Relations & Functions #20-24E, 32-47

EXERCISES

Practice

Show all work on separate paper.

Write each relation as a table of values and as an equation. Graph the relation.

17. the domain is all positive integers less than 10, the range is 3 times x, where x is a member of the domain

18. the domain is all negative integers greater than -7, the range is x less 5, where x is a member of the domain

19. the domain is all integers greater than -5 and less than or equal to 4, the range is 8 more than x, where x is a member of the domain

State each relation as a set of ordered pairs. Then state the domain and range.

20.

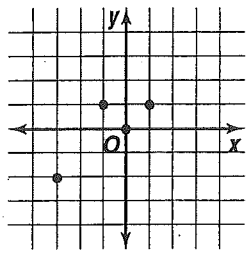
x	y
−5	−5
−3	−3
−1	−1
1	1

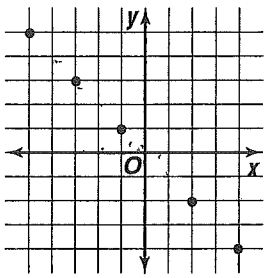
21.

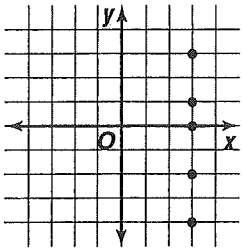
x	y
−10	0
−5	0
0	0
5	0

22.

x	y
4	0
5	1
8	0
13	1

23. 

24. 

25. 

internet CONNECTION

Graphing Calculator Programs
For a graphing calculator program that plots points in a relation, visit **www.amc.glencoe.com**

Given that x is an integer, state the relation representing each equation by making a table of values. Then graph the ordered pairs of the relation.

26. $y = x - 5$ and $-4 \leq x \leq 1$

27. $y = -x$ and $1 \leq x < 7$

28. $y = |x|$ and $-5 \leq x \leq 1$

29. $y = 3x - 3$ and $0 < x < 6$

30. $y^2 = x - 2$ and $x = 11$

31. $|2y| = x$ and $x = 4$

State the domain and range of each relation. Then state whether the relation is a function. Write *yes* or *no*. Explain.

32. {(4, 4), (5, 4), (6, 4)}

33. {(1, −2), (1, 4), (1, −6), (1, 0)}

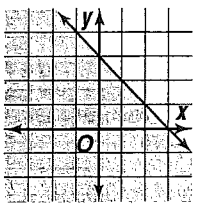
34. {(4, −2), (4, 2), (1, −1), (1, 1), (0, 0)}

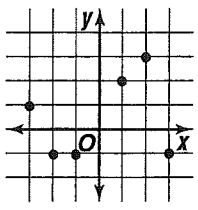
35. {(0, 0), (2, 2), (2, −2), (5, 8), (5, −8)}

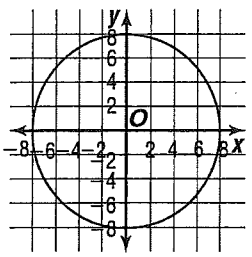
36. {(−1.1, −2), (−0.4, −1), (−0.1, −1)}

37. {(2, −3), (9, 0), (8, −3), (−9, 8)}

For each graph, state the domain and range of the relation. Then explain whether the graph represents a function.

38. 

39. 

40. 

Evaluate each function for the given value.

41. $f(3)$ if $f(x) = 2x + 3$

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

43. $h(0.5)$ if $h(x) = \frac{1}{x}$

44. $j(2a)$ if $j(x) = 1 - 4x^3$

45. $f(n - 1)$ if $f(x) = 2x^2 - x + 9$

46. $g(b^2 + 1)$ if $g(x) = \frac{3 - x}{5 + x}$

47. Find $f(5m)$ if $f(x) = |x^2 - 13|$.

State the domain of each function.

48. $f(x) = \frac{3x}{x^2 - 5}$

49. $g(x) = \sqrt{x^2 - 9}$

50. $h(x) = \frac{x + 2}{\sqrt{x^2 - 7}}$

Graphing Calculator

51. You can use the table feature of a graphing calculator to find the domain of a function. Enter the function into the Y= list. Then observe the y-values in the table. An error indicates that an x-value is excluded from the domain. Determine the domain of each function.

a. $f(x) = \frac{3}{x - 1}$ b. $g(x) = \frac{3 - x}{5 + x}$ c. $h(x) = \frac{x^2 - 12}{x^2 - 4}$

Applications and Problem Solving

52. **Education** The table shows the number of students who applied and the number of students attending selected universities.

a. State the relation of the data as a set of ordered pairs. Also state the domain and range of the relation.

b. Graph the relation.

c. Determine whether the relation is a function. Explain.

University	Number Applied	Number Attending
Auburn University	13,264	4184
University of California–Davis	27,954	4412
University of Illinois–Urbana–Champaign	21,484	6366
University of Maryland–College Park	23,117	3912
State University of New York–Stony Brook	16,849	2415
The Ohio State University	19,563	5982
Texas A&M University	17,284	6949

Source: *How to Get Into College*

53. **Critical Thinking** If $f(2m + 1) = 24m^3 + 36m^2 + 26m$, what is $f(x)$? (*Hint:* Begin by solving $x = 2m + 1$ for m.)

54. **Aviation** The temperature of the atmosphere decreases about 5°F for every 1000 feet that an airplane ascends. Thus, if the ground-level temperature is 95°F, the temperature can be found using the function $t(d) = 95 - 0.005d$, where $t(d)$ is the temperature at a height of d feet. Find the temperature outside of an airplane at each height.

a. 500 ft b. 750 ft c. 1000 ft d. 5000 ft e. 30,000 ft

55. **Geography** A global positioning system, GPS, uses satellites to allow a user to determine his or her position on Earth. The system depends on satellite signals that are reflected to and from a hand-held transmitter. The time that the signal takes to reflect is used to determine the transmitter's position. Radio waves travel through air at a speed of 299,792,458 meters per second. Thus, the function $d(t) = 299{,}792{,}458t$ relates the time t in seconds to the distance traveled $d(t)$ in meters.

a. Find the distance a sound wave will travel in 0.05, 0.2, 1.4, and 5.9 seconds.

b. If a signal from a GPS satellite is received at a transmitter in 0.08 seconds, how far from the transmitter is the satellite?