

MATHEMATICAL WORSHIPS

Fifteen class worships or devotional reflections on mathematical themes for high school students.

Topics include:

1. Using equations & expressions
2. Graphing a year as a circle in the X,Y plane
3. Lines crossing in the X,Y plane
4. Discontinuities
5. Transformations
6. A valentine's heart – representing God and us
7. Using the Bible and Bible Commentary to find how old Adam would have been at the time of the flood (had he not already died)
8. Metaphors
9. Numerical symbolism in the Bible
10. Exponential growth
11. Surface waves
12. Perimeter
13. Direct/inverse proportions
14. Solving equations in our earthly dimension
15. Using PEMDAS to simplify problems

Contributed by the NAD Spiritual Resources Summer Committee 2008

WORSHIP 1: USING EQUATIONS & EXPRESSIONS

Introduction: This worship works well for Algebra I students who are learning to solve linear equations. It's recommended that the teacher write the equations on the board/overhead projector and show the solving steps to the students.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 1.5 Value God's revelation of Himself through inspired writings and creation.
- J2E 1.8 Value and participate in worship alone and with others.
- J2E 2.6 Relate to lifestyle choices and cultural issues based on biblical principles.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 6.1 Broaden intellectual abilities through the study of God's Word.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 6.6 Approach all intellectual pursuits from a biblical perspective.
- J2E 8.1 Develop responsible decision-making skills.

I. In Our Daily Walk

- A. Solve for love: $\text{love} + \text{sin} = \text{life}$

To solve for love, we subtract sin from both sides, leaving that love is life without sin.

$$\text{love} = \text{life} - \text{sin}$$

- B. Solve for honesty: $\text{dependability} - \text{honesty} = -\text{dependability}$

This relates the fact that dependability without honesty leads to a lack of dependability. To solve for honesty, you end up adding honesty and dependability to both sides, leaving you with the result below, that honesty is twice as important as dependability.

$$2\text{dependability} = \text{honesty}$$

- C. Solve for leadership: $\text{leadership} - \text{good judgment} = \text{frustration}$

This applies to our student leaders who find out quickly that leadership without good judgment leads to frustration. When solving for leadership, you add good judgment to both sides, leaving that leadership is good judgment combined with frustration.

$$\text{leadership} = \text{good judgment} + \text{frustration}$$

- D. Solve for priorities: $\text{priorities} + \text{schedule} = \text{day}$

This equation reminds us that the things we have to do (our schedule) combined with the things we want to do (priorities) make up our day. Solving for priorities, we subtract our

schedule from both sides, leaving that priorities are our day without our schedule. That is, what's important to us is the day minus all the things we have to do as a student or worker.

priorities = day – schedule

- E.** Factor out a Greatest Common Factor: doing + grades + goodness + oldgal

The four words above are acting as algebraic clumps of expressions. Actions, results, character, and people constitute major components of life important to us. Consequently, we find that God is the greatest common factor in each of these areas. When factoring God out of each clump and unscrambling each expression – which is mathematically legal, thanks to the associative property of multiplication – we get that God is in our senses and all that we encounter.

God (in + ears + noses + all)

- F.** Solve for r: teachers + others = education

This equation illustrates how teachers combined with others (those being taught) constitutes the entire educational process. Notice that teachers and others can't be combined into one algebraic clump. That makes sense because they definitely aren't like terms! To solve for 'r', one must factor out an 'r', leaving the following after unscrambling the letters:

$r(\text{teaches} + \text{those}) = \text{education}$

Now, to solve for 'r', one must undo multiplication by dividing both sides by 'teaches + those'. This gives you the solution:

$$r = \frac{\text{education}}{(\text{teaches} + \text{those})}$$

So, 'r' you ready to serve as an educator? Recognizing that education is divided out among those we teach is indeed a unique solution!

II. Name the Biblical Principle or Story Represented

Introduction: This section is designed for students in algebra. Letters A through F can work for either Algebra I or II, while letters G and H work best for students in Algebra II or beyond. It's fun to write the equation on the board and have students speculate as to the story represented. If they can't come up with it (which can happen for ones like D - G below), the teacher can give clues that get as specific as the place in the Bible that contains the story.

- A.** $-2 \neq 1$ Two wrongs don't make a right! So many people think a negative and a negative make a positive. However, that's not true. A negative times a negative is a positive. That would only apply here if someone did

something negative a negative number of times (which isn't possible). Instead, it's combining -1 and -1, leaving us with -2, not 1.

(I Thessalonians 5:15)

B. $70(7) = \infty$

We are to forgive others an infinite number of times. It's interesting how this shows that numbers used back in Bible times weren't as large as ones we use today, because we hardly think of 490 as a huge, infinite number. (Matthew 18:22)

C. $(5 + 2)(5000) = \infty$
 $(7 + 3)(4000) = \infty$

The Feeding of the 5000 (Mark 6:30 – 44)

The Feeding of the 4000 (Mark 8:1 – 10)

Note: the units mathematically work since both contain (loaves/person + fish/person)(people). Thus, the units of people cancel, leaving loaves + fish.

D. $R \cdot T = \frac{1}{T} \cdot T = 1$

This equation represents the Parable of the Workers in the Vineyard. Each worker agreed to work for one denarius, which was equivalent to a day's work in Bible times. Since some workers arrived later and were still promised a denarius, it turns out their rate, just like for the original workers, was the reciprocal of their time. (Matthew 20:1 – 16)

E. $1 \cdot 0 = 0$; $2 \cdot 2 = 4$; $2 \cdot 5 = 10$

The Parable of the Talents reveals that those who use their talents double their total, while the one who buries their talent loses it. This illustrates the importance of using what the ultimate employer has given us. (Matthew 25:14 – 28)

F. Solve for x: $|x - 0| > \text{heaven}$

Ask your students to solve this linear inequality to tell which story is represented. When solving, they'll hopefully get the following:

$$\begin{array}{ll} x - 0 < -\text{heaven} & \text{or} & x - 0 > \text{heaven} \\ x < -\text{heaven} & & x > \text{heaven} \\ x < \text{earth} & & \text{or} & x > \text{heaven} \end{array}$$

(this works since the opposite of heaven is earth)

Now, they can tell it's the story where the disciples are arguing who will get to sit next to Christ in heaven. Christ responds by saying that whoever is least on earth will be the greatest in the kingdom of heaven. (Luke 9:46 – 50)

G. Solve for man:

$$\frac{(\text{man})^2 - (\text{man})(\text{God}) - (\text{man})(\$) + (\text{God})(\$)}{\text{man} - \$} = 0$$

To solve this algebraically, you can first put the zero over one and cross-multiply. This results in the following:

$$(\text{man})^2 - (\text{man})(\text{God}) - (\text{man})(\$) + (\text{God})(\$) = 0 \quad \text{for all } \text{man} - \$ \neq 0$$

meaning $\text{man} \neq \$$

The above equation is now solved using grouping.

$$\text{man}(\text{man} - \text{God}) - \$(\text{man} - \text{God}) = 0, \text{ so } (\text{man} - \$)(\text{man} - \text{God}) = 0$$

You'll note that man was the GCF of the first two clumps, while -\$ was pulled out as the GCF of the second two. Since both result in man - God in parentheses, we can solve for each, getting:

$$\text{man} = \$ \text{ and } \text{man} = \text{God}$$

Going back to the start of solving, there was the restriction that man could not equal \$ since the denominator can't get to zero (division by zero is not possible). Thus, man = \$ is a solution that gets discarded, or crossed out. Now, students can see that this problem illustrates that no man can serve two masters. (Matthew 6:24)

H. God goes beyond the laws of math!

$$\infty - 1 = 0$$

We know mathematically that one taken from infinity is still infinity. However, this equation works in regards to our salvation. An infinite number of us should have died, but because one did, none of us have to. Furthermore, if you add one to both sides, you can see that an infinite number of us can live because of one.

$$\infty = 1$$

WORSHIP 2: GRAPHING A YEAR AS A CIRCLE IN THE X,Y PLANE

Introduction: This worship is fun to use at the beginning of the school year, when students are forming goals for the year. It can also be used as a graduation talk – asking students to reflect on their year in review. It works best for Algebra II or Precalculus students who have experience graphing circles. You can draw an x-y plane on the board or overhead projector, labeling each axis in terms of the following:

x = relationship growth with others

y = personal growth

Journey to Excellence Goals & Essential Learnings Addressed

J2E 1.1	Accept God as the Creator and the Redeemer.
J2E 1.3	Embrace God's gift of grace by accepting Christ as one's personal Savior.
J2E 1.6	Respond to God's love by using one's spiritual gifts to serve others.
J2E 2.3	Become involved in spreading the gospel throughout the world.
J2E 3.2	Develop an appreciation for the diversity of individuals.
J2E 5.5	Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
J2E 5.6	Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
J2E 7.2	Apply a Christ-centered perspective to all forms of personal expression and media.
J2E 8.5	Value cooperation and teamwork when interacting in groups.
J2E 10.4	Experience the joy of serving others.

PLOTTING CIRCLES

1. Ask your students how they'd like their graphed circle to look one year from now. Explain a few parameters:
 - a) Let them know what x and y represent above – the two vital components that make up our Christian walk (others' growth and personal growth).
 - b) Challenge them to keep a diary in which they list which coordinate each day belongs. Explain that a day in the (+,+) quadrant would be a great day -- in which the person feels they improved their relationships with others as well as their own personal accomplishments. A day in the (-,+) quadrant would be an "OK" day – in which the person experienced personal accomplishment (maybe from having a great academic day) but didn't feel that they grew socially with others. A day in the (+,-) quadrant would be the exact

opposite – where the person did flourish socially with others, but didn't experience personal accomplishment. Finally, a really bad day would be one in the (-,-) quadrant – where the person experienced social and personal failures. Point out that personal growth on the y-axis can be more than just academic results. They can also be related to their jobs, Varsity games, musical performances, and class/ASB offices – to name a few. Since a circle has 360 degrees and a year has 365 days, let them know that they get five throw-outs!

- c) Ask your student what they need to plot a circle on the x,y plane. They'll recall it's the center and radius. Ask them what they think the center would be in this analogy. Hopefully, they'll come to the conclusion that it's God that is the center of their lives, and that the radius is their link to Him. Furthermore, the smaller the radius, the closer they are to Him. Point out how the circle is one of the rare graphs whose reference point is not on the graph itself. This fits the analogy, because God's divinity is something we sinners can never attain. However, we can get infinitely close to him – keeping him the center of our life with as small a radius away as possible.
2. Challenge your students to keep God as the center of their lives, staying as close to Him as possible, resulting in a great year (draw a circle with a tiny radius centered in quadrant I, having just a handful of days in quadrant III).
- a) Remind them that, unfortunately, we'll all be having those days in the (-,-) quadrant. Recognizing those days in others can help us better relate to each other – being able to chalk up frustrations we have with others as merely symptoms of a day in quadrant III.
 - b) Many people in the world aren't happy for two reasons: they either don't have God as the center of their life, or they're too large of a circle – meaning they're a long ways from God. Consequently, it results in a lot of days spent in quadrant III (draw a circle with a large radius, centered in quadrant I).
 - c) Ask students who they think the radius represents. Hebrews 7:25 says, "Jesus is able to completely save those who come to God through him, because he always lives to intercede for them." Christ is the radius, linking each of us to God! Establishing a relationship with him keeps us closer to God – helping us come full circle!

WORSHIP 3: LINES CROSSING IN THE X,Y PLANE

Introduction: This worship works best for Algebra I or II students who have learned or are learning how to solve systems of equations. Students spend a lot of time learning in math classes how to graph lines and interpret them. Consequently, it makes it useful for them to look at their priorities in life as lines. They can plot their lines in a plane and find possible intersection values. This can work as a graduation talk, in which you have students reflect about the lines in their life that are important to them and how their graph looks. Students may come up with lines such as spirituality, academics, family, sports, their social life,... etc. The Linear Representation of the Godhead (Part C) is observations from Ryan Ratcliff, a former student of mine (Class of '06) at Redlands Adventist Academy.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.5 Value God's revelation of Himself through inspired writings and creation.
- J2E 1.6 Respond to God's love by using one's spiritual gifts to serve others.
- J2E 3.1 Recognize that God's ideal for the basic unit of society is the family.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 5.6 Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 7.2 Apply a Christ-centered perspective to all forms of personal expression and media.
- J2E 9.2 Employ biblical principles as the basis for appreciation and expression of creative and performing arts.
- J2E 10.5 Identify one's interests, abilities and values, understanding their relationship to career options.

A. POINTS OF INTERSECTION

1. Ask your students about all the possible points of intersection for two lines in an x,y plane. They'll soon recall, from algebra, the following:
 - a) no solution (lines are parallel, never crossing)
 - b) infinitely many solutions (lines are the same, where one is just on top of the other)
 - c) unique solution (lines cross at one distinct coordinate)
2. It helps to point out that the x-component can be thought of as our own personal growth, while the y-component is our relationship growth with others. Ask your students what some of their lines of importance might be.

B. INTERPRETING GRAPHS

1. No Solution

- a) This type of picture reflects a life missing a solution. People who fall into this category are involved in a lot of activities, or lines, but they never seem related. There's no overlap, or consistency – resulting in very little happiness. Each line starts from a different place in their life (y-intercept), but the risk, or rate of change (slope), is the same for each. Consequently, the lines are all parallel, without overlap.
- b) Systems of equations that are no solution are called inconsistent. A no solution scenario is also referred to as the empty set – a fitting description of someone whose lines are graphically unrelated.

2. Infinitely Many Solutions (IMS)

- a) The IMS scenario occurs when a person has each of their lines exactly the same. Not only is the rate of change the same (slope), but the starting point (y-intercept) is the same as well. Because each line is directly on top of the others, it looks to others as though there's only one line present. It's easy for us teachers to fall into this trap, since we're teaching the same lessons over and over again in our career. Trying new things and varying our approach can take care of this danger. There's a story in the Bible of someone suffering from IMS:

The Rich Young Ruler (Luke 18:18-30)

This story illustrates what can happen when something earthly, like money, is apart of each line in our life. In this case, it's created a graph that's one-dimensional. The Rich Young Ruler's lack of focus on others created a graph that was just a horizontal line – changing for personal growth on the x-axis, but staying the same for others on the y (draw a horizontal line). Jesus knew this was the case, and responded, "How hard it is for the rich to enter the kingdom of God." (verse 24). Emphasize the importance of branching out and trying new things that are beneficial to both us as well as others.

- b) Systems of equations that produce IMS are called coincident. If you think of some people in this world (our plane), you can probably think of a few who have characteristics of their personality center on something that's dominant about them. It's a coincidence (or is it?) that everything always reverts back to that particular interest. It can be something constructive like having money, but becomes destructive when that's what every line in life becomes.

3. The Unique Solution

- a) God is the unique solution! Having each line go through God will take care of all the problems associated with the two previous scenarios.

He's the perfect blend of us and others – creating a graph that resembles an asterisk (draw on board). We definitely want each of our lines going through Him! Unfortunately, in this world of sin we're in, we'll have some lines that have negative slopes -- in which the rate of change we're experiencing might sting at times. Furthermore, we may start a line from a negative spot (y-intercept), making it extremely difficult to branch out. However, in Luke 18:27, Jesus points out the solution to the Rich Young Ruler's problem: "What is impossible with men is possible with God."

- b) Mathematically, we call such systems of equations consistent. That is, a consistent or unique solution exists for each line. Lives of those having God as their solution portray a level of consistency that's hard to miss.

C. LINEAR REPRESENTATION OF THE GODHEAD

1. A Unique Solution

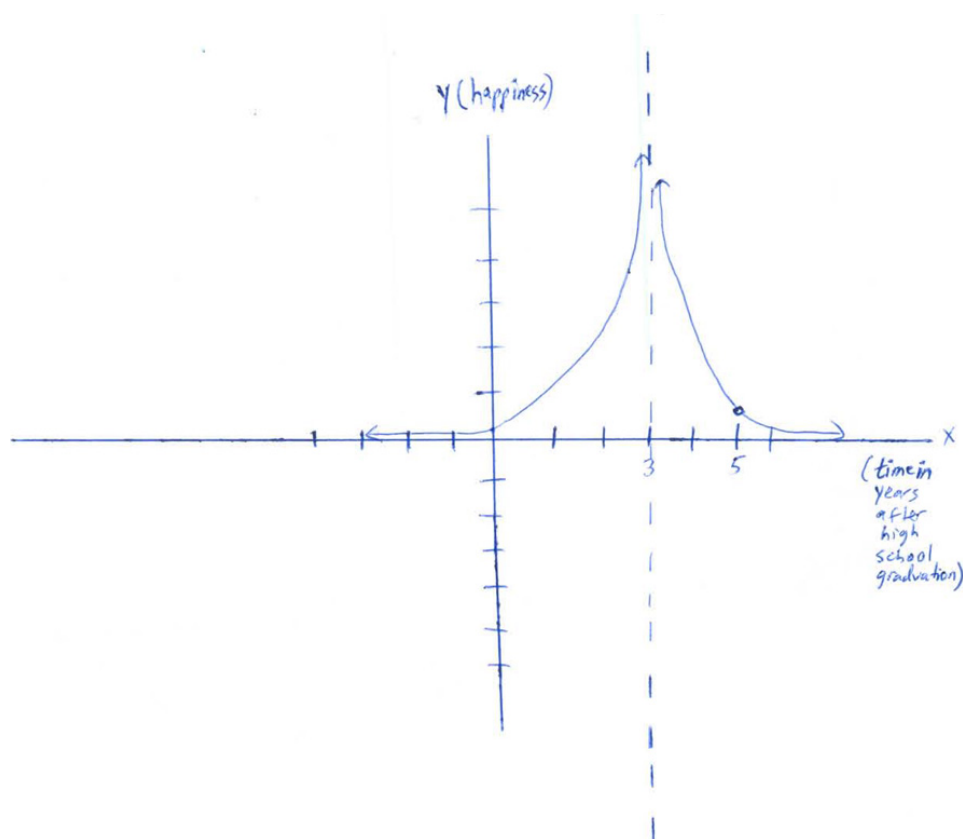
- a) God, Jesus, and the Holy Spirit can also be thought of as lines crossing uniquely to form an asterisk. In fact, it's probably better to use the previous analogy for humans as line segments, since they have distinct beginning and ending points. God, by definition, is never beginning or ending – making linear representation more appropriate.
- b) It's interesting what happens when you do the following (draw on board):
 1. Draw three lines to cross uniquely, forming an asterisk.
 2. Put a point the same distance from the unique solution on each of the six rays that exist. Note: think of them as six "half-lines."
 3. Take a point and connect it to every other point, meaning you're skipping a point each time. This will form a triangle. Repeat this step for a point next to the one you started with earlier, forming a second triangle. Note: this means that you've connected each part of the Godhead with its other two parts, appropriate for what we know about how the Godhead works together.
 4. You have formed a star of David (a six-pointed star)!
- c) It's also interesting to notice the following:
 1. When Jesus came down to earth, one line out of the asterisk was taken out, leaving a cross.
 2. The star usually drawn above a nativity scene is a four-pointed star (not six-pointed), foreshadowing Christ's death on a cross.

WORSHIP 4: DISCONTINUITIES

Introduction: This worship is recommended for students in an Algebra II or Precalculus course that are familiar with rational functions. Remind students of the definition of a discontinuous graph: one that can't be drawn without lifting the pencil. Take a rational equation that has both types of discontinuities for x -- the hole and vertical asymptote. An example that works well is the graph of $y = (x - 5)/(x^3 - 11x^2 + 39x - 45)$. This is the function shown below:

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 2.6 Relate to lifestyle choices and cultural issues based on biblical principles.
- J2E 5.3 Avoid at-risk behaviors.
- J2E 6.1 Broaden intellectual abilities through the study of God's Word.
- J2E 6.2 Use critical and creative thinking skills in "real-world" experiences.
- J2E 8.6 Develop conflict resolution skills.



Notice that if you let x be the number of years after high school and y be units of happiness, this graph represents what society believes will be our fate. It's interesting

that this is called a rational equation, meaning in the world we live in, it's common or rational. In other words, life will continue increasing to a certain point (such as $x = 3$), until a point of discontinuity is reached. Getting over that hurdle causes a change in the graph of time vs. happiness, and it's all downhill from there. Happiness takes a hit, and our best years are behind us. But does it have to be like this? Furthermore, how does the discontinuity faced when $x = 5$ differ from the one at $x = 3$? How might mathematical knowledge aid students in the obstacles they face?

A. GOING BACK

1. Time is a scalar, not vector, quantity – making it impossible to literally return to a previous moment in our lives. However, we can return to those attributes we had at those points, before all the stress and discontinuities began. The Bible talks about being as a child. Mark 10:15 says, “I tell you the truth, anyone who will not receive the kingdom of God like a little child will never enter it!”
 - a) How is being like a child similar to our Christian walk? These are attributes new parents notice in their children. Ask your students if they sound like what we want to be like as Christians:
 1. Children are very genuine. What you see is what you get. They don't try to disguise their bad moods.
 2. Children love affection and love others unconditionally.
 3. Children are curious and excited to learn. They ask lots of questions.
 4. Others are drawn to kids.
 5. The most innocent child obeys or disobeys without considering consequences for their behavior. They don't weigh alternatives. They don't rationalize (point to graph).
 6. Children don't take themselves too seriously.
 7. Children have fun and enjoy the simple things of life that matter most.
 8. Children need a family.
 - b) What are things that keep us from thinking like a child?
 1. Education can cause us to become too full of knowledge and lose our perspective. That doesn't mean we don't need an education. However, it can be helpful to recognize the danger of having lots of information. A child lacks knowledge but has an interest in others. Adults are often more prone to have knowledge but lacking in care for others. Knowledge might get our students a job, but it doesn't keep it for them.
 2. Money can be dangerous. It's not a coincidence that the story of the Rich Young Ruler comes immediately after Jesus' affirmation of little children to his disciples. This occurs in Matthew 19, Mark 10, as well as Luke 18.

3. Our pride can be a deterrent, creating discontinuities. We don't want to compare our graph with others to see whose is more positive.
4. There are unexpected results in life. It's important to note that bad things happen to us good people. Our actions or lack thereof don't cause evil. Sin causes evil. The book of Job reminds us of this reality. Nonetheless, it makes going back to childhood-type thinking much more difficult.

B. HURDLING DISCONTINUITIES

1. The graph shown (p.11) has a vertical asymptote at $x = 3$, caused by two factors in the denominator of $(x - 3)$ that aren't found in the numerator. At $x = 5$, there's a factor of $(x - 5)$ found in the denominator that's also found in the numerator, creating a hole in the graph since the factors cancel.
2. Ask students which type of discontinuity is graphically better to have in their life. Hopefully, they'll see that the hole (such as the one at $x = 5$) is just a small blip in their life. However, a vertical asymptote (such as the one at $x = 3$) has more serious effects, since it changes life's path.
 - a) Holes represent discontinuities in life that we're able to jump over without changing the direction of our life. In this case, you'll notice the graph decreases on either side of $x = 5$. Interpretively, this does mean the person is less happy after the discontinuity since the graph is decreasing. However, it's a marginal difference. Notice also that since y is still positive, the person is still happy, just less happy after the hole. Our students encounter holes in their lives on a regular basis.
 - b) Vertical asymptotes are more devastating discontinuities in life. Graphically, they change the direction completely. In this particular case shown, the graph goes from increasing to decreasing – which is usually what happens when we face things like loss of a loved one or failed relationships, to name a few. It's not something you can just jump over and continue life as it was before.

C. THE SOLUTION TO THIS NO SOLUTION – HOW TO MAINTAIN HAPPINESS

1. We can inspire students to become as little children in their Christian walk.
2. We can emphasize the importance of treating major obstacles in life as holes rather than vertical asymptotes.
3. We can remind students of I Corinthians 12:4-11. Each person has been given spiritual gifts. Recognizing ones given them is a primary goal of education.

See graphs below:

WORSHIP 5: TRANSFORMATIONS

Introduction: This worship works best for students in Algebra I or II that are studying graphs. It's usually best at the beginning of the year since our textbooks often introduce graphing in the first three chapters. Ask your students to think of their lives as being similar to graphs – which shift around on an x,y plane. Have them take that a step further and think of these shiftings on a road where they're moving around a lot – as will be the case in life. The road represents the world, yet it's one with people like us looking to find happiness in our journey toward Christ – the ultimate destination. Instead of picking the less traveled, narrow way (like we sometimes hear), consider going out and doing everything you can to bring more people toward Christ. Consequently, it's a crowded, messy commute, but one that's filled with lots of enjoyable changes along the way. Ask your students what our math textbook calls these shiftings. It calls them transformations, which are a series of experiences that bring about a change in a graph (or person). Growing spiritually involves lots of movement – like that of a driver on a road. You've maybe heard of this saying: "In life, we look up for inspiration, down in desperation, and side to side for information." There are three types of transformations you'll encounter:

1. moving left and right (side to side)
2. moving up and down or flipping your direction
3. making your route more vertical (skinny) or more horizontal (fat)

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 1.3 Embrace God's gift of grace by accepting Christ as one's personal Savior.
- J2E 1.6 Respond to God's love by using one's spiritual gifts to serve others.
- J2E 2.3 Become involved in spreading the gospel throughout the world.
- J2E 3.4 Recognize that God's unconditional love gives one self-worth.
- J2E 6.2 Use critical and creative thinking skills in "real-world" experiences.
- J2E 10.4 Experience the joy of serving others.
- J2E 10.6 Always put forth one's best effort in every task.

A. SIDE TO SIDE TRANSFORMATIONS (INFORMATION)

1. There's a story in the Bible that involves this sort of transformation. It's even on a road! Luke 24:13-17 (read) deals with the side-to-side experiences life entails. It's the story of the Road to Emmaus, where two apostles are sad about their friend's death.
 - a) You'll face (and are facing) discouragement and altered plans – maybe in the form of a damaging relationship or unsatisfying career choice.

- b) There will be obstacles you'll have to pass that are in the way. Remember the different perspectives each person involved will have. For example, you've probably been frustrated in your lifetime from a driver in the left passing lane on the highway who is going the exact speed limit. From your perspective, as you go around them on the right, they are a place they don't belong. However, from their perspective, they need to go faster to convince you they're "worthy" of being there. Consequently, getting around them becomes difficult. Don't be afraid to let others pass you. They may view side to side movement differently, as is the case here.
- c) Warning: side to side transformations occur inside the function itself! Thus, you can often see the true character in a person as they go around obstacles. Exercise caution when coming in contact with them.

B. UP AND DOWN TRANSFORMATIONS (INSPIRATION/DESPERATION)

1. Read verses 18-24 and 28-31 (of Luke 24)
 - a) The best part of the story is the fact that during the apostles' desperation, Jesus comes to them, turning their desperation into inspiration.
 - b) Despite the apostles' pain, they keep going forward. The most dangerous scenario is to turn around in desperation, although exiting and quitting is a danger as well.
 - c) In math, up/down and flipped transformations occur outside the function (or outside ourselves). Thus, it's a gift from God that we're able to move forward, because our inner selves only affect side to side changes.

C. FAT/SKINNY TRANSFORMATIONS

1. Read verses 32 and 52,53 (of Luke 24)
 - a) As a result of spending time with Christ, the drive is smoother. It's more vertical/skinny. More acceleration occurs, too! This is evident in the above verses, where it says hearts are burning and they're continually at the temple, praising God.
 - b) The focus now changes from one's own personal journey to helping others on their trip. Just as helping others on the side of the road has risks, so does helping others with their Christian journey. We run the risk of finding out our journey is far from perfect. Nonetheless, although we may misinterpret signs, we want to cause as much traffic as possible.

D. DIRECTIONAL TIPS

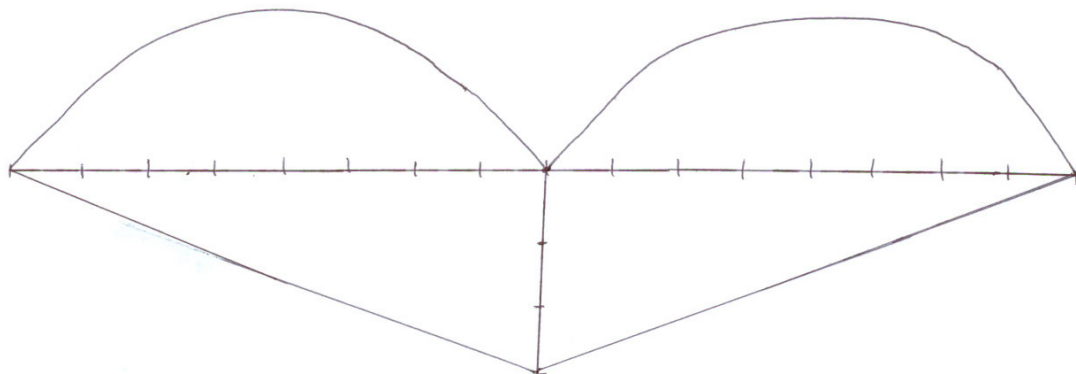
1. The road is filled with trauma. However, to be transformed, talk to Jesus, as the two apostles did. Sometimes, as they were, you may be unaware that you're on the right road! Jesus is with you through all the adversity, just like he was with the apostles.
2. You can exit and take slower roads. However, the highway (also known as the free-way) is the quickest – providing the fastest route. God doesn't ask us to go down any toll roads!
3. Keep in mind that a great family, stable job, comfortable finances, and happiness aren't at the end of the road – they're a result of being on the right road!
4. Be sure that each decision you make keeps you on the road with Christ. It's not that Christ can help us get somewhere, it's that Christ is somewhere to get to!
5. CHRIST as an acronym can stand for: Choosing His Route Inspires Several Transformations

WORSHIP 6: A VALENTINE'S HEART – REPRESENTING GOD & US

Introduction: This worship is a fun one to do on Valentine's Day (or a date close to Feb. 14). It works best for a Geometry class. The idea is that a heart consists of three geometrical shapes: a triangle and two semicircles. The triangle is the base, representing God in our heart. The two semicircles represent us – how much we have in our heart of ourselves. The base of the triangle shares the diameters of the two semicircles, meaning there's a part of us that's also a part of God in our heart. However, this part is a shared side, not a part of the area – which is the amount inside. What happens to the change in area of the semicircles and/or triangle when dimensions are changed? It helps to recall that the area of a semicircle is $(\pi \cdot \text{radius}^2)/2$, while the area of a triangle is $(1/2) \cdot \text{base} \cdot \text{height}$. The following two cases will illustrate what happens when an original heart changes. Note: all units shown are of length 1.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.6 Respond to God's love by using one's spiritual gifts to serve others.
- J2E 1.7 Recognize that God gave the Ten Commandments to show us how to love Him and each other.
- J2E 2.6 Relate to lifestyle choices and cultural issues based on biblical principles.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 5.6 Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
- J2E 6.2 Use critical and creative thinking skills in "real-world" experiences.
- J2E 7.2 Apply a Christ-centered perspective to all forms of personal expression and media.
- J2E 9.1 View God as the Author of beauty, both in His creation and in human expression.
- J2E 9.2 Employ biblical principles as the basis for appreciation and expression of creative and performing arts.



A. THE ORIGINAL

The area of each semicircle is $(\pi \cdot 2^2)/2$, or 2π . The area of the triangle is $(1/2) \cdot 8 \cdot 3$, or 12.

B. CASE I (CHANGING THE HEIGHT)

The area of each semicircle will still be 2π since the radii are still 2. However, the area of the triangle has changed since the height increased. The new triangle area is $(1/2) \cdot 8 \cdot 6 = 24$

C. CASE II (CHANGING THE BASE)

The area of the semicircles has changed, due to the new base. Each has a new area of $(\pi \cdot 4^2)/2$, or 8π . The new base has also changed the area of the triangle. Its new area is $(1/2) \cdot 16 \cdot 3$, or 24.

D. INTERPRETING OUR HEART

1. Keeping in mind that the semicircles represent us, while the triangular base is God, it seems appropriate that the heart has vertical line symmetry. That is, there's an equal blend of God and us on both the left and right sides, providing balance in our heart. Notice that God is our base. We're on top of Him, not the other way around. We don't throw God into our heart, we saturate our heart with Him.
2. God and us together make up the law. In fact, if you take either of the three pictures shown and draw triangles connecting the left and bottom coordinates, you'll generate a picture that resembles the stone tablets given by God to Moses. More specifically, if you look at the original picture and imagine the origin as the point where the two circles' diameters meet, connect the coordinate $(-4,0)$ to $(-4,-3)$. Then, connect the coordinate $(-4,-3)$ to $(0,-3)$. This will make the triangle that connects those left and bottom coordinates. Do the same on the right side – connecting $(4,0)$ to $(4,-3)$. Then, connect $(4,-3)$ to $(0,-3)$. The entire picture now looks like the Ten Commandments!

We want to make sure that our area doesn't exceed the area we're giving God in our heart. You probably noticed that's happening in both the original ($4\pi > 12$) and Case II ($16\pi > 24$).

3. With God as the triangle and us as the semicircles, it's interesting to notice that God's shape changes linearly (or uniformly), while ours change non-linearly (unpredictably). If you think about it, it makes sense that the area of God in our heart changes uniformly – since the priority we give God determines how much of Him we have in us. Remember, it's not God changing his shape, but us changing how much of Him we have in us. In contrast, our region is curvy, making it less predictable due to our sinful nature.

4. The Bible talks about the importance of having God in our hearts. Psalms 51:10 says, “Create in me a pure heart, O God, and renew a steadfast spirit within me.”
5. Case I illustrates that changing the altitude or height of God’s triangular region in your heart will increase the amount of God in your heart.
6. The main point of this analogy is Case II – illustrating that you can have both God’s region and yours increase in area. That’s possible when you increase the part of your heart that’s shared – the base of God’s triangular region/the diameters of your regions. There’s now more of God in your heart (from 12 to 24), and your area has grown as well (from 4π to 8π). The result is a heart flourishing from being filled with God, combined with the unique talents He’s blessed you with.

WORSHIP 7: USING THE BIBLE AND BIBLE COMMENTARY TO FIND HOW OLD ADAM WOULD HAVE BEEN AT THE TIME OF THE FLOOD (HAD HE NOT ALREADY DIED)

Introduction: This worship project works well for younger math students. It can be used for middle school or junior high, as well as incoming high school math students. It works best having your students do the research. It shows how you can use the Bible with mathematics to find out things that aren't directly known. This project was created by my uncle, Dale Bidwell, President of Adventist Frontier Missions. Be sure to give some guidance on how to complete the chart. Basically, they want to fill in the chart below everywhere it doesn't say "Leave Blank" or "Not Applicable." Filling the chart helps them discover how old Adam would have been at the time of the flood had he not died. Recommended directions are listed after the chart below:

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 1.5 Value God's revelation of Himself through inspired writings and creation.
- J2E 1.8 Value and participate in worship alone and with others.
- J2E 2.5 Appreciate the heritage of the Seventh-day Adventist Church.
- J2E 3.1 Recognize that God's ideal for the basic unit of society is the family.
- J2E 4.4 Use a biblical perspective to analyze history and current events.
- J2E 6.1 Broaden intellectual abilities through the study of God's Word.
- J2E 8.3 Acquire skill in the use of technologies.

A. DIRECTIONS TO GIVE STUDENTS

1. Have them use their Bible to find all the blanks that have texts from Genesis. You'll notice in the center of the chart, the texts follow along a diagonal. Remind them in reading the chart that it's how old the column was when the row was born or occurred.
2. To find all the blanks of the triangle that's inside those diagonals (rows 2-10), you might want to use an example like this: if Bob is the father of Tom, who's the father of Jim (meaning Bob is Jim's grandfather), and Bob was 30 when his son Tom was born, and Tom was 25 when his son Jim was born, how old was Bob when his grandson Jim was born? Your students will soon discover the answer is 55 ($30 + 25$). Consequently, they may notice (you may or may not want to tell them this) that they can add along the diagonal to generate the vertex point of the triangle that forms from the diagonal. This procedure will complete all of the middle down through Noah's row.

Here's the above step applied directly to the chart: Adam was 130 (discovered in Gen 5:3) when his son Seth was born. Seth was 105 (from Gen 5:6) when his son Enos was born. Thus, the blank illustrating how old Adam was when his grandson Enos was born was 235 ($130 + 105$).

AGE OF PATRIARCHS UP THROUGH THE FLOOD
(How old the column-patriarch was when the row was born/occurred)

	Adam	Seth	Enos	Cainan	Ma'leel	Jared	Enoch	M'selah	Lamech	Noah
Length of Life	Gen 5:5	Gen 5:8	Gen 5:11	Gen 5:14	Gen 5:17	Gen 5:20	Gen 5:23	Gen 5:27	Gen 5:31	Gen 9:29
Seth	Gen 5:3	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Enos		Gen 5:6	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Cainan			Gen 5:9	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Mahalaleel				Gen 5:12	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Jared					Gen 5:15	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Enoch						Gen 5:18	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Methuselah							Gen 5:21	Leave Blank	Leave Blank	Leave Blank
Lamech								Gen 5:25	Leave Blank	Leave Blank
Noah									Gen 5:28	Leave Blank
Command to Build Ark										Commentary
Shem, Ham, Japheth										Gen 5:32
Flood										Gen 7:10
Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Years Dead/ Gone Before Ark Built								Not Applicable	Not Applicable	Not Applicable
Years Dead/ Before Flood										Not Applicable
Years Lived After Flood	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Gen 9:28

Warning: Many students often assume that they can add any two numbers together that are diagonally across from each other. However, this won't work unless those numbers are along the diagonal itself. The answers are included so you can caution your students to avoid this trap. For example: to find out how old Adam was when his great grandson Cainan was born, you don't just add 235 and 195 to get 325 (see answer chart). How old Adam was when Enos was born, combined with how old Seth was when Cainan was born, doesn't give you how old Adam was when Cainan was born (there's no overlap). Instead, if you add the numbers along the diagonal such as $130 + 105 + 90$, you get the proper answer of 325. This represents how old Adam was when Seth was born + how old Seth was when Enos was born + how old Enos was when Cainan was born. Did you notice the transitive-type overlap?

3. To complete the next three rows (rows 11-13), it takes a bottom-up, inductive approach. Students will have the numbers from Genesis 5:32 (of 500) and 7:10 (of 600) in the last two rows. Let your students know that all of the numbers between those final three rows differ by constants. That is, you can add the same number to all the answers in the Shem, Ham, Japheth row to generate the Flood row. Since 500 and 600 are the answers from the Bible and differ by 100, we now know that 100 is the constant between those two rows. The same applies between the Command to Build the Ark row and the Shem, Ham, and Japheth row, only it's not necessarily a constant of 100. What they need to do now is find the last blank in the Noah row, representing how old Noah was when God commanded him to build the ark. They'll need the Bible Commentary or Internet to find this answer (which is 480).

Once students know the final diagonal of the triangle, they can complete the Command to Build the Ark row using the technique in step 2 above. Now, since the constant from the Command to Build the Ark row to the Shem, Ham, Japheth row is 20 ($500 - 480$), they can complete the last two rows of this section (rows 12 and 13). This finds the answer to our question! Adam would have been 1656 at the time of the flood had he not died (see answer key)!

4. The last two rows to fill (rows 15 and 16) involve basic subtraction. For example, since Adam would have been 1656 at the time of the Flood, yet only lived 930 years (from Gen 5:5), he was dead 726 years ($1656 - 930$) before the Flood (answer in row 16). Furthermore, the answer above that one is 606, from the fact that 1536 (how old Adam was when God gave the Command to Build the Ark) $- 930$ (his length of life). Below is the answer key to clarify these steps:

KEY: AGE OF PATRIARCHS UP THROUGH THE FLOOD
(How old the column-patriarch was when the row was born/occurred)

	Adam	Seth	Enos	Cainan	Ma'leel	Jared	Enoch	M'selah	Lamech	Noah
Length of Life	Gen 5:5 930	Gen 5:8 912	Gen 5:11 905	Gen 5:14 910	Gen 5:17 895	Gen 5:20 962	Gen 5:23 365	Gen 5:27 969	Gen 5:31 777	Gen 9:29 950
Seth	Gen 5:3 130	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Enos	235	Gen 5:6 105	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Cainan	325	195	Gen 5:9 90	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Mahalaleel	395	265	160	Gen 5:12 70	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Jared	460	330	225	135	Gen 5:15 65	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Enoch	622	492	387	297	227	Gen 5:18 162	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Methuselah	687	557	452	362	292	227	Gen 5:21 65	Leave Blank	Leave Blank	Leave Blank
Lamech	874	744	639	549	479	414	252	Gen 5:25 187	Leave Blank	Leave Blank
Noah	1056	926	821	731	661	596	434	369	Gen 5:28 182	Leave Blank
Command to Build the Ark	1536	1406	1301	1211	1141	1076	914	849	662	Commentary 480
Shem, Ham, Japheth	1556	1426	1321	1231	1161	1096	934	869	682	Gen 5:32 500
Flood	1656	1526	1421	1331	1261	1196	1034	969	782	Gen 7:10 600
Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
Years Dead/ Gone Before Command to Build Ark	606	494	396	301	246	114	549	Not Applicable	Not Applicable	Not Applicable
Years Dead/ Gone Before Flood	726	614	516	421	366	234	669	0	5	Not Applicable
Years Lived After Flood	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Gen 9:28 350

WORSHIP 8: METAPHORS

Introduction: Believe it or not, there are lots of similarities and differences between particular areas of math and our Christianity. This worship compares and contrasts our Christian experience with Geometric proofs (a mathematical favorite!). It then compares the role of the graphing calculator in math to God's role in our lives. Parts A and B are recommended for students taking or who have taken Geometry. Part C is recommended for students in Precalculus or Calculus who are familiar with the graphing calculator. The alphabetically outlined descriptions may be something you'd prefer omitting. You might want to elaborate on the numbered statements in your own way.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 1.5 Value God's revelation of Himself through inspired writings and creation.
- J2E 3.4 Recognize that God's unconditional love gives one self-worth.
- J2E 4.1 Exhibit concern and sensitivity for other peoples and cultures.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 5.6 Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 9.3 Develop fine arts talents through practice, performance and presentation.

A. WAYS A GEOMETRY PROOF IS LIKE OUR CHRISTIAN WALK

1. You can't always go by the picture.
 - a) This is true in Geometry, that pictures aren't necessarily drawn to scale. It's also true with Christians, because the outside of a person isn't always reflective of what's inside.
2. There's a goal. Stopping short of it is unsatisfying.
 - a) With proofs the goal is to justify each of the steps that conclude with the Prove statement. There's no way to be 100% correct unless you include each of the statements in between. Our Christian experience works the same way.
3. God has given us gifts to use.
 - a) The definitions, postulates, and theorems can be thought of as gifts. In fact, writing a proof is kind of like opening gifts (or givens) that are under the tree. This can help students avoid opening a gift that hasn't been given. God's freely given each of us lots of gifts to open and use.

4. There are many different ways of getting there. You can approach it directly/deductively – a top to bottom approach, or indirectly/inductively – a bottom to top approach.
 - a) With proofs, students often get hung up on how many steps there “should be.” However, recognizing there are different ways of proving something shows the number of steps can indeed vary. Likewise, although Christianity contains what are arguably “standard routes,” it doesn’t have only one narrow path for its members’ journey.

5. Although the order of steps can vary, there must be a common thread.
 - a) In Geometry, there’s a common thread for particular types of proofs. Some proofs always resort to substitution, while others utilize the triangle congruence postulates. Christ is the common thread that our Christian walk is woven around.

6. There’s a Reasons Sheet.
 - a) When students are first introduced to Geometry proofs, I like to give them a Reasons Sheet containing all the rules in one place. It’s basically a handout of all the “blue-box” definitions, postulates, and theorems that are in different chapters of the textbook. Our Reasons Sheet for Christianity is the Bible.

7. It can be an emotional, trying experience. However, once you’re there, the experience is rewarding.
 - a) Proofs have been known to try students’ patience. Yet there’s quite a look of satisfaction when the student gets there. Christianity has its share of ups and downs as well.

8. Once you understand the process, you can handle any type of problem.
 - a) The first few proofs are often quite challenging, but once the students get used to them, they take flight. In fact, they even start liking them! With Christianity, the newness within stages of growth can be intimidating, too. Soon, though, you learn what approach works best for different situations.

9. There’s always a possible solution, meaning the answer’s never no solution!
 - a) Every proof we encounter has a way to get there. Likewise, we’re promised in I Corinthians 10:13: “God will not let you be tempted beyond what you can bear. And when you are tempted, he will also provide a way out so that you can stand up under it.”

B. WAYS A GEOMETRY PROOF IS UNLIKE OUR CHRISTIAN WALK

1. Our Christianity doesn't require us to justify every step. We can take leaps of faith.
 - a) Thank goodness for this difference! In fact, faith is an essential ingredient for Christianity, but it's a dangerous component for Geometry proofs.
2. No two people can ever be congruent.
 - a) In Geometry, there are lots of shapes that we prove to be congruent. As Christians, no two of us can ever be exactly the same – neither in appearance nor configuration.
3. Our Christianity doesn't boil down to how well we can “do the problem.”
 - a) Math problems in general have a “plug and chug” persona that doesn't fit into our Christian journey. Instead, it's more about learning as we go rather than getting it done.
4. Coaches are provided throughout the tests.
 - a) Unlike on Geometry tests, there are coaches, such as the Holy Spirit, giving us hints to get through the tests of life.

C. WAYS A GRAPHING CALCULATOR'S ROLE IS LIKE GOD'S ROLE IN OUR LIVES

1. Both can be used as guides but don't do everything for you.
 - a) We make choices from lots of options.
 - b) We need to provide the basis for how to solve all the problems.
2. Both enable us to store lots of information.
 - a) You can call up past calculations by using the 2nd Enter feature.
3. There's a Clear button for starting over (Yeah!!).
4. We can insert here or delete there as we go.
5. When we find the part of the problem where the solution is, we can zoom in on that particular spot.
6. There are two different modes – radians and degrees.
 - a) These modes are comparable to wide and narrow paths.
7. Later in life, if we can't make basic decisions quickly, we're in trouble.
 - a) Sometimes, students use their graphing calculator for basic arithmetic, hindering their ability to quickly find solutions.

8. There's a main place where problems are solved.
 - a) For the calculator, that main place is the home screen. With God, the main place is during our personal devotional time.
9. Sin is present.
 - a) In fact, the graphing calculator contains names of sinners themselves – Trace, Del, and In (pronounced ellen)
10. If you try to solve problems with too many other things going at once, it won't work until some are closed down.
 - a) This happens if you try graphing normally and forget to turn your Plots Off from having done a scatterplot earlier. Likewise, we have lots of former actions that get in our way of moving forward with God.
11. There are things that both the calculator and God do that we don't even know about (or can even fathom).
12. There are negatives and positives.
 - a) Sin and certain keys cause these varying consequences.
 - b) God uses the absolute value symbol – where everything comes out positive!
13. There's a window to the rest of the world which we can control. We set the standards for how to graph/present ourselves.
14. We're the ones that have control of the On/Off button.
15. Our batteries are our faith. This faith is established from time with God – when we aren't just looking for answers.
16. Both the calculator and God never mess up. We do in how we enter the data.
17. Programs are out there that have nothing to do with our problems, throwing us off at times.
 - a) The graphing calculator contains lots of separate programs that can be activated using the PRGM (program) button. For example, I use LabPro for physics.
18. There are arrows that help us get around by pointing us in the right direction.
 - a) These arrows are found through God's Word.
19. Some keys you won't use until later in life. In fact, there are some keys you can't get to unless you first use others.
20. God is the technology that can help us solve problems we can't handle on our own.

WORSHIP 9: NUMERICAL SYMBOLISM IN THE BIBLE

Introduction: This worship looks at numbers used in the Bible and their recurring, symbolic meanings. It can be used for middle school, junior high, or high school. The purpose of this worship is to instill in our students the understanding that every number used in the Bible has a specific meaning. It's not that the authors haphazardly approximated particular quantities and included them for us math people. Instead, numbers, like the rest of its content, were divinely inspired to reveal more about God and His love for us.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 1.5 Value God's revelation of Himself through inspired writings and creation.
- J2E 6.1 Broaden intellectual abilities through the study of God's Word.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.

A. NUMBERS USED IN THE BIBLE

1. 2 = agreement in truth/arriving at the same conclusion
 - a) Disciples are sent out in twos with the power over unclean spirits (Mark 6:7).
 - b) Two angels tell the apostles at Christ's ascension of the truth regarding His return (Acts 1:10).
 - c) A poor widow gives two copper coins, illustrating how Christianity involves giving our all (Luke 21:1-4).

2. 3 = representing God's plan
 - a) Three visitors inform Abraham and Sarah that Sarah will have a child at an old age (Genesis 18:1-15).
 - b) Shadrach, Meshach, and Abednego are together in the fiery furnace (Daniel 3:24-25).
 - c) Jonah is in the belly of the whale three days and nights before fulfilling God's request to him (Jonah 1:17).
 - d) Peter denies Jesus three times (Matthew 26:69-75).
 - e) Matthew 18:20 says, "Where two or three are gathered in my name, there I am in the midst of them." This fuses the meaning of the numbers 2 and 3. It puts truth with God's plan, creating the Church. Thus, truth + God's plan = the Church. Ask your students if they're aware that 5, or $2 + 3 =$ the Church.

3. 4 = the world
 - a) We have four compass directions (north, south, east, and west).
 - b) There are four quadrants on the x,y plane ((+,+), (-,+), (-,-), and (+,-)).
 - c) There are four basic elements (earth, air, fire, water).
 - d) There are four angels on the four corners of the earth (Revelation 7:1).

4. 6 = work time
- a) There were six days for labor. “For in six days the Lord made the heavens and earth.” (Exodus 20:9-11).
 - b) The throne of King Solomon had six steps (I Kings 10:19). The steps illustrate the toils required to reach the rewarding, magnificent seat at the top.
5. 7 = completeness (in terms of the big picture)
- a) The book of Revelation contains numerous examples of 7’s:
 1. 7 letters to 7 churches (2:1-3:22)
 2. 7 unsealings (6:1-8:1)
 3. 7 trumpets (8:6-11:15)
 4. 7 visions (12:1-14:20 and 19:1-20:15)
 5. 7 bowls (15:5-16:21)
 6. Chapter 4 discusses the victory of the Lamb and its followers. The term ‘lamb’ appears 28 times – which has factors of 7 and 4. This illustrates the worldwide scope of Christ’s victory.
 7. John talks about all nations of the world exactly seven times in Revelation (5:9, 7:9, 10:11, 11:9, 13:7, 14:6, and 17:15).
 - b) Psalm 12:6 says, “The words of the Lord are pure, as silver tried in a furnace of earth, purified seven times.”
 - c) Water is used as a transformational symbol by John in the book of John exactly seven times:
 1. Jesus turns water into wine at the Wedding of Cana (2:1-11).
 2. Jesus tells Nicodemus the importance of being reborn of water and the spirit (3:5).
 3. Jesus meets with the Samaritan woman at the well (4:1-26).
 4. Jesus heals at the pool of Bethesda (5:1-18).
 5. Jesus walks on water (6:16-21).
 6. Jesus washes the disciples’ feet (13:1-20).
 7. Jesus causes a miraculous catch of fish after his resurrection (21:1-14).
 - a) In verse 11, it says the disciples caught 153 fish after following Christ’s counsel to cast their net on the right side of the boat. It’s believed that, in Bible times, there were 153 kinds of fish. Thus, this number has symbolism --representing the Christian call to share our beliefs, or nets, with all kinds of people.
 - b) Furthermore, it’s interesting that 153 is a triangular sum. That is, it’s the sum of numbers 1 through 17, which is equivalent to the area of a triangle that has a base and height of 17 and 18. Its area is $\frac{17 \cdot 18}{2}$, or 153. The fact that

this is a perfect triangular sum seems appropriate

as well, since God, the Son, and the Holy Spirit are the three components we want to share with others as Christians.

6. 10 and multiples of 10 = completeness on a smaller scale
- a) The woman with ten pieces of silver loses one and searches for it until she finds it (Luke 15:8).
 - b) The Shepherd searches for his lost sheep and doesn't rest until all 100 (10 squared) are back in the fold (Luke 15:3-5).
 - c) The Ten Commandments are complete when they're followed, yet there's more to the picture than just following them.
 - d) 70·7 is chosen to represent forgiveness. Seventy has factors of 7 and 10 in it. Thus, there are two factors of 7 and one factor of 10 in 490. The factor of 10 represents complete forgiveness for a person (smaller scale). Those factors of 7 represent the larger picture of being a forgiver to others as part of who you are. Some accounts of this story use the number 77, which has a 7 in it, not a 10.
1. Have your students read the Parable of the Talents in Matthew 18:21-35. Then, go through the following:
- a) 1 denarius is approximately 1 day's work (known from John 6:7).
 - b) 1 talent = 15 years of work (known from the Bible Commentary).
 - c) The 1st debtor owed 10,000 talents, so 150,000 years of work – which could never be paid off.
 - d) The 2nd debtor owed 100 days of work. Thus, you can show what fraction of the 1st debt the 2nd debt was – making the actions of the unmerciful servant even more baffling:

$$\frac{100 \text{ days}}{150,000 \text{ years}} \cdot \frac{1 \text{ year}}{365 \text{ days}}$$

This reduces to 1/547,500, meaning the unmerciful servant couldn't forgive his own servant for a debt that was one five hundred forty-seven thousand five hundredth of what his was. This equates to approximately .000183%.

7. 12 = God's people
- a) Revelation 21:12 talks about twelve gates, twelve angels, and twelve tribes of the children of Israel.
 - b) The 144,000 talked about in Revelation 14:1-5 has two factors of 12 and three factors of 10. The twelves signify being people of God,

while the tens represent complete acceptance of God by each person individually.

- c) The woman who touched Christ's garment had been sick twelve years and was healed by faith (Mark 5:25-34). Faith is a characteristic of God's people.
8. 40 = a time of trials
- a) Jesus is tested by Satan in the wilderness for forty days (Matthew 4:1-11).
 - b) The Israelites wander in the wilderness forty years after leaving Egypt, eventually reaching Canaan (Exodus 16:35).
 - c) It rained forty days and night during the flood (Genesis 7:12).

WORSHIP 10: EXPONENTIAL GROWTH

Introduction: This worship is designed for Algebra II, Precalculus, and Calculus students. They need to be familiar with exponential graphs that grow and decay. The key to an exponential graph is that it changes based on the amount present. If we let God be the variable that's the base of our exponential graph, our lives will take off. However, if we base our graph on something other than God, the results are a stagnant life or one full of decay. The Exponential Change In Zacchaeus (Part C) contains information provided by my sister, Dr. Kendra Haloviak, a religion professor at La Sierra University.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.3 Embrace God's gift of grace by accepting Christ as one's personal Savior.
- J2E 1.4 Discover the importance and power of prayer and faith in one's relationship with Jesus.
- J2E 2.6 Relate to lifestyle choices and cultural issues based on biblical principles.
- J2E 3.4 Recognize that God's unconditional love gives one self-worth.
- J2E 4.1 Exhibit concern and sensitivity for other peoples and cultures.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 7.2 Apply a Christ-centered perspective to all forms of personal expression and media.
- J2E 10.5 Identify one's interests, abilities and values, understanding their relationship to career options.

A. THE THREE TYPES OF GRAPHS

Exponential graphs are of the form $y = Ca^t$. Here's what each variable represents in this analogy:

t = time (in whatever units you prefer) from a particular point in time. Remember that we don't put years on a coordinate system, since something like 2008 would be ridiculously large. Instead, we represent the days, months, or years that we are from a point we can use as a reference.

y = you (containing units of happiness)

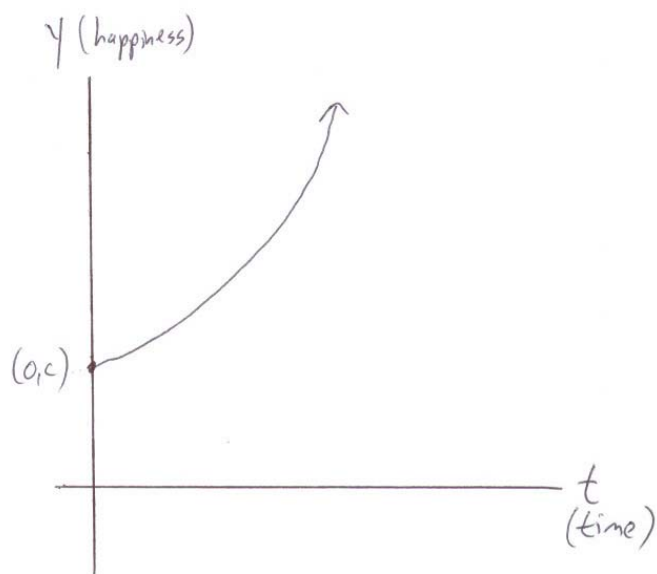
a = the exponential base that we use as our foundation. As you recall, there are three possibilities that make different graphical outcomes:

1. If $a > 1$, the graph is exponential growth
2. If $0 < a < 1$, the graph is exponential decay
3. If $a = 1$, the graph is no longer exponential but linear. In fact, it's just a horizontal line.

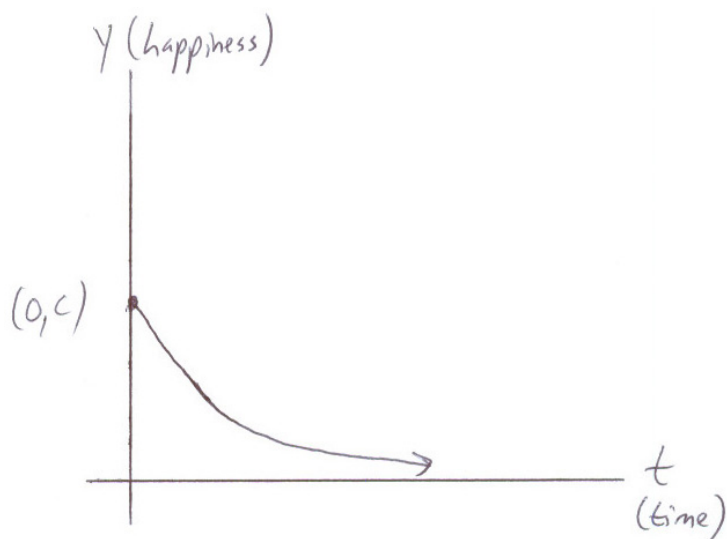
C = a starting point representative of how much happiness we bring into the equation

Here are the three graphs:

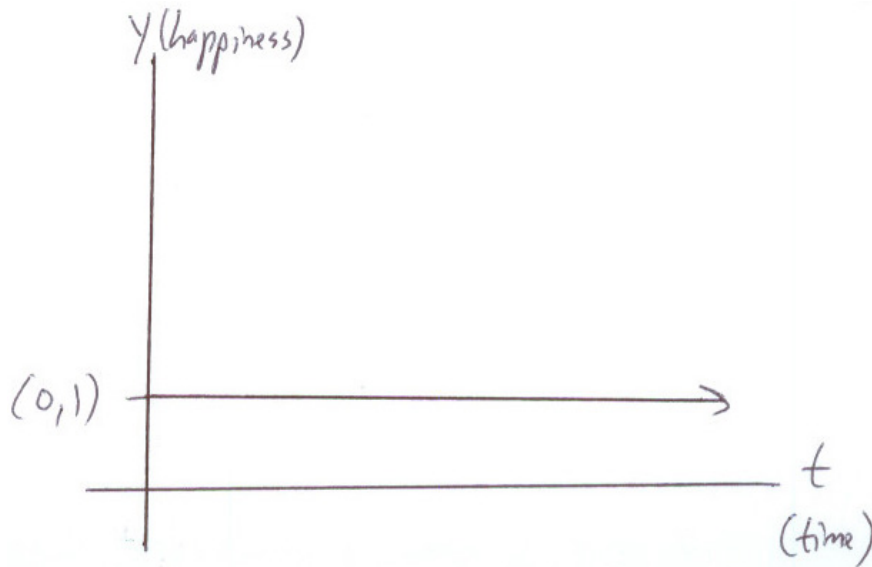
1. **EXPONENTIAL GROWTH ($a > 1$)**



2. **EXPONENTIAL DECAY ($0 < a < 1$)**



3. HORIZONTAL LINE ($a = 1$)



B. APPLICATION

1. Exponential growth occurs when we have our base be God. How fast our graph takes off is determined by how much of God we have in our life. The larger the 'a' value (meaning it's farther from 1), the graph is skinnier, having a faster rate of growth. The closer the 'a' value is to 1, the graph is fatter or more horizontal, having a slower rate of growth.
2. Exponential decay occurs when we have ourselves as the base. When everything is based on us, happiness goes down rapidly. Notice that regardless of the starting point, C, the graph will always decay (see graph 2).
3. The horizontal line $y = 1$ will be created when we let other things besides God become our base. Notice that it's still technically better than decay since we aren't losing happiness. However, we aren't gaining any either, since humanity has its limitations thanks to sin. This shows the danger of having things like hobbies or relationships become the base of our life.

C. THE EXPONENTIAL CHANGE IN ZACCHAEUS

1. Have your students read Luke 19:1-10. Point out how this story illustrates the change from exponential decay to exponential growth. Ask your students what made the change and how it was possible. Here's some feedback from the story:
 - a) Zacchaeus changes his base. Instead of the base being himself, it becomes Jesus! Making this transition takes lots of courage.
 1. By climbing the tree, Zacchaeus, wearing a robe, risks exposing his calves – a social faux pas for that time and region.
 2. By climbing the tree in his robe, he also risks exposing himself to those underneath.
 3. If you use the word COURAGE as an acronym, it can stand for: Considering Opinions Unimportant Responsive About God Everywhere! This is what Zacchaeus experiences, changing his exponential graph.
 - b) The growth begins immediately when Jesus is there.
 1. When Jesus sees the risk Zacchaeus has taken, he takes one as well. The only recorded instance of him inviting himself to another's house occurs. This was something that rarely happened back then.
 2. Jesus first tells Zacchaeus that he's going to his house (verse 5). He then tells him that salvation has come to his house (verse 9). Thus, using the transitive property (or substitution), Jesus is salvation!
 3. Jesus mentions Zacchaeus' genealogy with Abraham, affirming him as one of the team. This bothers those Zacchaeus has stolen from, and is all part of a changed man whose growth graph is taking off exponentially. It was normal for those robbed to be repaid $\frac{6}{5}$ times the amount they had taken, or 120%. Instead, Zacchaeus promises to pay back 4 times the amount (verse 8)! Sounds like our changed man wants to reimburse them with interest – exponentially speaking!

WORSHIP 11: SURFACE WAVES

Introduction: This worship is designed for students who have taken or are taking Physics. It works best if they have already learned the chapter on waves, so that they can relate to the three types that exist: transverse, longitudinal, and surface. We as Christians want to be a combination of both transverse and longitudinal waves. Surface waves are just that, pulsating upward toward God as well as side to side toward others. The world is whatever medium you choose. In this case, the medium in which the waves are moving is water.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God’s Word and enjoyment in its study.
- J2E 1.3 Embrace God’s gift of grace by accepting Christ as one’s personal Savior.
- J2E 1.4 Discover the importance and power of prayer and faith in one’s relationship with Jesus.
- J2E 1.6 Respond to God’s love by using one’s spiritual gifts to serve others.
- J2E 3.2 Develop an appreciation for the diversity of individuals.
- J2E 3.4 Recognize that God’s unconditional love gives one self-worth.
- J2E 6.2 Use critical and creative thinking skills in “real-world” experiences.
- J2E 6.3 Develop one’s intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 10.5 Identify one’s interests, abilities and values, understanding their relationship to career options.

A. TYPES OF WAVES

1. Transverse waves are waves that pulsate perpendicular to the direction of motion. Thus, something like a rope with a wave going down it fits into this category. In this analogy, a person who’s representative of transverse waves has a close relationship with God but isn’t sharing that relationship with others. There’s no pulse moving side to side.
2. Longitudinal waves are waves that pulsate parallel to the direction of motion. Sound waves travel longitudinally since they move side to side in the same direction as their motion. A person that’s representative of these types of waves has no interaction with God. They are pulsating to the sides, but not up or down. A slinky is another example of longitudinal waves.
3. Surface waves are characteristic of both transverse and longitudinal waves. They pulsate both perpendicular and parallel to the direction of motion. If you have your students think of waves at the surface of the ocean, they’ll be able to visualize this happening. God calls us to be surface waves – pulsating upward toward Him and sharing that with others. Read the story of Jesus Walking on the Water (Matthew 14:22-36).

B. HOW TO BE SURFACE WAVES

1. Learning From the Past

- a) The disciples don't do a great job of this. Even before the story starts of Jesus walking on the water, there are numerous examples of their disbelief:
1. They doubted Jesus could calm the storm at sea (Matthew 8:23-25).
 2. They are skeptical that Jesus can feed the 5000 (Matthew 14:13-21).
 3. They think Jesus is a ghost on the lake (Matthew 14:26).
 4. They again don't know how Jesus will feed the 4000, saying, "Where could we get enough bread in this remote place to feed such a crowd?" (Matthew 15:33).
- b) Each of these instances demonstrates a lack of faith. Challenge your students to have that confidence and faith from God to overcome their fears. Jeremiah 1:7-8 says, "Do not say, 'I am only a child.' You must go to everyone I send you to and say whatever I command you. Do not be afraid of them, for I am with you and will rescue you," declares the Lord.

2. Living in the Present

- a) Verses 25-31 illustrate the importance of getting out of the boat! It's important for us to leave our comfort zone or we might end up as just transverse waves -- that grow with God but don't help others' growth with Him. Challenge your students to pick a job or career that will allow them to be apart of this dual experience.
- b) There were two dangers Peter faced while in the boat:
1. If he didn't have enough faith, then he wouldn't have accepted Christ's invitation to get in the water.
 2. He could have gone into the water blindly without Christ's invitation -- in a longitudinal sort of way, focusing on the world.

An example you can use to illustrate this is when a student or student's parent tries to bypass a math class like Precalculus and go straight into Calculus. Maybe they even use the phrase that "With God, anything's possible." As math teachers, we know this is something that's not a good idea, academically speaking! As sinners, we sometimes confuse God's invitations with our own.

- c) Once Peter is walking on the water, he faces one final danger: losing sight of Christ. Peter starts sinking when he focuses on the challenges around him. The wind and side to side pulses become too much for us when our eyes aren't on God.

- d) Since the world is like the water, we look to be in the world but not of it (not sunk by it). When you start to sink, reach out to Christ. Notice that Christ doesn't go away when you start sinking. In verse 31, Jesus reaches out his hand and catches Peter.
- e) Here's some great news: the waves only change to longitudinal waves when you hit rock bottom! It's true that waves at the bottom of the ocean are longitudinal, pulsating just side to side. If we ever hit rock bottom from the world sinking us, God is still holding his arms out to us as he did to Peter. Taking hold will bring us back to the surface.

3. Planning for the Future

- a) Verses 32-36 reveal what happens when we live in the present with Jesus. Notice how the wind dies down after Jesus and Peter are together (verse 32). The distractions from the world go away.
- b) Verse 33 contains the ultimate result of a life pulsating to Jesus: others worshipped Him! Can you think of any better future to plan for than bringing others to Christ?
- c) Like Peter, we've only touched the surface. Letting Jesus be the face at our surface creates a ripple effect in every direction!

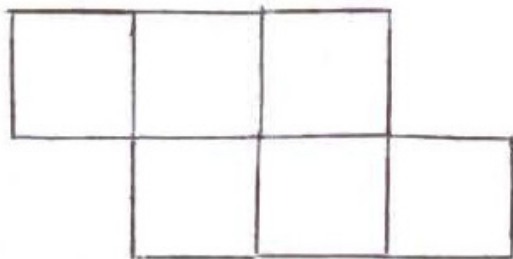
WORSHIP 12: PERIMETER

Introduction: This worship can be used for students in Grades 7 and on up. Basically, any group of students who are familiar with perimeter can relate to its application. You can use square tiles on an overhead projector to create the model below. That works well since you can add other tiles to your picture. Something our students hear a lot is the phrase: “It doesn’t matter what other people think.” However, as Christians who look to share what we have, it does matter how others perceive us. That’s because their impression of us externally could affect the relationship they have with God internally. That’s where perimeter comes in.

Journey to Excellence Goals & Essential Learnings Addressed

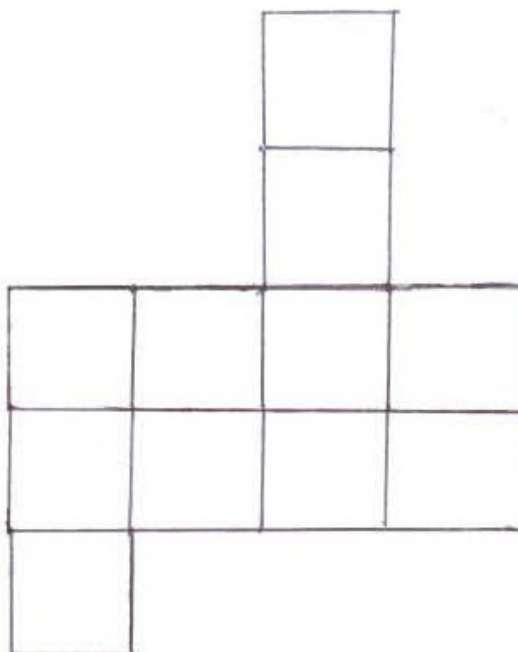
- J2E 1.6 Respond to God’s love by using one’s spiritual gifts to serve others.
- J2E 2.3 Become involved in spreading the gospel throughout the world.
- J2E 3.2 Develop an appreciation for the diversity of individuals.
- J2E 6.3 Develop one’s intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 6.5 Apply the principles of life-long learning.
- J2E 7.3 Understand how sensitivity to the differences of others affects communication.
- J2E 10.4 Experience the joy of serving others.

A. USING THE MODEL SHOWN

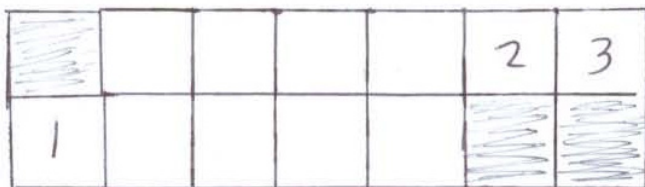


1. Ask your students to find the perimeter of the above polygon. They’ll soon come up with the correct answer: 12 units (you may want to show them to verify).
2. Ask them to find the maximum number of squares to add to the picture that keeps the perimeter at 12 units. It might take them a while to discover the following relationship from the model:
 - a) Adding a square that’s bordered by two sides produces a net gain of 0 units ($-2 + 2 = 0$). This applies to this question because adding squares at the top right and bottom left completes the rectangle. The perimeter is still 12 since $2(4) + 2(2) = 12$. Thus, the answer is 2 squares – the number required to complete the rectangle.

3. Ask them to find the minimum number of squares to add to the rectangle from #2 to get a perimeter of 18 units. This introduces what happens when the rectangle expands to a new row.
- a) Once a square is placed on either the top or bottom row (or sides, too), it produces a net perimeter gain of 2 units. That's because it covers up one side while providing three additional ones ($-1 + 3 = 2$). To get a perimeter of 6 units past 12, we need 3 additional rows having 2 units added (since $3 \cdot 2 = 6$). So, the answer is 3 squares shown in the picture below:



4. Finally, ask them to find the maximum number of squares to add to the rectangle from #2 to get a perimeter of 18 units. Applying the net gain of 0 concept from earlier, they'll soon discover that the answer is the number of squares that makes the picture above a perfect rectangle. Point out that there are two ways of looking at it:
- a) You can add squares "adjacently" to the picture. To illustrate this, I will number the squares in the order I added them to the above picture, making sure each is adjacent to another square. The answer is 12, resulting in the 3 from #3 combined with the 9 shown below:



- b) Another way is to start with squares that aren't adjacent to others. This causes a gain of 2 perimeter units like we noticed in #3 above. Now, "sandwiching" a square between two squares on a row causes a loss of 2 perimeter units. This is because we're covering up 3 sides and providing 1 new side ($1 - 3 = -2$). Since $2 - 2 = 0$, the perimeter stays the same. Again, I'll show the order in which squares were added to the picture from #3. The answer comes out 12 again. Check it out!



B. INTERPRETATION

1. Although our volume, what's on the inside, is most important, an essential ingredient in Christianity is the ability to show Christ to others. Even though we aren't polygons like the previous pictures, the distance around the "rim" (part of the word "perimeter") of our lives is what others see.
2. We don't want our students to get stagnant and not change their shape. It's possible to stay the same perimeter while changing the configuration. That is, you can stay the same person while leaving your comfort zone. We can add to our lives while keeping the same basic core of who we are. For example, Paul says in Ephesians 3:7-8: "I became a servant of this gospel by the gift of God's grace given me through the working of his power. Although I am less than the least of all God's people, this grace was given me: to preach to the Gentiles the unsearchable riches of Christ."
3. It's also true that we sometimes have to take away something to get more additions. This is evident from the new squares we added to rows. They created the 3 – 1 scenario in 4a above, where one aspect of the perimeter was covered up, resulting in three new positive sides or outcomes.
4. We want to limit the number of experiences shown in 4b above, where we have a net result that's negative. Covering up positives, resulting in a negative outcome, is dangerous for any of us to do regularly.
5. There are many different ways or shapes that can reach a particular perimeter. We don't have to approach things from the same way. For example, back in step 4a, students might have built their shape to the sides rather than up and down. This works, too, in this analogy. However, when they get to step 4b, it will create a 2 X 7 rectangle instead of a 5 X 4 one. Notice, though, that both rectangles have the same area since $2(2) + 2(7) = 2(5) + 2(4) = 18$. This is shown below, where the three shaded squares are the ones we started with like before, only to the sides:

As you can see, this time it takes 6 squares to keep the perimeter at 18. There are the three shaded squares, combined with the numbered squares. It makes sense that we came up with a number between 3 and 12, which are the minimum and maximum number of squares possible.
6. We want our students' perimeter to approach infinity!

WORSHIP 13: DIRECT/INVERSE PROPORTIONS

Introduction: This worship is designed for high school math students who have completed Algebra I. It works best for those who have an understanding of direct and inverse relationships. The idea is that we can look at relationships between any two variables in our life. If they are directly proportional, the quantities will rise together or fall together according to the equation $k = y/x$. If they are inversely proportional, one quantity will rise while the other will fall (and vice versa) according to the equation $k = xy$. Not all things in life fall into these two categories, as we'll see through a miracle of Jesus.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 2.6 Relate to lifestyle choices and cultural issues based on biblical principles.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 5.6 Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
- J2E 6.1 Broaden intellectual abilities through the study of God's Word.
- J2E 6.2 Use critical and creative thinking skills in "real-world" experiences.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 6.6 Approach all intellectual pursuits from a biblical perspective.

A. MATHEMATICAL SIGNIFICANCE

1. Show your students how two ratios that have the same quotient are representative of direct proportions. For example, if you take $6/3$ and increase both the numerator and denominator so that the quotient is still 2, it can become $8/4$. As the y increased, so did the x . This illustrates the $k = y/x$ relationship. In other words, $6/3 = 8/4$. Furthermore, if you decrease both the numerator and denominator to still equal 2, it can become $4/2$. $6/3 = 4/2$ as well. Emphasize that since $y_1/x_1 = y_2/x_2$, you can look for fractions that rise and fall proportionally.
2. Inverse proportions work similarly, only they involve products rather than quotients. If you take $2 \cdot 6 = 12$ and increase one quantity, but decrease the other to still get 12, you'll end up with something like $3 \cdot 4$, where the 2 went up to 3 while the 6 went down to 4. In other words, $2 \cdot 6 = 3 \cdot 4$, or $x_1 \cdot y_1 = x_2 \cdot y_2$.

B. APPLICATION

1. Ask your students to come up with variables in their life that are either directly or inversely related. That is, get them thinking about variables in their life that rise/fall together or oppose each other in terms of overall impact. Here are a few examples of variables you could expound on from each category:

- a) Direct
1. hard work vs. success
 2. distance to school vs. time to school (using the popular $d = rt$ equation)
 3. the teacher's attitude toward a lesson vs. the students' attitude toward a lesson
 4. teacher's patience with students vs. teacher's impact on students
 5. mistakes teachers can admit to vs. student participation
- b) Inverse
1. emotion vs. success in math
 2. average speed to school vs. time to school
 3. number of students teachers have vs. amount of energy teachers have
 4. number of children parents have vs. amount of money they have
 5. love of God vs. focus on self

C. ATTEMPTING TO FIND A MATH MODEL FOR A MIRACLE

1. In Mark 6:41-44, Jesus feeds 5000 people from 5 loaves and 2 fish, resulting in 12 basketfuls left over. Later, in Mark 8:6-9, Jesus feeds 4000 people from 7 loaves and what the Bible calls a few fish. Let's assume that a few fish represents three. Let's have x be the total number of food items originally, and y be the number of basketfuls leftover. Thus, we get the following scenarios:

FEEDING OF 5000
contains (7,12)

FEEDING OF 4000
contains (10,y)

Let's see if this relationship is either directly or inversely proportional:

- a) Direct

Using the formula from earlier, $\frac{12}{7} = \frac{y}{10}$.

Now you can cross-multiply on the board to solve for y . You'll first get that $7y = 120$. Dividing both sides by seven gives us that $y = 120/7$, or $17 \frac{1}{7}$ basketfuls leftover. Mark 8:8 tells us that seven basketfuls were leftover, not $17 \frac{1}{7}$. We now know this miracle doesn't reflect a direct proportion. Furthermore, since less people were fed, it wouldn't make sense that there would be more than 12 basketfuls leftover.

It's also interesting to point out that directly proportional graphs are linear and go through the origin. That's because the graph $y = kx$ is a line with a y -intercept of zero. For this to work, it would mean that if Jesus had 0 loaves and fishes originally, there would have been 0 basketfuls leftover. From our human perspective, that sounds logical.

However, Christ's divinity doesn't fit into any of our mathematical formulas or logic.

b) Inverse

Using the formula from earlier, $7 \cdot 12 = 10 \cdot y$. Thus, $84 = 10y$. Dividing both sides by 10 gives us that $y = 8.4$. Since this, too, isn't seven, we now know this miracle doesn't reflect an inverse proportion either. It does show an inverse relationship, since the number of original food items went up as the number of basketfuls leftover went down. However, since it doesn't fit the formula, it's not an inverse proportion.

2. Note: you could also try fitting these coordinates into other models – such as parabolic or cubic ones. You could also use a graphing calculator to look at the different fitting curves that contain the points (7,12) and (10,7). Ask your students which fit the data “best”. The main purpose of this is to show our students that God goes beyond the laws of mathematics! He doesn't fit into our man-made formulas. In Jeremiah 32:27, God reveals through Jeremiah, “I am the Lord, the God of all mankind. Is anything too hard for me?” Is ‘no’ too direct an answer? Not when you consider that an increase in difficulty doesn't cause a decrease in God's abilities!

WORSHIP 14: SOLVING EQUATIONS IN OUR EARTHLY DIMENSION

Introduction: This worship is for those who are familiar with solving linear equations in one dimension. Thus, it can work for students in Prealgebra on up through Calculus. As we know, equation-solving is a crucial concept for students in algebra. It's also a crucial part of our Christian walk with God here on earth. We're finding the value of 'x' that balances our life with God.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.2 Have a growing knowledge of God's Word and enjoyment in its study.
- J2E 1.4 Discover the importance and power of prayer and faith in one's relationship with Jesus.
- J2E 1.5 Value God's revelation of Himself through inspired writings and creation.
- J2E 1.6 Respond to God's love by using one's spiritual gifts to serve others.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 5.6 Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
- J2E 6.1 Broaden intellectual abilities through the study of God's Word.
- J2E 6.2 Use critical and creative thinking skills in "real-world" experiences.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.

A. GETTING READY TO SOLVE

1. Tell your students that the variable you're using represents God, while the constants (#'s without variables) represent us. Thus, solving for a variable means you're finding the relationship between God (x) and man (constants).
2. Remind them of the three possible outcomes:
 - a) No Solution – This is the unfortunate situation where there's no relationship that can balance a person's life. It's caused by a person choosing to remove God from their life. When solving, it occurs when all the variables, or clumps of God in our lives, cancel out. It leaves a false statement with only constants, or man-made impossibilities.
 - b) Infinitely Many Solutions (IMS) – This, too is unfortunate, because it happens when a person chooses to be on their own. Once again, the pieces of God cancel out, resulting in a stagnant existence lacking variety. It leaves a true statement of human options. It's slightly better than the scenario above, but due to the absence of God, there's no room for growth. This leftover true statement results in a life of repetition and frustration.

- c) Unique Solutions – This is a life filled with happiness. It results when we have God as part of our equation. That is, he isn't cancelled out of our life. Since we're still part of the equation, that doesn't guarantee that solving will always be pleasant. In fact, our equation might change during our journey. Staying focused on the variable in our life can eliminate solutions that are negative or zero. Consequently, we come up with unique solutions that are positive.

B. SOLVING – THE SIX STEPS FOR SIX-CESS!

1. The first step, appropriately enough, is to distribute. Mathematically, we have to get rid of parentheses before we can isolate the various expressions. Likewise, we want to distribute what we have to others, or other parts of the equation.
2. Get rid of fractions or decimals. This can be done by multiplying both sides by their least common denominator. In other words, make aspects of your life that are partial whole.
3. Combine like terms on each side. Put together the parts of your life that you see as a result of your relationship with God. Then do the same for those aspects that you feel are based on your humanity. Remind your students that $x + 2 \neq 2x$! You might want to point out that steps 2 and 3 aren't necessary for solving but make the process much easier – just like there are things we can do to ease our Christian journey.
4. Get your variables to one side. This is where experience comes in, because sometimes the variable should be moved and sometimes it doesn't need to be. The same works with God. To move a clump or expression, remember to think of using inverses and undoing what's already there. This is risky, because it involves new approaches to aspects of our lives. Moving negatives in our lives by adding positives seems logical. However, moving positives in our lives by subtracting or removing them, though, doesn't seem as practical. But this is what God did when he sacrificed His Son for us! We, too, can remove parts that are positive, trying to create a more positive overall effect.
5. Move your constants to the opposite side of your variables. Once again, we'll use inverses – undoing addition by subtracting and subtraction by adding. What's interesting is how this step is determined by the previous one. For example, if the variables all went to the left, then we'd move the constants all to the right. If the variables had all gone to the right, then we'd move the constants to the left. In other words, we want to always focus on one side of the equation – God's side! That's the side that determines what we should do.
6. By following steps 1 through 5, it means we'll always be ready to divide by the coefficient of the variable. That's because we'll end up with a number multiplied by our variable, and since division is the inverse of multiplication, we'll separate the expressions evenly. This means we're finding the unique proportion between God and man. For example, if you have $3x = 1$, you'd divide by 3 to both sides, leaving $x = 1/3$. Since God is x and we're the constants, that means that the ratio of God to man in this equation is 3 to 1 (since 1 over $1/3$ simplifies to $3/1$). In

other words, God is three times more prevalent in this equation than we are – a preferable situation. Just like most equations come out the other way (such as $x = 3$ where we are three times more prevalent than God), so, too, most equations in the world focus more on man than man's Creator. You can back that up to your students by mentioning television talk shows. They portray consequences of people's choices rather than the ingredient needed for making better choices.

C. THE AFTERMATH

1. Keep your life balanced! The way to do that is to focus on God first and keep your life in harmony with His.
2. God promises to provide the equation! It's up to us to initiate finding the solution that works. 2 Timothy 2:19 says, "Nevertheless, God's solid foundation stands firm, sealed with this inscription: 'The Lord knows those who are His, and everyone who confesses the name of the Lord must turn away from wickedness'." I hear God outlining a roadmap for finding unique solutions. Sounds like He's even providing the solution to no solution!

WORSHIP 15: USING PEMDAS TO SIMPLIFY PROBLEMS

Introduction: This worship will be best understood by a group of students who have used PEMDAS in their mathematical career. It attempts to provide answers as to why bad things happen to us good people. Furthermore, it will look at the order of the world we live in, from a PEMDAS-tic perspective. I'll be using things like acronyms and conditionals to help us dive into this topic. I like to always caution my students that the opinions presented may not be theirs, and that's OK. The purpose is to get them thinking about what they believe. The conclusion (Part C2) was provided by Diane Bradley, a math teacher from Loma Linda Academy.

Journey to Excellence Goals & Essential Learnings Addressed

- J2E 1.3 Embrace God's gift of grace by accepting Christ as one's personal Savior.
- J2E 3.1 Recognize that God's ideal for the basic unit of society is the family.
- J2E 3.3 Acquire knowledge, attitudes and skills essential to meeting family responsibilities, whether living alone or with others.
- J2E 5.1 Recognize that God's ideal for quality living includes a healthy lifestyle.
- J2E 5.5 Achieve a balance in work and leisure; balance physical, mental, social and spiritual activities.
- J2E 5.6 Recognize the interaction of physical, mental and spiritual health with emotional and social well-being.
- J2E 6.2 Use critical and creative thinking skills in "real-world" experiences.
- J2E 6.3 Develop one's intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts.
- J2E 10.6 Always put forth one's best effort in every task.

A. THE ORDER OF LIFE

1. Life has a distinct order to it. You can treat the term ORDER like an acronym that resembles the scientific method: Organize, Read, Data, Examine, Results.

- a) Here are just a few things in our student's lives requiring order:

1. study habits
2. dating
3. educational goals
4. relationship with parents

Although the sequence of steps might differ from person to person, there's a specific plan of action in place for each category. Often, we don't think about there being one. It's there, even though we're often oblivious to its existence.

- b) Our new generation wants to jump right to the results – bypassing any necessary steps. As a teacher, I find there are things I can do to encourage my students to focus more on the procedure than the outcome. For example, in math I can grade work, not just answers. I can avoid

saying things like, “It doesn’t matter how you get there, just get there!” Also, I can disallow late, unexcused work, since that’s a step out of the sequence they’ll face in their future. There are ways to keep our students from being out of order.

2. PEMDAS is used so that problems needing to be simplified will have one and only one answer. This is true both mathematically and sociologically.
 - a) Take the mathematical example: $(1 + 3) \cdot 3^2 - 5$:
 1. Parentheses tell us to first add the 1 and 3 to get 4, rewriting the problem as $4 \cdot 3^2 - 5$.
 2. Exponents come next, requiring us to square the 3, leaving the problem $4 \cdot 9 - 5$.
 3. Multiplication and division are next, whichever comes first from left to right. Here, there’s only multiplication, so we get $36 - 5$.
 4. Addition and subtraction are last, whichever comes first again from left to right. The subtraction leaves us with our answer of 31.
 - b) I believe there’s a PEMDAS, or order to this world. As an acronym, it can also stand for: People Experiencing Much Danger And Stress. Unfortunately, this is less than comforting, and it goes against what some Christians believe. Many feel that God is in control of the world. In fact, we hear songs on Christian radio stations singing about how we shouldn’t be afraid since God is the one who has the final say. However, as I’ve studied this issue over the years, I’ve come to the conclusion that God is no more in control of this world of sin than we as teachers are in control of our student’s test grades. This leads me to the following conclusions:
 1. God doesn’t control or cause pain. Many believe he does from using improper logic associated with this text in Psalm 91:11: “For he will give his angels charge over thee to keep you in all your ways.” Consequently, they’ll interpret that to mean the following conditional: If you love God, then He will protect you. Since conditionals and contrapositives must have the same truth associated with them, then that should also mean that if God doesn’t protect you, then you don’t love Him. We can all come up with counterexamples disproving this contrapositive. Someone who died in a car accident that you know loved God would be one. I believe both the conditional and contrapositive are false. I don’t hear Psalm 91:11 saying that we have an insurance policy by loving God. Furthermore, it’s Satan who’s in control of our sin-filled world, not God.
 2. God doesn’t allow bad things to happen to us for some overall good we may or may not see now. It frustrates me when I hear a prayer at church or an insinuation that God is “allowing” some sort of pain to be inflicted on someone. The reason many believe this is because God has the unbelievable ability to bring

good out of bad. However, that doesn't mean he causes it for altruistic reasons.

3. God can perform miracles! To fully understand how and why miracles take place, it requires divinity. As sinners, we can't fully comprehend the scope of miracles. In the meantime, we can praise God for miracles. I believe that when we get to heaven, we'll find out there were a lot more of them than we were aware of. When our students say that God could have intervened and performed a miracle yet didn't, we can say that we also could have intervened and helped them during their last math test, but couldn't due to established laws. These laws are consequences of sin, just like Adam and Eve were told in the Garden. In fact, after introducing triangle proofs in geometry, I like to use another meaning for CPCTC besides the traditional one. It can also stand for: Can't Promise Certain Things Consistently. This is the realization we can come to about miracles to relay to our students.

B. IN THE MEANTIME...

1. We can follow a different PEMDAS than the one representing the order of a sin-filled world. Here's a sequence I recommend on a daily basis:
 - a) Start your day with God. Spend time with Him reading His Word. Recommend to your students that they reread the part of the Bible they enjoy the most. Encourage them to feel there's no set length or timetable for being with your friend.
 - b) Put everything you can in what you do! Maybe that's school time or a job or both – whatever represents the part of your schedule that's required.
 - c) Make it a point to improve your family relationships in some way each day. The best way to do that is to budget a part of each day to spend specifically with just parents and/or siblings.
 - d) Have some sort of exercise plan that can be reasonably accomplished on a regular basis. Although this sounds time-consuming, you'll be surprised with how much time it will save you in the long run by improving your quality of sleep and disposition. As a result, the amount you can accomplish in a day will improve significantly.
 - e) Be sure to take time to have fun playing. Give yourself a certain amount of time to enjoy your interests. Since MATH stands for Makes A Terrific Hobby, our students will, I'm sure, consider this as an alternative to things like television and video games. Well, maybe. Nonetheless, we can still encourage them to make time for their hobbies and interests.

C. BONUS

1. As Christians who are living in this world but not of it, we still are vulnerable to the consequences of sin like others. But the good news is we have a huge advantage: God is always with us! He shares our pain, our joys, our growth – being right there with us on our journey. Through the sacrifice of His Son, God gave each of us bonus. In Matthew 28:20, Christ promises: “And surely I am with you always, to the very end of the age.” BONUS stands for Building Our Necessities Up Sequentially. Having our best friend alongside us builds up the sequences we face in this world, making them hardly routine!

2. If you let the letters of the alphabet stand for numbers from 1 through 26, notice what happens in the following:
 - a) HARD WORK = $8 + 1 + 18 + 4 + 23 + 15 + 18 + 11 = 98\%$
 - b) KNOWLEDGE = $11 + 14 + 15 + 23 + 12 + 5 + 4 + 7 + 5 = 96\%$
 - c) ATTITUDE = $1 + 20 + 20 + 9 + 20 + 21 + 4 + 5 = 100\%$
 - d) LOVE OF GOD = $12 + 15 + 22 + 5 + 15 + 6 + 7 + 15 + 4 = 101\%$

One can conclude with mathematical certainty that: while hard work and knowledge will get you close, and attitude will get you there, it's the love of God that will put you over the top!