Transition to College Mathematics, 2015-2016
Course outline

Unit 1

- **Topic 1: Getting Started**
    - Build the foundations for our success -- *Student success focus*
    - How big is a billion -- *Quantitative reasoning, large numbers*
    - Building a learning community -- *Student success focus*
    - How big is a billion (cont.) -- *Quantitative reasoning, large numbers*
    - Building a learning community (cont.) -- *Student success focus*
    - Creating success teams and working groups -- *Working in groups in a mathematics class*

- **Topic 2: Ratios and numbers**
    - Doubling population -- *Large numbers, doubling, rates*, *Introduction to note taking*
    - Scientific notation -- *Representing numbers in scientific notation, converting back to standard notation*
    - Ratios in water use -- *Large numbers, ratios, scientific notation*
    - Analyzing water footprints -- *Scientific notation, ratios*

- **Topic 3: Using numbers**
    - Large numbers in the media -- *Misinformation, strategies for testing information*
    - Seeking help -- *Student success focus*: *Campus resources, seeking and offering help*
    - Estimating sales prices -- *Estimation, benchmark percentages*
    - Calculating sales prices -- *Calculating, using estimation to heck reasonableness*
    - Developing self-regulation -- *Student success focus*

- **Topic 4: Charts and spreadsheets**
    - Budgeting operations -- *Use of order of operations, properties, pie charts*
    - Budgeting with spreadsheets -- *Algebraic reasoning through the use of spreadsheet formulas*
    - Graph analysis -- *Introduction to visual displays, misleading scale, relative change over time*
    - Using graphs to understand change -- *Relative size*
    - Preparing for an exam -- *Student success focus*

Unit 2

- **Topic 5: Displaying data**
    - The plastic brain and smart thinking -- *Student success focus*
    - Displaying table data -- *Stem-and-leaf plots, back-to-back comparison*
    - Relative frequency tables -- *Construct and analyze frequency, relative frequency, cumulative frequency*
    - Displaying data: Histograms -- *Convert frequency table from histograms*
    - Shapes of distribution -- *Dot plots used to introduce symmetry and skewness*

- **Topic 6: Statistical summaries**
    - Measures of central tendency -- *Mean, median, mode, conclusions from statistical summaries, create data sets to meet criterion*
    - Brain power --*Student success focus: How the brain learns*
    - Making decisions with data -- *Use statistical summaries to make decisions*
    - Boxplots -- *Analyze a data set via five-number summary*

- **Topic 7: Credit and tax**
    - The credit crunch -- *Reading strategies to understand financial information*

- o More credit crunch -- *Estimate and calculate credit card interest*
- o A taxing situation -- *Understand and complete tax forms*
- o A taxing situation (Continued) -- *Convert the tax instructions into mathematical expressions*
- o Creating motivation goals -- *Student success focus*

- **Topic 8: Determining probabilities**
  - o Using Venn diagrams
  - o Using tree diagrams
  - o Using area models
  - o All-American breakfast choices
  - o Probability in games (Optional)
  - o Driving and risk (Optional)

- **Topic 9: Risk**
  - o What's the risk? -- *Absolute and relative measures of risk, comparing fraction and decimal forms*
  - o An apple a day -- *Evaluate measures of risk*
  - o Reducing the risk -- *Percentages, risk reduction*
  - o Is reducing the risk worth it? -- *Evaluation risk reduction vs. side effects*

- **Topic 10: Analyzing data**
  - o Comparing categorical data -- *Two-way tables, importance of base value*
  - o Interpreting percentages -- *Analysis of abstract information*
  - o Do you trust the test? -- *Two-way tables, accuracy in test results*
  - o Do you trust the test? (Continued) -- *Two-way tables, false-positive and false-negative test results*
  - o Managing priorities and time
  - o Preparing to do well on exams
  - o Where we've been, Where we're going
  - o Midterm exam
  - o Midterm exam debrief

Unit 3

- **Topic 11: Proportions**
  - o Metacognition
  - o Identifying important information as you read
  - o Population density -- *Ratios, proportional reasoning*
  - o Density proportions -- *Scaling, dimensional analysis*
  - o State population densities (Optional) -- *Estimation strategies, optional spreadsheet use*
  - o Apportionment -- *Effect of relative change on representation*

- **Topic 12: Working with geometric formulas**
  - o Formulating a plan -- *Variables, evaluate expressions (geometric formulas)*
  - o The costs of geometry -- *Building on work with formulas*
  - o Modifying and combining formulas -- *Semicircle area, volume*

- **Topic 13: Multi-step problems**
  - o Texting distance -- *Dimensional analysis*
  - o The cost of driving -- *Unit rates to compare two options*

- o The true cost of driving -- *Multiple pieces of information, multiple step work*

- o Can the true cost vary? -- *Concrete to abstract approach to a system*

- **Topic 14: Algebraic formulas**

    - o Algebra reaction -- *More complex, unfamiliar formulas*

    - o Breaking down a formula -- *Reading to understand/apply a complex formula*

    - o Analyzing change in variables -- *Analyze effect of changing values of one variable while other variables remain fixed*

    - o Analyzing change in variables (Continued) -- *Analyze effect of changing values of one variable while other variables remain fixed*

- **Topic 15: Problem solving**

    - o Body mass index -- *Evaluate and record sequence of steps (multiplication and division only)*

    - o Target weight -- *Given target output, undo steps to find input value*

    - o Blood alcohol content -- *Evaluate and record sequence of steps (multiplication/division and addition/subtraction)*

    - o Balancing blood alcohol -- *Given target output, undo steps to find input value*

Unit 4

- **Topic 16: Proportional reasoning**

    - o Career project

    - o Proportional reasoning in art -- *Determine whether proportions are equivalent*

    - o Proportion solutions -- *Solve algebraic proportions*

    - o Solving equations -- *Additional practice with solving*

    - o More work with equations -- *Equations chosen by instructor*

    - o Proportional viewing

- **Topic 17: Rates**

    - o Describing rates -- *Slope as a unit rate (y-intercept = 0)*

    - o Comparing rates -- *Compare/contrast slopes (y-intercept = 0)*

    - o Interpreting change -- *Calculating slope from points, (y-intercept $\neq$ 0)*

    - o Where do we start? -- *Calculating y-intercept by backing out the effect of the variable term.*

    - o Predicting costs -- *Formalizing the calculation of y-intercept*

- **Topic 18: Linear relationships**

    - o Expressing linear relationships -- *Graphs, tables, algebraic, and verbal representations intersecting lines*

    - o Taxi ride -- *Algebraic inequalities*

    - o Shopping -- *Algebraic inequalities*

    - o First-aid supplies -- *Algebraic inequalities*

    - o Making the call -- *Using multiple representations to make decisions*

    - o Close enough -- *Scatterplots and trend lines*

    - o Predicting budget increases -- *Using a trend line to interpolate and extrapolate*

Unit 5

- **Topic 19: Non-linear functions and equations**

    - o Home improvements -- *Quadratic functions*

    - o Window panes -- *Polynomials and system of linear equations*

    - o I can see forever -- *Square root functions*

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- o I was going how fast? -- *Square root functions*

- o Tic Toc -- *Square root functions*

- o Comparing linear and exponential models -- *Exponential functions*

- o College tuition -- *Exponential functions*

- o Bright lights -- *Exponential functions*

- o Paintings on a wall -- *Rational functions*

- o Saline solution -- *Rational functions*

- o Median income (*Optional*) -- *Comparing linear and exponential growth*

- o E.Coli growth (*Optional*) -- *Exponential functions*

- o Space debris (*Optional*) -- *Exponential functions*

- **Topic 20: Finance**

  - o Pricing your product -- *Developing formulas for product markups and discounts*

  - o Backing out the sales tax -- *Determining the original amount, Note: Optional mini-project available*

  - o Compound interest makes cents -- *Develop exponential formula for annual interest*

  - o Long-term growth -- *Continue work with annual compounding*

- **Topic 21: Borrowing money**

  - o More compounding -- *Compounding monthly then abstract to general form*

  - o Depreciation -- *Exponential decay, Note: Optional project available*

  - o Payday loans -- *Effect of extremely high interest*

  - o Neither a borrower . . . -- *Linear loan model*

  - o Credit card repayment (Optional) -- *Effect of making minimum payments*

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