Baker Charters School

Algebra 2

BWA School Notes

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Contents

CHAPTER ONE

Graphs and Functions

Unit 1

Feb 21 2022 Mon (11:15:44)

Lesson 1: Writing parallel and perpendicular **Unit 1**

Consider the line: $y = -2x + 1$.

Let's:

- Find the equation of the line that is parallel to this line and passes through the point $(7, -5)$.
- Find the equation of the line that is perpendicular to this line through the point $(7, -5)$.

Let's first go over these Properties:

> **Property 1.** (Parallel Slope Property) Two non-vertical lines are parallel if and only if they have the same slope.

> **Property 2.** (Perpendicular Slope Property) Two non-vertical lines are perpendicular if and only if the product of their slopes is equal to -1.

Now, to equation $y = -2x + 1$ is written in the slope-intercept form: $y = mx + b$. In this form, the slope m is -2.

- We can use the **Parallel Slope Property**. Since the given lines has a slope of -2, a line parallel to it must also have the same slope, which is -2. So, the equation of the parallel line will have the form $y = -2x + b$. The line passes through $(7, -5)$, so we use $x = 7$ and $y = -5$ to solve for b:

$$\begin{aligned} y &= -2x + b \\ -5 &= -2(7) + b \\ -5 &= -14 + b \\ b &= 9 \end{aligned} \quad . \tag{1.1}$$

Now, we know the equation of the parallel line, which is $y = -2x + 9$.

- We use the **Perpendicular Slope Property**. Since the given lines has the slope -2, a line with the slope $\frac{1}{2}$ is perpendicular to it.

  So, the equation of the perpendicular line will have the form $y = \frac{1}{2}x + b$.

  The line passes through $(7, -5)$, so we use $x = 7$ and $y = -5$ to solve for b.

$$\begin{aligned} y &= \frac{1}{2}x + b \\ -5 &= \frac{1}{2}(7) + b \\ -5 &= \frac{7}{2} + b \\ -\frac{10}{2} &= \frac{7}{2} + b \\ b &= -\frac{17}{2} \end{aligned} \quad . \tag{1.2}$$

Equation of the parallel line: $y = -2x + 9$

Equation of the perpendicular line: $y = \frac{1}{2}x - \frac{17}{2}$

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Lesson 2: Solving a linear equation by graphing **Unit 1**

Let's look at this equation:

$$-4 = 5 - 3x. \tag{1.3}$$

Here's one method to solve it (by graphing):

- First, we write the equation with 0 on one side

$$\begin{aligned} -4 &= 5 - 3x \\ 0 &= 9 - 3x \end{aligned}. \tag{1.4}$$

- Then, we graph the equation and find the **x-intercept**:

x	$y = -3x + 9$	(x, y)
0	$y = -3 \times 0 + 9 = 9$	$(0, 9)$
1	$y = -3 \times 1 + 9 = 6$	$(1, 6)$
2	$y = -3 \times 2 + 9 = 3$	$(2, 3)$

Table 1.1: X-Y Table

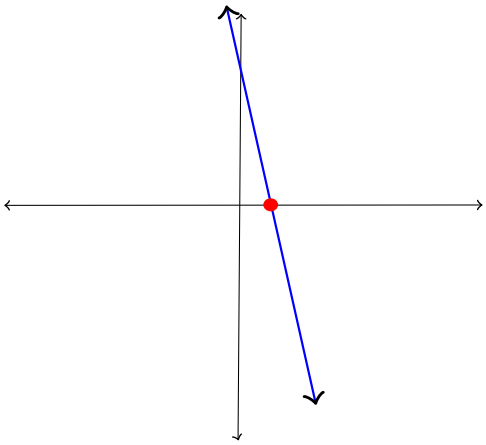

Figure 1.1: $-4 = 5 - 3x$ Graphed

We get that $x = 3$ is a solution to the original equation, which was $-4 = 5 - 3x$

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Lesson 3: Identify correlation and causation **Unit 1**

Definition 1. (Correlation) A mutual relationship or connection between two or more things.
Two quantities have a *correlation* if they tend to vary together.

Definition 2. (Causation) This indicates a relationship between two events where one event is affected by the other.

Let's take a look at a couple of examples for each definition:

Example. Maria and Andy are high school students in Arizona. Andy always gets an A on his math test when it's sunny outside.
You may think that Andy is acing his test because it's sunny when he takes the test, but that's not true. It just happens that it's sunny when there's a math test.
So, the two events: The sunniness and the acing his test occurred together without one causing the other. In simpler terms, the two events are **Correlated**, but there's no **Causal** relationship between them.

Note .

$$\text{Correlation} \neq \text{Causation}$$

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CHAPTER TWO

Linear Systems

Unit 2

CHAPTER THREE

Exponents and Polynomials

Unit 3

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Lesson 1: Factoring a sum or difference of two cubes **Unit 3**

Let's factor:

$$v^3 + 27. \tag{3.1}$$

We can use the following formulas to factor the sum or difference of two cubes:

$$\text{Sum of two cubes:} \quad a^3 + b^3 = (a+b)(a^2 - ab + b^2) \tag{3.2}$$
$$\text{Difference of two cubes:} \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2). \tag{3.3}$$

We need to factor: $v^3 + 27$.

Note . (27) Notice how 27 can be written as $27 = 3^3$.
So, $v^3 + 27$ is the sum of two cubes:

$$v^3 + 27 = v^3 + 3^3. \tag{3.4}$$

We can use the formula for the sum of two cubes to factor $v^3 + 3^3$:

$$\begin{aligned} a^3 + b^3 &= (a+b)(a^2 - ab + b^2) \\ &= (v+3)(v^2 - v \times 3 + 3^2) \quad \text{Letting } a = v \text{ and } b = 3. \\ &= \boxed{(v+3)(v^2 - 3v + 9)} \end{aligned} \tag{3.5}$$

CHAPTER FOUR

Quadratic and Polynomial Functions

Unit 4

CHAPTER FIVE

Rational Expressions

Unit 5

CHAPTER SIX

Exponential and Logarithmic Functions

Unit 6

CHAPTER SEVEN

Statistics and Probability

Unit 7

CHAPTER EIGHT

Sequences and Conics

Unit 8

CHAPTER NINE

Trigonometry

Unit 9