GRAPHING RATIONALS **A**

1. Which one of the following graphs does not have a vertical asymptote?

A. $f(x)=\frac{1}{x^2+1}$

B. $f(x)=\frac{1}{x^2-3}$

C. $f(x)=\frac{2}{x^2}$

D. $f(x)=\frac{3x+1}{x-5}$

2. The horizontal asymptote of the graph of the function $g(x)=\frac{-7x+2}{3x+2}$ is

A. $y=0$

B. $y=-\frac{7}{3}$

C. $y=-\frac{3}{7}$

D. $x=-\frac{2}{3}$

$\frac{-\frac{7x}{x}+\frac{2}{x}}{\frac{3x}{x}+\frac{2}{x}}=0 \quad = -\frac{7}{3}$

3. Which function has a graph with a hole?

A. $y=\frac{x+4}{2x^2+8x}$

B. $y=\frac{x-4}{2x^2+8x}$

C. $y=\frac{4x+4}{2x^2+8x}$

D. $y=\frac{x+4}{2x^2-8x}$

$\frac{(x+4)}{2x(x+4)}$

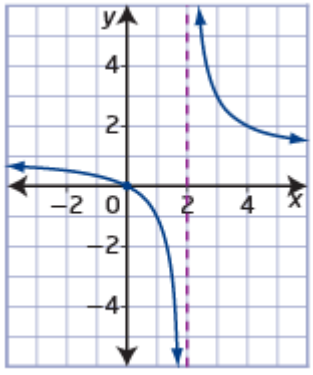
$=\frac{x+4}{2x(x-4)}$

$y = \frac{x}{x-3}$ $(x \neq 3)$ $\frac{2}{2-3}$ $= 1$

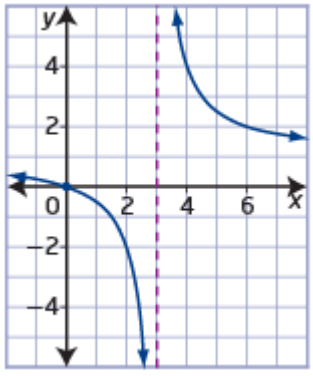
4. Which graph represents $y = \frac{x^2 - 2x}{x^2 - 5x + 6}$?

$= \frac{x(x-2)}{(x-3)(x-2)} \Rightarrow$ $y = \frac{x}{x-3}$

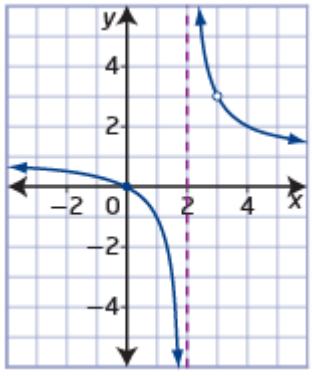
A.



B.



C.



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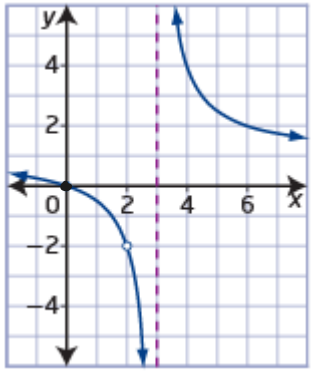


(2, −2) hole

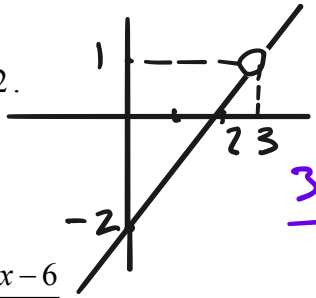
$x = 0$ $y = 0$

VA $x = 3$

5. Which statement about the graph of $y = \frac{x^2 - 5x + 6}{x - 3}$ is true?

$\frac{(x-3)(x-2)}{(x-3)} = \boxed{(x-2)}$ $x \neq 3$

A. There is a vertical asymptote at $y = 3$.
B. There is a horizontal asymptote at $x = 2$.
C. There is a vertical asymptote at $x = 2$.
D. There is a hole at (3, 1).



$3 - 2 = 1$

6. Determine the x-intercept(s) of $f(x) = \frac{3x^2 - 3x - 6}{x^2 + 4x + 4}$.

not x we are looking for what value of x

$\frac{3(x^2 - x - 2)}{(x+2)(x+2)} \Rightarrow \frac{3(x-2)(x+1)}{(x+2)(x+2)}$

$\frac{3(x-2)(x+1)}{3} = \frac{0}{3}$

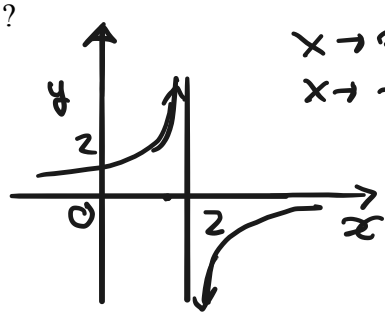
$\boxed{(x-2)(x+1) = 0}$

A. −2
B. −1, 2
C. −3, 6
D. 3, −6

$x = 2$ $(x-2) = 0$

$x = -1$ $(x+1) = 0$

7. Which statement is true about the function $y = -\dfrac{4}{x-2}$?



$y = \frac{-4}{-4} = 1$

$x \to \infty$
$x \to -\infty$

$y = \frac{-4}{\infty}$

$x = 2.001$ $\quad y = \frac{-4}{0.001} = -9000$

~~A~~ As x approaches -2, $|y|$ becomes very large.

~~B~~ As $|x|$ becomes very large, y approaches -4.

C As x approaches 2, $|y|$ becomes very large.

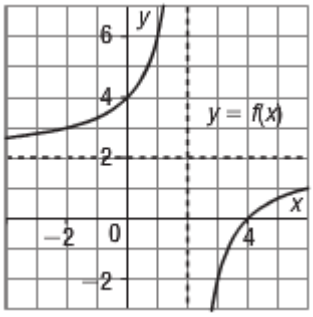
~~D~~ As $|x|$ becomes very large, y approaches 4.

$x \to \infty$
$x \to -\infty$ $\quad |-\infty| = \infty$

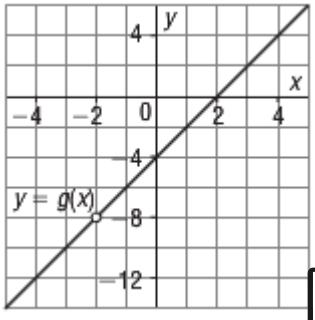
8. Which graph below represents the function $y = \dfrac{2x^2 - 8}{x-2}$?

$\frac{2x^2-8}{x-2} \Rightarrow \frac{2(x^2-4)}{(x-2)}$

A.



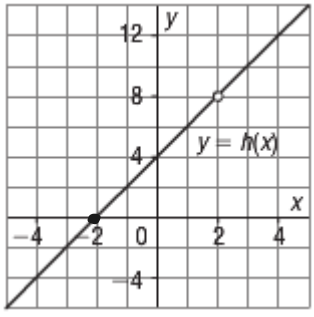
B.



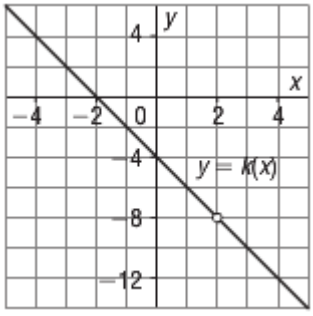
$\frac{2(x-2)(x+2)}{(x-2)}$

$y = 2(x+2)$

C



D.



$x \neq 2$
$y \neq 8$
$x = -2 \quad y = 0$
$x = 0 \quad y = 4$

9. The graph $f(x) = \dfrac{x^2 - 9}{x^2 - 2x - 3}$ has a "hole" at the point

A. $(-3, 0)$

B. $(3, 0)$

C. $(-3, 1)$

D. $\left(3, \frac{3}{2}\right)$

$y = \frac{(x-3)(x+3)}{(x-3)(x+1)} \Rightarrow \frac{(x+3)}{(x+1)} = y$

$x = 3$

$\frac{(3+3)}{(3+1)} = \frac{6}{4} = \frac{3}{2}$

10. Consider the rational function $f(x)=-\dfrac{ax+5}{7x-b}$, where a and b are natural numbers. The vertical asymptote and the horizontal asymptote of the graph of $f(x)$, respectively, are

A. $x=-\dfrac{b}{7}, y=-\dfrac{a}{7}$

B. $x=\dfrac{b}{7}, y=-\dfrac{5}{b}$

C. $x=\dfrac{b}{7}, y=\dfrac{a}{7}$

D. $x=\dfrac{b}{7}, y=-\dfrac{a}{7}$

11. Which statement about the function $y=\dfrac{x}{x^2-x}$ is true?

A. It has an x-intercept of 0.
B. It has a y-intercept of 0.
C. It has a point of discontinuity at $(0,-1)$.
D. It has a vertical asymptote at $x=0$.

12. The horizontal asymptote of the graph of $f(x)=\dfrac{2x+4}{3x-5}$ is

A. $y=0$

B. $y=\dfrac{2}{3}$

C. $y=-\dfrac{4}{5}$

D. $x=\dfrac{5}{3}$

13. The equation of a rational function can be written in the form $y=x-p$, $x\neq -3$. The graph of the rational function has a point of discontinuity at $(-3,10)$. The value of p is

A. 13
B. 7
C. –7
D. –13

14. Let f be a rational function given by $f(x)=\frac{ax^n}{bx^m}$. The graph has a horizontal asymptote of $y=0$ when

degree of num < deg. of denom

A. $n=m$
B. $n<0$
C. $n>m$
D. $n<m$

15. The vertical asymptote of the graph of $f(x)=\frac{2x+4}{3x-5}$ is

VA set denom = 0

$3x-5=0$

$3x=5$

$\frac{3x}{3}=\frac{5}{3}$

$x=\frac{5}{3}$

A. $y=\frac{3}{2}$
B. $x=-\frac{5}{3}$
C. $x=\frac{5}{3}$
D. $y=\frac{2}{3}$

16. The graph of a rational function has a horizontal asymptote at $y=3$, a vertical asymptote at $x=-2$, and a y-intercept of 1. What is the equation of the function?

HA

A. $y=\frac{4}{x+2}+3$ $\quad x\to\infty \quad y=\frac{4}{\infty}+3$

B. $y=\frac{-4}{x+2}+3$ $\quad$ HA $y=3$ $\quad |x|\to\infty \quad y\to 3$

C. $y=\frac{-9}{x-3}-2$ $\quad$ HA $y=-2$

D. $y=\frac{9}{x-3}-2$ $\quad$ HA $y=-2$

$\frac{-4}{x}$ $\quad +3$

$\frac{x}{x}$ $\quad \frac{+2}{x}$

$+3$

VA = 3

0

$y=\frac{4x}{x+2}+3$

HA = 7 $\quad$ VA = -2

17. Consider the function $f(x)=\dfrac{ax^3+bx^2+cx+d}{2x+5}$. If the numerator can be expressed in the factored form $(2x+5)(x^2-p)$ and the graph of the function has a point of discontinuity at $\left(q,\dfrac{9}{4}\right)$, the value of q is

A. 4

B. $\dfrac{5}{2}$

C. -4

D. $-\dfrac{5}{2}$

18. Which of the following rational functions describes a graph that has a horizontal asymptote of $y=-2$, a vertical asymptote of $x=1$, and a y-intercept at $(0,0)$?

A. $f(x)=\dfrac{-2x}{x-1}$

B. $f(x)=\dfrac{-x}{x-2}$

C. $f(x)=\dfrac{x+2}{x-1}$

D. $f(x)=\dfrac{x-2}{-x}$

19. Given $y=\dfrac{x+2}{x^2-3x-10}$, which statement is true?

A. The equations of the vertical asymptotes are $x=-2$ and $x=5$.

B. There is a point of discontinuity in the graph of the function at $\left(-2,-\dfrac{1}{7}\right)$ and at (5, 1).

C. The range is $\{x \mid x\neq -2 \text{ or } 5, x\in R\}$.

D. The non-permissible values are $x=-2$ and $x=5$.

GRAPHING RATIONALS **A**

1. **A**
2. **B**
3. **A**
4. **D**
5. **D**
6. **B**
7. **C**
8. **C**
9. **D**
10. **D**
11. **C**
12. **B**
13. **D**
14. **D**
15. **C**
16. **B**
17. **D**
18. **A**
19. **D**