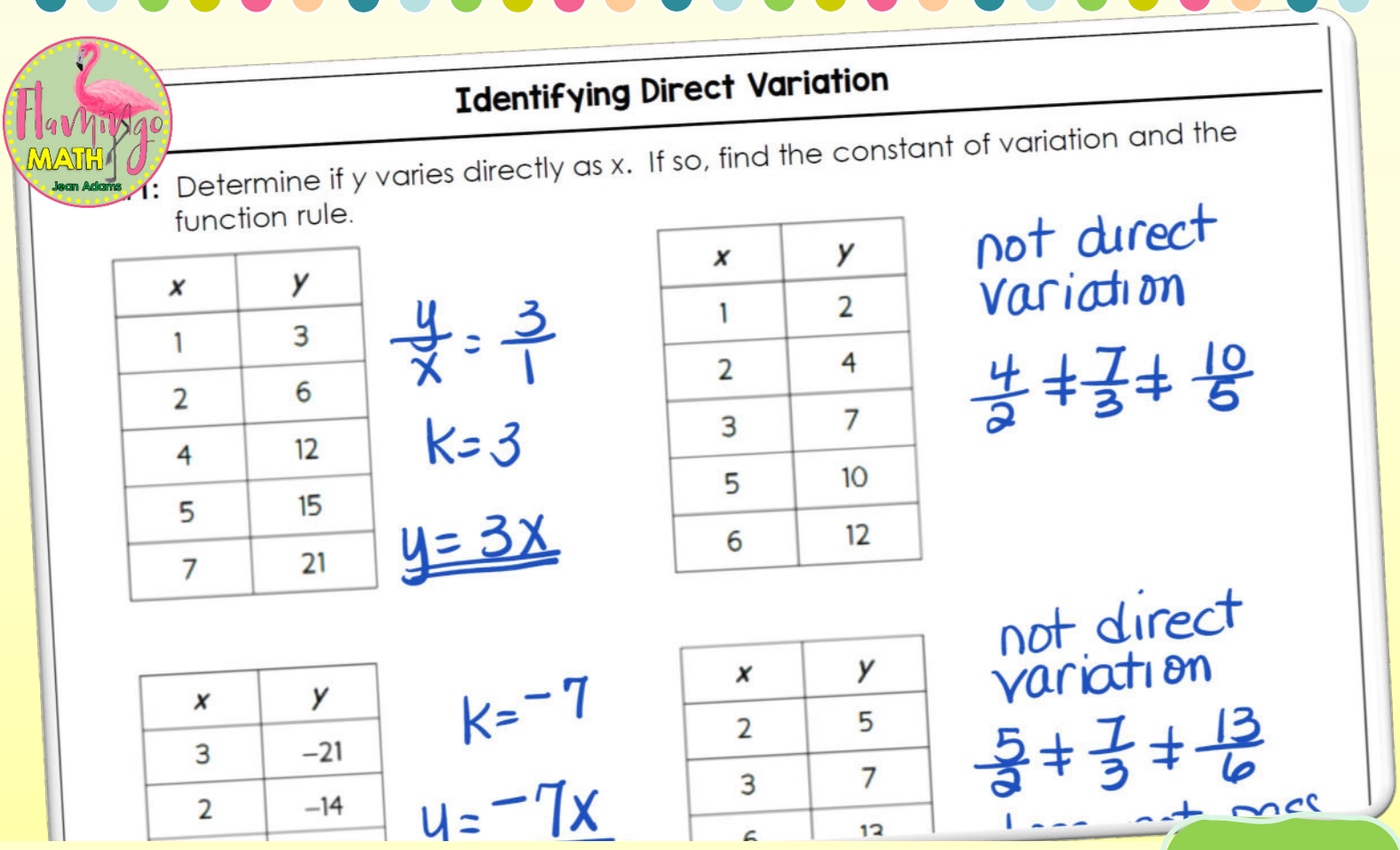
Algebra 2 Honors

Direct Variation



Completely Editable 2.2

Lesson 2: Direct Variation

_____ – a linear function defined by an equation of the form $y = kx$, where k is a positive constant, we say that y *varies directly as* x. The variable x represents input values, and y represents output values.

_____ – is the number k, the ratio of the two variables in a direct variation and the product of the two variables in an inverse variation.

Real-World Example

Practically Speaking . . .

A plumber earns \$75 per hour. In 1 hour \$75 is earned. In 2 hours \$150 is earned. In 3 hours \$225 is earned, and so on. Since the ratio is a constant \$75 per hour, we say that there is direct variation. The earnings for the plumber vary directly as the time. This can be written as an equation:

$E = 75t$ or $\frac{E}{t} = 75$

Where E = total earnings and

t = time worked, in hours.

Identifying Direct Variation

EX #1: Determine if y varies directly as x. If so, find the constant of variation and the function rule.

x	y
1	3
2	6
4	12
5	15
7	21

x	y
1	2
2	4
3	7
5	10
6	12

x	y
3	–21
2	–14
1	–7

x	y
2	5
3	7
6	13

Identifying Direct Variation Given an Equation

EX #2: Determine whether y varies directly with x. If so, what is the constant of variation?

A. $5y = 10x$

B. $4y = 12x + 8$

C. $5x + 3y = 0$

D. $y = \frac{x}{9}$

Using a Proportion to Solve Direct Variation

EX #3: Set up the direct variation and solve.

A. Suppose y varies directly with x, and $y = 24$ when $x = 3$. What is y when $x = 5$?

B. Suppose y varies directly with x, and $y = 8$ when $x = 20$. What is y when $x = 12$?

C. Suppose y varies directly with x, and $y = 15$ when $x = 3$. What is y when $x = 12$?

Solving Problems with Direct Variation

EX #4: The weight M of an object on Mars varies directly as its weight E on earth. A person who weighs 95 kilograms on earth weighs 38 kg on Mars. How much would a 100 kg person weigh on Mars?

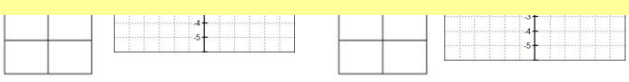
EX #5: The number of calories varies directly with the mass of cheese. If 50 grams of cheese contain 200 calories, how many calories are in 70 grams of cheese?

Graphing Direct Variation Equations

EX #6: What is the graph of each direct variation equation?

A. $y = -\frac{2}{3}x$

B. $y = 3x$



NOTES

Name _____ Date_____

2.2

Direct Variation Practice

Problems 1 – 3, determine whether y varies directly with x. If so, find the constant of variation and write the function rule.

1.

x	y
6	48
11	33
15	45

2.

x	y
−10	4
−5	2
15	−6

3.

x	y
2	5
6	15
12	30

Problems 4 – 8, determine whether y varies directly with x. If so, find the constant of variation.

4. $y = \frac{3}{5}x$

5. $4x - 2y = 1$

6. $4x + 3y = 0$

7. $x - y + 3 = 0$

Problems 8 - 11, y varies directly with x.

8. If $y = 13$ when $x = 4$, find x when $y = 26$.

9. If $y = 6$ when $x = 16$, find x when $y = 2$.

10. If $y = \frac{3}{4}$ when $x = \frac{1}{2}$, find y when $x = 6$.

11. If $y = \frac{5}{3}$ when $x = \frac{3}{2}$, find y when $x = 12$.

Problems 12 – 16, solve.

12. The electric current I, in amperes, in a circuit varies directly as the voltage V. When 18 volts are applied, the current is 4 amperes. What is the current when 24 volts are applied?

13. Casey's weekly pay is directly proportional to the number of hours he works at the YMCA. His gross earnings are $210 for 24 hours. What is Casey's pay if he works 40 hours?

14. The weight M of an object on Mars is directly proportional to its weight E on earth. An astronaut who weighs 170 lbs. on Earth may soon travel to Mars where his weight would be 64 lbs. How much would a 125lb. astronaut weigh on Mars?

15. Hooke's Law states that the force needed to stretch a spring is proportional to the amount the spring is stretched. If 60 pounds of force stretches a spring 5 inches, how much will the spring be stretched by a force of 140 pounds?

16. Kepler's Law of Planetary Motion states that the square of the time needed for a planet to make one revolution about the sun varies directly as the cube of the average distance of the planet

Practice Sets

Lesson Warm-Ups

2.2 Direct Variation **Form A**

Name _____

Date _____ Period _____

Problems 1 – 2: In the direct variation below:

x	y
4	12
7	21
8	24

1. Find the constant of variation.

2. Write the function rule.

3. If y varies directly with x and $y = 7$ when $x = -2$, Find x when $y = 3$,

4. Write a direct variation equation that passes through the point $(-5,3)$.

Grade:

2.2 Direct Variation **Form B**

Name _____

Date _____ Period _____

Problems 1 – 2: In the direct variation below:

x	y
3	−18
8	−48
9	−54

1. Find the constant of variation.

2. Write the function rule.

3. If y varies directly with x and $y = -5$ when $x = 8$, Find x when $y = 12$,

4. Write a direct variation equation that passes through the point $(6, -8)$.

Grade:

Name _____ Date _____ Period _____

Lesson 2.2: Direct Variation **Warm-Up #1**

1. Determine whether y varies directly with x. If so, what is the constant of variation?

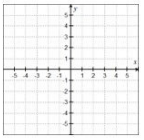
x	1	2	4	5
y	3	6	12	15

2. Determine whether y varies directly with x. If so, what is the constant of variation?

$3y = 6x + 9$

3. Set up the direct variation and solve. Suppose y varies directly with x, and $y = 12$ when $x = 4$. What is y when x is 12?

4. What is the graph of the direct variation equation $y = \frac{3}{4}x$.



Name _____ Date _____ Period _____

Lesson 2.2: Direct Variation **Warm-Up # 2**

1. Determine whether y varies directly with x. If so, what is the constant of variation?

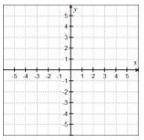
x	1	2	3	4
y	0.75	1.5	2.25	3

2. Determine whether y varies directly with x. If so, what is the constant of variation?

$4y = 8x + 16$

3. Set up the direct variation and solve. Suppose y varies directly with x, and $y = 24$ when $x = 8$. What is y when x is 24?

4. What is the graph of the direct variation equation $y = \frac{2}{5}x$.



Daily Lesson Quiz