Functions and straight-line graphs - Practice test 3

Name: _____ Date: _____

10 questions | 43 marks | 70 minutes

Use functions to connect algebra with measurement and practical restrictions. Justify choices of models.

A scientific calculator may be used.

1. The rule is $f(x) = 3/(2 - x)$. [4 marks]

(a) Evaluate f(-1) and f(5). [2 marks]

(b) Solve f(x)=6 and state the excluded input of the original rule. [2 marks]

2. A rectangle has fixed width 4 cm and variable positive length l cm. [5 marks]

(a) Write area A as a function of l. Name the independent and dependent variables and their units. [2 marks]

(b) State suitable domains and ranges for A(l) and perimeter P(l). [3 marks]

3. A straight line has equation $2x - 3y = 9$. [4 marks]

(a) Find its gradient and intercepts. [2 marks]

(b) Find the point on this line with y=5. [2 marks]

4. Line L passes through (1,2) and (5,4). [4 marks]

(a) Find its equation. [2 marks]

(b) Find the line perpendicular to L through (3,1). [2 marks]

5. A car park charges 8 dollars for a van and 5 dollars for a car. There are 13 vehicles and the total charge is 80 dollars. [5 marks]

(a) Form simultaneous equations for the vehicle counts. [2 marks]

(b) Solve and interpret the solution. [3 marks]

6. A quadrilateral has A(0,1), B(4,1), C(4,4) and D(0,4). [4 marks]

(a) Calculate the lengths of diagonals AC and BD. [2 marks]

(b) Calculate both diagonal midpoints. State what the matching midpoints show. [2 marks]

7. A job needs 60 worker-hours. Assume all workers have the same constant work rate and can work together without interference. [4 marks]

(a) Write the completion time t in hours as a function of the positive number of workers w. Find t for 5 workers. [2 marks]

(b) Find t for 8 workers and explain one limitation of the model. [2 marks]

8. A circle is centred at (2,-1) and passes through (5,3). [4 marks]

(a) Find its radius and equation. [2 marks]

(b) Find the leftmost, rightmost, lowest and highest points. [2 marks]

9. The table describes part of a reciprocal function. [4 marks]

x	-2	-1	0	1	2
y	-4	-8	?	8	4

(a) Find its rule and complete the missing entry if possible. [2 marks]

(b) State whether this is a function of x and describe its two branches. [2 marks]

10. An engineer proposes a linear model $y = ax + b$. It must pass through measurements (2,11) and (6,23). [5 marks]

(a) Determine a and b. [2 marks]

(b) A third measurement is (8,32). Does the exact model pass through it? Give a careful conclusion. [3 marks]