Co-Requisite Mathematics October 2018

Resources @ https://tinyurl.com/GA-coreq

Dana Center Mathematics PATHWAYS

Co-requisite Courses

Narrowing the gap between instruction and supports

Dana Center Mathematics PATHWAYS

The Success of Co-Requisite Support Courses

While there are many versions of co-requisite remediation, the broad definition refers to the placing of students who have been designated as underprepared directly into college-level courses and providing necessary additional supports to help them effectively engage with the college-level coursework. As the result of co-requisite support strategies that were implemented across the country, institutions and states are seeing double and triple the number of students passing their first college-level mathematics course, and in half the time or less.

How are they gaining these results? Institutions have made structural and cultural changes to their mathematics offerings that address the following issues that have long negatively impacted developmental mathematics students.

> *The guiding principle of the co-requisite model is to meet students where they are academically and provide them with the content and strategies they need to succeed in their college-level courses.*

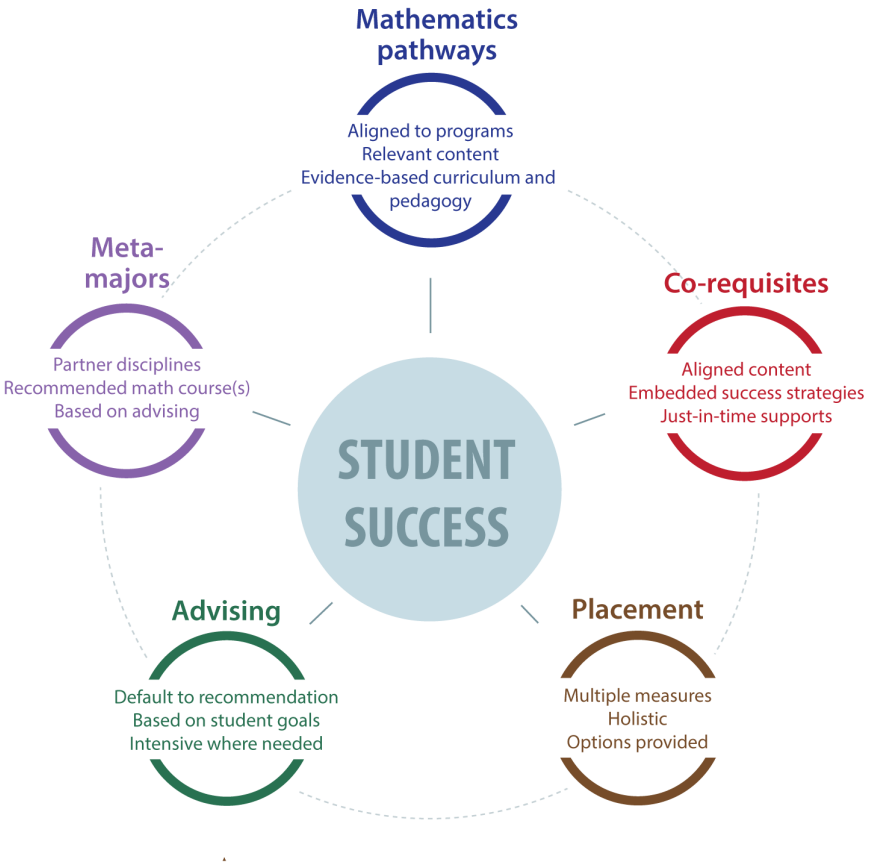
- Long developmental sequences were designed to give underprepared students more time to master mathematical concepts and to improve success in the college-level course. However, that well-intentioned goal has not been attained.
- The long sequences increase the time between the learning of content in the developmental course and the application of that content in the college-level course, as well as providing additional exit points where students may drop out of the sequence due to life obstacles.
- The content in the developmental course may not support the student's college-level course. For example, a traditional Intermediate Algebra course contains content that is not necessary for a college-level statistics course, and lacks other content that would support success in statistics.
- Referral to remedial or developmental courses holds a stigma and contributes to further disenfranchisement of students designated as underprepared. It can lead to a belief that a student does not belong in college and may prevent some students from enrolling in college in the first place.

There is no single "best model" for co-requisites

Local context plays a large role in determining the co-requisite model(s) that will best serve each institution. Many decisions must be made in collaboration among faculty, advisors, administrators, and financial aid staff to design and construct the initial model, with planned cycles of data reviewing and model revision. Some points for discussion are provided on the remaining pages.

Consideration 1: Existing campus supports

- Are there other initiatives on campus that complement this work, such as guided pathways, content and pedagogy redesign, pathways alignment, enrollment initiatives (such as multiple measures placement), persistence initiatives (such as programs designed to help all students develop a growth mindset or productive persistence), etc.? What other on-campus resources can be accessed or included to provide additional support for students enrolled in a co-requisite course?



Consideration 2: Co-requisite model (placement, credit hours, financing)

- **Placement:** What information is used to determine the default enrollment for students into their mathematics courses?
  - Research shows that the majority of students designated as underprepared are well-served by a strong one-semester co-requisite structure. How will you determine which students are best served by a one-semester co-requisite structure or by an alternate option?

    https://ccrc.tc.columbia.edu/publications/improving-accuracy-remedial-placement.html
  - Consider giving students information about support options and allowing them to choose or opt-in to the support course, regardless of placement.
  - Ensure that students are placed into a course that is aligned to their program of study. Co-requisite supports need to be available for all possible entry points, not just the non-algebraically-intensive courses.

- **Student structures**
  - **Co-mingling:** Mixing college-ready and underprepared students in the same college-level class. Underprepared students are provided additional supports during separate sessions.
  - **Cohorting:** Designating certain sections of college-level courses exclusively for underprepared students. Additional supports may be embedded in or separate from the sections for underprepared students.

- **Calendar structures**

Just-in-time supports; one semester

  - **Support courses:** Separate, structured support courses that run before, after, or on opposite days to the college-level courses; completed within one semester.
  - **Embedded supports:** College-level classes with the developmental content embedded.
  - **Mandatory tutoring:** Required attendance in a tutoring lab for a specified number of hours per week.

Prerequisite supports + college-level; one semester

  - **Compressed courses:** Developmental prerequisite class is compressed into 8 weeks, and then the college-level class is compressed into 8 weeks, so that both classes are completed in one semester (classes meet for extra hours each week throughout the semester in order to equal the two classes).
    - Caution: Research clearly shows that transition points lead to attrition. If this model is utilized, students should be enrolled in the entire sequence from the beginning of the semester to minimize attrition.
  - **Boot camps:** First 3-5 weeks of the semester are remediation, followed by the college-level content (classes meet for extra hours each week throughout the semester in order to equal the two classes or class + lab).
    - Caution: Research indicates that boot camp effects are short-term and generally have "trivial negative to moderate positive effects. https://ccrc.tc.columbia.edu/media/k2/attachments/improving-students-college-math-readiness-capsee.pdf

Just-in-time supports; two semesters

  - **Stretch courses:** College-level classes with the developmental content embedded, and stretched over two semesters.
    - Caution: Research clearly shows that transition points lead to attrition. If this model is utilized, consider strategies to ensure students enroll in the second semester prior to completing the first semester.

- **Staffing:** Determine whether the college-level instructor will also teach the support/developmental portion.
  - If separate instructors, what mechanisms will be in place to foster coordination between instructors?
  - What professional development time needs to be spent training instructors for this new model? What credentials will be required to teach each part of the course?

	Co-mingle prepared and underprepared students	Cohort of only students designated as underprepared
Embedded supports in extended hours (e.g. 5 or 6 contact hours)	Not possible	Need one instructor for the full time
Separate courses (e.g. 3 credits + 3 credits)	Can be same instructor or different instructors	Can be same instructor or different instructors

- **Credit hours and financing**
  - How many hours do students attend the college-level portion?
  - How many hours do students attend the support/developmental portion?
  - How many hours do students pay for?
  - How do the hours count in the instructor's teaching load?

- **Grades:** Whether to give one grade or separate grades for the two portions. Example below from Roane State Community College in Tennessee.

Support Course \ Parent Course	Pass	Fail
Pass	Gen Ed requirement is satisfied. Unless other math courses are needed, remediation is satisfied.	Student repeats parent course. Repetition of support is optional.
Fail	Gen Ed requirement is satisfied. Unless other math courses are needed, remediation is waived.	Student repeats both courses. Student is likely to lose Tennessee Promise scholarship.

Consideration 3: Co-requisite content

- What are the common learning outcomes for each college-level course that have been designated by the department and/or transfer agreements?
- What are the essential foundational concepts that students need to know in order to be successful in the college-level course? These should be backmapped from the common college-level course content and outcomes.

Consideration 4: Cultural shifts

Cultural shifts in both the college-level and the support classrooms, as well as in the overall department culture, can contribute to the narrowing of the gap between instruction and supports.

- **Collaborative work** can contribute to the formation of peer support groups.
- **Early alert systems and interventions** can increase success and decrease withdrawals.
- **Explicit instruction** in goal-setting, self-regulation, and the value of struggle can increase persistence.
- **Ongoing formative assessment** can result in early intervention and increased success.

Implementing such shifts can pay off in students' increased sense of belonging both in the class and on campus, as well as increased feelings of capability and purpose for both students and instructors.

Consideration 5: Continuous improvement

Developing a department culture of continuous evaluation and ongoing improvement of any co-requisite support model is crucial to ensure that the changing needs of students are met in the future. Set some initial data collection at the outset and revisit the plan each semester or year.

- Collect feedback on both college-level and support courses from students and faculty.
- Compare longitudinal retention and success data of co-requisite and pre-requisite structures.

  https://ccrc.tc.columbia.edu/publications/ccbc-alp-student-outcomes-follow-up.html

Selected research and reports

- Compilation of results from Complete College America: http://completecollege.org/spanningthedivide/#home and the Executive Summary http://completecollege.org/spanningthedivide/wp-content/uploads/2016/01/CCA-SpanningTheDivide-ExecutiveSummary.pdf
- Florida results (see especially the *Learning to Adapt* report): http://centerforpostsecondarysuccess.org/publications/
- Repository of Tennessee results: https://www.tbr.edu/news/transforming-remedial-programs-dramatic-gains-student-success-2016-04-05
- Complete College Georgia: http://www.completegeorgia.org/content/about-complete-college-georgia
- West Virginia's placement policy (specifically sections 4.1 and 4.2): http://webhost-wp.wvnet.edu/wvctcs/wp-content/uploads/sites/15/2016/05/Series_21_Final_File.pdf
- As additional reports become available, they will be posted to: https://dcmathpathways.org/take-action/classroom-level/classroom-level-planning-implementing
  Scroll to the bottom of the page and choose "Co-requisite Support Courses."

Redesign
Planning and Implementation

SOUTHEAST MISSOURI STATE UNIVERSITY · 1873

Department Chair Responsibilities

- Select redesign team members and let them work
  - Math faculty applied to be on each redesign team
  - Two faculty for each team (Regular Non-Tenure Track, Tenure Track)
- Solicit buy in from campus constituents and continue to keep them informed
  - Mathematics Faculty
  - Support Units (Registrar's Office, Information Technology, Telecommunications, Facilities Management)
  - Campus Community
    - Administrators (president, provost, deans, and chairpersons)
    - Faculty (outside Mathematics Department)
    - Advisors (Professional Advising Team)
    - Students

Redesign Team Responsibilities

- Create cohesive courses (gateway and lab)
- Work with other redesign teams to ensure consistency across labs
- Find consensus on software, use of calculators, faculty guided notes, assignments, due dates, etc.
- Listen to constituents (students, other faculty, other departments, etc.)
- Constantly keep the audience in mind for each of the courses

Redesign Team Work

- Met at least once a week starting the year before implementation
- Added rigor to gateway courses
- Established a common platform, originally Pearson's MLP
- Matched appropriate developmental math content to each gateway using a common textbook; included study skills
- Created week by week design of courses: guided instructor notes, student syllabus, Moodle, and homework platform

Co-Requisite Model

- Gateway and developmental math are:
  - Co-mingled
  - Both co-taught by instructor and GA
  - 60 students (e.g. 35 college-ready and 25 developmental)
  - Taught in a computer classroom
  - Separate course registrations
  - Separate grades
  - Using one platform for all courses in the redesign
- Gateway component:
  - 3 credits
  - Mini-lectures with time for homework
  - Daily quizzes from homework
- Developmental component:
  - 1 credit hour, 2 contact hours
  - Counted as 1 hour in faculty load; changing to 2 hours next fall
  - Mini-lectures with time for homework
  - "Just-in-time" support
  - Time for 1-1 help
  - Study skills integrated

Results

- 78% of all students enrolled in both courses were successful in one semester
- Freshmen – Sophomore retention increased to 74% (1.3% increase in one year)
- Developmental students are:
  - Have an 88% success rate in developmental component
  - Are spending less time and less money in developmental classes
  - Are more engaged with instructors

Action Items
Implementing Co-Requisite Mathematics

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Action Item	Who is responsible?	Who else needs to know?	Target Date

Resources @ https://tinyurl.com/GA-coreq

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Defining the Content:
Content Backmapping Example

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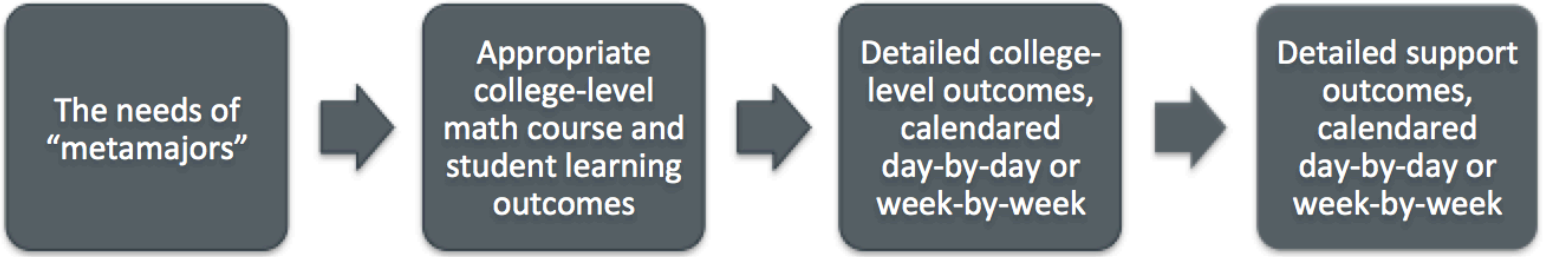
The content of support courses should be selected based on the skills that students need to be successful in the college-level course. This tool is designed to facilitate the process of backmapping learning outcomes for the support course from the readiness competencies of the college-level course.



Designing Co-Requisite Courses

To identify learning outcomes for support courses, list the specific skills from the learning outcomes of the college-level course in the first column. In the second column, identify the competencies needed in order to successfully engage in activities that develop the skills in the first column. Those competencies become the descriptors of the learning outcomes of the co-requisite course. For sequential course structures, consider carefully which skills may need to be reinforced in the college-level course or may even be best saved for initial introduction in the college-level course.

An example that could serve a variety of courses (e.g., algebraic, statistical, quantitative, technical, business, education) is shown below. Choose a course and tailor the example.

Choose, create, and use models for quantitative bivariate data sets.				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**
Create a scatterplot.				

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Choose, create, and use models for quantitative bivariate data sets.				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**
Create a scatterplot.	Determine appropriate labels	X	X	
	Plot coordinate pairs	X		
	(If using technology) Enter data into a grapher or app	X		
Analyze data to determine appropriate model.	Look for linearity or curvature			
Create the model.				
Use model for prediction.				

Defining the Content:
Content Backmapping Template

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To identify learning outcomes for support courses, list the specific skills from the learning outcomes of the college-level course in the first column. In the second column, identify the competencies needed in order to successfully engage in activities that develop the skills in the first column. Those competencies become the descriptors of the learning outcomes of the pre/co-requisite course.

Course:

State- or institution-level course description:

Learning Outcome 1:				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**
(add or remove rows as needed)				

Learning Outcome 2:				
In the college-level course, students will:	**Therefore, they need the ability to:**	**These skills should be:**		
		Taught in support course	**Reinforced in college level**	**Taught in college level**
(add or remove rows as needed)				

Copy and paste additional tables as needed to backmap each course outcome.

Sample Preparatory Assignment

Working with Functions

In the next class, you will need to be able to calculate the percent change between two values, write a formula for an **exponential function** given its starting value and percent rate of change, relate the base of an exponential function to its percent rate of change, determine whether an exponential function is increasing or decreasing, and use interval notation. You will also need to analyze **periodic functions**, identify the period of each function, and identify when the functions are increasing and when they are decreasing. Don't worry if you are unfamiliar with some of these terms; they will be defined below as needed.

Percent Change Between Two Values

When a quantity changes from an initial value, P_1, to a new value P_2, the **percent change** may be calculated by dividing the change in the values by the initial value. Sometimes this is also called the **relative change**. In symbols,

$$\frac{P_2 - P_1}{P_1}.$$

Be aware that the change in values (the top part of the fraction) is computed by subtracting the initial value from the new value.

For example, if a population grows from 800 to 863, then the percent change in the population is

$$\frac{863 - 800}{800} = 0.07875 \approx 7.9\%.$$

1) Calculate the percent change in these two situations.

   Part A: The population of a town grows from 2500 to 2580.

   Part B: The number of goats on an island declines from 250 to 210.

Exponential Growth and Decay

A function such as $f(x) = 10(1.12)^x$ is an example of an **exponential function**. In this example, the number 1.12 is called the **base**. Notice that in an exponential function, the independent variable appears as the **exponent**. You may have seen exponential functions when working with compound interest. They arise in many other situations as well. You will work with exponential functions on the next page.

Sample Preparatory Assignment

2) Tim hears that guppies are relatively easy to breed because they reproduce quickly.[1] A typical population of guppies may grow at a rate of 26% per month. Tim decides to breed guppies, so he goes to a pet store and buys 40 guppies.

Part A: Approximately how many guppies will he have after one month? After two months? After three months? Complete the table.

Months Elapsed	**Calculation**	**Number of Guppies**
1	$40 + 40 \times 0.26 = 40(1 + 0.26) = 40(1.26)$	50 (round down from 50.4)
2		
3		

Part B: Can you determine the approximate number of guppies Tim will have after six months without calculating the numbers for four and five months? Explain.

Part C: Using patterns discovered in answering the question in Part B, write an exponential function g modeling the number of guppies Tim will have after x months, assuming he begins with 40 guppies and the population grows at a rate of 26% per month. Be sure to use correct function notation.

Part D: What is the base of your exponential function? How is it related to the growth rate of 26%?

[1] Information on guppy reproduction retrieved from http://animals.pawnation.com/fast-guppies-multiply-4229.html on November 1, 2014.

Sample Preparatory Assignment

3) Use the exponential function $f(x) = 4000(0.8)^x$ to answer the following questions.

Part A: Use your calculator to complete the table.

x	***f(x)***
0	
1	
2	
3	
4	

Part B: Is this function increasing or decreasing?

Part C: What is the percent rate of change?

Part D: How is the percent rate of change related to the base of the exponential function?

Sample Preparatory Assignment

Interval Notation

In this course, we will speak often about different segments of the real number line. For example, we might talk about all values of the variable *x* between 2.5 and 3.2. You may have seen this written as $2.5 < x < 3.2$. If we wanted to include the value 2.5 as a possible value of *x*, we would write $2.5 \leq \mathrm{x} < 3.2$. **Interval notation** gives us a good way to express intervals like these.

Some examples are shown in the table:

Inequalities	Interval Notation
$-3 \leq \mathrm{x} \leq 2$	$[-3, 2]$
$-3 < \mathrm{x} \leq 2$	$(-3, 2]$
$-3 < \mathrm{x} < 2$	$(-3, 2)$
$-3 \leq \mathrm{x} < 2$	$[-3, 2)$

When using interval notation,

1. List the two endpoints, with the smaller one first.
2. If an endpoint is included in the set, brackets, [or], are used; if the endpoint is not included, parentheses, (or), are used instead.

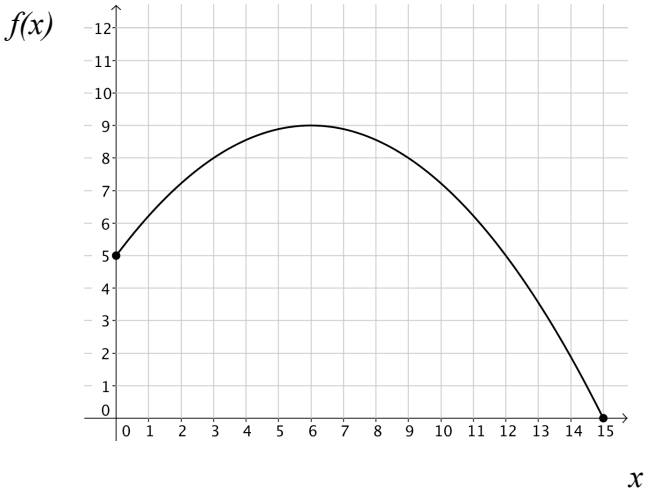
4) Write, using interval notation:

Part A: $-11 < x \leq -2$

Part B: "All numbers between 4 and 7, not including the endpoints."

Sample Preparatory Assignment

5) The graph of a function f is given below. Use the graph to decide whether each of the statements is true or false. If you decide it is False, try to rewrite the statement so that it is true.



Part A: $f(x) > 8$ when x is chosen from the interval $(3, 9)$.

Part B: The function is decreasing on the interval $(0,6)$.

Part C: $f(x) < 5$ when x is chosen from the interval $(12, 15)$.

Part D: The function is decreasing on the interval $(6, 15)$.

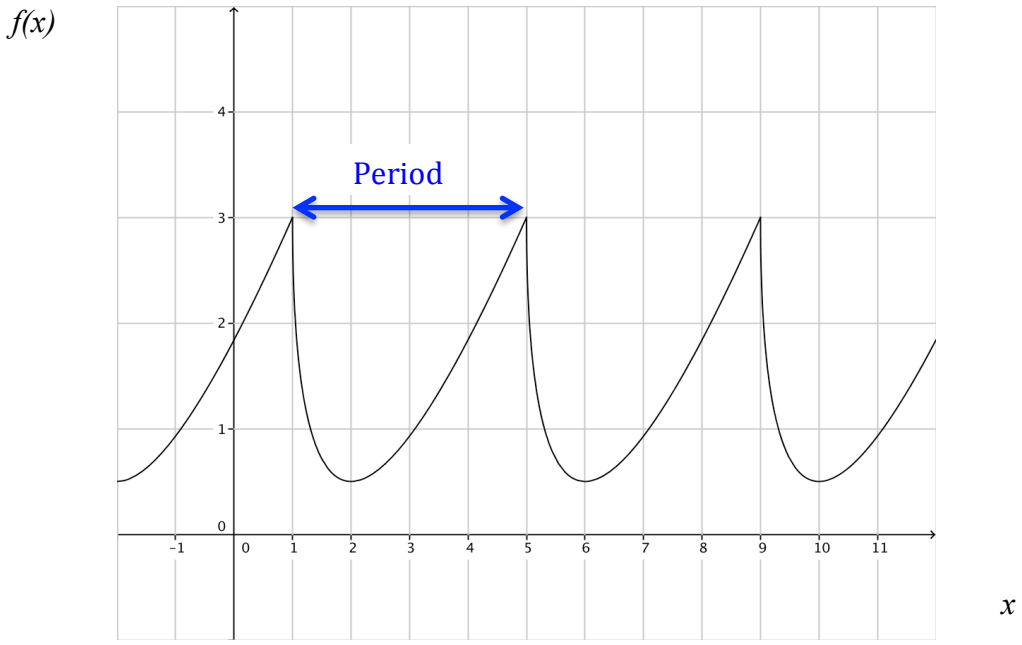
6) Write down one or two questions you want to ask in class in order to better understand how to use interval notation.

Sample Preparatory Assignment

Periodic Functions

A function that repeats its values over regular intervals is called a **periodic function**. The length of that regular interval is called the **period** of the function.

7) Use the graph of the periodic function shown below to answer the questions.



Part A: What is the value of $f(1)$?

Part B: According to the graph, what other values of x have the same function value as $f(1)$? (Hint: You should find two more x values that have the same y - value as Part A.)

Part C: All of the y - values in Part B occur at a high point of the graph. High points like these are the **maximum values** of the function. Low points of the graph are called **minimum values** of the function. What is the minimum value of the function shown? At what x - values does the minimum occur? (Hint: You should find at least three minimum values and the associated x – values.)

Sample Preparatory Assignment

Part D: How far apart do the maximum values occur? How far apart do the minimum values occur? Determining the distance between the x – values of the maximum values (or the x – values of the minimum values) is an easy way to determine the **period** of a function.

Formalizing the concept of period:
Because we can say that $f(1) = f(5) = f(9)$, and so on, we could generalize by saying that $f(x) = f(x + 4)$ for all x. That is, the function values repeat every four units. Of course, they also repeat every eight units and every 12 units. However, to list the period, we always choose the smallest interval. In general, the period of a function is the smallest positive number P such that $f(x) = f(x + P)$ for all x.

Part E: The function is increasing on the interval $(2, 5)$. List two other intervals over which the function is increasing.

Part F: The function is decreasing on the interval $(1, 2)$. List two other intervals over which the function is decreasing.

8) Consider the function described in the following table. Label each of the statements below as True or False.

x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
f(x)	7.2	5.1	4.0	4.7	6.8	8.9	10.0	9.3	7.2	5.1	4.0	4.7	6.8	8.9	10.0	9.3	7.2	5.1

Part A: The function appears to be periodic.

Part B: The period is 7.

Sample Preparatory Assignment

Part C: Assuming the pattern continues, then we would expect $f(20) = 4.7$.

Part D: The function is decreasing on the interval $(4,8)$.

Part E: Assuming the pattern continues, we would expect the function to be increasing on the interval $(18,22)$.

9) Write down one or two questions you want to ask in class in order to better understand periodic functions.

Monitoring your readiness

9) To effectively plan and use your time wisely, it helps to think about what you know and do not know. How confident are you that you can:

Part A: Calculate the percent change between two values?

Part B: Write a formula for an exponential function given its starting value and percent rate of change?

Part C: Relate the base of an exponential function to its percent rate of change?

Part D: Use interval notation?

Part E: Identify the period of a periodic function?

Part F: Identify whether or when a function is increasing or decreasing?

If you are not confident in the above skills, you should seek help by:

- seeing your instructor before class,
- asking your instructor for on-campus resources,
- setting up a study group with classmates, or
- working with a tutor.

Sample Learning Community Activities

Building a learning community

1. Building a Learning Community

Student objectives

- Be responsible for creating a positive learning environment and a sense of community in the classroom.
- Identify their responsibilities in the course as individual learners and as members of a learning community.

Rationale

In an active, collaborative learning environment, students are responsible for their own learning and for supporting the learning of others. It is important to help students understand this responsibility and to set norms. Giving students the opportunity to set norms and have input into how the class works together helps create buy-in.

Strategy: Setting classroom norms (handout included at the end of this document)

Have students complete the **Setting classroom norms** handout in groups. A way to prompt their thinking is to have them refer to the **Successful students** handout. The sections on Thoughts and Behaviors list items that can be translated into responsibilities and norms for the classroom. Have each group share an entry until the class agrees on a complete set of norms.

Modifications:

- Give students the **Setting classroom norms** handout to think about as homework and, in the next class, have them work in groups or share in a class discussion.
- Give students the items for the first column ("Norm for the classroom") and ask them to fill in the next two columns in groups or through class discussion. Assign the last column ("What can I do . . .") as homework.

Strategy: Define a "positive learning environment"

Think-Pair-Share*:* Ask students to identify characteristics of a positive learning environment versus a negative learning environment. Record the characteristics of each type. Lead a discussion to identify norms that would support the characteristics of a positive learning environment.

Strategy: Establish classroom routines

Instructors can establish a few routines to emphasize and support certain behaviors. These routines should be started immediately at the beginning of the term and explained to the students. For example:

- To encourage attendance, start each class by asking the students who is absent, and note the absent students on the board. This routine encourages students to be aware of each other and indicates that someone will notice if they are gone. Have students volunteer to call absent classmates outside of class to offer help with missed material.

Sample Learning Community Activities

- To encourage mutual support, have students form “buddy groups” in which they exchange contact information. The group members are responsible for sharing information if anyone is absent.

2. Building Connections with Students

Student objectives

Understand that you are an important member of the classroom community.

Instructor objective

Gather information and/or initiate activities to help you make a personal connection with each student.

Rationale

Research shows that one of the most important factors in student success is for the student to feel that a faculty member knows and cares about him or her. It is difficult to find the time to have a personal interaction with each student in the first week of the course, but instructors can use activities and routines to support this goal. Several of these strategies include learning information about students, but make sure you have a way to use the information. Be careful not to ask intrusive questions.

Strategy: Student information sheet (handout included at the end of this document)

Ask students to complete a short form that summarizes key information about themselves. This information sheet can also be a way to gather contact information if you do not have easy access to that information.

Strategy: Quick reference index cards

Give each student an index card. Ask them to write their name and responses to two or three quick prompts. For example:

- “When did you take your last math class?”
- “Is this your first time in college?”
- An excellent prompt is “Tell me something interesting about yourself.”

Responses to these questions give you something to talk about with students and can be an aid in learning names. You can also use the cards in class to randomize calling upon students.

Strategy: Math autobiography (handout included at the end of this document)

Writing a math autobiography is an excellent opportunity for students to reflect upon their past experiences and for the instructor to learn about the students. The attached example lays out a highly structured format that helps students think about what to write and keeps the autobiographies to a manageable length. Instructors should include any expectations about length, formatting, etc., and inform students how the assignment will be graded. A simple rubric or grading scale can streamline and expedite grading.

Strategy: Establish classroom routines

As noted above, instructors can use a few carefully chosen routines to support classroom environment. These routines should be kept at a minimum because the value is in consistency. You do not want to overwhelm yourself with tasks. Below are examples of routines that can support connections with students:

Sample Learning Community Activities

- Greet students at the door as they arrive.
- Establish a practice of having a quick, personal conversation with five students every day. Make sure you work through all students.
- Keep track of students you interact with during each class period. Ensure you interact with each one at least once during the week.

Suggested assessment, assignments, and reflections

- Give any assignments from the attached activities that you want students to complete outside of class:
  - Setting classroom norms
  - Student information sheet
  - Math autobiography
- Give the Preview Assignments, if any, for the lesson activities you plan to complete in the next class meeting.

Sample Learning Community Activities

Setting classroom norms

What qualities do you expect to find in a college instructor? What qualities do you expect to find in your classmates? Fill out the following table and be prepared to discuss your thoughts with others in a few minutes. If you are having trouble getting started, think back to a class that you enjoyed or you learned a lot in—what are some characteristics of those classroom interactions that would be nice to see in this course? A sample entry is included in *italics.*

Norm for the classroom	I can expect my instructor to:	I can expect other students to:	What can I do to meet this norm?
We will all encourage one another.	*Create interesting activities so that I am excited to come to class.*	*Help me figure things out that I don't understand, both in and outside of class.*	*I can ask a question when I'm confused so others will feel comfortable asking questions, too.*

Notes from whole class discussion:

Sample Learning Community Activities

Student information sheet

Personal

Full name: _____

Current address: _____

_____

_____

Contact information (please complete at least one):

Home phone: _____

Cell phone: _____

Email: _____

Other: _____

Do you work? (yes / no)

If yes: full-time or part-time? _____

How many hours? _____

Are there other outside obligations you would like for me to know about?

Academic

What is your major?

(put "undeclared" if relevant): _____

Where did you go to high school? _____

What year did you graduate from high school? _____

Do you plan to transfer from this college? circle one: Yes / No

If yes, where do you plan to transfer? _____

What other colleges (if any) have you attended? _____

Sample Learning Community Activities

Course Specific

Have you taken a math course at the community college level?

When was the last time you took a math course?

What course was it?

Where did you take this course?

What is your level of comfort with math? 1 2 3 4 5 6 7 8 9 10

Not comfortable Very comfortable

List the courses you are enrolled in this semester.

What grade do you intend to earn in this course?

What strengths or assets do you have that will help you achieve your goal in this course? These strengths/assets can include things about you such as being a hard worker or things about your life such as having a supportive family or having a flexible work schedule.

Sample Learning Community Activities

Math autobiography template

This template is provided as an example of how an assignment for a Math Autobiography might be structured. Notes in brackets are places where an instructor would provide individual information.

Purpose of the assignment

[Explain how this information helps you as an instructor. Include expectations for format, length, etc., and information on grading.]

Content: Your autobiography should address the four sections listed below. You don't have to answer every question listed. Answer the ones that you think are most important. Write one to three paragraphs for each section and give enough detail to help the reader understand your story. See the example below:

> Not enough detail: I used to like math until I got into high school.
>
> Good detail: I understood math until I got into high school. In grade school and middle school, I felt confident and was able to keep up with the work. But when I was in 9th grade, I got sick and missed a lot of school. When I got back, I was lost in math. I never felt like I really got caught up. I had to repeat that class, and I started to hate it.

Section 1: Who are you?

- How would you describe yourself?
- Where are you from? How did you decide to attend college?
- What is your educational background? Did you just graduate from high school? Have you been out of school for a few years? If so, what have you been doing since then?
- What are some of your general interests (e.g., favorite subjects in school, favorite activities or hobbies)?

Section 2: What has been your experience with math?

- What math classes have you taken and when?
- What have your experiences in math classes been like?
- How do you feel about math?

Section 3: How do you learn and study math?

- Do you prefer to work alone or in groups? Why?
- What do you do when you get "stuck"?
- Do you ask for help? From whom?
- Describe some of your study habits. For example: Do you take notes? Are they helpful? Are you organized? Do you wait until the last minute to do work?

Sample Learning Community Activities

Section 4: What are your plans for the future?

- What do you expect this class to be like? What is your goal for the class?
- What are your responsibilities as a student in this course? What do you expect from your instructor?
- What are your educational and career goals?
- How does this class fit into your goals?

Sample In-Class Activity

Seeking help

Consider the following two statements.

Statement 1: Successful students do not need to ask for help.

Statement 2: Successful students know when and how to ask for help.

1) Which one do you think is true?

Credit: iStockphoto

Objectives for the lesson

Students will understand that:

- ☐ Successful students ask for help.
- ☐ There are resources available for them to use.
- ☐ As members of a learning community, all students help one another.

Students will be able to:

- ☐ Identify when they need to ask for help.

On the back of this page is some information: “Successful Students: The Difference That Makes the Difference.”

2) Look at the Beliefs section. Which of the beliefs listed support the statement you selected above?
3) What are some the reasons that people do not ask for help?
4) In your group, discuss any on-campus resources that would be helpful to other people in the class. For example, do you have a list of all of the tutoring labs? Do you know the instructor’s office hours? Generate a list then look up any information your group doesn’t already know.
5) Seeking help is important. It is also important to realize that you can offer help. What are some ways you might be able to help your classmates in this class?
6) How do you know when you need help?

Sample In-Class Activity

Successful students: The difference that makes the difference

Beliefs (opinions/confidence/trust in)

- College experiences and a degree help me achieve bigger career and life goals.
- It is up to me to take responsibility for my own learning.
- Resources are available to me on campus; I need to find out what they are and use them.
- Earning the grades I want this semester will require more than the minimum amount of work.
- During my journey through college, it is not what happens to me that matters, but how I react to challenges along the way.
- When I am in a new environment and stretching myself, I do not expect instant results; I know that good things come to me with time and patience.
- Success is a process, not a destination.
- I am fully supported!

Attitudes and emotions (feelings about)

- I want more than just a grade—I get a bigger sense of accomplishment when I understand and can apply what I learn in college.
- I know that if I treat my instructors with respect, they are more likely to want to help me succeed.
- I help myself feel in control of my time and on top of my work by creating a study schedule—and sticking to it.
- I quickly recognize when I start to feel lost or unhappy about my academic progress; I speak to my instructor or advisors about why and what I can do to feel more in control.
- I like to show initiative.
- I do whatever I can to feel part of the college community.

Thoughts (consideration/reflection)

- I think about how to connect new course material to what I already know and/or have learned in other courses.
- I give considerable thought to what courses I need to take in the future to help me achieve my academic and career goals.
- When something negative happens, I consider what I did to contribute to that outcome and how I might do things differently next time.
- I know that feedback from my instructors is an opportunity for learning and improving.
- I understand that making mistakes is a part of the learning process.

Behaviors (actions/reactions)

- I keep a calendar of all my commitments (academic and otherwise) to help me stay organized.
- I make it a priority to attend all my classes.
- I do what is necessary so I can pay attention and focus in class (including getting enough sleep and eating well).
- I speak up in class and show myself to be an active, engaged member of that community.
- I ask for advice and guidance from academic advisors, career counselors, tutors/mentors, financial aid staff, etc., to help me make good choices and decisions.
- I complete all my assignments, taking care to present neat, accurate work.

Sample In-Class Activity

Developing self-regulation

You have been doing self-assessment in your preparatory assignments. How can you use this information to improve your learning?

Credit: iStockphoto

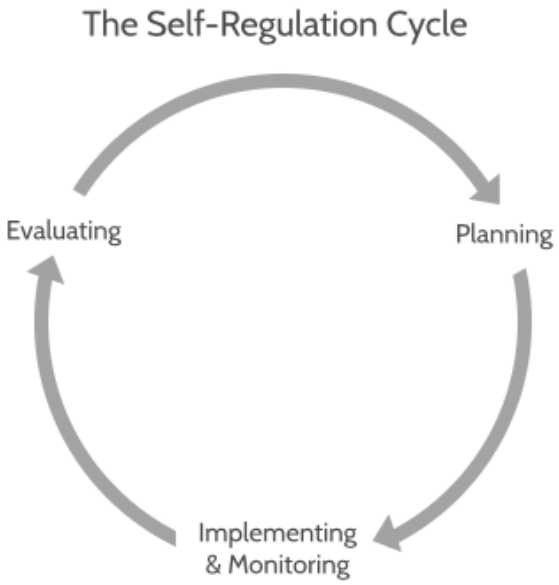
Objectives for the lesson

You will understand that:

- ☐ Self-assessment is a skill that improves with practice and reflection.
- ☐ Self-regulation can help students study and learn more efficiently.

You will be able to:

- ☐ Evaluate the accuracy of your self-assessment to this point.
- ☐ Make a plan to continue to improve your self-assessment and use it to regulate your learning.



Planning: Determining which resources and strategies to use to accomplish a specific task.

Implementing & Monitoring: Executing your plan and continuously examining the progress you are making toward completing that specific task.

Evaluating: Assessing how well the planning and monitoring helped you complete the task.

Sample In-Class Activity

1) How well have you been using your self-assessments in the assignments to prepare for class? Consider the following in answering this question. Give specific examples in your answer.
    - Did your self-assessments match your performance? For example, if you rate yourself very low on every concept but you perform well, you are underestimating your understanding.
    - Have you been thoughtful about your self-assessments? Sometimes people just mark “ready!” for every concept without really thinking about it.
    - Have you used your self-assessments to review material in order to be prepared for class?

2) List strategies that you are currently using or will use in the future to prepare for class.

Key Shifts in Mathematics

Introduction

http://www.corestandards.org/other-resources/key-shifts-in-mathematics/

The Common Core State Standards for Mathematics build on the best of existing standards and reflect the skills and knowledge students will need to succeed in college, career, and life. Understanding how the standards differ from previous standards—and the necessary shifts they call for—is essential to implementing them.

The following are the key shifts called for by the Common Core:

1) **Greater focus on fewer topics**

   The Common Core calls for greater focus in mathematics. Rather than racing to cover many topics in a mile-wide, inch-deep curriculum, the standards ask math teachers to significantly narrow and deepen the way time and energy are spent in the classroom. This means focusing deeply on the major work of each grade as follows:

   - In grades K–2: Concepts, skills, and problem solving related to addition and subtraction
   - In grades 3–5: Concepts, skills, and problem solving related to multiplication and division of whole numbers and fractions
   - In grade 6: Ratios and proportional relationships, and early algebraic expressions and equations
   - In grade 7: Ratios and proportional relationships, and arithmetic of rational numbers
   - In grade 8: Linear algebra and linear functions

   This focus will help students gain strong foundations, including a solid understanding of concepts, a high degree of procedural skill and fluency, and the ability to apply the math they know to solve problems inside and outside the classroom.

2) **Coherence: Linking topics and thinking across grades**

Mathematics is not a list of disconnected topics, tricks, or mnemonics; it is a coherent body of knowledge made up of interconnected concepts. Therefore, the standards are designed around coherent progressions from grade to grade. Learning is carefully connected across grades so that students can build new understanding onto foundations built in previous years. For example, in 4 th grade, students must "apply and extend previous understandings of multiplication to multiply a fraction by a whole number"

(Standard 4.NF.4). This extends to 5th grade, when students are expected to build on that skill to "apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction" (Standard 5.NF.4). Each standard is not a new event, but an extension of previous learning.

Coherence is also built into the standards in how they reinforce a major topic in a grade by utilizing supporting, complementary topics. For example, instead of presenting the topic of data displays as an end in itself, the topic is used to support grade-level word problems in which students apply mathematical skills to solve problems.

3) **Rigor: Pursue conceptual understanding, procedural skills and fluency, and application with equal intensity**

Rigor refers to deep, authentic command of mathematical concepts, not making math harder or introducing topics at earlier grades. To help students meet the standards, educators will need to pursue, with equal intensity, three aspects of rigor in the major work of each grade: conceptual understanding, procedural skills and fluency, and application.

Conceptual understanding: The standards call for conceptual understanding of key concepts, such as place value and ratios. Students must be able to access concepts from a number of perspectives in order to see math as more than a set of mnemonics or discrete procedures.

Procedural skills and fluency: The standards call for speed and accuracy in calculation. Students must practice core functions, such as single-digit multiplication, in order to have access to more complex concepts and procedures. Fluency must be addressed in the classroom or through supporting materials, as some students might require more practice than others.

Application: The standards call for students to use math in situations that require mathematical knowledge. Correctly applying mathematical knowledge depends on students having a solid conceptual understanding and procedural fluency.

Introduction to Statistics and Co-requisite Support Course Sample Timeline
Adapted from and with thanks to Roane State Community College

Day	Co-requisite Notebook Topics	On-line Lab	*Essentials of Statistics* Triola 5th ed.		MyLabs Plus Assign-ment
0	Orientation, study skills, time management	0		Orientation	0
1	Whole numbers: place value, rounding, estimating, problem solving, variable expressions	1	1.1 – 1.2	Orientation; introduction to statistical terms and statistical thinking	1
2	***Must have TI-83/84 Calculator!*** Exponents, square roots, fractions, order of operations	2	1.3 – 1.4	Types of data; collecting sample data	2
3	Decimals, ratios, percent, conversions	3	2.2 – 2.3	Frequency distributions; histograms	3
4	Applications of percent	4	2.4	Graphs that enlighten and graphs that deceive	4
5	Operations on real numbers, scientific notation	5	3.2	Measures of center	5
6	Review of types of data, sampling methods, types of graphs	6	3.3 – 3.4	Measures of variation; measures of relative standing and boxplots	6
7	Review of measures of center and variation	7	Practice Test 1		
8	Comprehensive review of chapters 1 – 3 & basic skills	8	**Test 1**		
9	Review basic skills and concepts of probability	9	4.1 – 4.2	Basic concepts of probability	7
10	Review fractions, complements, contingency tables	10	4.3 – 4.5	Probability rules: addition, multiplication	8
11	Probability distributions, discrete vs. continuous, Inequalities	11	5.2	Probability distributions	9
12	Discrete probability distributions, maximum and minimum usual values	12	5.3 – 5.4	Binomial distributions; parameters	10
13	Review of probability and discrete probability distributions	13	Practice Test 2		

14	Comprehensive review: chapters 4 – 5 & basic skills	14	**Test 2**		
15	Area of a rectangle, lower/upper boundaries of regions, identify specified area under a curve, shade the area representing a percentile	15	6.2 – 6.3	Standard normal distribution; applications	11
16	Uniform distribution, standard normal curve, find z-scores, find critical values, determine type of problem	16	6.5	Central Limit Theorem	12
17	Probability/proportion/percent, calculate critical values, deconstruct intervals, identify parts of proportion problems	17	7.2	Estimating a population proportion	13
18	Find the best point estimate, calculate CI estimate for proportion, determine the required sample size	18	7.3	Estimating a population mean	14
19	Review of normal probability distributions and confidence intervals	19	Practice Test 3		
20	Comprehensive review: chapters 6 – 7 and basic skills	20	**Test 3**		
21	Coordinate system, intercepts, graph lines, compare & round decimals	21	8.2	Basics of hypothesis testing	15
22	Slope from graph & points, average rate of change, $\hat{p}$, x *and* n	22	8.3	Testing a claim about a proportion	16
23	Concepts of slope and analyzing linear relationships	23	8.4	Testing a claim about a mean	17
24	Scattergrams and concepts of linear equations	24	10.2 – 10.3	Correlation; regression	18
25	Review statistical concepts: hypothesis testing, correlation, regression	25	Practice Test 4		
26	Comprehensive review of chapters 8 & 10 and basic skills	26	**Test 4**		
27	Review statistical concepts: all chapters	27	Practice Final		
28	Comprehensive review: all chapters	28	**Final Exam**		

Course:

Course Calendar Template

Dana Center Mathematics PATHWAYS

Date	Support content	Course content

Course Calendar for:_____

Fostering Productive Communication

Dana Center Mathematics PATHWAYS

Cooperative teams are much more than simply asking students to "work in groups." Structuring activities that require both individual thinking and active group processing will yield the best results.

Invest time *before class* to plan how you will support and encourage collaboration *during class*. It will be time well spent!

Credit: iStockphotos.com

Positive Interdependence	Committing to other people's achievement as well as one's own is the heart of cooperative learning. Each team member perceives that he/she cannot succeed unless everyone succeeds ("sink or swim together"). Strategies for occasional use: Assign each member complementary and interconnected roles that specify responsibilities that the group needs to do in order to complete a joint task. Each member only has a portion of the information, resources, or materials necessary for the task to be completed and the members' resources must be combined in order for the group to achieve its goal. Divide the elements of a task so that the actions of one group member have to be completed if the next team member is to complete his or her responsibility.
Individual Accountability	Working collaboratively does not mean that individuals are not accountable for their learning. If done well, it means that group members are better prepared to succeed alone. Strategies for occasional use: Develop a shared language of accountability in the class that groupmates can use to hold one another responsible for contributing to the group's success (no "hitch-hiking"). Students individually complete a graded pre-assignment before coming to class. Students in a group receive bonus points if all in their group do well individually.
Group Processing and Behaviors	Careful analysis of why groups are working together and how well they are achieving the goals can provide continuous improvement of the learning process and promote buy-in for cooperative learning. Strategies: Provide occasional but regular opportunities for groups to process how well they are achieving their goals and maintaining effective working relationships. Instructors can monitor group interactions to reinforce positive social skills and mediate poor ones, but for groups to function effectively, members must also establish and maintain positive relationships through strong interpersonal (social) skills. See the reverse side of this document for a resource to use with students as a handout or poster.

This resource is adapted from the Southern Center for Active Learning Excellence and from David Johnson and Roger Johnson www.co-operation.org

04/2017

Active Classroom Behaviors

Dana Center Mathematics PATHWAYS

Considering Alternative Ideas & Strategies

SOUNDS LIKE
"I like what you said and…"
"I see your point and maybe…"
"Have you ever thought…"

LOOKS LIKE
Note taking
Active thinking
Eye contact among participants
Accepting body language

Achieving Group Consensus

SOUNDS LIKE
"Let's review all the points."
"Do you agree? Why or why not?
"Let's go with this idea…"

LOOKS LIKE
Reviewing all positions
Active listening
Asking pertinent questions
Reviewing notes and materials

Asking Probing Questions

SOUNDS LIKE
"What if…?"
"Why?"
"What else?"
"What supports that idea?"

LOOKS LIKE
Eye contact
Note taking
Everyone involved
Engaging conversation

Elaborating on Ideas

SOUNDS LIKE
"Please give another example."
"Tell us more."
"Can you expand further?"

LOOKS LIKE
Engaged students
Furrowed brows
Active communication

This resource is adapted from David Johnson and Roger Johnson
www.co-operation.org
Illustration credits: Thinkstockphotos.com