Functions: inputs, domains, tables and graphs — Teacher answers

Year 8, lower volume • text pp. 49–58 • textbook lessons 25–29

Use the two prerequisite checks to choose support. Project the worked and guided tasks, then collect the eight paper core questions. Follow-ups and extensions are optional; accept other complete valid methods. This page does not save learners' paper answers.

Ordinary route: prerequisites 4, short inquiry 5, worked/guided 8, independent 15, correction 5, exit 3 minutes. Advanced route: inquiry 18, organise 4, selected practice 13, exit 5 minutes.

Prerequisites: Coordinates, substitution and simple inequalities.

Ordinary route: use the first fixed case for the five-minute demonstration. Advanced route: complete the full investigation.

1. 3′ Predict whether repeated inputs or repeated outputs prevent a relation from being a function.
2. 8′ On paper compare tables {−1→1,0→0,1→1}, {0→0,0→1}, and {0→0,0→0,1→1}. Then model a tank filled at 3 L/min up to 60 L; test times 0,20,21 minutes.
3. 5′ A repeated identical pair adds no second output; conflicting outputs for the same input do. Explain why the filling relation applies only for $0 \leq t \leq 20$ even though its algebraic expression can be evaluated later.
4. 2′ Individually give a function with two distinct inputs sharing one output, and explain why it is valid.

Worked example 1

Does this table define y as a function of x? Explain using each input.

x	y
-1	1
0	0
1	1
2	4

Use the stated conditions and the labelled scales.

Reference answer

Yes. Every input has exactly one output; different inputs may share an output.

1. Check repeated inputs, not merely repeated outputs.
2. No input has conflicting outputs.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Guided attempt 2

An initially empty 60 L tank fills at 3 L/min, stopping when full. Write V in terms of t while filling and state the time domain.

1. During filling, $V = \square t$ L, with t measured in minutes.
2. At capacity, $3t = 60$, so $t = \frac{60}{\square} = \square$ minutes.
3. Time domain: $0 \leq t \leq \square$; explain both endpoints.

Reference answer

$V = 3t, \quad 0 \leq t \leq 20.$

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1. Volume=rate×time, and 60/3=20 minutes fills the tank.
2. Include the initially empty and just-full endpoints.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Prerequisite 3

For the given relation, find y when $x = 3$.

$$y = 2x + 1$$

Reference answer

$y = 7$

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1. Substitute $x = 3$ into the complete relation.
2. $2 \times (3) + (1) = 7$.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Prerequisite 4

The relation contains only the pair $(2, -1)$. On its stated input domain $\{2\}$, is it a function?

x	y
2	-1

Use the stated conditions and the labelled scales.

Reference answer

Yes. Every input has exactly one output; different inputs may share an output.

1. Check repeated inputs, not merely repeated outputs.
2. No input has conflicting outputs.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Independent practice 5

Does this table define y as a function of x? Explain using each input.

x	y
0	1
0	2
1	3

Use the stated conditions and the labelled scales.

Reference answer

No. At least one input is paired with two different outputs.

1. Check repeated inputs, not merely repeated outputs.
2. The repeated input has conflicting outputs.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Independent practice 6

For the given relation, find y when $x = -1$.

$$y = 3x - 2$$

Reference answer

$y = -5$

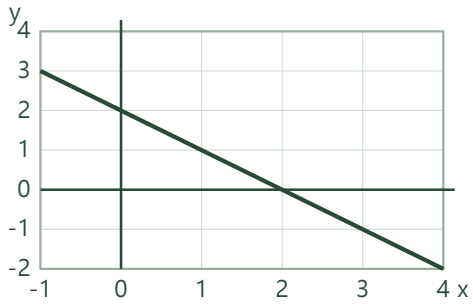
$$y = -5$$

1. Substitute $x = -1$ into the complete relation.
2. $3 \times (-1) + (-2) = -5$.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Independent practice 7

Read the x-coordinate where the shown graph meets the x-axis. Check it in the relation.



Use the stated conditions and the labelled scales.

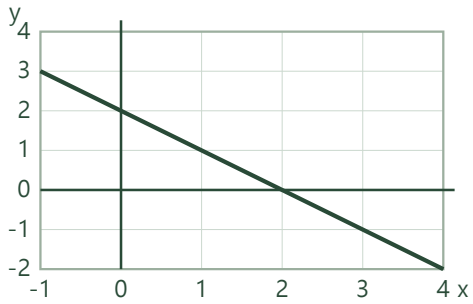
Reference answer

x=2, since y=0 there.

$$x = 2$$

1. At the x-axis the output is zero.
2. 0=−x+2 gives x=2.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.



Use the stated conditions and the labelled scales.

Independent practice 8

State the real input that must be excluded from this relation.

$$y = \frac{1}{x - 2}$$

Reference answer

$x \neq 2$

$$x \neq 2$$

1. The denominator cannot be zero.
2. x−2=0 at x=2.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Exit question 9

Does this table define y as a function of x? Explain using each input.

x	y
1	5
2	5
3	5

Use the stated conditions and the labelled scales.

Reference answer

Yes. Every input has exactly one output; different inputs may share an output.

1. Check repeated inputs, not merely repeated outputs.
2. No input has conflicting outputs.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Exit question 10

A ticket costs 4 dollars. At most 20 tickets are available. State the possible ticket counts n and write the cost C.

Reference answer

$C = 4n, \quad n \in \{0, 1, \ldots, 20\}$

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1. Counts are whole numbers, including buying none.
2. The maximum count is 20; multiply the count by 4.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Further practice 11

For the given relation, find y when $x = 0$.

$$y = 2x - 2$$

Reference answer

$y = -2$

$$y = -2$$

1. Substitute $x = 0$ into the complete relation.
2. $2 \times (0) + (-2) = -2$.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Further practice 12

Every input in the table has output 4. Is this a function? Is it a constant function?

x	y
-1	4
0	4
1	4

Use the stated conditions and the labelled scales.

Reference answer

Yes to both: y=4 gives one output for every input.

1. Unique outputs per input do not have to differ between inputs.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Further practice 13

For $y = x^2$, complete the outputs at $x = -2, 0, 2$. Is one output shared by two inputs allowed?

Reference answer

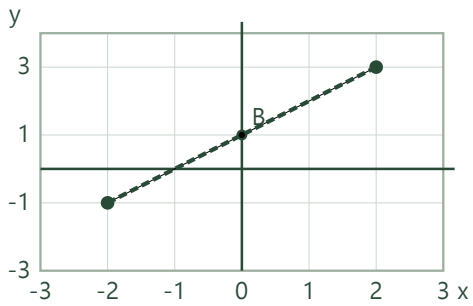
Outputs 4,0,4; yes, repeated outputs are allowed.

1. Square each signed input separately.
2. Both −2 and 2 give 4, without creating conflicting outputs for one input.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Further practice 14

Draw the graph of $y = x + 1$ for $-2 \le x \le 2$. Make a value table first.



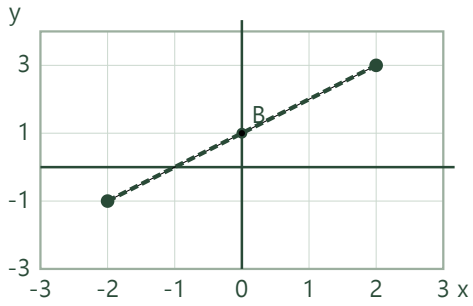
Use the stated conditions and the labelled scales.

Reference answer

Use points (−2,−1),(0,1),(2,3), then join them on the stated domain.

1. Substitute at least two distinct inputs and plot the ordered pairs.
2. Join the collinear points only over the stated input interval.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.



Use the stated conditions and the labelled scales.

Extension 15

The vertical line $x = 2$ contains the points shown. Does it define y as a function of x?

x	y
2	-1
2	1

Use the stated conditions and the labelled scales.

Reference answer

No. At least one input is paired with two different outputs.

1. Check repeated inputs, not merely repeated outputs.
2. The repeated input has conflicting outputs.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.

Extension 16

The 60 L tank fills at 3 L/min and stops when full. A learner uses $V=3t$ at $t=21$ to predict 63 L. Explain why the calculation does not give a valid filling-stage prediction.

Reference answer

21 minutes is outside $0 \leq t \leq 20$. The formula gives 63 algebraically, but the stopped tank holds 60 L.

1. Find the fill time $60/3=20$ minutes.
2. The model $V=3t$ describes the filling stage only.

- Use the stated conditions and justify the relation before calculating.
- Give an exact answer where possible, with units and any domain restrictions.