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 $f(x)=\frac{3}{2-x}$. [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]