Foundations of Math 2 Name_____
Variation Date_____Period___

## DIRECT VARIATION

- Recall that direct variation is a _____ function of the form $y =$ _____, where $k$ is the nonzero constant of variation.

For each function, determine whether $y$ varies directly with $x$. If so, find the constant of variation and write the equation.

1.

| $x$ | -1 | 1 | 3 |
|---|---|---|---|
| $y$ | -3 | 3 | 9 |

2.

| $x$ | 1 | 2 | 3 |
|---|---|---|---|
| $y$ | 1 | 4 | 9 |

3.

| $x$ | -2 | 2 | 5 |
|---|---|---|---|
| $y$ | -1 | 1 | 2.5 |

In each exercise, $y$ varies directly with $x$. Find the missing value.

4. If $y = 3$ when $x = 2$, find $x$ when $y = 5$.

5. If $y = -4$ when $x = \frac{1}{2}$, find $y$ when $x = \frac{2}{3}$.

6. If $y = -14$ when $x = -7$, find $x$ when $y = 22$.

## INVERSE VARIATION

- A function of the form $y =$ _____ or $xy = k$, where $k \neq 0$.

Suppose that $x$ and $y$ vary inversely. Write a function that models each inverse variation.

7. $(3, -5)$ 8. $(0.3, 1.4)$ 9. $(7, 4)$

Is the relationship between the variables in each table a direct variation, an inverse variation, or neither? Write functions to model the direct and inverse variations.

10.

| $x$ | 0.5 | 2 | 6 |
|---|---|---|---|
| $y$ | 1.5 | 6 | 18 |

11.

| $x$ | 0.2 | 0.6 | 1.2 |
|---|---|---|---|
| $y$ | 12 | 4 | 2 |

12.

| $x$ | 1 | 2 | 3 |
|---|---|---|---|
| $y$ | 2 | 1 | 0.5 |

## COMBINED VARIATION

- Combines direct and inverse variations in more complicated relationships

Examples of Combined Variations

| Combined Variation | Equations Form |
|---|---|
| $y$ varies directly with the square of $x$ | |
| $y$ varies inversely with the cube of $x$ | |
| $z$ varies jointly with $x$ and $y$ | |
| $z$ varies jointly with $x$ and $y$ and inversely with $w$ | |
| $z$ varies directly with $x$ and inversely with the product of $w$ and $y$ | |

Write the function that models each relationship. Find $z$ when $x = 4$ and $y = 9$.

13. $z$ varies directly with $x$ and inversely with $y$. When $x = 6$ and $y = 2$, $z = 15$.

14. $z$ varies jointly with $x$ and $y$. When $x = 2$ and $y = 3$, $z = 60$.

15. $z$ varies directly with the square of $x$ and inversely with $y$. When $x = 2$ and $y = 4$, $z = 3$.

16. $z$ varies inversely with the product of $x$ and $y$. When $x = 2$ and $y = 4$, $z = 0.5$.