

Patterns and Algebra Synthesis

Lesson 20 Worksheet

Name _____

Date _____

Class _____

Section 1 — Skill Practice

Q1. Evaluate each expression when $a = 4$, $b = -2$, $c = 3$.

(a) $a + b + c$ (b) $2a - b$ (c) $a^2 - c^2$ (d) $3b + c^2$ (e) $(a + b)^2$

Q2. Solve each equation. Show all working.

(a) $3x + 7 = 22$ (b) $2(x - 4) = 10$ (c) $5x - 3 = 2x + 12$

(d) $x/4 + 2 = 7$ (e) $3(2x + 1) = 4x + 9$

Q3. Simplify each expression using index laws.

(a) $4^5 \times 4^3$ (b) $x^8 \div x^5$ (c) $(2^3)^4$

(d) $3a^2 \times 4a^5$ (e) $10m^6 \div 2m^2$

Section 2 — Problem Solving

Q4. A pattern of squares is made from matchsticks. Pattern 1 uses 4 matchsticks, Pattern 2 uses 7, Pattern 3 uses 10.

(a) Draw Pattern 4 and state how many matchsticks it uses. **1 mark**

(b) Write a rule for the number of matchsticks M in Pattern n . **1 mark**

(c) How many matchsticks are in Pattern 20? **1 mark**

(d) Which pattern uses 85 matchsticks? **1 mark**

Q5. A shop sells notebooks for \$3 each and pens for \$2 each. Mia buys n notebooks and p pens.

(a) Write an expression for the total cost. **1 mark**

(b) If Mia spends \$26 and buys 4 notebooks, how many pens does she buy? **2 marks**

(c) If Mia buys twice as many pens as notebooks and spends \$21, how many of each does she buy? **2 marks**

Section 3 — Extended Response

Q6. Reflect on your learning in this unit.

(a) Describe a real-world situation where you would use algebra to solve a problem. **1 mark**

(b) Explain the difference between an expression and an equation. **2 marks**

(c) A student says: "If $2x = 10$, then x must be greater than 10." Explain why this is incorrect. **1 mark**

(d) Design your own word problem that can be solved using a two-step equation. Write the equation and the solution. **2 marks**

► **Answer Key**