Rule.
22. EXPLAIN why the Zero Product Rule is important.

(F) WHY Factor in the First Place

23. If f(x) = 2x, solve f(x) = 8
24. EXPLAIN the mathematical processes that are going on as you develop your solution ➔ WHY do these mathematical processes WORK in the first place?

25. If $g(x) = 2x^2$, solve g(x) = 8
26. EXPLAIN the mathematical processes that are going on as you develop your solution ➔ WHY do these mathematical processes WORK in the first place?

27. Now solve f(x) + g(x) = 8
28. EXPLAIN the mathematical processes that are going on as you develop your solution ➔ WHY do the previous mathematical processes NOT WORK now?