
Exam 1 Topics

The following is a list of ideas/concepts that may or may not show up on exam 1. Note that this list may not be complete. Additionally, ideas are carried through multiple sections. This list will not account for that, so make sure that when appropriate you can talk about say a 1.4 concept in context of a 3.3 situation, for example. Anything covered in class or on homework is fair game. There will be no notes, books, or calculators allowed for the exam. You will only need yourself and a writing utensil.

1.1: Variables and Constants

- Definitions: variable, constant, natural numbers, integers, rational numbers, irrational numbers, real numbers, numerator, denominator, mean
- Be able to identify a variable or a constant written algebraically or in context of a given situation
- Be able to identify what type of number you are given
- Be able to plot numbers on a number line
- Be able to compute the mean of a set of data
- Be able to interpret a value for a variable in context (i.e. If g = gallons of gas used, then what does $g = 5$ mean?)

1.2: Scattergrams

- Definitions: ordered pair, coordinate, axes, independent variable, dependent variable
- Be able to identify which variable is independent and which variable is dependent
- Be able to identify the x -coordinate or the y -coordinate in a table, ordered pair, or scattergram
- Be able to describe what an ordered pair represents in context of the given situation
- Be able to create/read a scattergram of data given
- Be able to create/read a bar graph when appropriate
- Understand when a scattergram is appropriate and when a bar graph is appropriate

1.3: Exact Linear Relationships

- Definitions: linearly related, linear model, input, output, x -intercept, y -intercept
- Be able to identify inputs and outputs for a given situation, ordered pair, table, or graph
- Be able to identify the x or y intercept(s) given a table or graph
- Be able to describe what the x or y intercept(s) mean in a given situation
- Be able to determine if data is linearly related
- Be able to fit a linear model to a set of data

1.4: Approximate Linear Relationships

- Definitions: approximately linearly related, interpolation, extrapolation, model breakdown
- Be able to determine if data is linearly related or approximately linearly related
- Be able to fit a model to data that is approximately linearly related
- Be able to use the graph of a model to determine when certain inputs or outputs happen
- Be able to determine if interpolation or extrapolation is used to determine a specific output
- Be able to determine if results found from using a model are overestimates or underestimates
- Be able to determine when or if model breakdown will occur

2.1: Expressions

- Definitions: expression, product, quotient, sum, difference
- Be able to identify an expression
- Be able to identify which variables/constants are used in expressions
- Be able to use words to describe an algebraic expression
- Be able to use an algebraic expression to describe words
- Be able to determine an expression to describe a given situation

2.2: Operations with Fractions

- Definitions: prime number, simplified (for a fraction), reciprocal
- Be able to write a number as a product of prime factors
- Be able to add, subtract, multiply, and divide positive rational numbers
- Understand what it means to multiply by 0 or by 1
- Understand that you can not divide by 0

2.3/2.4: Adding/Subtracting Real Numbers

- Definitions: opposites, absolute value, change in quantity
- Be able to find the opposite of a number
- Be able to find the absolute value of a number
- Be able to add/subtract real numbers (know how to handle negatives)
- Be able to find the change in quantity for a given situation
- Understand what it means to get a positive/negative change in quantity

2.5: Ratios, Percents, and Multiplyin and Dividing Real Numbers

- Definitions: ratio, unit ratio, percent
- Be able to find and interpret the ratio for two quantities or a given situation
- Be able to find and interpret the unit ratio for two quantities or a given situation
- Be able to convert a percentage to a decimal
- Be able to convert a decimal to a percentage
- Be able to find what percent of the whole a certain portion represents
- Be able to determine how much is needed to equal a certain percentage of a given amount
- Be able to multiply and divide real numbers (know how to handle negatives)

2.6: Exponents and Order of Operations

- Definitions: exponent, base
- Be able to compute powers of numbers
- Be able to identify an exponent or a base when appropriate
- Be able to simplify expressions using arithmetic operations done in the correct order
- Understand that PEMDAS is not a guarantee of simplifying in the correct order
- Understand that mathematical expressions should be read left to right as we do with sentences in english

3.1: Graphing Equations of the Form $y = mx + b$

- Definitions: equation, solution, solution set, graph
- Be able to identify equations
- Be able to identify whether an ordered pair is a solution to an equation
- Be able to graph a line using a table and a given equation
- Understand that graphs of equations of the form $y = mx + b$ and $x = a$ are lines
- Understand that b represents the y -intercept
- Understand how the sign of m affects the line

3.2: Graphing Linear Models; Unit Analysis

- Definitions: unit analysis
- Be able to use the rule of four on a given situation
- Be able to find an equation for a linear model
- Be able to perform a unit analysis on a linear model

3.3: Slope of a Line

- Definitions: slope, increasing, decreasing
- Be able to compute the slope of a line given two points on the line
- Be able to find an equation for a line given two points and a y -intercept
- Be able to find an equation for a line using the slope and the graph of the line
- Understand that the slope is a ratio of rise to run, and thus is a measure of steepness
- Be able to compare slopes of lines given only the graphs
- Be able to sketch a line with given conditions on the slope and/or y -intercept

3.4: Using Slope to Graph Linear Equations

- Definitions: parallel, perpendicular
- Be able to graph a line given the equation and using the slope and y -intercept
- Be able to graph a line given the slope and a point on the line
- Be able to identify lines as either parallel, perpendicular, or neither.
- Be able to find an equation for a line parallel to a given line
- Be able to find an equation for a line perpendicular to a given line

3.5: Rate of Change

- Definitions: rate of change, average rate of change
- Be able to compute the rate of change of y with respect to x
- Be able to determine whether a rate of change represents a constant rate of change or an average rate of change
- Be able to interpret the rate of change in context of the situation
- Understand that slope is a constant rate of change
- Be able to determine if a table represents a line by using the idea of slope as a constant rate of change