Section 1.5

Subtracting Real Numbers
Section objectives

- Subtracting real numbers
- Evaluate algebraic expressions using real numbers
- Determine whether a given number is a solution to an equation
- Solve problems that involve subtraction of real numbers
- Find complementary and supplementary angles
- Vocabulary: complementary angles; supplementary angles
Subtracting real numbers

- We know that $9 - 7 = 2$
- We also know that $9 + (-7) = 2$, by adding two real numbers that don’t have the same sign
- So the difference of 9 and 7 is the same as the sum of 9 and -7.
- This seems obvious to us. This same theory holds true when we involve variables in the algebraic expression:

- If $a$ and $b$ are real numbers, then $a - b = a + (-b)$
Subtract real numbers

-8 – 4

11 – 18

-15 – (-10)

-12 – 12

15/7 – (-9/14)
Simplify each expression; 1 step at a time

-3 + ((-2 - 5) - 2)

2³ - 10 + (-6 - (-5))
Evaluating algebraic expressions

- It is important to learn this skill, to help check solutions of equations.
- Find the value for each expression when $x = 2$ and $y = -5$:
  - $X^2 - y$
  - $(x - y)/(12 + x)$
Evaluate each when $x=-3, y=-7, \& z=9$

- $X - y$
- $(10 - x) \div (y - 2)$
- $|x| + |y| - |z|$
- $X^2 - y$
If you tend to get confused when substituting variables with values, first place parenthesis around any variables

Evaluate \( x^2 - y \), where \( x \) is 2 and \( y \) is -5

\[ X^2 - y = (x)^2 - (y) = (2)^2 - (-5) = (2 \times 2) - (-5) = 4 - (-5) \]
\[ = 4 + 5 = 9 \]
A solution of an equation is a value for the variable that makes the equation true.

Determine if \(-4\) is a solution of \(x - 5 = -9\).

Replace \(x\) with \(-4\) and see if the true statement results:
Determine whether the given number is a solution of the given equation:

- Solving equations – ISOLATE the variable
- \( X + 8 = 14; \ X = -5 \)

- \( Y - 8 = 17; \ Y = -9 \)

- \( -x + 7 = x + 11; \ x = -2 \)
Solving subtraction problems

- Mt. Everest is 29,035 feet above sea level
- Dead Sea is 1,349 feet below sea level
- What is the difference in elevation between the two points?
- The word “difference” implies subtraction
- The elevation of Dead Sea is written as a negative -1,349
- \( 29,035 - (-1,349) = ? \)
Solve

In a game of cards, Alicia won 11 chips, lost 6 chips, won 3 more chips, lost 14 chips, and won 1 chip. What was her final count of chips?
Finding complementary and supplementary angles

- Geometric concepts are used by doctors, nurses, carpenters, electronic technicians, gardeners, machinists, pilots, etc.
- Pg. 41 in the book for diagrams of complementary and supplementary angles
- Two angles are complementary if the sum of their angles is $90^\circ$
- A 90 degree angle is a ‘right angle’
- Two angles are supplementary if the sum of their angles is $180^\circ$
- A 180 angle is a straight line
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- Two complementary angles, one is 38°. What’s the other?
- Complementary angles add up to be?
- So the difference between the two is ___ - 38° = ?

- Two supplementary angles, one is 62°. What’s the other?
- Supplementary angles add up to be?
- So the difference between the two is ______ - 62° = ?
Find the complementary or supplementary angle:

- Supplementary, 42°
- Complimentary, 53°
As many as 30% of college students struggle with math anxiety.

As with any psychological therapy, one must go back in the past to pinpoint when the anxiety first started.

Page 26: take 10 minutes (more if needed) to reflect on your past math experiences. If there was a specific time or subject that started to give you difficulty, write it down, and explain how you reacted immediately afterward.
Symptoms of Math Anxiety

- Math Avoidance – treating math situations and math class differently than you would treat other classes and situations

- Do you change your personal habits and behaviors when it comes to math?

- Avoidance tends to snowball – the more you avoid it, the worse you will do, which only encourages you to further avoid it
Symptoms of Math Anxiety

- Poor exam performance – freezing up on math tests
- Freezing on one test, left unchecked, will make freezing on subsequent tests more likely
- Why does this happen?
  - Usually an unpleasant past experience triggers negative feelings when it comes to doing math
  - Society definitely contributes to the notion that math is hard; only for geeks; and is not worth the effort for ‘normal’ people
  - Since society considers math ‘hard’, then it is (unfairly) used as a yardstick for intelligence – which only adds to the pressure to succeed
The Physiology of Attitude

- Math anxiety can cause negative thoughts to dominate your mind when you need to do your best at math.
- Anxiety is a state of mind that causes chemicals in your brain that trigger the ‘flight-or-fight’ response.
- It is almost impossible to concentrate on a task when all you want to do is run or fight.
- You have to take control over your thoughts, to stop thinking negatively, to avoid the ‘flight-or-fight’ panic.
- This is more common with people who take their education very seriously.
So, what’s the cure?

- Like hitting golf balls or running on a treadmill – do a little math every day – avoid going into one marathon session
- Do NOT skip class – coming to class may or may not build confidence, but *missing* classes erodes confidence
- Be organized – you will always have questions, forget concepts – know where you can find the answers
- Practice quizzing yourself – don’t let the class exam be the first time you tried to test yourself
- Don’t overstudy – 3 to 4 hours total a week is usually enough
- Reset your mind – mentally go over things you DO know
- Replace negative self-talk
- Use all the resources you have – study groups are helpful
Tips for the day of the test

- Develop a routine – wake up at same time, eat at same times, sit in same place
- Get to class a few minutes early – take deep breaths
- Once you get the test, count the number of problems and figure out how much time you can spend on each (25 problems, 50 minutes = 2 minutes a problem)
- If you get to a problem that is too hard at first – skip it, do the next problems, and go back to it in the end
- If you totally get lost, go back to the easiest problems, think about them for a minute – the hard stuff may come back in your mind then
- Show all your work – teachers like to see that you put out the effort, even if the answer is wrong
Math is Useless?

- The government feels the most important subject to teach is English. The second most important subject? It starts with an ‘M’, if you need a hint.
- Math is the foundation for all sciences – can’t do anything scientific without it.
- What if you aren’t going to be a scientist?
- Employers want to hire well-rounded candidates, and proof of math proficiency is a positive sign.
- Math sharpens the mind, especially your powers of reasoning, which applies to your everyday life.
- At the very least...you want to know how to read your bank statements. Can’t do that without math.