

# Algebra 1 · Key Features of Graphs and Rate of Change · Quiz

Common Core F-IF.B.4, F-IF.B.6, F-IF.C.9 · mathovore.fr

Name: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ Score: \_\_\_\_\_

Ten multiple-choice questions check whether you can find intercepts, read increasing and decreasing intervals, describe end behavior, compute an average rate of change and compare functions. Pick one answer for each question, then read the explanation.

**Algebra 1** Common Core: **F-IF.B.4 · F-IF.B.6 · F-IF.C.9**

## Questions

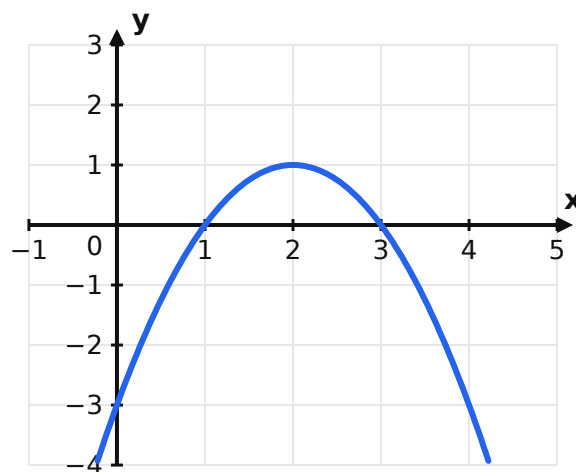
### Question 1

What are the  $x$ -intercepts of  $f(x) = x^2 - 16$ ?

- A.  $x = 16$  and  $x = -16$
- B.  $x = -4$  and  $x = 4$
- C.  $x = 4$  only
- D.  $x = -16$  only

### Question 2

What is the  $y$ -intercept of the function graphed?



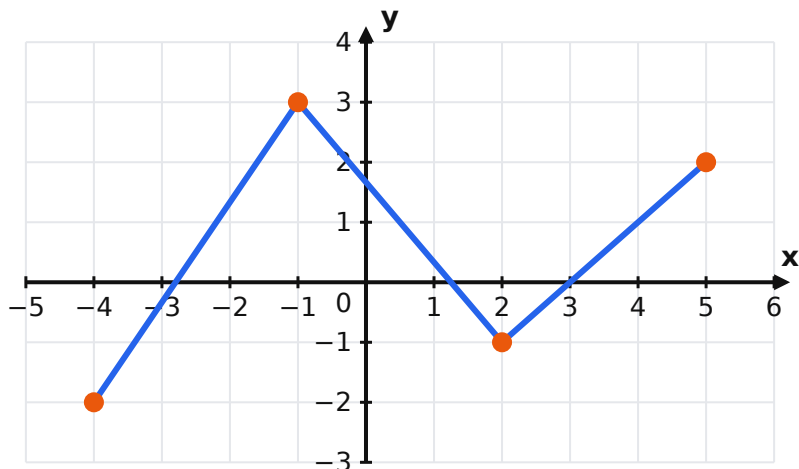
The graph of a function  $f$ .

- A. 1

- B. 3
- C.  $-3$
- D. 2

### Question 3

On which interval is the function decreasing?

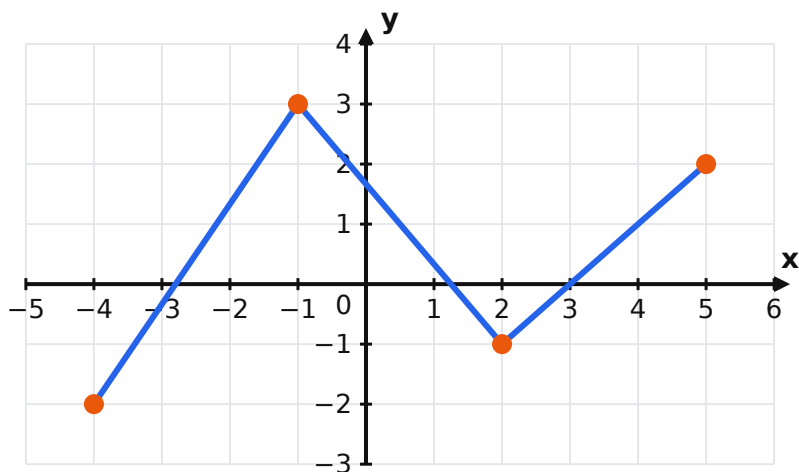


A graph made of three line segments.

- A.  $-4 < x < -1$
- B.  $2 < x < 5$
- C.  $-1 < x < 2$
- D.  $-2 < x < 3$

### Question 4

What is the relative maximum of the function in the same graph?



A graph made of three line segments.

- A. The value  $-1$ , at  $x = 2$

- B. The value 3, at  $x=5$
- C. The value  $-1$ , at  $x=3$
- D. The value 3, at  $x=-1$

### Question 5

What is the end behavior of  $f(x) = -x^2 + 3$  as  $x$  gets very large?

- A. The outputs decrease without bound
- B. The outputs increase without bound
- C. The outputs approach 3
- D. The outputs approach 0

### Question 6

What is the average rate of change of  $f(x) = x^2 - 3x$  from  $x=2$  to  $x=5$ ?

- A. 12
- B. 8
- C. 6
- D. 4

### Question 7

The table shows miles driven. What is the average speed from  $t=2$  to  $t=6$  hours?

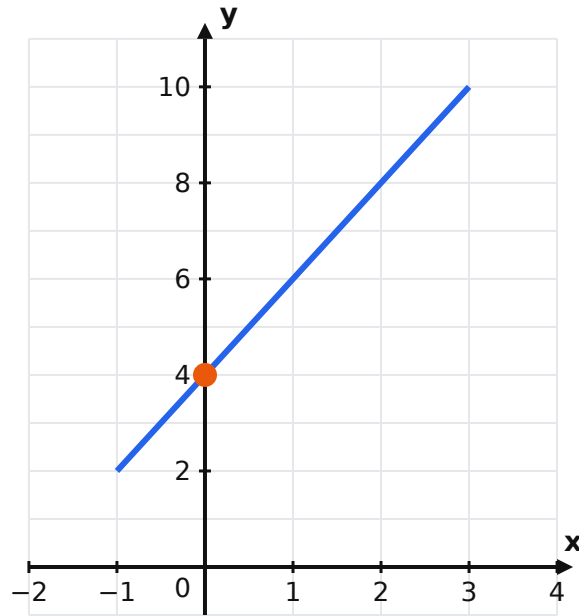
|               |   |    |     |     |
|---------------|---|----|-----|-----|
| <b>t (h)</b>  | 0 | 2  | 4   | 6   |
| <b>d (mi)</b> | 0 | 80 | 140 | 200 |

Distance driven over time.

- A. 30 miles per hour
- B. 33 miles per hour
- C. 60 miles per hour
- D. 40 miles per hour

### Question 8

Function  $f$  is  $f(x) = 5x + 2$ . Function  $g$  is graphed. Which statement is true?



The graph of a function  $g$ .

- A. Function  $f$  has the greater rate of change and the greater  $y$ -intercept
- B. Function  $g$  has the greater rate of change, and  $f$  has the greater  $y$ -intercept
- C. Function  $f$  has the greater rate of change, and  $g$  has the greater  $y$ -intercept
- D. Function  $g$  has the greater rate of change and the greater  $y$ -intercept

### Question 9

A tank holds  $V(t) = 90 - 6t$  gallons after  $t$  minutes. What does the  $t$ -intercept  $(15, 0)$  mean?

- A. The tank started with 15 gallons
- B. The tank is empty after 15 minutes
- C. The tank loses 15 gallons each minute
- D. The tank holds 90 gallons after 15 minutes

### Question 10

A parabola has  $x$ -intercepts at  $x = -1$  and  $x = 7$ . What is its axis of symmetry?

- A.  $x = 6$
- B.  $x = 3$
- C.  $x = 4$
- D.  $x = -3$

## Answer key

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1. **B** - Solve  $x^2 - 16 = 0$ :  $x^2 = 16$ , so  $x = 4$  or  $x = -4$ . Both square roots count. The number  $-16$  is the  $y$ -intercept.
2. **C** - The graph crosses the  $y$ -axis at  $(0, -3)$ . The value 1 is the vertex height and 3 is an  $x$ -intercept.
3. **C** - Reading left to right, the graph falls from  $(-1, 3)$  to  $(2, -1)$ . The other two segments rise.
4. **D** - The highest turning point is  $(-1, 3)$ : the value is the  $y$ -coordinate and it occurs at the  $x$ -coordinate. The point  $(2, -1)$  is the relative minimum.
5. **A** - The term  $-x^2$  becomes very negative, so  $f(x)$  falls forever. The 3 only shifts the graph up.
6. **D** -  $f(2) = -2$  and  $f(5) = 10$ , so  $\frac{10 - (-2)}{5 - 2} = \frac{12}{3} = 4$ . Choosing 12 means forgetting to divide by the change in  $x$ .
7. **A** - Use  $\frac{200 - 80}{6 - 2} = \frac{120}{4} = 30$ . Dividing 200 by 6 uses the start of the trip instead of  $t = 2$ .
8. **C** - The graph of  $g$  rises 2 for each 1 across and crosses the  $y$ -axis at 4:  $g(x) = 2x + 4$ . So  $f$  has rate 5 versus 2, while  $g$  has intercept 4 versus 2.
9. **B** - The intercept has output 0, so the tank is empty, and the input 15 is the time. Check:  $90 - 6(15) = 0$ .
10. **B** - The axis is halfway between the intercepts:  $\frac{-1 + 7}{2} = 3$ . Using 4 comes from dropping the negative sign of  $-1$ .

### Remember:

- The  $x$ -intercepts are the inputs where  $f(x) = 0$ ; the  $y$ -intercept is  $f(0)$ .
- Increasing means the graph rises from left to right; decreasing means it falls.
- A relative maximum or minimum is a turning point, higher or lower than nearby points.
- Average rate of change =  $(f(b) - f(a)) / (b - a)$ , with units.
- To compare functions, compare the same feature, such as rate or intercept.