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## Topic 4 Test Practice

Is the relationship between the variables in the table a direct variation, an inverse variation, or neither? If it is a direct or inverse variation, write a function to model it.
$\qquad$ 1.

| $\boldsymbol{x}$ | -9 | -7 | -2 | -1 |
| :---: | :---: | :---: | :---: | :---: |
| $\boldsymbol{y}$ | 36 | 28 | 8 | 4 |

a. inverse variation; $y=\frac{-324}{x}$
b. direct variation; $y=-4 x$
c. neither
$\qquad$ 2. Suppose that $x$ and $y$ vary inversely, and $x=10$ when $y=8$. Write the function that models the inverse variation.
a. $y=\frac{2}{x}$
b. $y=\frac{18}{x}$
c. $y=\frac{80}{x}$
d. $y=0.8 x$
$\qquad$ 3. A soccer team is collecting money to buy their coach a present. The table represents the cost per person for the gift compared to the number of people contributing. What function models the data, and how much per person will it cost if all 40 players contribute?

| Number of Players $(\boldsymbol{n})$ | 5 | 8 | 15 | 20 |
| :--- | :---: | :---: | :---: | :---: |
| Cost per Player $(\boldsymbol{c})$ | $\$ 40$ | $\$ 25$ | $\$ 13$ | $\$ 10$ |

a. $n c=400, \$ 10$
b. $\frac{n}{c}=100, \$ 5$
c. $n c=200, \$ 5$
d. $\frac{n}{c}=200, \$ 20$

## Sketch the asymptotes and graph the function.

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

c.

b.

d.

5. This graph of a function is a translation of $y=\frac{4}{x}$. What is an equation for the function?

a. $\quad y=\frac{4}{x+3}+4$
b. $y=\frac{4}{x+3}-4$
c. $y=\frac{4}{x+4}-3$
d. $y=\frac{4}{x+4}+3$
6. Write an equation for the translation of $y=\frac{4}{x}$ that has the asymptotes $x=7$ and $y=6$.
a. $\quad y=\frac{4}{x-6}+7$
b. $\quad y=\frac{4}{x+7}+6$
c. $y=\frac{4}{x-7}+6$
d. $y=\frac{4}{x+6}+7$

What are the vertical asymptotes for the graph of the rational function?
7. $y=\frac{(x+3)(x-5)(x+7)}{(x+1)(x+4)}$
a. $\quad x=1, x=4$
b. $x=-1, x=-4$
c. $x=3, x=-5, x=7$
d. $\quad x=-3, x=5, x=-7$
8. Find the horizontal asymptote of the graph of $y=\frac{3 x^{6}-7 x+9}{7 x^{2}+7 x+9}$.
a. $y=3$
c. $y=0$
b. $y=\frac{3}{7}$
d. no horizontal asymptote

What is the graph of the rational function?
9. $y=\frac{x^{2}-4 x+3}{x^{2}-9}$
a.

c.

b.

d.

10. $y=\frac{2 x+4}{x+1}$
a.

c.

b.

d.


Simplify the rational expression. State any restrictions on the variable.
11. $\frac{k^{2}-k-2}{k^{2}-4 k-5}$
a. $\frac{-(k-2)}{k-5} ; k \neq 5$
b. $\frac{-(k-2)}{k-5} ; k \neq-1, k \neq 5$
c. $\frac{k-2}{k-5} ; k \neq-1, k \neq-5$
d. $\frac{k-2}{k-5} ; k \neq-1, k \neq 5$
12. $\frac{t^{2}-4 t-32}{t-8}$
a. $\quad t-4 ; t \neq-8$
b. $\quad t+4 ; t \neq 8$
c. $-t-4 ; t \neq 8$
d. $-t+4 ; t \neq-8$

What is the product in simplest form? State any restrictions on the variable.

- 13. $\frac{y^{2}}{y-3} \cdot \frac{y^{2}-y-6}{y^{2}+1 y}$
a. $\frac{y^{2}+2 y}{y+1}, y \neq 3,-1$
b. $\frac{y^{2}+2 y}{y+1}, y \neq 3,0,-1$
c. $\frac{y+2}{y+1}, y \neq 3,0,-1$
d. $\frac{y+2}{y+1}, y \neq 3,-1$

14. $\frac{3 g^{5}}{10 h^{2}} \cdot \frac{h^{5}}{10 g^{2}}$
a. $\frac{3 g^{3} h^{3}}{100}, g \neq 0, h \neq 0$
b. $\frac{100}{3 g^{3} h^{3}}, g \neq 0, h \neq 0$
c. $\frac{3 g^{7}}{100 h^{7}}, g \neq 0, h \neq 0$
d. $\frac{3}{100} g^{7} h^{7}, g \neq 0, h \neq 0$

What is the quotient in simplified form? State any restrictions on the variable.
15. $\frac{a+2}{a-5} \div \frac{a+1}{a^{2}-8 a+15}$
a. $\frac{(a+2)(a-3)}{a+1}, a \neq 5,-1,3$
b. $\frac{(a+2)(a+1)}{(a-5)^{2}(a-3)}, a \neq 5,3,-1$
c. $\frac{(a+2)(a-3)}{a+1}, a \neq 3,-1$
d. $\frac{(a+2)(a+1)}{(a-5)^{2}(a-3)}, a \neq 5,3$

## Simplify the sum.

16. $\frac{4}{m+9}+\frac{5}{m^{2}-81}$
a. $\frac{9}{(m-9)(m+9)}$
b. $\frac{4 m-31}{(m-9)(m+9)}$
c. $\frac{9}{m^{2}+m-72}$
d. $\frac{4 m+41}{(m-9)(m+9)}$

Simplify the difference.
17. $\frac{n^{2}-10 n+24}{n^{2}-13 n+42}-\frac{9}{n-7}$
a. $\frac{n-13}{n-7}$
b. $\frac{n-4}{n-7}$
c. $n-13$
d. $\frac{n^{2}-10 n+15}{n^{2}-13 n+42}$

Solve the equation. Check the solution.
$\qquad$ 18. $\frac{4}{a}+\frac{5}{3 a}=3$
a. $\frac{17}{9}$
b. $\frac{17}{3}$
c. $\frac{19}{9}$
d. $\frac{3}{4}$
19. $\frac{-4}{x+1}=\frac{-1}{x+5}$
a. $-\frac{19}{4}$
b. $\frac{1}{3}$
c. $-\frac{19}{3}$
d. 2
20. The sum of the reciprocals of two consecutive even integers is $\frac{7}{24}$. Write an equation that can be used to find the two integers. Find the two integers.
a. $\quad q+(q+2)=\frac{7}{24} ; 4$ and 6
b. $\quad q+(q+2)=\frac{7}{24} ; 6$ and 8
c. $\frac{1}{q}+\frac{1}{q+2}=\frac{7}{24} ; 6$ and 8
d. $\quad \frac{1}{q}+\frac{1}{q+2}=\frac{7}{24} ; 4$ and 6

## Topic 4 Test Practice

## Answer Section

1. ANS: B PTS: 1 DIF: L2

REF: 4-1 Inverse Variation and the Reciprocal Function
OBJ: 4-1.1 Use inverse variation to write and graph the reciprocal function.
NAT: HSA.CED.A.2| HSA.CED.A. 4 TOP: 4-1 Example 1 Identify Inverse Variation
KEY: inverse variation
2. ANS: C PTS: 1 DIF: L2

REF: 4-1 Inverse Variation and the Reciprocal Function
OBJ: 4-1.1 Use inverse variation to write and graph the reciprocal function.
NAT: HSA.CED.A.2|HSA.CED.A. 4 TOP: 4-1 Example 2 Use Inverse Variation
KEY: inverse variation
3. ANS: C PTS: $1 \quad$ DIF: L3

REF: 4-1 Inverse Variation and the Reciprocal Function
OBJ: 4-1.1 Use inverse variation to write and graph the reciprocal function.
NAT: HSA.CED.A.2| HSA.CED.A. 4 TOP: 4-1 Example 3 Use an Inverse Variation Model
KEY: inverse variation
4. ANS: C PTS: $1 \quad$ DIF: L3

REF: 4-1 Inverse Variation and the Reciprocal Function
OBJ: 4-1.2 Identify the effect of transformations on the graph of the reciprocal function and define the effects
of $h$ and $k$ on the function $f(x)=1 / x-h+k$.
NAT: HSA.CED.A.2| HSF.BF.A.1| HSF.BF.B. 3
TOP: 4-1 Example 5 Graph Translations of the Reciprocal Function
KEY: reciprocal function
5. ANS: D PTS: $1 \quad$ DIF: L3

REF: 4-1 Inverse Variation and the Reciprocal Function
OBJ: 4-1.2 Identify the effect of transformations on the graph of the reciprocal function and define the effects
of $h$ and $k$ on the function $f(x)=1 / x-h+k$.
NAT: HSA.CED.A. $2 \mid$ HSF.BF.A. 1 HSF.BF.B. 3
TOP: 4-1 Example 5 Graph Translations of the Reciprocal Function
KEY: reciprocal function
6. ANS: C PTS: $1 \quad$ DIF: L2

REF: 4-1 Inverse Variation and the Reciprocal Function
OBJ: 4-1.2 Identify the effect of transformations on the graph of the reciprocal function and define the effects
of $h$ and $k$ on the function $f(x)=1 / x-h+k$.
NAT: HSA.CED.A.2| HSF.BF.A.1| HSF.BF.B. 3
TOP: 4-1 Example 5 Graph Translations of the Reciprocal Function
KEY: reciprocal function
7. ANS: B PTS: 1 DIF: L2 REF: 4-2 Graphing Rational Functions

OBJ: 4-2.1 Graph rational functions by identifying asymptotes and end behavior.
NAT: HSA.CED.A.2| HSF.IF.C.7| HSF.BF.A.1| HSF.BF.A.1.b
TOP: 4-2 Example 2 Find Asymptotes of a Rational Function
KEY: rational function | point of discontinuity | removable discontinuity | non-removable points of discontinuity
8. ANS: D PTS: 1 DIF: L3 REF: 4-2 Graphing Rational Functions

OBJ: 4-2.1 Graph rational functions by identifying asymptotes and end behavior.
NAT: HSA.CED.A.2| HSF.IF.C.7| HSF.BF.A.1|HSF.BF.A.1.b
TOP: 4-2 Example 2 Find Asymptotes of a Rational Function KEY: rational function
9. ANS: C PTS: 1 DIF: L3 REF: 4-2 Graphing Rational Functions

OBJ: 4-2.1 Graph rational functions by identifying asymptotes and end behavior.
NAT: HSA.CED.A.2| HSF.IF.C.7| HSF.BF.A.1| HSF.BF.A.1.b
TOP: 4-2 Example 5 Graph a Rational Function KEY: rational function
10. ANS: B PTS: 1 DIF: L2 REF: 4-2 Graphing Rational Functions

OBJ: 4-2.1 Graph rational functions by identifying asymptotes and end behavior.
NAT: HSA.CED.A.2| HSF.IF.C.7| HSF.BF.A.1| HSF.BF.A.1.b
TOP: 4-2 Example 3 Graph a Function of the Form $(a x+b) /(c x+d)$
KEY: rational function
11. ANS: D PTS: 1 DIF: L3

REF: 4-3 Multiplying and Dividing Rational Expressions
OBJ: 4-3.1 Use the structure of rational expressions to rewrite simple rational expressions in different forms.
NAT: HSA.SSE.A.1| HSA.SSE.A.1.a| HSA.SSE.A.1.b| HSA.SSE.A. 2
TOP: 4-3 Example 2 Simplify a Rational Expression KEY: rational expression | simplest form
12. ANS: B PTS: 1 DIF: L2

REF: 4-3 Multiplying and Dividing Rational Expressions
OBJ: 4-3.1 Use the structure of rational expressions to rewrite simple rational expressions in different forms.
NAT: HSA.SSE.A.1| HSA.SSE.A.1.a| HSA.SSE.A.1.b| HSA.SSE.A. 2
TOP: 4-3 Example 2 Simplify a Rational Expression KEY: rational expression | simplest form
13. ANS: B PTS: 1 DIF: L3

REF: 4-3 Multiplying and Dividing Rational Expressions
OBJ: 4-3.2 Understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to multiply and divide rational expressions.
NAT: HSA.SSE.A.1| HSA.SSE.A.1.a| HSA.SSE.A.1.b| HSA.SSE.A. 2
TOP: 4-3 Example 3 Multiply Rational Expressions KEY: rational expression | simplest form
14. ANS: A PTS: 1 DIF: L2

REF: 4-3 Multiplying and Dividing Rational Expressions
OBJ: 4-3.2 Understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to multiply and divide rational expressions.
NAT: HSA.SSE.A.1| HSA.SSE.A.1.a| HSA.SSE.A.1.b| HSA.SSE.A. 2
TOP: 4-3 Example 3 Multiply Rational Expressions KEY: rational expression | simplest form
15. ANS: A PTS: 1 DIF: L3

REF: 4-3 Multiplying and Dividing Rational Expressions
OBJ: 4-3.2 Understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to multiply and divide rational expressions.
NAT: HSA.SSE.A.1| HSA.SSE.A.1.a| HSA.SSE.A.1.b| HSA.SSE.A. 2
TOP: 4-3 Example 5 Divide Rational Expressions
KEY: rational expression | simplest form
16. ANS: B PTS: 1 DIF: L2

REF: 4-4 Adding and Subtracting Rational Expressions
OBJ: 4-4.1 Understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to add and subtract rational expressions.
NAT: HSA.APR.D. 7
TOP: 4-4 Example 3 Add Rational Expressions With Unlike Denominators
17. ANS: A PTS: 1 DIF: L3

REF: 4-4 Adding and Subtracting Rational Expressions
OBJ: 4-4.1 Understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to add and subtract rational expressions.
NAT: HSA.APR.D. 7
TOP: 4-4 Example 4 Subtract Rational Expressions
18. ANS: A PTS: 1 DIF: L3 REF: 4-5 Solving Rational Equations

OBJ: 4-5.1 Solve rational equations in one variable.
NAT: HSA.APR.D.6| HSA.APR.D.7| HSA.CED.A.1| HSA.REI.A.2| HSA.REI.A. 11
TOP: 4-5 Example 1 Solve a Rational Equation KEY: rational equation
19. ANS: C PTS: 1 DIF: L2 REF: 4-5 Solving Rational Equations

OBJ: 4-5.1 Solve rational equations in one variable.
NAT: HSA.APR.D.6| HSA.APR.D.7| HSA.CED.A.1|HSA.REI.A.2| HSA.REI.A. 11
TOP: 4-5 Example 1 Solve a Rational Equation KEY: rational equation
20. ANS: C PTS: 1 DIF: L3 REF: 4-5 Solving Rational Equations

OBJ: 4-5.1 Solve rational equations in one variable.
NAT: HSA.APR.D.6| HSA.APR.D.7| HSA.CED.A.1|HSA.REI.A.2| HSA.REI.A. 11
TOP: 4-5 Example 1 Solve a Rational Equation KEY: rational equation

