STOP REMEDIATION BEFORE IT STARTS
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ABOUT EDUCATION STRATEGY GROUP

Education Strategy Group supports America’s education leaders and employers at the transition points that have the highest stakes for students and the highest impact for states, communities and economies. We bring deep experience leading policy development, advocacy and implementation work in the K-12, higher education, and workforce sectors. For more information, visit http://edstrategy.org/.
Success for youth in the economy increasingly depends on a postsecondary credential or degree. Nearly every new job created since the Great Recession requires education beyond a high school diploma. And yet, nationally, postsecondary attainment rates hover around 45%, with rates for students of color and low-income students substantially lower. Remediation stands as the most significant hurdle for closing postsecondary attainment gaps, especially for traditionally underserved student populations. There are significant efforts underway across the nation to reform remediation in higher education, but waiting to address the issue until a student matriculates is a significant missed opportunity. K-12 and higher education leaders must work together to create opportunities for students to “catch up” on their academic skills while in high school so that they can avoid remediation altogether and place directly into credit-bearing coursework upon enrollment in a postsecondary degree program.

The Challenge
Despite significant efforts to prepare youth for the rigors of college, millions of 12th graders are not ready to seamlessly transition to college without the need for remediation. Remediation is harmful for student progress toward a postsecondary credential. Remedial courses do not count as credit toward graduation and students often use their limited financial aid resources to pay for the courses, limiting their aid eligibility for credit-bearing courses in later years. The longer it takes a student to gain the necessary credits to attain a credential, the less likely they are to find success.

More than half of incoming community-college students, and approximately 20 percent of incoming students at four-year institutions, are academically unprepared when they arrive on campus. Fewer than one in 10 students who enroll in remedial coursework in community college will attain a credential within three years. This is particularly troubling given that community colleges and regional public universities are the points of entry for a large number of traditionally underrepresented students. And it is incredibly costly, as remedial coursework costs students and families across the country approximately $1.3 billion annually.

When students arrive at postsecondary institutions prepared for credit-bearing coursework, they are more likely to complete a degree or certificate. This is especially true for first-generation college goers. Our challenge lies in the ability of our education pipeline to produce equitable outcomes, ensuring all students have the necessary supports to transition to postsecondary education and training ready for success. To solve this challenge, it is paramount that K-12 and higher education leaders collaboratively align expectations and develop supports to ensure that all students can attain a meaningful postsecondary credential.

If remediation is a significant barrier to increasing students’ postsecondary success, why wait until college to catch students up academically? We need to add a new chapter in our student-success playbook, and it should start in high school.

State Context for Postsecondary Transitions
Postsecondary readiness and success must be a priority for every student, educator, and policymaker to ensure that the transition between high school and higher education is a launch pad, not a hurdle.
States with Postsecondary Attainment Goals

- More than 40 states have set postsecondary attainment goals that include certificates, 2-year, and 4-year degrees.
- Every state will need to increase its attainment rate by >10 percentage points to meet their established goal.
- Significant equity gaps remain in postsecondary attainment, with fewer than 1/3 Hispanic and African Americans holding a postsecondary degree or credential.

Gaps in Postsecondary Preparation

- Two-thirds of students require remediation in community college nationally.
- 1/10 remedial students at 2-year institutions earn a degree within 3 years.
- There are 20-point gaps in enrollment rates across income and race/ethnicity groups.
- Without adequate postsecondary preparation, students are less likely to enroll, and when they do they are more likely to acquire student debt without attaining a certificate or degree.

The Solution

Every state should take advantage of the 12th grade year to design and scale postsecondary “transition” courses that provide students opportunities to catch up on knowledge and skills they have not yet mastered, so that they can successfully enroll in credit-bearing coursework upon matriculation. Transition courses, offered in 12th grade, provide students who are at risk of being placed into remedial education an opportunity to demonstrate their postsecondary readiness while still in high school. The courses in mathematics or English language arts are co-developed by K-12 and higher education educators, thereby ensuring that they meet the level of rigor necessary for students to succeed in entry-level college courses. When transition courses are developed collaboratively, they provide a seamless pathway for students into courses that count for credit, setting them up for long-term postsecondary success.

The implementation of transition courses has led to increases in postsecondary enrollment and success in a number of states. Tennessee is the vanguard of states ensuring that every student has an opportunity to receive this type of support prior to high school graduation. Starting in 2011, Chattanooga State Community College launched the Tennessee SAILS (Seamless Alignment and Integrated Learning Systems) program, which has resulted in significant improvements in enrollment and completion rates. Other states have also adopted similar strategies, leading to positive outcomes for students and communities alike.
Support) program to deliver remedial mathematics courses to seniors in high school who need to catch up to be ready for college-level math. SAILS is part of the governor’s Drive to 55 initiative, which seeks to get 55 percent of Tennesseans equipped with a college degree or certificate by 2025. Through SAILS, students who receive a score lower than 19 on the ACT in 11th grade receive the Learning Support Math curriculum, designed and endorsed by community colleges. Upon their successful completion, students may enter directly into credit-bearing coursework when they enroll in the community college.

For states looking to close their postsecondary preparation and attainment gaps, Education Strategy Group recommends the following:

**Co-develop 12th grade postsecondary transition course(s) to serve students likely to need remedial supports.** K-12 and higher education leaders should create a cross-sector workgroup of educators to define student learning objectives, identify appropriate curricula and assessments, propose professional development requirements, and recommend specific implementation supports. Given that mathematics often serves as the largest barrier to postsecondary readiness, states should work to develop transition courses in mathematics first. Higher education leaders must take appropriate steps to guarantee that any student that successfully completes the course can place directly into credit-bearing coursework.

**Use multiple measures for identification of students to enroll in transition courses.** Drawing upon emerging research in higher education about the benefits of using multiple measures to determine students’ postsecondary readiness for course placement, states can use multiple measures in K-12 as well to identify students to enroll in the transition course(s). All students that score below the college-ready level on a higher-education validated assessment(s), or have demonstrated challenge in completing college-ready level coursework, should receive the opportunity to enroll in courses in 12th grade that solidify their knowledge in core areas and expose them to the skills necessary for success in higher education. In general, these courses are best suited for students that are just below the cut off points for college readiness. It will be up to individual states to determine how far below the “college readiness” bar on assessments (i.e., SAT, ACT, End of Course tests), course grades, or other measurements to set a floor as a minimum entrance requirement. And states should evaluate, and make changes over time, how well students perform in the course, and subsequently in postsecondary courses, based on their entering performance levels.

**Recognize completion of transition courses as meeting state graduation requirements.** In states that require students to pass specific assessments or demonstrate postsecondary readiness to graduate, passage of the transition course should signal students’ readiness in the particular subject. For instance, in Texas students are required to pass the Texas Success Initiative (TSI) Assessment prior to graduation. Recently, the state recognized that a student passing its postsecondary transition course in mathematics was
equivalent to passage of the TSI, providing multiple opportunities for students to demonstrate their preparation for their next step beyond high school.

**Communicate with students and families about the status of student transitions and the availability of supports.** Students and parents need timely and actionable information on students’ readiness for postsecondary coursework. Too often, preparation perceptions do not align with the reality of student performance. This lack of alignment can lead to students—especially first-generation students—internalizing that they are “not college material.” K–12 and higher education leaders must educate students and parents about the expectations for college readiness, the realities of student performance, and the availability of supports to help all students make a successful transition to postsecondary education.

**Develop and invest in a statewide strategy for scaling catch up programs in all high schools, starting with those serving large numbers of underserved students.** K-12 and higher education leaders should develop a long-term strategy for scaling the courses statewide. The plan should be grounded in data analysis—examining and addressing gaps in specific content areas, regions of the state, and groups of students—and set specific short-, medium- and long-term goals for the number of students served. States will need to invest time and resources—from new technologies to educator training to tuition and materials for postsecondary coursework—to scale these strategies, so it is critical that the plan identifies a sustainable funding strategy. Additionally, states will want to consider how best to leverage their assets in K-12 and higher education to assist in scale. For instance, many states have core transfer libraries that identify specific courses as being transferrable across postsecondary institutions. The courses generally specify what pre-requisites are required to enroll, and as such, could be used to signal that passage of a transition course counts for demonstrating postsecondary readiness without the need for remediation.

**Anticipated Outcomes**
Providing students who need to catch up opportunities to fill gaps in their academic preparation before leaving high school holds tremendous promise. Research indicates that offering students a 12th grade transition course leads to increases in postsecondary preparation and enrollment, as well as increasing students’ meta-cognitive skills (e.g., self-regulation, persistence, and self-efficacy), especially for students from traditionally underserved backgrounds.

**Evidence of Success**
In just 6 years, the Tennessee SAILS program expanded from one high school to serve over 50,000 students statewide, with a 92% course passage rate. Over that same time period, Tennessee’s math remediation rate decreased by 15 percentage points and its college enrollment rate increased by over 5 percentage points. Students that completed SAILS were more likely to pass college math by the end of their first year of college and earned more credits overall when compared to similar peers that did not participate in SAILS. Participants also reported improved perceptions of the usefulness and

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enjoyment of math. The state sees an annual savings of $64 million as a result of the SAILS program expansion statewide. 

During the 2016-17 school year, the Transitions to College Mathematics (TCM) course was implemented across 18 high schools in Texas. Results showed that students’ use of meta-cognitive skills increased during the first half of the year and remained stable during the second half. Students reported positive experiences in the course, indicating it positively influenced their plans to attend college and enhanced their understanding of and attitudes toward mathematics. Across all districts, 61% of the students who participated in the TCM course met the state’s college readiness benchmark after completing the course, which is considerably higher than would be expected for the high-needs students taking the TCM course.

In Washington, students that took the state’s Bridge to College math and English courses were more likely to enroll in first-year college courses than their peers that did not enroll in the transition courses. Additionally, students that scored below the college-ready level on the state’s assessment in 11th grade and took the transition math or English course outperformed their peers in first-year math and English grades. And in New York, students who completed the Lessons in Navigating College Transitions (LINCT) program demonstrated scores above a comparison group on the state’s ELA assessment and the SAT.

State and Local Opportunities

A number of states and communities have implemented postsecondary transition course options in the past few years. According to the most recent scan of transition courses, the Community College Research Center found that some version of a transition course is offered in 39 states, with fewer than half of those created at the state level. Implementation varies significantly, with those states that have used legislation to require the courses or provided public funding to support their design and implementation experiencing the greatest scale. (see Figures 1 and 2 for a sample of transition courses). Most states offer courses in both math and English, with math being the most widely available. While not offered consistently across implementations, courses that allow successful students to place out of developmental education in college have been found to produce better long-term outcomes for students. Thus, even in places where transition courses currently exist, there is more work to be done to build appropriate higher education buy-in and validation to enable the courses to serve as a launch pad into credit-bearing coursework.

All states and communities can support the high-quality expansion in one of the following ways:

1. Develop a collaborative K-12 and higher education process to co-develop student objectives and pilot the course(s) in small sample of high schools.
2. Establish agreements with higher education institutions or systems to accept passage of the transition course(s) for direct placement into credit-bearing gateway courses.
3. Scale implementation statewide through the development of state-led professional development and support structures.

References:

4 Forthcoming research from Charles A. Dana Center at the University of Texas at Austin
8 https://ccrc.tc.columbia.edu/media/k2/attachments/math-transition-courses-context.pdf
PART 2: IMPLEMENTATION PLAN

Strong cross-sector alignment starts with a common vision for success, but does not end there. Goals without strategies to meet and exceed them are empty. State leadership from K-12 and higher education need to collectively identify the strategies that are likely to have the greatest impact for increasing student success, and develop plans to jointly support their creation and expansion. By stopping remediation before it starts, transition courses can have a lasting impact for students and states—accelerating student progress and opening doors to economic opportunity.

What it Will Take to Get There

There are three approaches that states and/or communities can take to develop and implement postsecondary transition courses:

State Policy

Illinois provides a model for how a state could promote the development and scale of transition courses. In 2016, the state passed the Postsecondary and Workforce Readiness (PWR Act). Among a number of other policy changes, the PWR act identifies transitional math instruction as a means to address college readiness in mathematics before high school graduation by reducing the need for remediation. The PWR Act called for the development of transition math courses for high school seniors in three paths: Quantitative Literacy and Statistics, STEM, and Technical Math.

Students will receive guaranteed placement at any Illinois community college upon successful completion of a transitional course approved for statewide portability. The procedures for statewide portability require demonstration that the relevant competencies are addressed, and the required policies are met. Success will be based on the demonstration of the process and content competencies, which demonstrates readiness for college courses, instead of a single test score.

Statewide transitional mathematics course development commenced in FY17. The mathematical pathways outlined in the PWR Act serve as transitional math bridges for students from high school to postsecondary, eliminating the barrier created by placement in remedial or developmental math as college freshmen. The legislation appointed a panel of secondary math teachers, community college faculty, vocational/tech faculty, and faculty from 4-year colleges whose goal was to develop course competencies aligned to the to the Common Core State Standards for Mathematics for each pathway. The Statewide Transitional Math Competencies and Policies guides and informs the three transitional mathematics instructional pathways defined in the PWR Act. Teams of teachers are now working to develop resources such as units of study that align to the pathway competencies developed by a statewide team of educators.

The legislation called upon the state’s K-12 agency and Community College Board to jointly establish a phased implementation plan and benchmarks that lead to full statewide implementation of transitional mathematics instruction in all school districts. Illinois is currently convening high schools and their local community college for collaboration in the development and delivery of each transitional math course the high school will offer. The state anticipates approximately one-third of all high schools in the state will offer a transitional math course in the 2019-20 school year.
Local Development

Tennessee offers a strong example of a locally-developed course that over time was scaled statewide, without any policy requirement to do so. After successfully using MyMathLab to redesign the remedial math programs at Chattanooga State Community College, faculty and staff sought to bring remediation to a local high school to prepare students for credit-bearing coursework before graduation. In spring 2012, Red Bank High School partnered with Chattanooga State to create a developmental math class for seniors who scored less than a 19 on the math portion of the ACT. Using a blended learning format, a pilot group of 20 students worked to complete interactive exercises targeted to their individual needs, based on the gaps identified through the ACT. Eighty percent of the students successfully completed the course, and as a result, the TN SAILS pilot program was quickly expanded to three additional community colleges.

Chattanooga State and Cleveland State Community Colleges received $117,000 and $40,000 grants from Tennessee Board of Regents and the Tennessee College Access and Success Network, respectively, to bring TN SAILS to additional high schools. Of the 500 total students in these pilots, 82 percent would go on to complete the program, enabling them to enter directly into credit-bearing courses. Chattanooga State then pitched the idea for a formal, statewide pilot to the Tennessee Higher Education Commission. A $1.12 million grant from the governor’s office for Year 1 extended TN SAILS to 118 high schools and all 13 community colleges, reaching more than 8,000 students. In 2013–14, the first year TN SAILS expanded statewide — and less than 24 months after the initial pilot of 20 students launched — 5,625 (69 percent) of these students successfully completed the course, saving a combined total of almost $6.3 million in tuition and 11,471 total semesters of math remediation in college. With Year 2 funding increased to $2.45 million, TN SAILS continued to rapidly scale by adding 61 partner high schools, growing to reach more than 10,000 students in 2014–15 and 14,000 in 2015–16, while boosting completion rates from 69 percent in 2012–13 to 91 percent and 92 percent in 2014–15 and 2015–16, respectively. In 2016-17, over 17,000 students participated in the SAILS course statewide.

Based on the success of the course, the state has developed an additional component of the course that enables students that complete the catch up portion of the materials to use the second semester of their senior year speed up in their transition to higher education by earning dual enrollment credit. This could be the next generation of transition course implementation.

Statewide Development

Washington offers an example of a state’s K-12 and higher education leaders collaboratively developing transition courses, absent any formal policy requirement. Following the adoption of the Smarter Balanced Assessment, the state’s community and technical college system agreed to place students in college-level coursework based on their scores on the assessment.

As part of this agreement, the State Board of Community and Technical Colleges (SBCTC) and the Office of Superintendent of Public Instruction (OSPI) partnered to provide students that do not meet the college-ready level on the assessments with an opportunity to catch up on their skills prior to high school graduation. SBCTC and OSPI brought together higher education faculty, high school teachers and curriculum specialists from colleges and school districts to design “Bride to College” math and English courses.

Students who earn a B grade or above in Bridge to College courses are considered college-ready and eligible to enroll in college level math and English at all participating Washington higher education institutions. In 2017-18, 247 teachers in 138 high schools across Washington State taught the Bridge to College course, with roughly 6000 students using the course to prepare for college success.
OSPI and SBCTC, with funding from College Spark Washington, support implementation of the transition courses, including creating a professional development structure and opportunity for networking among educators. To be eligible to teach a transition course, educators must participate in state-run professional development during the summer and through the school year. Teachers also can participate in "Communities of Practice" meetings up to three times per year to collaborate with fellow educators and identify additional areas of needed support.

Given the success of the initiative, in 2019, the state passed legislation allowing students to use successful completion of the Bridge to College course to meet the state’s graduation requirement.

**Ideal Conditions for Success**
Regardless of the approach to develop and scale transitions courses, there are a number of elements that increase the likelihood for successful implementation and sustainability. Strong collaboration across K-12 and higher education systems is necessary for success.

**K-12 and Higher Education Collaboration**
Collaboration across sectors is the foundation upon which postsecondary transition courses are built. Both sectors need to be involved in the development and implementation of the courses. In particular, it is critical that higher education faculty and administrators play a significant role in validating the quality and rigor of the courses, to ensure that students will be prepared for successful entry into first-year credit-bearing coursework upon matriculation. Further, higher education leaders need to have deep knowledge of the course as they make decisions about whether a students’ successful passage can be used as a mechanism for placement. Without strong partnership, the courses may be developed, but they will be of little value to students.

**Defined Measures of College Readiness**
One of the most challenging aspects of implementing a transition course that offers the guarantee of placement into first-year, credit-bearing coursework is that there must be a commonly-defined way to determine "readiness." Most placement decisions in higher education are based on a specified score on an assessment, though that is changing as more states seek to use multiple measures for placement. In states that have a college readiness definition that is linked to a specific assessment, it may mean requiring that assessment as a final examination in the transition course. In states that do not link readiness to an assessment, or have institutions/systems that use multiple measures for placement, there is greater opportunity to identify passage of a transition course as representing preparation for the next level, and thereby serving as the “placement” mechanism.

**Process to Define Transferability**
States that have a defined process for allowing the transfer of courses among public institutions of higher education will be better situated to facilitate the development and implementation of a transitions math and/or English course in high school. It will be limiting for students if success in the transition course only enables direct placement into credit-bearing coursework at a single institution. Further, it can serve as a barrier—by increasing time and potentially cost—for students, an increasing number of whom transfer between institutions to complete their degree. Most state systems have work groups in place to deal with issues of course transfer, including dual credit. It is advisable to include members of those groups in any transition course development and implementation discussions.
Math Pathways in Higher Education

While not necessary for the successful development and implementation of a postsecondary math transition course, increasingly states are finding that work done in higher education to restructure math pathways beyond the traditional College Algebra/Calculus sequence can serve as a beneficial foundation upon which to base the transition math course in high school. Multiple math gateway courses in higher education, such as Statistics, Quantitative Reasoning, or technical math, expand the opportunities for students to excel in math that is more aligned to their particular career pathways. Having these options as gateway courses enables high schools to focus a transition math course on content that will prepare students for success in higher education, without having to simply serve as a refresher course for Algebra I or II. This is both beneficial for students and educators.

High-Quality Professional Learning Opportunities

It is important that the 12th grade transition courses are not approached as simply re-teaching the same material in the same way. The students that will enroll in these courses have not yet mastered content through the traditional course sequences. It does not benefit them to simply repeat material in a condensed fashion. It is imperative that educators for these courses have opportunities to receive high-quality, ongoing professional learning supports that help them bring students up to the college- and career-ready level. In particular, the places that have demonstrated the most success in implementing transition courses have providing specific professional learning supports, including deep engagement and partnership from higher education faculty, for the high school educators of these courses.

Process for Development and Scale

To develop postsecondary transition course(s), we recommend organizing two groups of K-12 and higher education leaders. The first, or Steering Committee, should be charged with discussing the policy and practice implications of developing and implementing transition course(s). The second, or Course Development Work Group, should be charged with defining the course learning objectives, recommending curricula and assessments, and supporting the development of additional implementation materials and support structures.

Steering Committee

The Steering Committee will engage in discussions and make recommendations in the following areas:

1. **Policy context to expand postsecondary transition courses**: The state’s policy infrastructure will have significant bearing on the ability of these courses and course pathways to flourish. Potential questions to address include: to what extent does the state’s high school graduation requirements support transition math and/or English courses in high school? How should the 12th grade transition course align with prior high school math or English sequences? How can the
state’s efforts to expand access to high-quality career pathways inform and connect to new approaches to high school mathematics?

2. **Aligning K-12 and higher education expectations:** Higher education validation is a necessary component to ensure that students can seamlessly transition into higher education ready to succeed in credit-bearing coursework. Potential questions to address include: To what extent will changes need to be made to placement and admissions policies within and across institutions, and what is the process to enable that to happen at scale? How does the state define college and career readiness, and how can students meet that demonstration through the successful completion of transition math and/or English course? How do the transition course(s) connect to Guided Pathways or metamajors in higher education? To which postsecondary gateway math and/or English course(s) will passage of the 12th grade transition course enable remediation-free entry? What feedback loops exist through data and reporting to monitor the college readiness of high school graduates as they transition to postsecondary?

3. **Support for implementation:** State K-12 and higher education leaders have an important role to play in guiding and supporting implementation of new transition math and/or English courses. The Committee will work to identify key elements to enable the successful implementation and scale these courses. Potential questions to address include: What is the optimal process for developing a course that can both count for high school diploma requirements and be used for placement into entry-level credit-bearing coursework? What is the process by which high schools should be selected to pilot the course? How can the state support educator professional development? What role can the state play in communicating about the new courses and pathways to students, parents, educators and the broader community? What data can be gathered to evaluate the impact of the courses over time? What is an appropriate timeline and strategy for scaling the courses statewide, and what additional budgetary support may be necessary?

The Steering Committee should be comprised of state and local K-12 and higher education leaders that are (1) prepared to engage in conversations about the policy and programmatic ramifications of this work and (2) equipped to promote this work to their colleagues, key policymakers, and the general public. This will likely include school and district administrators, 2- and 4-year institutional leaders (i.e., Vice Provost, Dean), K-12 and higher education agency leadership, and policymakers (i.e., State Board of Education member). The membership should include geographic, size, and demographic diversity to best represent the needs of different populations statewide. Ideally, membership will be approximately 10-15 individuals.

**Course Development Work Group**

The Course Development Work Group, comprised of educators and administrators from K-12 and higher education, will create a course framework in the relevant content area. This group should meet to define the parameters of the course and identify appropriate curricular materials and supports to ensure that students can find success. Additionally, this group should make recommendations regarding what “success” in this course entails and how that should be measured, with the goal that students who are successful can place out of developmental coursework in college. A recommended set of steps, which are not meant to be exhaustive, are detailed below.

**Student Learning Objectives**

- Review current remedial math and/or English and postsecondary gateway course expectations and prerequisites

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*See Appendix A for an example of a Work Group charge. See Appendix B for an example of a course framework.*
• Review high school math and/or English standards and student learning objectives in current math and/or English courses taken by the preponderance of Seniors (may require reviewing state-level course taking data, disaggregated by student subgroups)
• Identify gaps in content between current high school math and/or English courses and higher education gateway courses (and their related remedial courses)
• Review content coverage of postsecondary transition courses from other states
• Define student learning objectives for the course, aligned to one or more postsecondary gateway course expectations
• Share with outside experts for feedback and amend as appropriate

Materials and Assessments
• Identify and review relevant course materials
• Select, curate, and/or adapt curricular materials based on agreed-upon student learning objectives
• Identify and review relevant through-course and/or end-of-course assessments to validate rigor
• Determine the measure of “successful completion” for course passage
• Recommend plan for acquisition, if necessary

Define Student Course Success
• Determine whether student success will be defined through an assessment score or final grade
• Engage higher education administrators from multiple institutions (or course transfer group) in defining the expectations for student success
• Create process for standardizing assessment items and/or scoring of student work
• Identify any additional requirements necessary for students to place directly into credit-bearing coursework (i.e., enroll within a specified time period)

Finalize Recommendations
• Create final recommendations and support documentation for presentation to appropriate K-12 and higher education board(s) and/or committee(s), as well as any additional presentation materials for sharing broadly with K-12 and higher education colleagues
• Identify approach for informing higher education institutions which students successfully completed the course (i.e., transcript or other means of communication)
• Develop recommendations regarding communications and support materials for parents, students, educators, counselors, and administrators
• Determine professional development approach for pilot teachers, aligned to and using the chosen course materials
• Recommend criteria to support fidelity of implementation and additional training and support structures (i.e., field coordination and/or DOE/CHE staffing) to facilitate implementation

Beyond the development process, there will be a number of steps that a state will need to take to ensure smooth implementation:
1. Draft communication materials, including a detailed communication plan, featuring core messages for key audiences such as high school principals, teachers, and students/parents.
2. Disseminate communication materials
3. Secure NCAA course approval
4. Secure evaluator and determine evaluation plan
5. Purchase licenses (if necessary)
6. Secure/create and deliver professional development
7. Identify pilot sites and gather commitments
8. Define state and/or higher education institution supports for pilot high schools and educators
9. Identifying students to enroll in pilot
10. Develop an evaluation plan and data collection strategy

**Key Implementation Elements**
When implementing postsecondary transition courses, it is advisable to begin with a pilot. This will enable the state or community to monitor implementation, address any issues that may arise, and develop appropriate supports for students and educators.

**Pilot**

**Criteria to be Considered when Selecting Pilot Schools**
1. **Demographics**: Student body composition, including race/ethnicity and income.
2. **Location**: Statewide spread, inclusive of urban, suburban and rural settings.
3. **Size**: Mix of small, medium and large.
4. **Scale of challenge**: Postsecondary enrollment and remediation rates for specific high schools.
5. **Engagement in work**: How closely educators or administrators have been to the development process.
6. **Pre-established relationship**: Previous state-level engagement with educators or administrators provides confidence in ability to successfully pilot.

**Expectations for pilot schools**
1. **Receive high-level buy-in to run a minimum of one section of the course from district leadership.** Partnerships between K-12 school districts and higher education will be essential to the success of this course. These partnerships thrive when leadership at the K-12 and postsecondary level are committed to working together. Therefore, to pilot this course, school and district leadership must be fully supportive of the course and committed to working with higher education.
2. **Agree to follow the identified course framework, curriculum and assessments.** In order to ensure students who are successful in the transitions course are eligible for direct entry into gateway math and/or English courses, schools must agree to follow the course curriculum decided on by a collaborative group of K-12 and higher education faculty.
3. **Select pilot instructors who can commit to teaching the course for a one year, with the potential of becoming course leaders after the pilot.** Pilot schools are required to commit course instructors for at least one academic year. These instructors should have the interest and capacity to become ideally, instructors will be interested in continuing beyond the and will have the opportunity to become “course leaders” who will be responsible for providing feedback to the state following the pilot year.
4. **Adhere to the professional development requirements for course instructors.** All instructors of the transitions course must participate in professional development. In the first year, pilot instructors will be required to participate in a 3-4 day centrally located training event. In addition, instructors must participate in ongoing professional development throughout the year, which will include two additional in-service days and participation in a community of practice with other pilot instructors.
5. **Encourage pilot instructors to become course leaders, leading teacher professional development beyond the pilot year.** Leadership opportunities will be available for pilot instructors to develop and train new course instructors during the summer following the pilot and
beyond. These course leaders will not only take part in facilitating professional development for these instructors, but also providing feedback to the state on how to improve the training and course.

6. **Choose students for placement based on a variety of metrics.** Pilot schools are encouraged to place students in the course based on multiple measures of college readiness. These measures include, but are not limited to, SAT/ACT scores, grades in prior math and/or English courses, high school GPA, teacher recommendations, etc. Schools will track the selection criteria used for placing specific students and share that information with the state.

7. **Collaborate with university partners to continuously improve upon the course.** It is important that higher education faculty remained involved in implementation of the transitions course. A minimum of one college campus, local to your school district, will also participate in professional development offerings throughout the summer and academic year. Meaningful collaboration between the pilot schools and these partners is essential to course success.

8. **Participate in teacher and student surveys at the end of the pilot year.** Teachers and students will be surveyed about their experiences in the transition math course to identify opportunities for improvement.

9. **Conduct pre- and post-course assessments.** To gather immediate data on students’ performance in the course, pilot schools will be expected to conduct pre- and post-course assessments of students. Alternatively, placement tests could be taken alongside course assessments to determine how course grades match up with a traditional placement exam.

**Expectations for participating college campuses**

1. **Receive high-level buy-in from campus presidents/leadership to work with K-12 and improve upon the course.** Partnerships between K-12 school districts and higher education will be essential to the success of this course. These partnerships thrive when leadership at the K-12 and postsecondary level are committed to working together. Therefore, to pilot this course, higher education leadership must be fully supportive of the course and committed to working with K-12.

2. **Select faculty who can commit to providing initial training for pilot instructors and later for course leaders.** Instructors in the pilot schools will receive professional development prior to piloting the course in the 2019-2020 school year. Because this course is preparing students for college-level mathematics, it is highly recommended that higher education faculty be involved in the delivery of professional development. Faculty chosen during the pilot years must commit a minimum of one year of their time to providing professional development.

3. **Evaluate the performance of transition course students in gateway courses.** Participating college campuses must commit to tracking data on students who have taken and passed the transition math and/or English course including 1) which gateway math/English course students enter and 2) their overall performance in the gateway course. This information will be used to provide feedback to the state on the course.

4. **Encourage involved faculty to become “course leaders,” leading and participating in ongoing professional development opportunities after the pilot year.** Based on the initial pilot and data on transition course graduates’ performance in gateway courses, higher education institutions should encourage faculty who have been involved during the pilot year to continue on as “course leaders.” Course leaders are required to attend both the course leader convening each summer, as well as participate in 4-5 “communities of practice” that occur throughout the academic year.

5. **Grading of students’ final examinations.** Based on a state-developed rubric, higher education course leaders and/or other faculty members will gather to grade students’ final examinations. This will ensure consistency across sites and maintain clear expectations for postsecondary readiness.
Proposed Professional Development Structure

Pilot Year:
Inaugural Summer Institute (Summer I): 3- or 4-day training for pilot school instructors provided by a combination K-12 and higher education agency staff, higher education faculty, and an external professional development provider.
Communities of Practice (Academic Year I): Pilot teachers meet in small groups of 5-10 individuals 4-5 times during the year; higher education faculty participate, as needed.
In Service (Academic Year I): 1-day in service training each semester (Fall and Spring).
Liaisons (Academic Year I): Each high school teacher will be paired with a higher education liaison to offer through-year support and guidance.
Observations (Academic Year I): K-12 agency staff and/or higher education liaisons will observe classroom instruction periodically to provide direct feedback and identify additional support needs across the pilot schools.

Implementation Year 2:
Course Leaders Convening (early Summer II): Course leaders, which will include pilot school instructors and higher education faculty, will meet to discuss lessons learned from the pilot year and shape professional development accordingly. Changes to curriculum may be made.
Summer Institute (Summer II): 3- or 4-day training for newly recruited course instructors provided by course leaders.
Communities of Practice (Academic Year II): Course instructors meet virtually in small groups of 5-10 individuals 4-5 times during the year; higher education faculty participate, as needed.
In Service (Academic Year II): 1-day in service training each semester (Fall and Spring).
Liaisons (Academic Year II): Each high school teacher will be paired with a higher education liaison to offer through-year support and guidance.
Observations (Academic Year II): K-12 agency staff and/or higher education liaisons will observe classroom instruction periodically to provide direct feedback and identify additional support needs across the pilot schools.

Implementation Years 3-4:
Course Leaders Convening (Summer III, IV): Course leaders will meet to discuss lessons learned from the second year running the course. Higher education partners will make recommendations based on performance of pilot students in gateway math courses.
Summer Institute (Summer III, IV): 3- or 4-day training for newly recruited course instructors provided by course leaders.
Communities of Practice (Academic Year III, IV): Course instructors and higher education faculty meet virtually in small groups of 5-10 individuals 4-5 times during the year.
In Service (Academic Year III, IV): 1-day in service training each semester (Fall and Spring).
Liaisons (Academic Year III, IV): Each high school teacher will be paired with a higher education liaison to offer through-year support and guidance.
Observations (Academic Year III, IV): K-12 agency staff and/or higher education liaisons will observe classroom instruction periodically to provide direct feedback and identify additional support needs across the pilot schools.
Placement
For the course to be approved by higher education institutions as a way to bypass developmental education coursework and place students directly in a first-year gateway math and/or English course certain expectations should be met. Those include the following:

1. The transition math and/or English course expectations are aligned to the pre-requisites for entry into credit-bearing courses (i.e., College Algebra, Quantitative Reasoning, Finite Math, Freshman Composition) in higher education, as specified in the state’s transfer course library (if one exists).
2. All high schools offering the transitions course(s) will use common, state-approved curricula and assessments. Only schools using these materials, and meeting the other specified criteria, will enable their successful students to place directly into entry-level credit-bearing courses in math and/or English.
3. Educators of the transition course(s) are required to participate in both summer and through-year professional development activities offered by the state in collaboration with higher education faculty.
4. Students must complete the course with a grade of a B or higher, with a final assessment counting for at least 30% of the final grade.
5. Assessment items used in the final examination will be consistent statewide, and educators will receive professional development and rubric(s)—created in collaboration with higher education representatives—to support scoring of student work.
6. Students must enroll in a specified gateway math and/or English course in higher education within 1 year of completion of the postsecondary transitions course to be eligible for placement without additional examination.
7. Any changes to the course curricula, assessments, or professional development must be done in concert with representatives of Indiana higher education and go through the appropriate review process used by institutions or the state.

Budget for Statewide Scale
Resources are necessary to support the development and scale of transition courses. These largely relate to the creation of the course expectations, delivery of professional development, and purchase of materials to support students and educators in the course. Nearly all the states that currently have transition course initiatives at the state level have supported those through either initial grant funds or legislative appropriations. When the course is delivered in a hybrid or fully online mode, there may be ongoing costs to secure and maintain appropriate technology infrastructure and licenses for curriculum, assessments, etc. The following details a number of key considerations to take into account when budgeting for course development and implementation, as well as examples of investment from a handful of states.10

Key Considerations
In any initiative, the projected costs will be based on both assumptions of scale and specific approaches to state and/or community support for the transition course.

Scale of staff capacity: In our research, we found that as states scaled their courses beyond the initial set of pilot schools the number of associated staff support increased quickly. Current state agency staff may be able to support an initial pilot, however, if the state anticipates significant expansion in year 2 or beyond, the state will likely need to increase the number of FTE dedicated to supporting this work. This can be accomplished through the hiring of regional field coordinators, but may best be served through one

10 https://ccrc.tc.columbia.edu/media/k2/attachments/high-school-college-transition-typology.pdf
full-time K-12 and higher education agency staff for management and engagement with school and district administrators. The position(s) could also oversee other components of the state’s postsecondary transitions strategy, as is the case in other states.

Professional development requirement: It is critical that each educator that intends to teach a transition course be required to participate in annual professional development. At a minimum, all new educators should participate in up to 4 days of professional development over the summer, 2 in-service days throughout the year, participate in a community of practice and receive quarterly observations and support visit per year.

Cost sharing between K-12 and higher education: In many states, the higher education system is involved in the administration of the transition course implementation, whether through delivery of professional development or employment of the field coordinators that support schools. The K-12 and higher education agency may want to consider what, if any, cost- and/or capacity-sharing could take place.

Evaluation: States and communities should include costs associated with an evaluation of the implementation. Tracking the impact of the course, both in terms of student completion of the course and their success in credit-bearing coursework, is valuable and would encourage the state to invest in an evaluation. Long-term, it could help the state or community make the case for additional investment from the legislature. However, attributing funds for the evaluation may be difficult. As such, the state or community may want to work with its higher education partners to see if they would be interested in providing those services in-kind, as has happened in other states.

Tennessee
The Tennessee Seamless Alignment and Integrated Learning Support (SAILS) course to support students’ math preparation and transitions is delivered in a hybrid setting, and the state covers the cost of student fees for access to the online platform for the delivery of curriculum and assessments. Additionally, the state invested in the purchase of mobile computer labs and supports a full-time staff in each region to support implementation, as well as statewide staff to administer the program.

The state initially invested $1.1 million to support implementation, which came after the course was developed and already in use in a small number of schools. That investment covered curriculum access to Pearson’s MyMathLab for up to 8,800 students (at approximately $50 per student), mobile computer labs, all required professional development activities, and up to six full time state staff and regional field coordinators. Investment in year 2 approximately doubled the year one budget, with the greatest increases going to fund more student software licenses and nearly doubling staff capacity.

New York
The City University of New York’s (CUNY) Lessons in Navigating College Transitions (LINCT) initiative has a postsecondary transition mathematics and ELA course as its foundation. The courses were initially developed under the state’s Race to the Top grant and intended to be used statewide. The state facilitated a workgroup of K-12 and postsecondary educators to adapt available high school curriculum modules, and continues to update the modules based on lessons from prior years of implementation.

The state budgeted $840,000 over two years to develop the curriculum and support implementation. Given that the state used Race to the Top funds to develop the course, the curriculum was made available free to any school that wanted use it. Educators were required to go through 10 days of professional development in the summer and during the year to be eligible to teach the course. CUNY hosted regional
professional development workshops in the summer and during the school year, as well as engaged in ongoing school site visits to support implementation. The state paid the educators for their time (5 days) during the summer and reimbursed the districts for teacher’s time away from the classroom during the school year. The initial investment supported three full time staff to oversee and administer the program.

**Delaware**

In 2016, the state of Delaware received a grant from the Strada Education Network to support the development and implementation of a Foundations of English postsecondary transition course (building upon their previously designed Foundations of Math course). The $250,000 grant over two years allowed the state to update the curriculum for Delaware Technical and Community College’s (DTCC) developmental education course to a high school setting, development of module connected to the SAT assessment, staff time for higher education faculty to support curriculum development, and initial training for high school educators. The state also provided $15,000 grants to six schools to support the initial pilot, which served 250 students. All state, district and community college administration costs were provided in kind.

The state now charges districts for access to the curriculum and support for implementation. There is a $1,500 curriculum fee per district, which is an annual subscription and includes both the course curriculum and the learning modules via Schoology. Administrators also receive support from the state to develop a project implementation plan. Additionally, there is a $500 training fee per school, which includes training for school based teams over the summer (3-4 teachers for 4 days), online coaching for counselors, and on-site coaching for teachers from DTCC staff throughout the school year (typically 2-3 observations).

**Washington**

Washington’s State Board for Community and Technical Colleges received roughly $3.4 million from College Spark Washington for Bridge to College. This was initially a 3-year grant that has been extended with moderate increases in 2017-18 and 2018-19. The course uses curriculum developed by the Southern Regional Education Board that has been adapted for the Washington context.

About half of the funding for this initiative goes directly to teachers to pay for stipends or substitute teachers costs to attend professional learning activities, travel costs and course supplies. A combined 20% of the funding supports Bridge Course Leaders and higher education disciplinary leaders, who design and facilitate professional development. Another 20% goes toward planning, travel and logistics for the professional learning opportunities. Finally, Washington uses a little less than 10% of the funding to support a half-time project manager and a portion of the director’s salary.

**Texas**

Texas HB 5 requires that each district, in partnership with an institution of higher education, offer college preparatory courses in Mathematics and ELA for students that are not yet ready for college-level work. The state did not provide any resources for districts to develop the courses, rather they were encouraged to use available open source resources. To fill a gap, the Charles A. Dana Center led a statewide process to design an appropriate curriculum and student assignments that became the Transitions to College Mathematics (TCM). The Dana Center now sells the materials and related training to districts. During the 2016-17 school year, the Transitions to College Mathematics (TCM) course was implemented across 18 high schools in nine districts in central and east Texas, involving 21 teachers and reaching more than 600 students. For 2017-2018, 30 districts used the curriculum to serve just over 4000 students.
The Dana Center sells materials in two different ways: directly and as a package with professional development. Teacher instructional materials, including student learning outcomes for the course, instructional guidance to support facilitation of daily lessons, keys to student in-class activities, and optional lessons to support students in developing strategies for approaching exams and examining careers, cost $175 per teacher. Student packets are $25 each and include both printed materials for in-class use and access to an online platform that provides homework and other resources. Alternatively, for $725, one teacher can receive two days of professional development, one set of teacher resources, and 10 sets of student resources. All additional implementation costs are the responsibility of the district.

Indiana
The Indiana 2019-2020 biennial budget appropriates $600,000 over two years to support the implementation of a postsecondary math course. The funding will support educator training, technical assistance from higher education faculty and Department of Education staff, and outreach materials. The state will pilot the course in the 2019-20 school year in approximately 10 schools, and anticipates expanding to 30 schools in the 2020-21 school year.

Talking Points
The following provides an example set of talking points that can be used in communicating about the transition courses, development process, and a potential pilot.

Benefits
• For students
  o Catch up on skills so that they can be ready for success beyond high school
  o Save time and money by avoiding remediation during the first year of college
  o Increase likelihood of earning a postsecondary credential or degree
  o Develop a healthier attitude towards math and/or English and their ability
• For K-12 teachers
  o New ways to contextualize math and/or English to prepare students for success in higher education
  o Receive on-going professional development and support from the state
  o New opportunities for professional leadership
• For high schools
  o Increase the number of students progressing into higher education ready to succeed
  o Receive state-funded professional development for teachers that can be transferrable to other math and/or English courses
  o Receive statewide recognition in communications and materials
• For higher education
  o Increase the number of matriculating students who enroll directly in credit-bearing coursework
  o Increase the likelihood of credential attainment and decrease students’ time to degree
  o Develop formal structures for engaging with K-12 educators about students’ preparation for postsecondary coursework.

Context
• Remediation remains a barrier for far too many students
  o Through the hard work of K-12 and higher education educators and administrators, the number of students requiring remediation has declined over the past 5 years
o And yet, many students continue to lack the skills to be successful in entry-level math courses
o Students that enroll in a remedial math course have about a 1/10 chance of attaining a postsecondary credential
• K-12 and higher education have a shared responsibility for supporting students’ positive transitions from high school to higher education
  o States/communities across the country have found that building stronger pathways in math from high school to higher education can set students up to succeed from day one
• The state/community convened a statewide panel of K-12 educators and higher education faculty to develop a math course to support students’ transitions into entry-level math courses in higher education
  o The course is intended to serve students who, without additional support while enrolled in high school, are likely to need remediation in postsecondary education
  o In the long term, students who successfully complete the course will be eligible to enroll directly into a credit-bearing math course at public state institution without the need for remediation

Development
• The development committee met over the course of [INSERT] months to define student expectations and identify appropriate curricula, assessments and related educator materials
  o The educators involved represented schools and higher education institutions statewide, with diversity in size and setting
  o Committee developed the course based on the expectations for entry into entry-level math courses
• The development committee reviewed a number of potential curricula to identify materials that would best prepare students to meet the course expectations
• The committee recommended the following high-quality curricula and materials: [INSERT]
• The committee recommended the state include significant professional development and support for educators that will teach this course.
  o The course offers a new way of presenting math and/or English to students and strategies for college success, and thus it is critical that educators feel prepared to support their students

Course Specifics
• The course is intended for students who are not projected to be ready for college-level coursework
  o Decisions about enrollment will occur locally based on a review of student readiness across a variety of measures
  o Students will need to have passed Algebra 2 (or its equivalent) prior to enrolling
• Course addresses a variety of topics to prepare students to be successful in college-level math/English
  o Students will cover topics including [INSERT]
• Successful completion of the course meets the state’s diploma requirements and will enable placement into credit-bearing courses, without the need for remediation
  o Success means [INSERT]
  o For the pilot, successful students will be able to enroll in [INSERT] without an additional placement exam
Pilot

- The state will pilot the transitions math course in up to [INSERT] schools starting in the [INSERT] school year
  - [INSERT] is selecting a diverse set of high schools to pilot the course
  - [INSERT] staff will provide ongoing support throughout the pilot and engage with each school to best understand implementation challenges and success
- To support educators through implementation, the state will fund summer and during-year professional development and support
  - [INSERT] is contracting with an external provider to offer the initial training and to support additional training activities during and after the pilot
  - Higher education faculty will participate in the training and support the pilot educators during the initial pilot
- Pilot schools and educators will have opportunity to shape implementation and serve as leaders in future scale
  - Pilot educators will be asked to serve as trainers during future postsecondary transition course professional development sessions
Appendix

A. Work Group Charge Example

The Indiana Transitions Steering Committee—co-chaired by Superintendent McCormick and Commissioner Lubbers—charges members of the Indiana Math Work Group to collaboratively design a postsecondary transition math course for pilot in Fall 2019 that enables students to enter postsecondary education remediation-free in mathematics.

Remediation in higher education is one of the most significant hurdles for students to overcome on the path to postsecondary credential attainment. It is the goal of Indiana K-12 and higher education leaders and practitioners to support dramatically more Hoosiers to gain the math skills they need to enter a variety of postsecondary gateway courses in mathematics, without the need for remediation.

The Work Group should design a course to serve students who, without additional support while enrolled in high school, are likely to need remediation in postsecondary education. This may include students who have taken Algebra II and are not yet deemed college-ready based on course grades and assessments such as SAT/ACT and for students who have attempted, but not yet passed Algebra II. Students in this course will be expected to have completed at least four of the six required Core 40 math credits.

The students that pass the postsecondary transition math course should be eligible to enter into, at a minimum, the following gateway mathematics courses at Indiana institutions of higher education: 1) Quantitative Reasoning and 2) College Algebra. The course may also prepare students for other entry-level math courses from the Core Transfer Library (i.e., Finite Mathematics and Trigonometric Functions), as well as other non-CTL entry-level math courses (i.e., Technical Math and Math for Elementary Educators).

Ideally, the course should allow students to demonstrate college readiness through applied mathematics content rather than solely through measurements of Algebra, thus providing more relevancy in instruction. The Work Group should identify and incorporate key college success competencies into the course, as appropriate, to support students’ successful transition into higher education. The Work Group should also identify appropriate course materials and assessments to support and measure students’ mastery of content.

The aim is for the Math Work Group to present a course—and any appropriate supporting documentation—to the State Board of Education and Commission for Higher Education for approval by the end of 2018, so that the course may be piloted in select high schools starting in Fall 2019. The Work Group should also present any recommendations related to course implementation that may arise during the discussions to the Postsecondary Transitions Steering Committee prior to the end of the year, and be prepared to engage in further discussions with DOE and CHE as the state works to execute the pilot.
B. Course Framework Example

Indiana Mathematics Transition Course Framework

**Course Goal:**
The goal of the math transition course is to increase college readiness rates and bridge the gap between high school and college-level math for students, decreasing their chances of needing math remediation in college. Students who satisfactorily complete this course will be prepared to enroll and succeed in College Algebra, Finite Mathematics, or Quantitative Reasoning.

**Target Population:**
Transitional math courses are intended for students who, based on a series of metrics decided upon by local education agencies, are not projected to be ready for college-level coursework. To take a transitional math course, a student must have earned at least a D in Algebra I, Geometry and Algebra II, or Integrated Math 1, 2 and 3.

**Enrollment Criteria:**
The authority to enroll a student into the transitions math course ultimately rests with the student’s high school and/or school district. Because of the often high-stakes nature and subjectivity of certain metrics, the Indiana Department of Education recommends schools use multiple measures to place students. These measures can include, but are not limited to, PSAT math scores; SAT math scores; ACT math scores; cumulative high school GPA; Algebra I, Geometry and/or Algebra II grades; ISTEP scores and/or teacher recommendations.

**Successful Completion and College-Readiness Designation:**
Success in the transition course will be measured based on a student’s course grade. Students must complete the course with an A or B grade, with a final assessment counting for at least 20% of the final grade, to be eligible for placement directly in credit-bearing coursework in higher education. All high schools offering the transition math course will use common, state-approved curricula and assessments, that were selected and validated by both K-12 and postsecondary educators. Only schools using these materials, and meeting the other specified criteria, will enable their successful students to place directly into entry-level credit-bearing courses in math. For the pilot, Ivy Tech Community College has committed to allow students that successfully complete the Accelerating to College course to place directly into the MATH 123 Quantitative Reasoning course, without the need for remediation, at any of their participating campuses. Participating pilot schools will be required to adhere to a series of expectations that have been collaboratively set by IDOE, the Indiana Commission for Higher Education and Ivy Tech Community College.

To utilize any college-readiness designation obtained through the transition, successful students are expected to remain continuously enrolled in mathematics through high school graduation and to enroll in an associated gateway mathematics course within two years of completion of the postsecondary transitions course.
**Course Description:**
This course addresses a variety of mathematical topics (see Mathematics Content Standards) needed to prepare students to be successful in college-level mathematics. In this course students will connect and use multiple strands of mathematics in situations and problems, as well as in the study of other disciplines. In addition, this course will include mathematical process standards and college success competencies. The mathematical process standards describe ways in which students are expected to engage in the content, and the college success competencies describe how the curriculum should promote a positive and productive disposition for learning mathematics.

**Mathematics Content Standards:**
Students will be able to use the language, symbols, and structure of algebra to investigate, represent, and solve problems.

a. **Proportional Reasoning**
   i. Model real-world situations using ratios in a variety of forms—including, percentages, fractions, and decimals—and be able to determine when a proportional relationship exists between two values.
   ii. Apply direct and indirect variation to model and solve problems.
   iii. Understand unit rates and use dimensional analysis to convert between units of measurement and to solve problems involving multiple units of measurement.

b. **Algebraic Equations**
   i. Analyze real-world situations and use variables to construct and solve equations or inequalities involving one or more unknown variables.
   ii. Construct and use linear, piecewise-linear, quadratic, exponential, rational and square root equations to model and solve problems.

c. **Functions and Modeling**
   i. Understand the concepts of function, domain, range and graph of a function.
   ii. Combine functions using addition/subtraction, multiplication/division, and composition to construct new functions to model and solve problems.
   iii. Understand the relationship between a function and its inverse, abstractly and in a real-world context.
   iv. Recognize, graph, and understand the common features of linear, exponential, quadratic, rational, and radical functions.
   v. Use linear, piecewise-linear, exponential, quadratic, rational, and square root functions to model and solve real-world applications.

d. **Probabilistic/Statistical Reasoning**
   i. Create, compare, and evaluate different graphical displays of the same data—including, histograms, frequency polygons, cumulative frequency distributions, pie charts, scatterplots, stem-and-leaf plots, and box-and-whisker plots.
   ii. Compute and interpret mean, median, mode, weighted mean, variance, and standard deviation for populations and samples.
   iii. Apply basic probability, combinatorics, independence/dependence, conditional probabilities and expected value to model outcomes of real-world situations.
Mathematical Process Standards:
The student is expected to use mathematical processes to acquire or demonstrate mathematical understanding, including to:

a. Make sense of problems and persevere in solving them.
b. Reason abstractly and quantitatively.
c. Construct viable arguments and critique the reasoning of others.
d. Model with mathematics.
e. Use appropriate tools strategically.
f. Attend to precision.
g. Look for and make use structure.
h. Look for and express regularity in repeated reasoning.

College Success Competencies:
In addition to the above mathematics content, this course should promote a positive and productive disposition towards learning mathematics. Transition course curricula should explicitly embed content to support student understanding of:

a. Growth versus Fixed Mindset Theory
b. Study Skills and Productive Persistence
c. College and Career Opportunities and Goal Setting
d. Teamwork and Active, Collaborative Learning

Transition Course Curriculum:
To promote quality and consistency of implementation across Indiana public schools, school districts delivering this course are required to use pre-identified curriculum and assessments spanning the standards and competencies listed above. The required curriculum is “Bridge to College Mathematics,” Developed by Washington’s Office of Superintendent of Public Instruction.

Professional Development for Teachers:
To support teachers in making the best use of this new curriculum, participating teachers are required to undergo prior and ongoing professional development specifically tied to the required curriculum.

Course Changes:
Any changes to the course curricula, assessments, or professional development must be done in concert with representatives of Indiana higher education and go through the appropriate review process used by institutions or the state.

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