Worksheet | Algebra

# Explore formulas with digital tools

Name: _____ Date: _____

8 questions | 28 marks | Show your working.

Use exact values where possible. Simplify fractions and state units when required.

Cost: $C = pn + f$. Here $C$ is total dollars, $p$ is dollars per visit, $n$ is visits, and $f$ is a fee paid once. Rectangle perimeter: $P = 2l + 2w$, with $P$, length $l$ and width $w$ in centimetres.

Written companion: calculate and record each comparison here. Complete the digital Formula lab in the lesson separately; this sheet alone does not demonstrate digital-tool use.

**1.** For $C = pn + f$, $p$ is the price per visit, $n$ is visits and $f$ is a fixed fee paid once. Set $p = 3$, $n = 4$, $f = 5$. Show a substitution that evaluates the formula and state the total in dollars. [2 marks]

**2.** In the cost formula $C = pn + f$, hold $p = 5$ and $f = 3$ fixed. Change $n$ through $2, 3, 4$. Record a comparison table showing every input and output, then describe the effect of each extra visit. [4 marks]

**3.** Use $C = pn + f$ with $n = 3$ and $f = 4$ fixed. Vary $p$ through $2, 4, 6$ dollars per visit. Record each total and describe the cost change for each 2-dollar rise in price per visit. [4 marks]

**4.** Keep $p = 4$ and $n = 3$ in $C = pn + f$. Compare $f = 1, 4, 7$. State the three totals, their successive differences, and why this investigation isolates the fixed fee's effect. [3 marks]

**5.** Use $P = 2l + 2w$. Hold $w = 4$ cm fixed and vary $l$ through $3, 5, 7$ cm. Record a table of lengths and perimeters, state the fixed width, and describe the change in perimeter for each 2 cm increase in length. [4 marks]

**6.** A student predicts: 'Doubling a rectangle's length while keeping its width fixed always doubles its perimeter.' Using $P = 2l + 2w$, keep $w = 3$ cm and compare $l = 4$ cm with $l = 8$ cm. Use the two outputs to decide whether the prediction is correct. [3 marks]

**7.** For $C = pn + f$, keep $p = 3$ and $f = 5$. Predict whether changing $n$ from 2 to 4 doubles the total cost. Calculate both settings, record the totals and explain the result using the fixed fee. [4 marks]

**8.** A student records $(p, n, f) = (2, 3, 4)$ giving $C = 10$, then $(3, 5, 4)$ giving $C = 19$. They conclude: 'Raising price per visit by 1 dollar raises total cost by 9 dollars.' Explain the problem. Design and calculate a fair comparison using $n = 3$ and $f = 4$, then state the price change's effect. [4 marks]