

DP Analysis & Approaches (SL/HL)

Maths with Lemon

Lesson 2.3 Function Basics – Worksheet

Mathematician: _____

Prior Learning: Number and Algebra	Focus
Functions, relations, domain and range	Function notation, representations, mathematical models, vertical line test and domain restrictions.

A. Function Basics

1. Define a function in your own words.

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2. Give two real-life examples that could be modelled by functions.

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3. Let $f(x) = 3x^2 - 5x + 1$. Find

(a) $f(2)$ (b) $f(-1)$ (c) $f(0)$.

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B. Evaluating Different Representations

4. Consider

$$A = \{(-4, 7), (0, -2), (2, 5), (6, 5)\}.$$

Find $A(2)$, $A(0)$ and $A(6)$.

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5. The table represents a function g .

x	-2	0	2	4	6
$g(x)$	7	3	-1	-5	-9

Find (a) $g(2)$, (b) $g(-2)$, and (c) the value of x for which $g(x) = -5$.

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C. Function or Relation?

For Questions 6–10, state whether the relation is a function and justify your answer.

6. $\{(-3, 5), (0, 2), (4, 5), (7, -1)\}$

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7. $\{(-2, 3), (-2, 8), (1, 4), (5, 0)\}$

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8.

x	1	2	3	2	5
y	-4	0	6	7	9

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9. $1 \rightarrow 4, 2 \rightarrow 4, 3 \rightarrow 7, 5 \rightarrow 7$. Is this a function?

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10. Is $y = \pm\sqrt{x+4}$ a function of x ? Explain.

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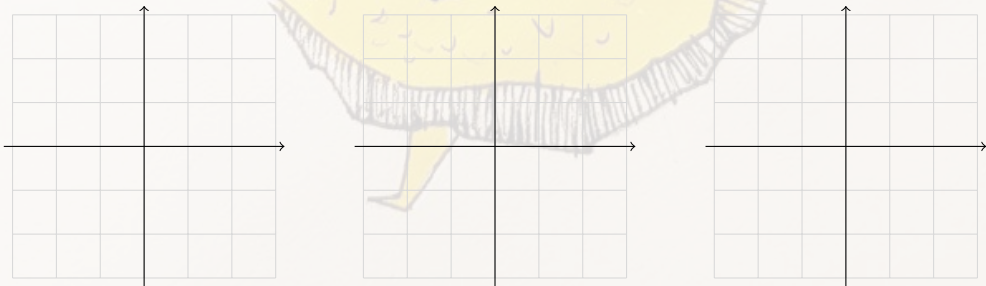
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D. Vertical Line Test

11. Sketch each relation and decide whether y is a function of x .

- (a) $y = x^2 - 4$
- (b) $x = (y - 1)^2$
- (c) $y = |x + 2| - 3$



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E. Domain and Range of Discrete Relations

12. Find the domain and range of

$$\{(2, 3), (5, 7), (2, 6), (-4, 8), (3, 8)\}.$$

13. Find the domain and range of

$$\{(-7, 12), (-4, 9), (-2, -11), (8, 17), (10, 6), (19, -5)\}.$$

14. A function contains the points

$$(-5, 2), (-3, -4), (1, -4), (3, 2), (5, 2).$$

State its domain and range.

F. Domain and Range from Equations

Find the domain and range where possible.

15. $f(x) = \sqrt{7 - x}$

16. $g(x) = -3(x - 5)^2 + 2$

17. $h(x) = 2|x + 3| - 3$

18. $p(x) = -4x^2 - 2x + 1, x \geq 0$. Find the domain and range.

G. Domain Restrictions

Find the domain of each function.

19. $f(x) = \frac{x}{x^2 + 1}$

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20. $g(x) = \frac{x - 3}{2x - 4}$

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21. $h(x) = \frac{1}{\sqrt{x + 4}}$

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22. $q(x) = \sqrt{2x - 6}$

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H. Mathematical Modelling

23. A taxi company charges a fixed fee of \$4 and \$2.50 per kilometre.

- (a) Write a function $C(d)$ for the total cost of travelling d kilometres.
- (b) Find $C(12)$.
- (c) Identify the independent and dependent variables.
- (d) Give a sensible domain for d .

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24. A square has side length s .

- (a) Write its area A as a function of s .
- (b) State a sensible domain for s .

(c) Find $A(7)$.

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I. Challenge

25. The relation $x = -2(y - 1)^2 - 3$ is a sideways parabola.

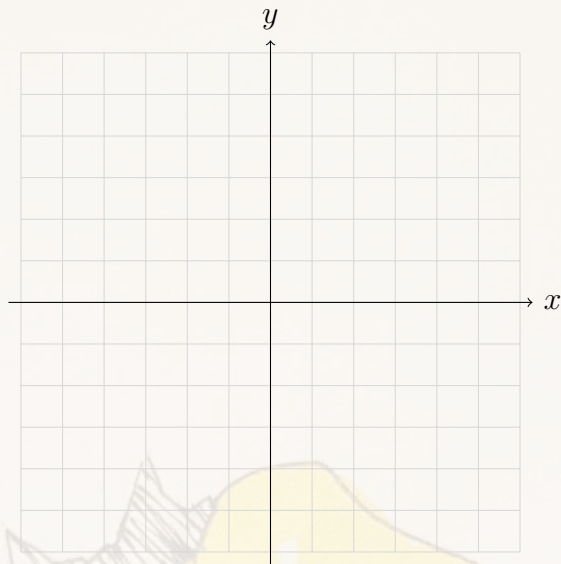
- Find its vertex.
- State its possible x -values.
- Explain why y is not a function of x .

26. Consider $f(x) = \frac{x-3}{2x-4}$.

- (a) Explain why $x = 2$ is excluded from the domain.
(b) Show that $f(x) \neq \frac{1}{2}$ for every value in its domain.
(c) Hence state the range of f .

27. Consider the relation $x^2 + y^2 = 25$.

- (a) Sketch the relation.
- (b) State its domain and range.
- (c) Is y a function of x ? Justify using the vertical line test.





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Mathematics made clear.