Exponential Growth and Decay Models: Lesson 1

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| **Grade**: Algebra | **Section**: 1 |
| **Unit**: Data Models | **Lesson #**: 1 |
| **Lesson**: Spread of Religion through Asia | **Date / Day**:  |

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| T.S.W.B.A.T.Analyze data about religion spread and create a model using the point slope formula while understanding what are some of the religions in South East Asia. | **Warm-Up / Anticipatory Set:**1. List the name of as many religions as you know.2. Do you think religion spreads from country to country? Why why not?3. Find the slope using the next two points a. (4,3) (2,6)b. (-2,4)(4,8) |
| Key Activities and Timing:1. Go over warm up. Allow for 15-20 min of sharing. It’s a new topic that might spark some interest.
2. Direct instruction: Creating models of linear increase or decrease by using time as the independent variable and population as the dependent. (15-20)
3. Students practice with simple population growth examples.( See attached WS. )
 | Resources Required:1. Overhead projector.
2. Ipads for each student
3. Work sheets.
 |
| Old Homework:New Homework:HW: Students select one religion and research: Locations around the world. Where did it originate. An approximation of how many it has today.  | Diversity / Differentiation Strategies:* Direct instruction with Q&A.
* Individual Ipad-based work with individual teacher assistance.
* Cooperative learning as appropriate (students may discuss examples with each other).
 |
| IL Learning Standards Addressed:A.CED.1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.Evaluation Procedures:* Observe student performance during in-class examples.
* Homework assigned and checked.
* Individual project on Spread of religion
* Unit quiz on modeling data using point slope form.
 | **Lesson Critique / Student Notes:** |

Set or “Hook”

Today we’re going to take linear functions to the next level as we explore the spread of religion, we will specifically look at the 5 main religions that world has today and how fast they are increasing or decreasing in numbers. It is important to know that there are other religions in the world so we can open our minds and understand others. We will mainly look at the numbers but we can come up with conclusions from that analysis on what and why we think a certain religion is inclining as opposed to declining and vice versa. We will also take a look at where these religions as located in the world.

# Lesson Body

**Direct Instruction: Point slope formula 20 minutes**

**Yesterday we learned how to calculate the slope of a line by both looking at a line and using two points on a line.**

**Today we’re going to derive a formula that is going to help us solve many many problems, it’s called the point slope formula. For these next couple of days this formula is going to help us projecting the future of population numbers specifically for the number of members in any religion. Projecting this type population has the benefit of what is happening with other cultures around the world and how we might tolerate better than before.**

**But first we need the equations that is going to help up.**

**Remember that in order to find a slope we use the formula:**

$$m=\frac{y-y\_{1}}{x-x\_{1}}$$

$\frac{y-y\_{1}}{x-x\_{1}}=m$Switched the equation for looks.

$y-y\_{1}=m(x-x\_{1})$Crossed multiplied.

There you have it!!!!

The point slope formula is very useful: As long as you have a slope and a point you can create an equation.

Let see how we can use this:

**The population of pandas in China linearly as follows: in 2003 there were 1596 and in 2013 the number of pandas was 1864. If this trend continues how many pandas will there be in 2026? Create an equation that will help you solve this problem.**

**Important information: In 2003 there were 1596 pandas)**

 **And in 2013 there were 1864 pandas)**

**This creates two points. Time is our x coordinate and the number of pandas is our y coordinate. Remember x-is independent variable and y is the depended variable.**

**So here are our points (2003, 1595) and (2013,1864)**

**So now that we have our points we can find the slope or the rate of change that the pandas are growing by the numbers.**

$$m=\frac{1864-1595}{2013-2003}= \frac{269 pandas}{10years} $$

**So this means that 269 pandas are born every 10 years if this keeps on being a linear model. Or that about 26.9 more pandas are born every year.**

**So our equation for our pandas is going to look like this:**

$$y-1595=26.9(x-2003)$$

**So if we want to know what how may pandas there will be in 2026 then we know that the year is the independent variable so we substitute that number for the x in our equation so it can look like.**

$y-1595=26.9(2026-2003$**)**

**Simplify and solve for “y” to get 2213.7 but since we can’t have a .7 of a panda we will only have 2213 pandas approximately.**

**So by using this example and our new formula we will explore the expansions or decline of 5 religions around the world. This will become very useful for your project.**

**There are many religions in the world but we will only take a look a few because they are the most prevalent: Christianity, Islam, Hinduism, Buddhism, Non-religious and Atheism.**

**These religions are all over the world with Christianity in Europe and the Americas, Islam in the Middle east and North Africa, Hinduism and Buddhism in South and East Asia.**

**What I want to discuss now is the following: (Discussion should be with whole class or groups depending on your taste. here is going to be a discussion about religion and see what students think about it no right or wrong answers)**

1. **How do you think religion spreads to grow in numbers?**
2. **What are the driving factors of religious decline? Why do you think people stop believing in a religion?**
3. **What do you think are the differences between non-religious and Atheism?**
4. **Why do you think the religions are in certain parts world?**

## **Close**

**After we discussion explain that they are going to have to research any religion that they would like to know more about for homework and must answer at least the flowing questions: Locations around the world. Where did it originate. An approximation of how many it has today and how many were there in 2000.**

Spread of Religion Models: Lesson 2

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| **Grade**: Algebra | **Section**: 1 |
| **Unit**: Point slope form | **Lesson #**: 2 |
| **Lesson**: Continue creating models.  | **Date / Day**:  |

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| T.S.W.B.A.T.Students will able to create a model for the expansion of their religion they chose.  | **Warm-Up / Anticipatory Set:**Create an equation using the following two points: (3,5)(-3,-5)Take out HW and ask 2 classmates which religion they chose to look up.  |
| Key Activities and Timing:1. Students discuss the warm-up question with a partner.. (10 min)
2. Class discussion: what factors can limit the spread of religion? What are some factors that can make a religion grow? (5 min)
3. Students receive an individual assignment and use in-class time to get started. (30 min)
 | Resources Required:1. Ipad for each student
 |
| Old Homework:Questions. New Homework:Individual project (assignment) | Diversity / Differentiation Strategies:* Cooperative learning (in pairs).
* Class discussions.
* Individual ipad.
 |
| IL Learning Standards Addressed:A.CED.1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. Evaluation Procedures:* Observe student performance during in-class examples.
* Homework assigned and checked.
* Individual project.
* Quiz on Point slope form.
 | **Lesson Critique / Student Notes:** |

Set or “Hook”

Mathematical models can help understand behavior of humans, there are trends in what humans tend to do and those trends can be traced by numbers. Today we are going to look at how religion spreads around some regions and even around the world. In class we will look at where Buddhism started and how it spread around East Asia and around the world.

# Lesson Body

**In response to the warm-up question and through class discussion, the following factors that can affect the spread or religion or it’s decline that can be identified during the class discussion:**

**Spread:**

 **Religion offers a guide on how to live life.**

 **It inspires to do good.**

 **It has a strong foundation.**

 **It solves proves.**

 **Its members are very persuasive on converting others to their**

 **religion because they think it’s the ultimate religion.**

 **Easy travel.**

 **Common language.**

**Decline:**

 **Religious institutions not trustworthiness.**

 **People stop believing.**

 **People get converted to other religion.**

**Today you will work on an individual assignment that investigates the spread of Buddhism mathematically. Where did it come from? (Where we now know as India) Where did it mainly spread to? (China) Do you guys know why? (because china was close by and it the silk road was a major gate way for the religion to spread) .**

**In the year 1900 there were 127,077,000 Buddhist around the world.**

**In the year 1970 there were 233,424,000 Buddhist around the world.**

**That means that their rate of change in growth was:**

$$m=\frac{233,424,000-127,077,000}{1970-1900}= \frac{106,347,000 buddhist}{70years}$$

$$=1,519,242 New buddhis per year. $$

**This is the rate of which new Buddhist were joining religion from 1900 to 1970. Do you think that’s a lot? Or a little? Now lets create a linear equation using point slope so we can find out how many Buddhist there will be in the year 2050.**

**Following our formula:**

$$y-y\_{1}=m\left(x-x\_{1}\right)$$

**We get out model to be:**

$$y-127,077,000=1,519,242(x-1900)$$

**So if we wanted to know how many Buddhist there will be in 2050 then we just substitute for the “x” and solve for ‘y’**

$$y-127,077,000=1,519,242(2050-1900)$$

**Y=354,963,300**

**There will be 354,963,300 Buddhists in the world in 2050 according to our model.**

**Do you think that is a lot? Which country has about 300 million people?**

**Do you think other religions are growing as fast as Buddhism? Which ones? Why do you think that?**

**(Introduce the individual assignment)**

# Algebra

**Section 1**

# Point-Slope and the Spread of Religion

In this assignment you will compare how fast one religion is spreading compared to another.

**You will select two religions from** [**http://www.wnrf.org/cms/statuswr.shtml**](http://www.wnrf.org/cms/statuswr.shtml) **so you can get some numbers of how many members your two religions have at a certain time. Your project must include the following:**

**A 5 slide presentation prepared in PowerPoint:**

**Slide 1:**

**Which 2 religions are you comparing, what do they believe in?**

**Slide 2.**

**State the years and the numbers of members for each religion.**

**Slide 3.**

**Show how you used that information to find the “slope” or rate of change for each religion in members per year. Compare the two numbers, who is increasing faster? Why?**

**Slide 4.**

**Create a linear equation using the point-slope form that models the spread of both religions.**

**Slide 5.**

**How many members will each religion have in the year 2050?**

**Slide 6.**

**Compare both religions, What do the numbers tell you?**

**Students start to work on this until the end of the period.**

**Assignment is due at the beginning of class on xxxxxxxx.**

Spread of religion Models: Lesson 3

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| **Grade**: Algebra | **Section**: 1 |
| **Unit**: Point slope Form | **Lesson #**: 3 |
| **Lesson**: Quiz and Extension | **Date / Day**:  |

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| T.S.W.B.A.T.1. Show what they know about slope form.
 | **Warm-Up / Anticipatory Set:**Journal: How do you create a model equations using point slope form? What information do you need?Why do you think learning about other religions is important?Clear desks and prepare for the unit quiz. |
| Key Activities and Timing:1.Journal (15 min) 2.Review 20min3.Quiz  | Resources Required:1. Quiz
 |
| Old Homework:ProjectNew Homework:Presentations tomorrow. | Diversity / Differentiation Strategies:* Written quiz.
* Class discussion.
 |
| IL Learning Standards Addressed:A.CED.1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functionsEvaluation Procedures:Section quiz  | **Lesson Critique / Student Notes:** |

Set or “Hook”

It’s your turn to show me what you’ve learned about point slope form.

# Lesson Body

**Review using bingo cards.**

**Ask questions regarding how to create point slope form using two points, using word problems.**

**After going over those questions students take quiz.**

**Closure:**

**Tomorrow you will present your power points! Be ready!**

**Algebra**

**Section 1**

**Unit: Point slope form**

# Worksheet 1

Point-Slope Form Assignment Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Do Now

**Write each equation in slope intercept form. y = mx + b Solve for y and state the slope and y intercept.**
1) 2x + y = 3 2) 4x - y = 7

**Graph the following lines by using the y intercept first and then the slope.**
3) y = 2x + 2 4) y = (3/5)x - 2

Write the learning objectives for the lesson on Point Slope Form.

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3) Write the general form of an equation in point slope form.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4) What does x1 represent in the general point slope form. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5) What does y1 represent in the general point slope form. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6) What does m represent in the general point slope form. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**From the video**

7) Write the point slope form equation used in the example.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8) From the example what was the point that was graphed?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9) From the example what was the slope of the line?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10) When graphing a line using an equation in point slope form what do you graph first?

**From the First PowerPoint**

11) Given the point (3,2) and slope= ½ write a point slope form equation.\_\_\_\_\_\_\_\_\_\_\_\_

12) Given the point (-2,5) and slope= 4/5 write a point slope form equation.\_\_\_\_\_\_\_\_\_\_\_

13) Given the point (4,-1) and slope= -2/5 write a point slope form equation.\_\_\_\_\_\_\_\_\_\_

14) Given the points (4,-1) and (-4,-3) what do you need to find first in order to write an equation in point slope form?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15) In question 14 which point represents (x1,y1)

**From the Second PowerPoint**

16) Given the points (-1,1) and (3,5) write an equation in point slope form.\_\_\_\_\_\_\_\_\_\_\_\_

17) Rewrite the equation from 16 in slope intercept form.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18) Given the points (-1,-4) and (2,8) find the slope. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19) Write an equation in point slope form using the points and slope from 18. \_\_\_\_\_\_\_\_\_

20) Rewrite the equation from 19 in slope intercept form. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice: Write an equation in point-slope form, given the following points and slopes. Then graph the line**.

21) P = (3,2) m = 2 22) P = ( -4,1) m = ½

 

23) P = (5,0) m = -3 24) P = (-2,-3) m = 2/3





25) P = (4,5) m = 9 26) P = (7, -4) m = 2/5



**Write an equation in slope intercept form given the following point and slope.**

27) P = (1,1) m = 2 28) P = (-2,-5) m = ½

29) P = (3,6) m = 1/3 30) P = ( -6,4) m = 0

Write an equation in point slope form given two points.

31) ( 1,1) ( 2,3) 32) (-3,5) ( 1,6)

33) ( -2,-2) (2, -3) 34) (4,5) ( -3,5)

Write an equation in slope intercept form given two points.

35) (4,5) 6,1) 36) (5,5) (0,1)

# Algebra

**Section 1**

**Unit: Slope intercept.**

# Unit Quiz

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Points Earned: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Percentage Earned: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Points Available: 40 Letter Grade: \_\_\_\_\_\_\_\_\_**

Identiy the slope and a point on the following equations.

$1. y-4=\frac{3}{2}(x-5)$ 2. $. y-2=\frac{3}{2}(x+3)$ 3$. y=\frac{3}{2}(x-5)$

 Create an equation using the following information.

4. point (3,5) slope m=3 5. Point (-3,2) slope m=-2 6. Point(4,5) and Point(-2,-4)

7. If Christianity in the 1900 had had 558,132,000 members and in 1970 had 1,236,374,000 members. Create a linear equation that models this growth in members.

b. If the members keep on growing at that same rate how many Christians will there be in 2020?

8. If Muslims in the 1900 had had 199,941,000 members and in 1970 had 553,528,000 members. Create a linear equation that models this growth in members.

b. How many members will there in 2020?

9. Using questions 8 and 9. Which religion is growing faster? Explain your reasoning.

10. What are some factors that determine the growth of a religion?

**Resources**

**http://www.wnrf.org/cms/statuswr.shtml**