Name: ……. Date: ……..

Thinking with models _ Quadratic equations

Assessment Criterion: A and C

Criterion A: A: Knowing and Understanding.

Achievement Level	Task-Specific Descriptor	Sample Student Response
1–2	The student selects limited or inappropriate mathematics. The student attempts to apply mathematics but makes frequent errors. Solutions are mostly incorrect or incomplete.	**Q1:** Writes $x^2 + 5x + 6 = 0$ and does not solve. **Q2:** Writes $y + 4 = 780$. **Q3:** Applies Pythagoras incorrectly, e.g. $(x+6)^2 = (x+4)(x+2)$). **Q4:** Does not clear the denominator in 25/m+3 = m+3.
3–4	The student selects appropriate mathematics in familiar situations but struggles in unfamiliar contexts. The student applies mathematics with some success but makes procedural errors. Some solutions are correct.	**Q1:** Correctly factorises but makes a sign error. **Q2:** Forms (y(y+4)=780) but solves incorrectly. **Q3:** Forms the correct equation but makes an expansion error. **Q4:** Clears the denominator correctly but makes a mistake when solving the quadratic.
5–6	The student selects appropriate mathematics in both familiar and unfamiliar situations. The student applies the mathematics successfully and solves most problems correctly in different contexts.	**Q1:** Correctly solves $x^2 + 5x + 6 = 0$. **Q2:** Forms and solves the quadratic correctly but does not justify rejecting the negative solution. **Q3:** Solves correctly but does not explain reasoning clearly. **Q4:** Solves and finds both solutions but does not check restrictions.
7–8	The student consistently selects appropriate mathematics in a wide range of familiar and	**Q1:** Correctly factorises and states both solutions.

	unfamiliar situations. The student applies mathematics accurately and solves problems correctly in a variety of contexts.	**Q2:** Models the situation with a quadratic equation, solves it correctly, and rejects the negative value with justification. **Q3:** Uses Pythagoras correctly, solves the quadratic, and selects the valid solution. **Q4:** Solves the equation, states both solutions, and checks restrictions ((m ≠-3)).

Criterion C: Communicating

Achievement Level	Task-Specific Descriptor	Sample Student Response
1–2	The student uses limited or incorrect mathematical language and symbols. Mathematical representations are unclear or inappropriate. Reasoning is incomplete and information is poorly organized.	**Q1:** Writes answers without showing steps; uses incorrect symbols (e.g. “(x = 2, 3)” without justification). **Q2:** Uses words instead of algebraic notation; equations are missing or unclear. **Q3:** Diagram labels are missing or incorrect. **Q4:** Steps are written in random order.
3–4	The student uses some appropriate mathematical language and representations, mainly in familiar contexts. Reasoning is partially communicated but may lack clarity or logical flow. Organization is inconsistent.	**Q1:** Uses correct symbols but skips steps in factorisation. **Q2:** Writes the quadratic equation correctly but explanations are brief or unclear. **Q3:** Uses a diagram and algebra but does not clearly link them. **Q4:** Shows steps but does not explain why values are rejected.

5–6	The student uses appropriate mathematical language, notation, and representations. The student communicates reasoning clearly and logically, with minor omissions. Information is generally well organized.	**Q1:** Uses correct notation and clearly shows factorisation steps. **Q2:** Forms and solves the equation using algebra and short written explanations. **Q3:** Correctly moves from a geometric diagram to an algebraic equation. **Q4:** Presents steps logically but does not fully justify restrictions.
7–8	The student consistently uses precise mathematical language, symbols, and terminology. The student effectively uses and moves between different representations. Reasoning is complete, coherent, and concise, and information is logically structured.	**Q1:** Uses correct symbols, clear working, and accurate conclusions. **Q2:** Clearly explains the modelling process, solution, and interpretation in context. **Q3:** Links the diagram, Pythagorean theorem, and quadratic equation smoothly. **Q4:** Clearly solves, checks restrictions, and justifies both solutions using correct notation.