

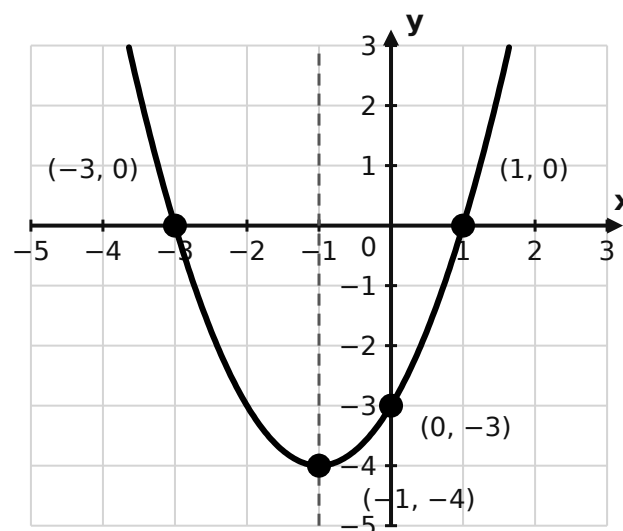
Algebra 1 · Key Features of Graphs and Rate of Change · Test Answer Key

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

Use this answer key to grade out of 20 points. Each question shows the full solution and a scoring guide with partial credit. Accept equivalent forms of intervals and any valid method, and require units in the questions that have a context.

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

Question 1: Features of a parabola (3 points)

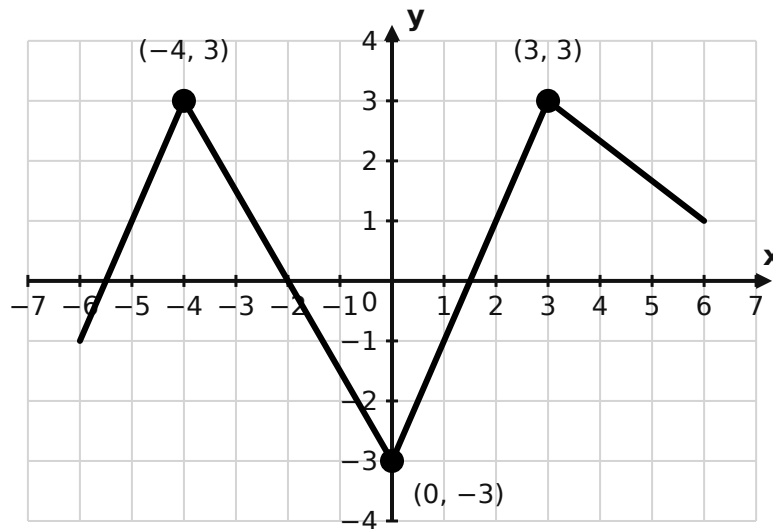


Intercepts $(-3, 0)$, $(1, 0)$, $(0, -3)$; the vertex $(-1, -4)$ is a minimum.

- a. $x = -3$ **and** $x = 1$
- b. $(0, -3)$
- c. **Vertex** $(-1, -4)$, **a minimum**

Scoring: 1 point per part. In part (c), both the coordinates and the max/min word are needed.

Question 2: Increasing and decreasing (3 points)



Turning points: relative maxima at $(-4, 3)$ and $(3, 3)$, relative minimum at $(0, -3)$.

- a. $-6 < x < -4$ **and** $0 < x < 3$
- b. $-4 < x < 0$ **and** $3 < x < 6$
- c. **Minimum value -3 at $x = 0$**

Scoring: 1 point per part. In parts (a) and (b), both intervals are needed; give 0.5 for one interval.

Question 3: End behavior (2 points)

- a. The term $-x^2$ becomes very negative. $f(x)$ **decreases without bound.**
- b. Powers like $2^{-10} = \frac{1}{1024}$ are tiny and positive. $g(x)$ **approaches 0.**

Scoring: 1 point per part for the correct description.

Question 4: Symmetry of a parabola (2 points)

The axis is $x = -\frac{-8}{2(1)} = 4$. Then $f(4) = 16 - 32 + 10 = -6$.

Axis $x = 4$; vertex $(4, -6)$

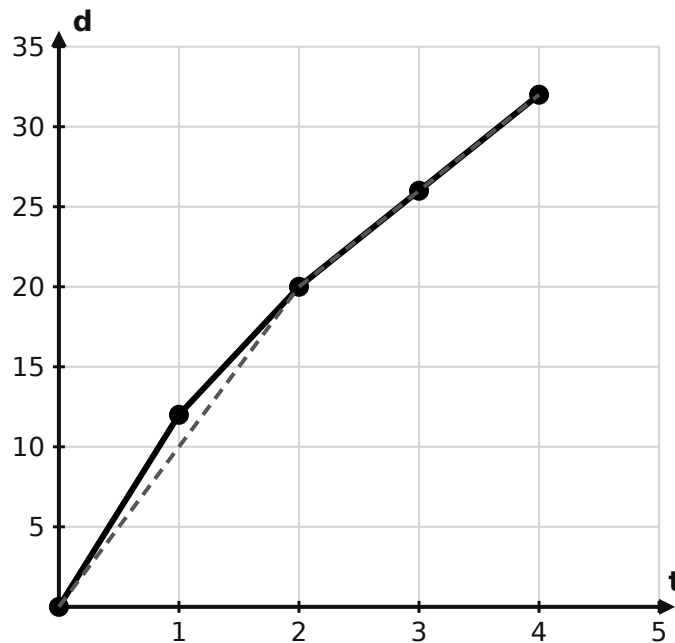
Scoring: 1 point for the axis. 1 point for the vertex: 0.5 for the correct x -value and 0.5 for the y -value.

Question 5: Average rate of change (2 points)

$f(1) = 2$ and $f(4) = 16 + 4 = 20$. The rate is $\frac{20-2}{4-1} = \frac{18}{3} = 6$.

Scoring: 1 point for both function values; 1 point for the correct quotient.

Question 6: Biking distance (3 points)



Secant segments: $t = 0$ to 2 has slope 10; $t = 2$ to 4 has slope 6.

- a. $\frac{20-0}{2-0} = 10$. **10 miles per hour**
- b. $\frac{32-20}{4-2} = \frac{12}{2} = 6$. **6 miles per hour**
- c. **The first interval:** his average speed was 10 mph, which is greater than 6 mph.

Scoring: 1 point per part. Parts (a) and (b) need units; part (c) needs the comparison of the two rates.

Question 7: Compare two functions (2 points)

- a. f has rate 4. g rises 2 per step, so its rate is 2. f
- b. $f(10) = 4(10) - 5 = 35$. $g(10) = 3 + 2(10) = 23$. f

Scoring: 1 point per part for the correct function with supporting numbers.

Question 8: Ball height (3 points)

- a. The axis is $t = -\frac{32}{2(-16)} = 1$, and $h(1) = -16 + 32 + 6 = 22$. **22 feet at 1 second**
- b. $h(0) = 6$. **The ball starts 6 feet above the ground.**
- c. $\frac{22-6}{1-0} = 16$. **16 feet per second**

Scoring: 1 point per part. In part (b), an interpretation without units earns 0.5.

Total

20 points