ALBERT

Name _____ Date _____

Linear and Nonlinear Functions Worksheet

Grade 8 · Common Core 8.F.A.3

> Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s² giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

Practice

Builds the skill step by step.

1. Which equation defines a linear function?

   A. $y = 2^x$

   B. $y = x^2 + 1$

   C. $y = x^3$

   D. $y = 3x - 4$

2. Is the function in the table linear? Answer Yes or No.

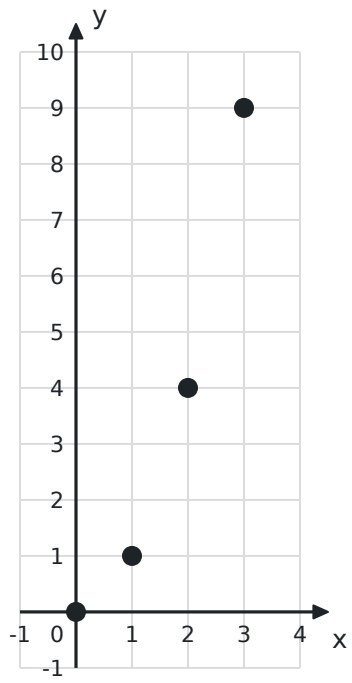
x	0	1	2	3
y	1	4	7	10

3. Is the function in the table linear? Answer Yes or No.

x	0	1	2	3
y	0	1	4	9

4. The graph of $y = 4x - 1$ is a straight line. At what y-value does it cross the y-axis?

5. The graph shows four points of a function. Do the points lie on one straight line? Answer Yes or No.



6. Which table shows a linear function?

   A. x: 1, 2, 3, 4 → y: 2, 4, 8, 16

   B. x: 1, 2, 3, 4 → y: 1, 4, 9, 16

   C. x: 1, 2, 3, 4 → y: 5, 3, 1, −1

   D. x: 1, 2, 3, 4 → y: 1, 2, 4, 7

7. Is y = 7 a linear function? Answer Yes or No.

8. The area of a square is $A = s^2$, where s is the side length. What is the area of a square with side length 5 cm?

9. Which situation is modeled by a linear function?

   A. A number of bacteria that doubles every hour.

   B. A square's area as its side length grows.

   C. A gym charges 20 dollars to join plus 10 dollars per visit.

   D. The height of a ball thrown up into the air over time.

10. Rewrite $y = 2(x + 3)$ in the form $y = mx + b$.

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On Level

Grade-level practice.

1. The table shows a linear function. Write its equation in the form $y = mx + b$.

x	0	2	4	6
y	3	7	11	15

2. Is the function in the table linear? Answer Yes or No.

x	1	2	3	4
y	2	5	10	17

3. Which equation does NOT define a linear function?

   A. $y = x(x + 1)$

   B. $y = -x$

   C. $y = 0.5x + 8$

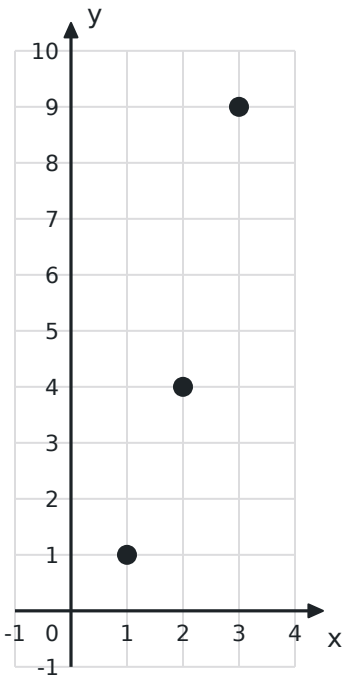
   D. $y = 3(x - 2)$

4. The volume of a cube is $V = s^3$. Is volume a linear function of the side length s? Answer Yes or No.

5. A linear function passes through (1, 5) and (3, 11). Write its equation in the form $y = mx + b$.

6. The point (4, y) lies on the graph of $y = -2x + 9$. What is y?

7. The graph shows three points of $y = x^2$. Why is the function not linear?



A. The graph does not pass through the origin.

B. The function has no initial value.

C. All of the outputs are positive.

D. The rate of change between the points is not constant.

8. Is the function in the table linear? Answer Yes or No.

x	0	1	2	3
y	5	5	5	5

9. A linear function has an initial value of -4 and a rate of change of 1.5. What is its output when $x = 6$?

10. Explain how you can tell from a table whether a function is linear. Assume the x-values go up by the same amount each row.

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Challenge

Multi-step and word problems that stretch it.

1. The table should follow y = 3x + 2, but one output was copied wrong. Which input has the wrong output?

x	0	1	2	3	4
y	2	5	8	12	14

2. Ana says y = 3 can't be a linear function because it has no x in it. Is she right? Explain.

3. For $y = x^2 + 1$, find the rate of change from x = 0 to x = 1, and then from x = 2 to x = 3.

4. Which set of points lies on one straight line?

   A. (0, 1), (1, 3), (3, 9)

   B. (0, 1), (2, 4), (4, 7)

   C. (1, 1), (2, 4), (3, 9)

   D. (0, 2), (1, 4), (2, 8)

5. A rectangle is 3 units wide and $x + 2$ units long. Is its area a linear function of x? Answer Yes or No.

6. For a square, $A = s^2$. The side length doubles from 3 cm to 6 cm. The area is multiplied by what number?

7. A linear function passes through $(-2, 7)$ and $(4, -5)$. Write its equation in the form $y = mx + b$.

8. The points $(1, 2)$, $(2, 5)$ and $(3, k)$ lie on one straight line. What is k?

9. Use the points $(1, 1)$, $(2, 4)$ and $(3, 9)$ to explain whether $y = x^2$ is a linear function.

10. A function's graph is a straight line through $(0, 3)$ that falls 2 units for every 1 unit to the right. Which equation is it?

    A. $y = -2x + 3$

    B. $y = 2x + 3$

    C. $y = 3x - 2$

    D. $y = -3x + 2$