

Algebra 2 · Rational Functions and Their Graphs · Test Answer Key

Common Core F-IF.C.7d, F-IF.B.4 · mathovore.fr

Use this key to score the test out of 20 points. Each solution shows the full work, and the scoring note explains how the points are awarded. Accept equivalent forms of a correct answer, such as 2.5 and $\frac{5}{2}$.

Algebra 2 Common Core: F-IF.C.7d · F-IF.B.4

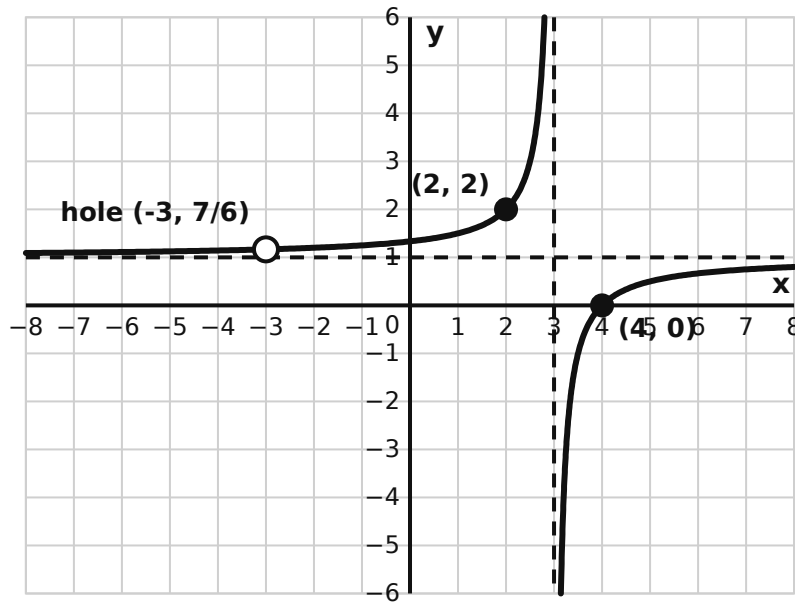
Question 1: Domain and asymptotes (2 points)

- a. The denominator is zero at $x=4$. Domain: $x \neq 4$; vertical asymptote $x=4$.
- b. Equal degrees: $\frac{2}{1}=2$, so $y=2$.

Scoring: 1 point for the domain and vertical asymptote together; 1 point for the horizontal asymptote.

Question 2: Hole and asymptotes (3 points)

Factor: $f(x) = \frac{(x-4)(x+3)}{(x-3)(x+3)}$. The factor $x+3$ cancels, leaving $\frac{x-4}{x-3}$. At $x=-3$: $\frac{-7}{-6} = \frac{7}{6}$. Hole: $(-3, \frac{7}{6})$. Vertical asymptote: $x=3$. Horizontal asymptote: $y=1$.

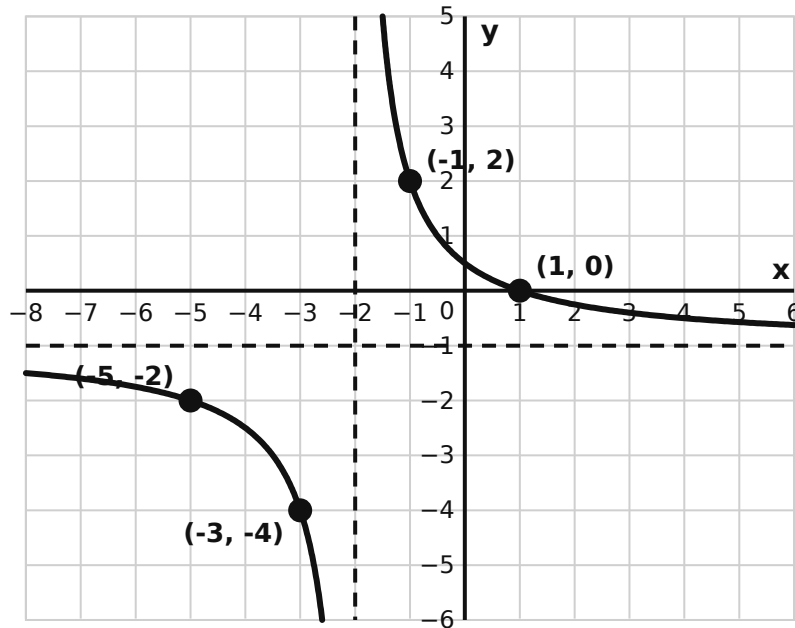


The open circle marks the hole.

Scoring: 1 point for the hole (both coordinates); 1 point for the vertical asymptote; 1 point for the horizontal asymptote.

Question 3: Graph a rational function (3 points)

Asymptotes: $x = -2$ and $y = -1$. Points: $(-1, 2)$, $(1, 0)$, $(-3, -4)$, $(-5, -2)$.



The graph of the function.

Scoring: 1 point for both dashed asymptotes; 1 point for at least four correct points; 1 point for both branches drawn approaching the asymptotes.

Question 4: Equation from a graph (2 points)

Asymptotes $x = 1$ and $y = -2$ give $h = 1$, $k = -2$. The point $(2, 1)$ gives $1 = \frac{a}{1} - 2$, so $a = 3$. Equation: $y = \frac{3}{x-1} - 2$. Check $(4, -1)$: $\frac{3}{3} - 2 = -1$.

Scoring: 1 point for $h = 1$ and $k = -2$; 1 point for the correct value of a .

Question 5: Inverse variation (3 points)

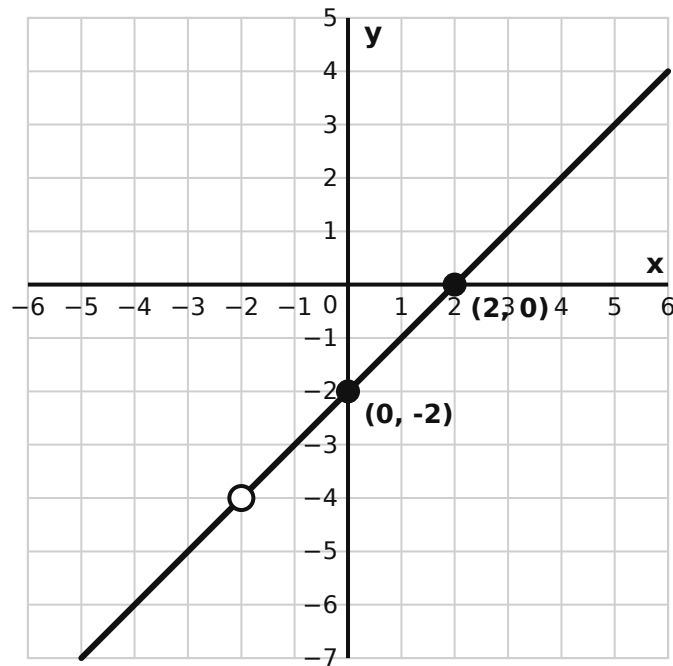
- $k = 4 \cdot 9 = 36$, so $y = \frac{36}{x}$.
- $y = \frac{36}{12} = 3$.
- $2.25 = \frac{36}{x}$ gives $x = \frac{36}{2.25} = 16$.

Scoring: 1 point per part.

Question 6: Graph with a hole (2 points)

$$f(x) = \frac{(x-2)(x+2)}{x+2} = x-2 \text{ for } x \neq -2.$$

- a. At $x = -2$ the line has height -4 : $(-2, -4)$.
- b. Domain: $x \neq -2$.



The hole is at $(-2, -4)$.

Scoring: 1 point for each part.

Question 7: Driving time (3 points)

- a. $t = \frac{180}{45} = 4$ hours.
- b. $2.5 = \frac{180}{r}$ gives $r = 72$ mph.
- c. The time gets closer to 0 but never reaches it; the horizontal asymptote is $t = 0$.

Scoring: 1 point per part.

Question 8: Average cost (2 points)

- a. $C(30) = \frac{120+120}{30} = 8$. The average is **\$8**.
- b. $4n+120=5n$ gives $n=120$. Check: $\frac{480+120}{120} = 5$. **120 shirts**.

Scoring: 1 point per part.

Total

20 points