Name: ________________________ Class: ___________________ Date: __________ ID: A

Algebra II Practice Quiz 8.3 - 8.4

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Subtract $\dfrac{-6x^2 + x - 3}{x^2 + 9} - \dfrac{-2x - 4}{x^2 + 9}$. Identify any x-values for which the expression is undefined.

a. $\dfrac{-6x^2 - x - 7}{x^2 + 9}$; The expression is always defined.

b. $\dfrac{-6x^2 - x - 7}{x^2 + 9}$; The expression is undefined at $x = \pm 3$.

c. $\dfrac{-6x^2 + 3x + 1}{x^2 + 9}$; The expression is undefined at $x = \pm 3$.

d. $\dfrac{-6x^2 + 3x + 1}{x^2 + 9}$; The expression is always defined.

____ 2. Find the least common multiple for $6(x+1)^3(x-4)^2$ and $10(x+1)^8(x-4)^5$.

a. $10(x+1)^3(x-4)^2$

b. $30(x+1)^8(x-4)^5$

c. $2(x+1)^8(x-4)^5$

d. $30(x+1)^3(x-4)^2$

____ 3. Add $\dfrac{x+6}{x-7} + \dfrac{-12x-59}{x^2-3x-28}$.

a. $\dfrac{-11x-53}{x^2-2x-35}$

b. $\dfrac{x^2+10x+24}{(x+4)(x-7)}$

c. $\dfrac{x+6}{(x-7)(x+4)}$

d. $\dfrac{x+5}{x+4}$

____ 4. Subtract $\dfrac{2x^2-48}{x^2-16} - \dfrac{x+6}{x+4}$. Identify any x-values for which the expression is undefined.

a. $\dfrac{x-6}{x-4}$
The expression is undefined at $x = 4$ and $x = -4$.

b. $\dfrac{x^2+2x-72}{(x-4)(x+4)}$
The expression is undefined at $x = 4$ and $x = -4$.

c. $\dfrac{x+6}{x-4}$
The expression is undefined at $x = 4$ and $x = -4$.

d. $\dfrac{x-6}{x+4}$
The expression is undefined at $x = 4$ and $x = -4$.

____ 5. Simplify $\dfrac{\dfrac{-5}{x-4}+\dfrac{x-6}{10}}{\dfrac{x+3}{x-4}}$. Assume that all expressions are defined.

a. $\dfrac{x-56}{10(x+3)}$
c. $\dfrac{x^2-10x-26}{10(x+3)}$
b. $\dfrac{x^2-10x-26}{10\left(x^2-x-12\right)}$
d. $\dfrac{x^3-14x^2+14x+104}{10\left(x^2-x-12\right)}$

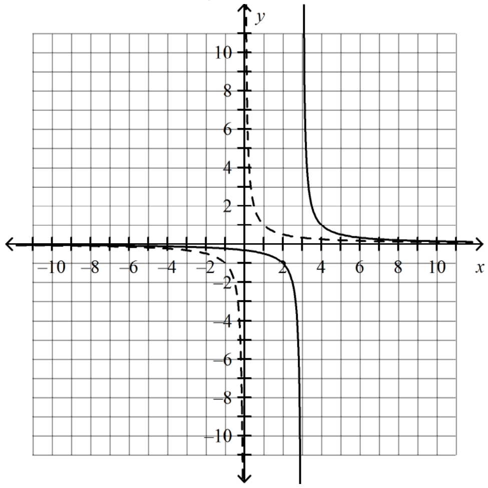
____ 6. Michaela climbed up a mountain at an average speed of 3 mi/h. She climbed down at an average speed of 5 mi/h. What is Michaela's average speed for the entire trip? Round to the nearest tenth.

a. 3.8 mi/h
c. 1.9 mi/h
b. 4.0 mi/h
d. 3.9 mi/h

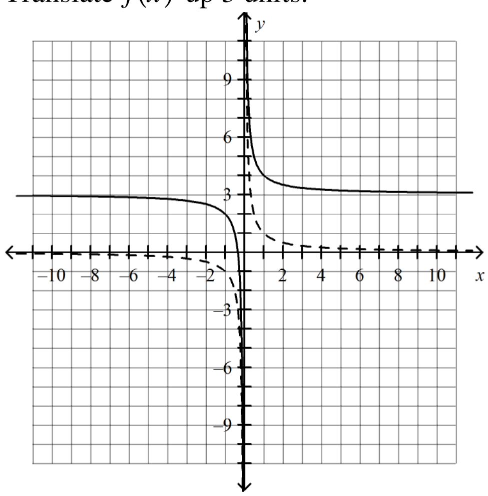
Name: ________________________ **ID: A**

____ 7. Using the graph of $f(x) = \frac{1}{x}$ as a guide, describe the transformation and graph $g(x) = \frac{1}{x} + 3$.

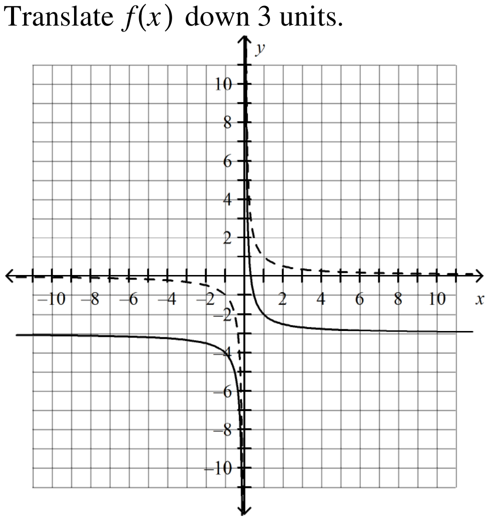
a. Translate $f(x)$ right 3 units.



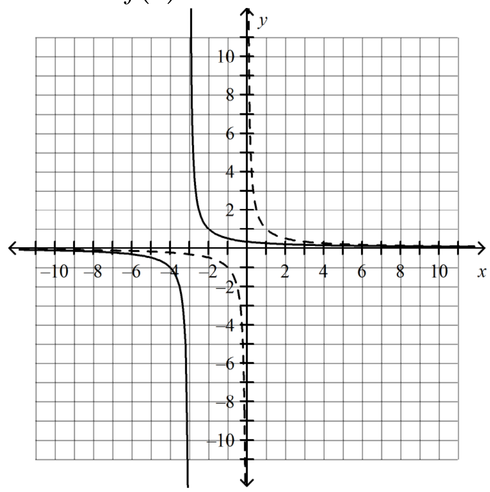
b. Translate $f(x)$ up 3 units.



c. Translate $f(x)$ down 3 units.



d. Translate $f(x)$ left 3 units.



____ 8. Identify the asymptotes, domain, and range of the function $g(x) = \dfrac{1}{x+7} + 3$.

a. Vertical asymptote: $x = -7$
Domain: $\{x | x \neq -7\}$
Horizontal asymptote: $y = -3$
Range: $\{y | y \neq -3\}$

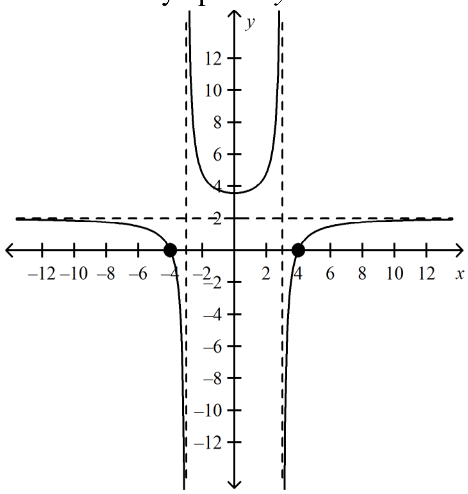
b. Vertical asymptote: $x = 7$
Domain: $\{x | x \neq 7\}$
Horizontal asymptote: $y = 3$
Range: $\{y | y \neq 3\}$

c. Vertical asymptote: $x = 7$
Domain: $\{x | x \neq 7\}$
Horizontal asymptote: $y = -3$
Range: $\{y | y \neq -3\}$

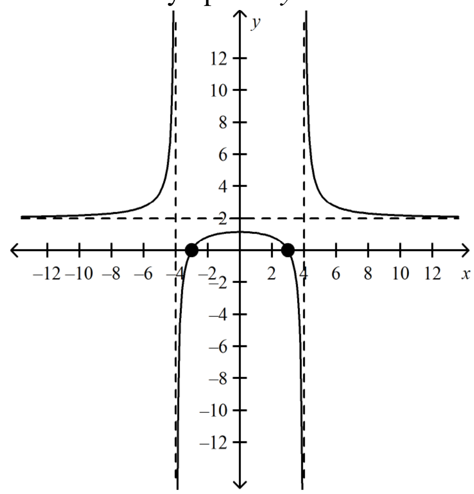
d. Vertical asymptote: $x = -7$
Domain: $\{x | x \neq -7\}$
Horizontal asymptote: $y = 3$
Range: $\{y | y \neq 3\}$

____ 9. Identify the zeros and asymptotes of $f(x) = \dfrac{2x^2 - 18}{x^2 - 16}$. Then graph.

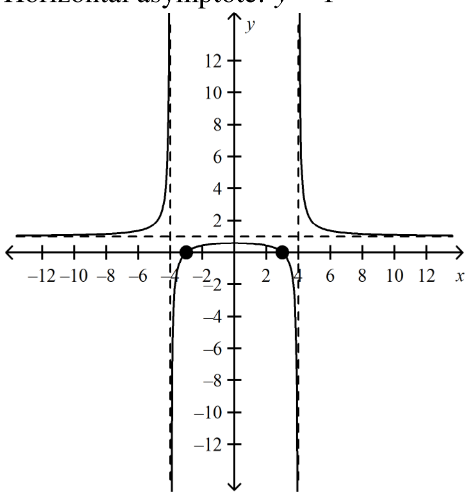
a. Zeros: –4 and 4
Vertical asymptotes: $x = -3$, $x = 3$
Horizontal asymptote: $y = 2$



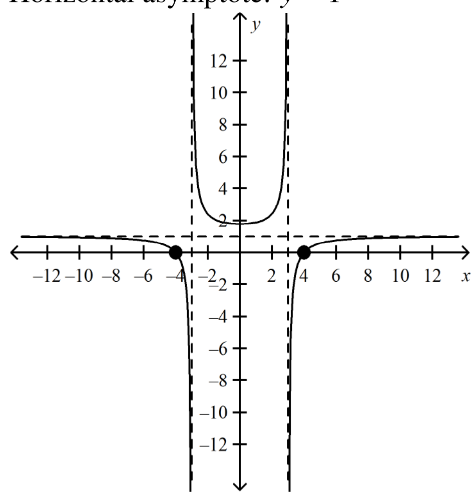
c. Zeros: –3 and 3
Vertical asymptotes: $x = -4$, $x = 4$
Horizontal asymptote: $y = 2$



b. Zeros: –3 and 3
Vertical asymptotes: $x = -4$, $x = 4$
Horizontal asymptote: $y = 1$

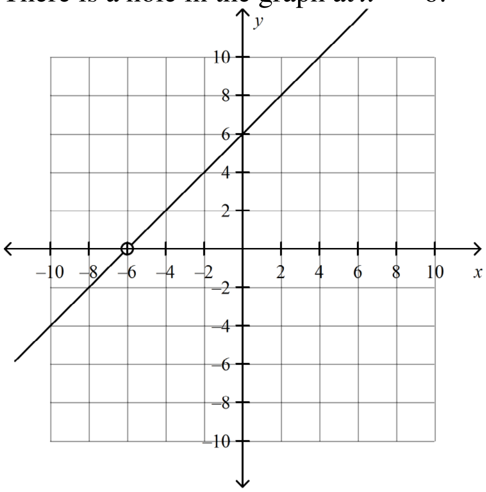


d. Zeros: –4 and 4
Vertical asymptotes: $x = -3$, $x = 3$
Horizontal asymptote: $y = 1$

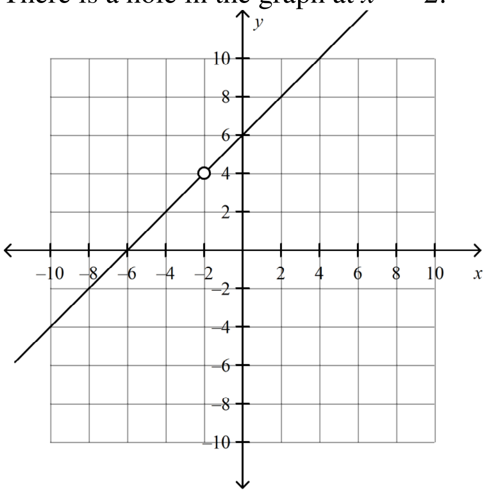


____ 10. Identify holes in the graph of $f(x) = \dfrac{x^2 + 8x + 12}{x + 2}$. Then graph.

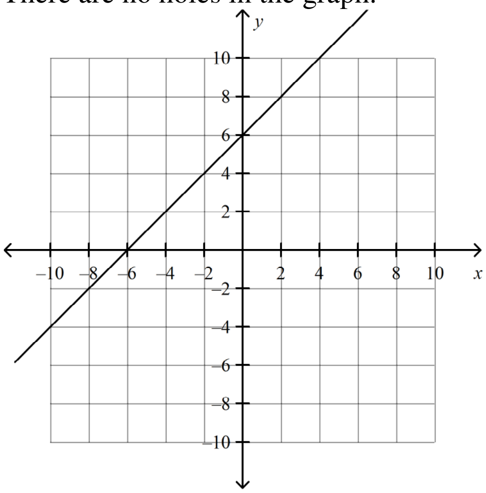
a. There is a hole in the graph at $x = -6$.



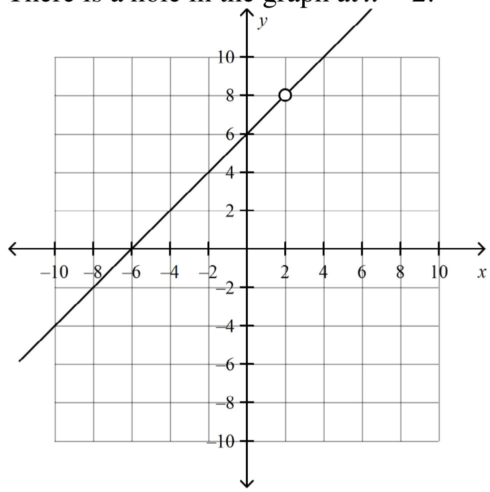
b. There is a hole in the graph at $x = -2$.



c. There are no holes in the graph.



d. There is a hole in the graph at $x = 2$.



Algebra II Practice Quiz 8.3 - 8.4
Answer Section

MULTIPLE CHOICE

1. ANS: D

$$\frac{-6x^2+x-3}{x^2+9}-\frac{-2x-4}{x^2+9}$$

$$=\frac{-6x^2+x-3+2x+4}{x^2+9}$$ Subtract the numerators. Distribute the negative sign.

$$=\frac{-6x^2+3x+1}{x^2+9}$$ Combine like terms.

There is no real value of x for which $x^2+9=0$; the expression is always defined.

	Feedback
A	Did you add or subtract the numerators?
B	Did you add or subtract the numerators?
C	The expression is undefined at $x = c$ if and only if the denominator is zero at $x = c$.
D	Correct!

PTS: 1 DIF: Basic REF: Page 583
OBJ: 8-3.1 Adding and Subtracting Rational Expressions with Like Denominators
NAT: 12.5.3.c TOP: 8-3 Adding and Subtracting Rational Expressions

2. ANS: B

List the factors for each polynomial.

$6(x+1)^3(x-4)^2 = 3\cdot 2\cdot (x+1)^3\cdot (x-4)^2$ and $10(x+1)^8(x-4)^5 = 5\cdot 2\cdot (x+1)^8\cdot (x-4)^5$

If the polynomials have common factors, use the highest power of each common factor.

The LCM is $3\cdot 5\cdot 2\cdot (x+1)^8(x-4)^5 = 30(x+1)^8(x-4)^5$.

	Feedback
A	Use all the factors of each polynomial and the highest power of any repeated factors.
B	Correct!
C	Use all the factors of each polynomial and the highest power of any repeated factors.
D	Use all the factors of each polynomial and the highest power of any repeated factors.

PTS: 1 DIF: Advanced REF: Page 584
OBJ: 8-3.2 Finding the Least Common Multiple of Polynomials
NAT: 12.5.3.c TOP: 8-3 Adding and Subtracting Rational Expressions

3. ANS: D

$\dfrac{x+6}{x-7}+\dfrac{-12x-59}{(x+4)(x-7)}$	Factor the denominators. The LCD is $(x+4)(x-7)$.
$=\left(\dfrac{x+4}{x+4}\right)\dfrac{x+6}{x-7}+\dfrac{-12x-59}{(x+4)(x-7)}$	Multiply by $\left(\dfrac{x+4}{x+4}\right)$.
$=\dfrac{x^2+10x+24}{(x+4)(x-7)}+\dfrac{-12x-59}{(x+4)(x-7)}$	
$=\dfrac{x^2-2x-35}{(x+4)(x-7)}$	Add the numerators.
$=\dfrac{(x+5)(x-7)}{(x+4)(x-7)}$	Factor the numerator.
$=\dfrac{x+5}{x+4}$	Divide the common factor.

	Feedback
A	Find a common denominator before adding the fractions.
B	This is the first fraction rewritten with the common denominator. Add this to the second fraction.
C	Find a common denominator before adding the fractions.
D	Correct!

PTS: 1 DIF: Average REF: Page 584 OBJ: 8-3.3 Adding Rational Expressions
NAT: 12.5.3.c TOP: 8-3 Adding and Subtracting Rational Expressions

4. ANS: A

$\dfrac{2x^2-48}{(x-4)(x+4)}-\dfrac{x+6}{x+4}$	Factor the denominators.
$=\dfrac{2x^2-48}{(x-4)(x+4)}-\dfrac{x+6}{x+4}\left(\dfrac{x-4}{x-4}\right)$	The LCD is $(x-4)(x+4)$, so multiply $\dfrac{x+6}{x+4}$ by $\dfrac{x-4}{x-4}$.
$=\dfrac{2x^2-48-(x+6)(x-4)}{(x-4)(x+4)}$	Subtract the numerators.
$=\dfrac{2x^2-48-\left(x^2+2x-24\right)}{(x-4)(x+4)}$	Multiply the binomials in the numerator.
$=\dfrac{2x^2-48-x^2-2x+24}{(x-4)(x+4)}$	Distribute the negative sign.
$=\dfrac{x^2-2x-24}{(x-4)(x+4)}$	Write the numerator in standard form.
$=\dfrac{(x-6)(x+4)}{(x-4)(x+4)}=\dfrac{x-6}{x-4}$	Factor the numerator, and divide out common factors.

The expression is undefined at $x=4$ and $x=-4$ because these values of x make the factors $(x-4)$ and $(x+4)$ equal 0.

	Feedback
A	Correct!
B	Check your distribution of the negative sign.
C	Did you factor the numerator and divide out common factors correctly?
D	Did you factor the numerator and divide out common factors correctly?

PTS: 1 DIF: Average REF: Page 585
OBJ: 8-3.4 Subtracting Rational Expressions NAT: 12.5.3.c
TOP: 8-3 Adding and Subtracting Rational Expressions

5. ANS: C

Method 1 Write the complex fraction as division.

$\left(\dfrac{-5}{x-4}+\dfrac{x-6}{10}\right)\div\dfrac{x+3}{x-4}$ Divide.

$=\left(\dfrac{-5}{x-4}+\dfrac{x-6}{10}\right)\cdot\dfrac{x-4}{x+3}$ Multiply by the reciprocal.

$=\left(\dfrac{-5}{x-4}\left(\dfrac{10}{10}\right)+\dfrac{x-6}{10}\left(\dfrac{x-4}{x-4}\right)\right)\cdot\dfrac{x-4}{x+3}$ Add by finding the LCD.

$=\dfrac{x^2-10x-26}{10(x-4)}\cdot\dfrac{x-4}{x+3}$ The common factor $(x-4)$ cancels.

$=\dfrac{x^2-10x-26}{10(x+3)}$ or $\dfrac{x^2-10x-26}{10x+30}$ Simplify.

Method 2 Multiply the numerator and denominator of the complex fraction by the LCD of the fractions in the numerator and denominator.

$\dfrac{\dfrac{-5}{x-4}(10)(x-4)+\dfrac{x-6}{10}(10)(x-4)}{\dfrac{x+3}{x-4}(10)(x-4)}$ The LCD is $10(x-4)$.

$=\dfrac{-5(10)+(x-6)(x-4)}{10(x+3)}$ Cancel common factors.

$=\dfrac{x^2-10x-26}{10(x+3)}$ or $\dfrac{x^2-10x-26}{10x+30}$ Simplify.

	Feedback
A	Multiply both addends in the numerator by the reciprocal of the denominator, not just the first.
B	Multiply the numerator by the reciprocal of the denominator.
C	Correct!
D	Multiply the numerator by the reciprocal of the denominator.

PTS: 1 DIF: Average REF: Page 586
OBJ: 8-3.5 Simplifying Complex Fractions NAT: 12.5.3.c
TOP: 8-3 Adding and Subtracting Rational Expressions

6. ANS: A

The average speed is equal to the total distance divided by the total time. Let d represent the distance between the starting point and the destination.

Total distance: $2d$	
Total time: $\frac{d}{3}+\frac{d}{5}$	Use the formula $t=\frac{d}{r}$.
Average speed: $\frac{2d}{\frac{d}{3}+\frac{d}{5}}$	The average speed is $\frac{\text{total time}}{\text{total distance}}$.
$\frac{2d(15)}{\frac{d}{3}(15)+\frac{d}{5}(15)}$	The LCD of the fractions in the denominator is 15.
$=\frac{30d}{5d+3d}$	Simplify.
$=\frac{30\cancel{d}}{8\cancel{d}}\approx 3.8$	Combine like terms and simplify.

Michaela's average speed is 3.8 mi/h.

	Feedback
A	Correct!
B	The average speed is equal to the total distance divided by the total time.
C	The average speed is equal to the total distance divided by the total time.
D	The average speed is equal to the total distance divided by the total time.

PTS: 1 DIF: Average REF: Page 587 OBJ: 8-3.6 Application
NAT: 12.5.3.c TOP: 8-3 Adding and Subtracting Rational Expressions

7. ANS: B

Write $g(x)$ in the form $g(x)=\frac{1}{x-h}+k$ where h is the horizontal translation and k is the vertical translation.

$g(x)=\frac{1}{x}+3=\frac{1}{x-0}+3=\frac{1}{x-h}+k$

$h=0$ and $k=3$. Translate $f(x)$ up 3 units.

	Feedback
A	$(1/x)+c$ represents a vertical translation of $f(x)$.
B	Correct!
C	The sign of c determines whether $(1/x)+c$ represents a vertical translation of $f(x)$ $\lvert c\rvert$ units up or down.
D	$(1/x)+c$ represents a vertical translation of $f(x)$.

PTS: 1 DIF: Average REF: Page 592
OBJ: 8-4.1 Transforming Rational Functions TOP: 8-4 Rational Functions

8. ANS: D

Write the function in the form $g(x) = \dfrac{1}{x-h} + k$ where $x = h$ is the vertical asymptote and helps find the domain, and $y = k$ is the horizontal asymptote and helps find the range.

$g(x) = \dfrac{1}{x-(7)} + 3$, so $h = -7$ and $k = 3$.

Vertical asymptote: $x = -7$
Domain: $\{x | x \neq -7\}$

Horizontal asymptote: $y = 3$
Range: $\{y | y \neq 3\}$

	Feedback
A	The horizontal asymptote is equal to the vertical translation of the parent function.
B	The vertical asymptote is at the value of x that makes the denominator equal 0.
C	The vertical asymptote is at the value of x that makes the denominator equal 0. The horizontal asymptote is equal to the vertical translation of the parent function.
D	Correct!

PTS: 1 DIF: Average REF: Page 593
OBJ: 8-4.2 Determining Properties of Hyperbolas TOP: 8-4 Rational Functions

9. ANS: C

$f(x) = \dfrac{2(x+3)(x-3)}{(x+4)(x-4)}$ Factor the numerator and denominator.

Zeros: –3 and 3 The numerator is 0 when $x = -3$ or $x = 3$.

Vertical asymptotes: $x = -4$, $x = 4$ The denominator is 0 when $x = -4$ or $x = 4$.

Horizontal asymptote: $y = 2$ Both p and q have the same degree: 2. The horizontal asymptote is

$$y = \frac{\text{leading coefficient of } p}{\text{leading coefficient of } q} = \frac{2}{1} = 2$$

.

	Feedback
A	You reversed the values of the zeros and the vertical asymptotes.
B	To find the horizontal asymptote, divide the leading coefficient of p by the leading coefficient of q.
C	Correct!
D	Find the zeros by checking when the nominator is 0. Then find the vertical asymptotes by checking when the denominator is 0. To find the horizontal asymptote, divide the leading coefficient of p by the leading coefficient of q.

PTS: 1 DIF: Average REF: Page 595
OBJ: 8-4.4 Graphing Rational Functions with Vertical and Horizontal Asymptotes
TOP: 8-4 Rational Functions

10. ANS: B

$f(x) = \dfrac{x^2 + 8x + 12}{x + 2}$

$= \dfrac{(x+2)(x+6)}{x+2}$ Factor the numerator. $x + 2$ is a factor in both the numerator and the denominator, so there is a hole at $x = -2$.

$= x + 6$ Divide out common factors.

Except for the hole at $x = -2$, the graph of f is the same as $y = x + 6$. On the graph, indicate the hole with an open circle. The domain of f is $\{x \mid x \neq -2\}$.

	Feedback
A	For what value(s) of x are the numerator and denominator of $f(x)$ equal to zero?
B	Correct!
C	For what value(s) of x are the numerator and denominator of $f(x)$ equal to zero?
D	For what value(s) of x are the numerator and denominator of $f(x)$ equal to zero?

PTS: 1 DIF: Average REF: Page 596
OBJ: 8-4.5 Graphing Rational Functions with Holes TOP: 8-4 Rational Functions