

3-2 Relations and Functions

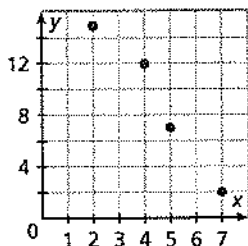
EXAMPLES

- Express the relation $\{(2, 15), (4, 12), (5, 7), (7, 2)\}$ as a table, as a graph, and as a mapping diagram.

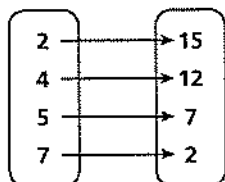
Table

x	y
2	15
4	12
5	7
7	2

Graph



Mapping Diagram



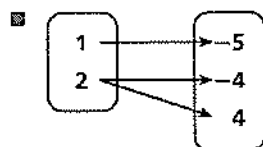
Give the domain and range of each relation. Tell whether the relation is a function. Explain.

x	y
-3	0
-2	0
-1	1

D: $\{-3, -2, -1\}$

R: $\{0, 1\}$

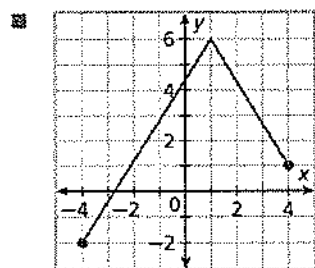
The relation is a function because each domain value is paired with exactly one range value.



D: $\{1, 2\}$

R: $\{-5, -4, 4\}$

The relation is not a function because one domain value is paired with two range values.



D: $-4 \leq x \leq 4$

R: $-2 \leq y \leq 6$

The relation is a function because every x -value is paired with exactly one y -value.

EXERCISES

Express each relation as a table, as a graph, and as a mapping diagram.

9. $\{(-1, 0), (0, 1), (2, 1)\}$

10. $\{(-2, -1), (-1, 1), (2, 3), (3, 4)\}$

Give the domain and range of each relation.

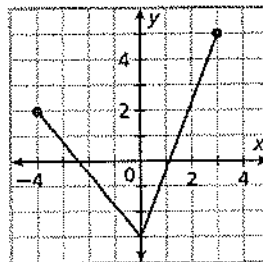
11. $\{(-4, 5), (-2, 3), (0, 1), (2, -1)\}$

12. $\{(-2, -1), (-1, 0), (0, -1), (1, 0), (2, -1)\}$

13.

x	0	1	4	1	4
y	0	-1	-2	1	2

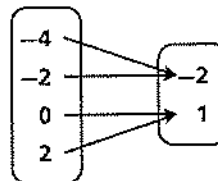
14.



Give the domain and range of each relation. Tell whether the relation is a function. Explain.

15. $\{(-5, -3), (-3, -2), (-1, -1), (1, 0)\}$

16.



17.

x	1	2	3	4	1
y	3	2	1	0	-1

18. A local parking garage charges \$5.00 for the first hour plus \$1.50 for each additional hour or part of an hour. Write a relation as a set of ordered pairs in which the x -value represents the number of hours and the y -value represents the cost for x hours. Use a domain of 1, 2, 3, 4, 5. Is this relation a function? Explain.

19. A baseball coach is taking the team for ice cream. Four students can ride in each car. Create a mapping diagram to show the number of cars needed to transport 8, 10, 14, and 16 students. Is this relation a function? Explain.

3-3 Writing Functions

EXAMPLES

- Determine a relationship between the x - and y -values in the table. Write an equation.

x	1	2	3	4
y	-3	-6	-9	-12

What are possible relationships between the x -values and the y -values?

$$1 - 4 = -3 \quad 1(-3) = -3$$

$$2 - 4 \neq -6x \quad 2(-3) = -6 \quad \checkmark$$

$$3(-3) = -9 \quad \checkmark$$

$$4(-3) = -12 \quad \checkmark$$

$$y = -3x$$

Write an equation.

- Nia earns \$5.25 per hour. Identify the independent and dependent variables. Write an equation in function notation for the situation.

Nia's pay depends on the number of hours she works.

Dependent: pay

Independent: hours

Let h represent the number of hours Nia works.

The function for Nia's pay is $f(h) = 5.25h$.

EXERCISES

Determine the relationship between the x - and y -values. Write an equation.

20.

x	1	2	3	4
y	-6	-5	-4	-3

21. $\{(1, 9), (2, 18), (3, 27), (4, 36)\}$

Identify the independent and dependent variables. Write an equation in function notation for the situation.

22. A baker spends \$6 on ingredients for each cake he bakes.

23. Tim will buy twice as many CDs as Raul.

Evaluate each function for the given input values.

24. For $f(x) = -2x + 4$, find $f(x)$ when $x = -5$.

25. For $g(n) = -n^2 - 2$, find $g(n)$ when $n = -3$.

26. For $h(t) = 7 - |t + 3|$, find $h(t)$ when $t = -4$ and when $t = 5$.

3-4 Graphing Functions

EXAMPLE

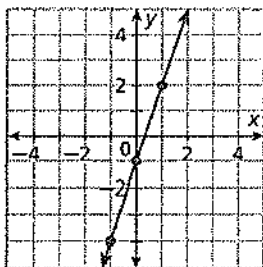
- Graph the function $y = 3x - 1$.

Step 1 Choose several values of x to generate ordered pairs.

x	$y = 3x - 1$	y
-1	$y = 3(-1) - 1 = -4$	-4
0	$y = 3(0) - 1 = -1$	-1
1	$y = 3(1) - 1 = 2$	2
2	$y = 3(2) - 1 = 5$	5

Step 2 Plot enough points to see a pattern.

Step 3 Draw a line through the points to show all the ordered pairs that satisfy this function.



EXERCISES

Graph each function for the domain $\{-2, -1, 1, 2\}$.

27. $4x + y = 2$

28. $y = (1 - x)^2$

Graph each function.

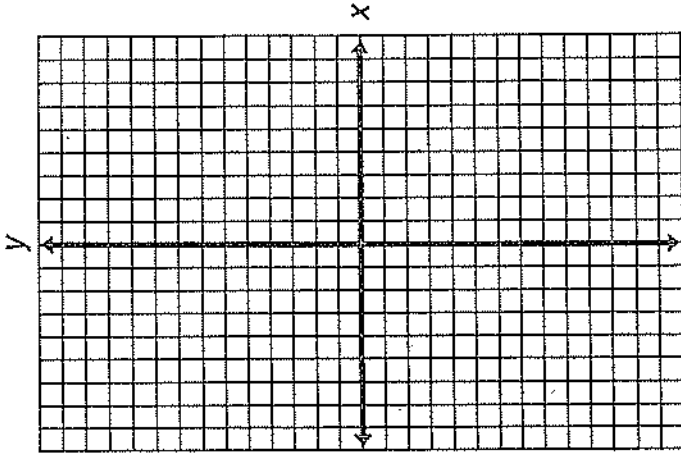
29. $3x - y = 1$

30. $y = 2 - |x|$

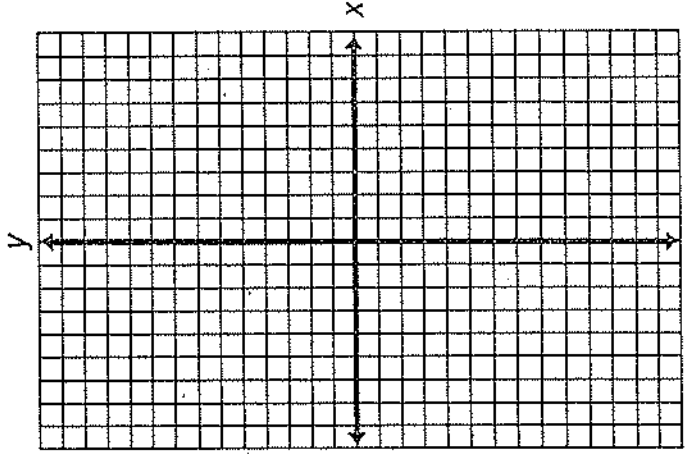
31. $y = x^2 - 6$

32. $y = |x + 5| + 1$

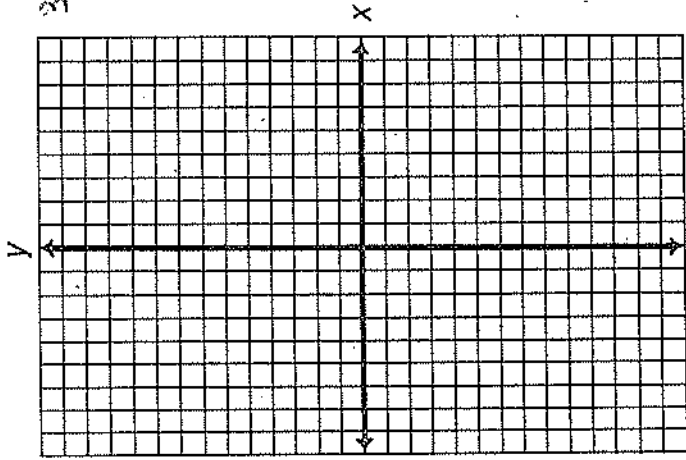
33. The function $y = 6.25x$ describes the amount of money y Peter gets paid after x hours. Graph the function. Use the graph to estimate how much money Peter gets paid after 7 hours.



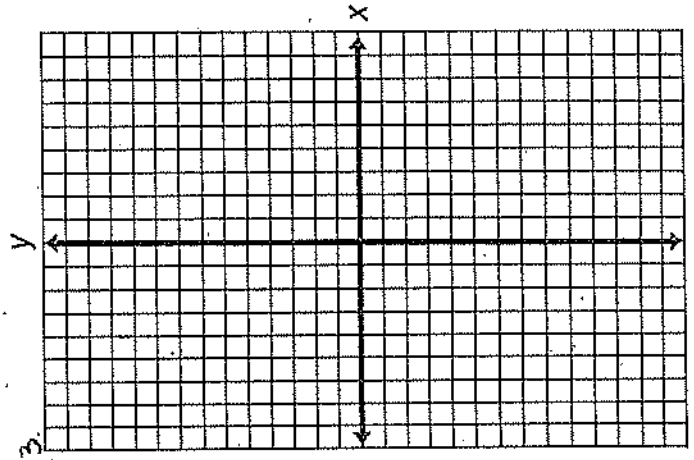
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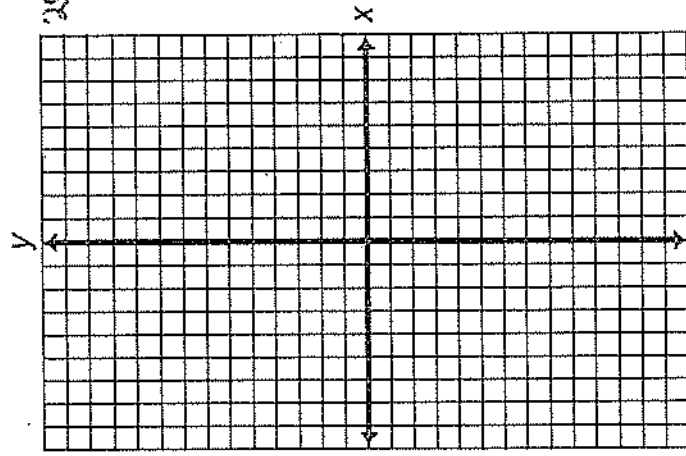
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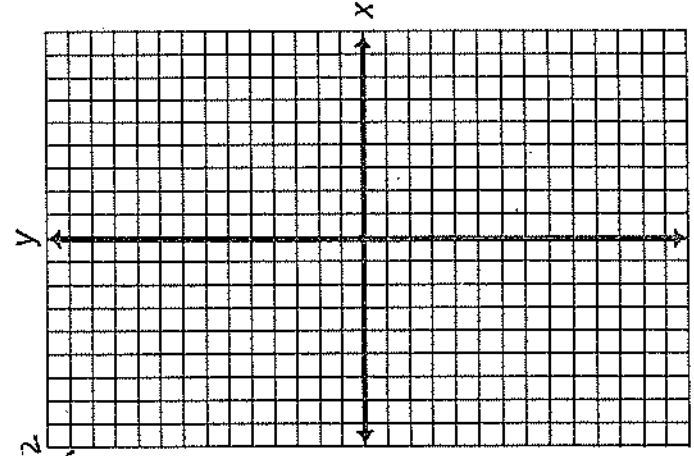
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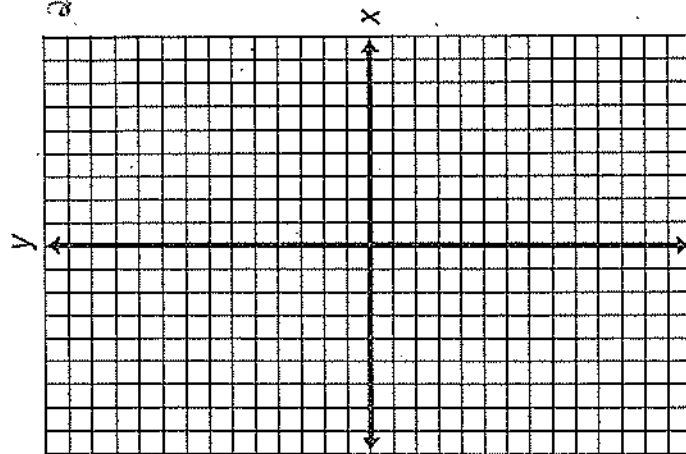
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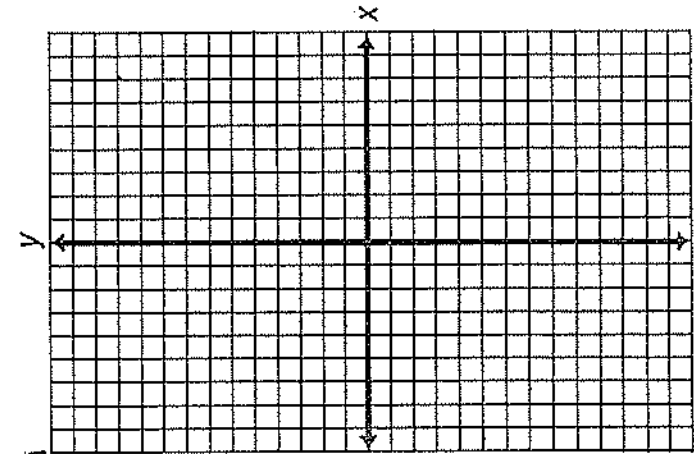
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27



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CH 3 REVIEW: *For the following functions, find $f(x) + g(x)$ and $f(x) - g(x)$

1) $f(x) = 7x - 5$ $g(x) = -3x + 2$

2) $f(x) = -4x + 1$ $g(x) = -6x - 10$

3) $f(x) = -3x - 4$ $g(x) = 8x + 5$

4) $f(x) = 9x + 3$ $g(x) = 5x - 2$

*For the following functions, find $f(x) \bullet g(x)$

5) $f(x) = -4x + 5$ $g(x) = 8$

6) $f(x) = -10$ $g(x) = 8x - 7$

*Find the INVERSE of the Function:

7) $f(x) = 9x - 4$

8) $f(x) = -5x + 2$

9) $f(x) = -x + 7$

10) $f(x) = .5x - 3$