The Mathematics of Pace

By Jim DeWilde, Associate Director, WWU Financial Aid Department

You have all integrated the quantitative standard of Pace into your Satisfactory Academic Progress policies. Have you wondered, though, how to determine the credits a student must complete at a 100% completion rate to get back on Pace after falling below your school's quantitative standard for Pace? You likely have a web calculator or spreadsheet to get the answer, but let's have some fun with math as we take a look at the Mathematics of Pace to answer the question.

$$\boldsymbol{b = 4a - 5c}$$

This simple and elegant equation describes the number of credits (or clock-hours) needed to get back on Pace for a school using an 80% pace of completion requirement (common for schools with a 125% maximum timeframe quantitative measure). For schools using a 67% pace of completion requirement (and a 150% maximum timeframe), the formula is not quite as elegant as you will read below. Schools that use a modified or graduated pace requirement will need a multistep approach that goes beyond a simple equation.

In this equation ***a*** is the number of **attempted** credits and ***c*** is the number of **completed** credits. The value ***b*** is the number of credits a student must take at a 100% rate of completion to get back on pace (e.g., no more withdrawals, incompletes, or failures – the plan is to pass all coursework!) For example, if a student attempts 100 credits and completes 65 credits for a 65% pace, then ***b*** is 75 credits (4*100 – 5*65 = 75). If our student successfully completes the 75 additional credits, the resulting completed credits is 140 and the attempted credits become 175 to achieve an 80% pace (140/175 = 0.8, or 80%)!

Here is the algebra leading to the solution:

Pace requirement = 80% (generally used by schools with a 125% maximum timeframe)
Let a = attempted credits,
Let c = completed credits
Let b = the number of credits that must be completed at 100% to achieve an 80% Pace once Pace falls below 80%.

Find b for any given a or c when Pace is less than 80%.

$$\frac{c+b}{a+b} = 80\%$$

$$c + b = 0.8(a + b)$$

$$b = 0.8a + 0.8b - c$$

$$b - 0.8b = 0.8a - c$$

$$0.2b = 0.8a - c$$

$$b = \frac{0.8a - c}{0.2}$$

$$b = \frac{0.8a}{0.2} - \frac{c}{0.2}$$

$$b = 4a - 5c$$

So, there it is! This formula can be used in a web-based calculator or a spreadsheet where you or a student can input current attempted and completed credits to then know how many additional credits – with 100% completion – are needed to get back on 80% pace.

What about the 67% Pace of Completion?

The algebra is the same, but the 67% value introduces extra decimals and rounding issues. Here are the steps to get to the equation:

Pace requirement: 67%
Let a = attempted credits
Let c = completed credits
Let b = the number of credits that must be completed at 100% to achieve a 67% Pace once Pace falls below 67%.

Find ***b*** for any given ***a*** or ***c*** when Pace is less than 67%

$$\frac{c + b}{a + b} = 67\%$$

$$c + b = 0.67(a + b)$$

$$b = 0.67a + 0.67b - c$$

$$b - 0.67b = 0.67a - c$$

$$0.33b = 0.67a - c$$

$$b = \frac{0.67a - c}{0.33}$$

and finally,

$$b = \lceil \frac{0.67a - c}{0.33} \rceil$$

where the $\lceil \rceil$ brackets represent the ceiling function meaning that b is the smallest integer greater than the calculated result. The ceiling function gives ***b*** as a whole number since credits and hours are not awarded in fractional amounts. Spreadsheets and web programming code have functions to take care of this rounding-up task.

Well, that was fun! And we answered the age-old question, “well I ever need algebra again in my life?”

Western Washington University has a Pace calculator that uses the 80% equation so students can create accurate academic plans leading them back to satisfactory Pace. The calculator is available online at http://www.finaid.wwu.edu/client_services/pages/pace_calculator.php in case you would like to test it out.