Functions and straight-line graphs - Practice test 4

Name: _____ Date: _____

10 questions | 44 marks | 70 minutes

A reasoning paper with parameter restrictions, a shifted reciprocal rule and geometric modelling.

A scientific calculator may be used.

1. The linear function f satisfies f(-1)=-5 and f(3)=7. [4 marks]

(a) Find the rule f(x). [2 marks]

(b) Compare f(2t) with 2f(t). Are they equal for all t? [2 marks]

2. Let $h(x) = \sqrt{10 - 2x}$. [4 marks]

(a) Find the real domain and range without a contextual restriction. [2 marks]

(b) Now restrict 0≤x≤5. Find the new range. [2 marks]

3. Consider the line $3y - 6x = 15$. [4 marks]

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

(b) A student says y=2x+1 is perpendicular to it because the intercepts differ. Correct the statement. [2 marks]

4. For a real number p, two points are A(p,1) and B(p,6). [4 marks]

(a) State the equation and gradient of AB. [2 marks]

(b) Find the line perpendicular to AB through (0,-3). [2 marks]

5. A laboratory mixes 10% and 30% saline solutions to make 20 L of a 22% solution. Assume volumes add. [5 marks]

(a) Form equations for the litres x and y of the two solutions. [2 marks]

(b) Solve and check the mixture. [3 marks]

6. Three points are A(-4,1), B(2,9), C(2,1). [4 marks]

(a) Calculate all three side lengths. [2 marks]

(b) Explain why the triangle is right-angled and find the midpoint of AB. [2 marks]

7. A shifted reciprocal rule is $y = 6/(x - 2) + 1$. [5 marks]

(a) State the asymptotes, domain and range. [2 marks]

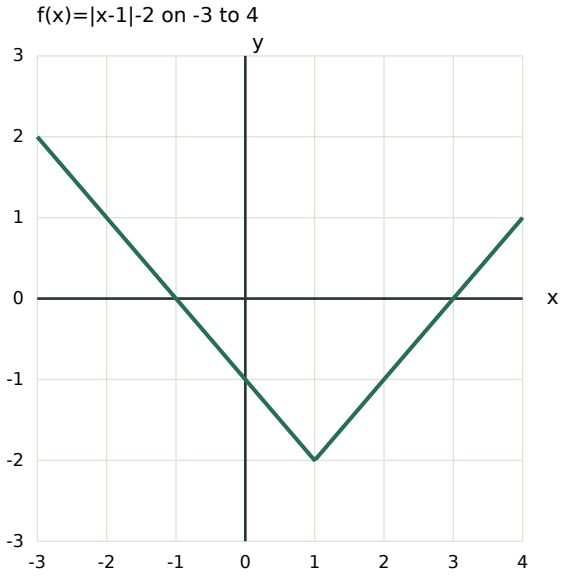
(b) Find both axis intercepts. [3 marks]

8. A circle has centre (-2,1) and passes through (1,3). [5 marks]

(a) Write its equation. [2 marks]

(b) Find its exact x-intercepts. [3 marks]

9. A V-shaped function is $f(x) = |x - 1| - 2$ on -3≤x≤4. Here |u| means the non-negative distance of u from zero. [4 marks]



(a) Find its minimum point and its range. [2 marks]

(b) Does its repeated output at x=0 and x=2 prevent it being a function? Explain. [2 marks]

10. A linear taxi tariff charges 17.50 dollars for 5 km and 27.50 dollars for 9 km. [5 marks]

(a) Find a fare rule C(d), explaining both coefficients. [2 marks]

(b) What is the greatest distance costing at most 25 dollars under this tariff? [3 marks]