Session 1

Chapter 1 Prealgebra 1 Recap

Week₁
1.1 Order of Operations
1.2 Greatest Common Factor (gcf)
1.3 Least Common Multiple (lcm)

Week₂
1.4 Arithmetic Operations with Fractions and Decimals

Week₃
1.5 Algebraic Expressions

Week₄
1.6 Percent, Percent Increase or Decrease

Week₅
Mixed Review and Quiz #1

Chapter 2 Linear Equations, Inequalities, and Ratios

Week₆
2.1 Solving Linear Equations with fraction and decimal coefficients
2.2 Solving Equations with absolute values
2.3 Solving inequalities

Week₇
2.4 Ratios
   2.4.1 Multi-Way Ratios
   2.4.2 Speed and Rate

Chapter 3 Complex Fractions and Repeating Decimals

Week₈
3.1 Complex Fractions
3.2 Repeating Decimals

Week₉
Mixed Review and Quiz #2
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Chapter 4 Introduction to Graphing and Statistics

Week ⑩
4.1 Tables, Pie Charts, and Pictographs

Week ⑪
4.2 Bar Graphs (Charts), Line Graphs (Charts), and Stem-and-Leaf Plot

Week ⑫
4.3 Mean, Median, Mode, and Range

Chapter 5 Graphing Linear Equations

Week ⑬
5.1 Coordinate Plane
5.2 Slope-Intercept Form \( y = mx + b \) and Standard Form \( Ax + By = C \)

Week ⑭ Review and Final Exam

Week ⑮
5.3 Final Exam Recap
5.4 Graph Linear Equations Using \( X \) and \( Y \) Intercepts
Session 2

Chapter 6  Problem Solving Strategies

Week ①
6.1 Mixed Review and Problem Solving Strategy I

Week ②
6.2 Mixed Review and Problem Solving Strategy II

Week ③
6.3 Mixed Review and Problem Solving Strategy III

Week ④
6.4 Mixed Review and Problem Solving Strategy IV

Week ⑤
6.5 Mixed Review and Problem Solving Strategy V

Chapter 7  Basic Geometry

Week ⑥
7.1 Line and Angles

(Week 6, last 60 minutes, Quiz #1)

Week ⑦
7.2 Parallel Lines, Perimeters and Areas
   7.2.1 Parallel Lines
   7.2.2 Perimeters
   7.2.3 Areas

Week ⑧
7.3 Circumference and Area of Circles
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Chapter 8  Triangles

Week ⑨
8.1 Triangles
   8.1.1 Triangles
   8.1.2 Isosceles and Equilateral Triangles
   8.1.3 Polygons

Week ⑩
8.2 Right Triangles and Pythagorean Theorem

Chapter 9  Basic Counting

Week ⑪
9.1 Basic Counting
9.2 The Multiplication Principle

(Week 11, last 60 minutes, Quiz #2)

Week ⑫
9.3 Counting by Cases

Week ⑬
9.4 Counting Geometric Shapes

Week ⑭  Final Exam

Chapter 10  Introduction to Probability

Week ⑮
10.1 Final Exam Recap
10.2 Probability
Session 1 Week 2
Arithmetic Operations with Fractions and Decimals

1. Evaluate and simplify the following:
   (a) \( \frac{6}{10} + \frac{33}{55} \)
   (b) \( 3 \frac{1}{3} - \frac{10}{5} \)

2. Simplify \( 5 \frac{1}{6} - 2 \frac{1}{3} \).

3. Evaluate \( \frac{22}{7} \div 2 \frac{3}{4} \times 3 \frac{1}{8} \).

4. Arrange the following numbers from the smallest to the largest:
   0.99, 0.9099, \( \frac{9}{10} \), 0.909, 0.9009.

5. Evaluate
   (a) \( 3 - 0.27 + 0.002 + 0.40 \)
   (b) \( 0.3 - 0.03 + 0.003 \)

6. Evaluate the following:
   (a) \( 1.26 \div 4.5 \div 0.12 \)
   (b) \( 1.2 + 8.8 \div (0.05 \times 40) \)

7. Evaluate
   (a) \( 0.973568 \times 1000 \)
   (b) \( 9735.68 \div 10000 \)

8. Express the sum \( \frac{1}{2} + \frac{0.1}{2} + \frac{1}{0.2} \) as a decimal.

9. Which number is greater, \( \frac{506}{101} \) or \( \frac{509}{102} \)?

10. Find the following:
    (a) What number is \( \frac{3}{4} \) of \( \frac{8}{9} \) of 210?
    (b) What is \( \frac{1}{2} \) of \( \frac{2}{3} \) of \( \frac{3}{4} \) of \( \frac{4}{5} \) of 500?

11. Find the value of the following:
    (a) \( 60 \) is \( \frac{2}{3} \) of what number?
    (b) \( \frac{9}{7} \) is \( \frac{2}{3} \) of what number?

12. Peter’s family ordered a 12-slice pizza for dinner. Peter ate two slices and shared another slice equally with his brother Paul. What fraction of the pizza did Peter eat?

13. Find the gcf and lcm of \( (700, 35, 130) \).
14. Terry has between 50 and 100 pennies in her piggy bank. She can count them 2 at a time and come out even. She can also count 3 or 5 at a time and come out even. She cannot count them 4 at a time and come out even. How many pennies does Terry have in her piggy bank?

15. The product of two natural numbers is 1400, and each of the numbers is divisible by 10. However, neither of the two numbers is 10. What is the larger of the two numbers?
Session 1  Week 2  Key Points #S1-02

(a) **Absolute Value**: how far a number from zero. \(|-7| = 7\), \(|7| = 7\), \(|-\frac{1}{3}| = \frac{1}{3}\).

(b) **Subtracting Fractions**: find the LCM for the denominators, then subtract numerators, and simplify the results.

(c) **Multiplying fractions**: multiply numerators and denominators separately, then simplify.

(d) **Dividing by a fraction**: multiply by the reciprocal of the divisor, then simplify.

(e) If \(a\) is not zero, then \(\frac{0}{a} = 0\), \(\frac{a}{a} = 1\).

(f) \(\frac{a}{1} = a\).

(g) **Adding/Subtracting Decimal Numbers**: align the decimal, and then add/subtract.

(h) **Multiplying a Decimal Number by 10, 100, 1000, ⋯**: move the decimal point to the right by one place, two places, three places, ⋯.

(i) **Dividing a Decimal Number by 10, 100, 1000, ⋯**: move the decimal point to the left by one place, two places, three places, ⋯.

(j) **Multiplying a Decimal Number by a Decimal Number**: find the product as with the whole numbers, and then fix the decimal point according to the total number of places in the two numbers.

(k) **Dividing a Decimal Number by a Decimal Number**: convert the divisor to whole number, and then move the decimal point in the dividend the same number of places to the right as in the divisor. Then perform the division.

(l) **Rounding Numbers**: if the digit is 5 or above, round up, otherwise round down.

(m) **Converting a decimal number to a fraction**: write the decimal number into an equivalent fraction by making the numerator the number itself and the denominator 1. Then multiply both the numerator and the denominator with a number (usually 10, 100, or 1000, ⋯ depending on how many decimal digits the number has) which makes the numerator an integer. Simplify the result.

(n) **Convert a fraction to a decimal number**: divide the numerator by the denominator.
Session 1  Week ②  Homework #S1-02

1. Arrange $\frac{11}{12}$, $\frac{5}{8}$, $\frac{4}{15}$ in ascending order (the smallest to the largest).

2. Evaluate $\left(2 \cdot \frac{1}{4} + 3 \cdot \frac{1}{2}\right) \div \frac{1}{8}$.

3. Simplify $2 \times \frac{22}{7} \times \frac{21}{4}$.

4. Find the values of $5 \times (2 + 0.2) - 4 \div 16$.

5. Amanda used a calculator to find the product of 0.075 and 2.058. She forgot to enter the decimal points. The calculator showed 154350. If Amy had entered the decimal points correctly, what would the answer have been?

6. Evaluate $3 \times 5.25 \div \left(0.7 - \frac{1}{4}\right)$.

7. Find the gcf and lcm of 4, 8, 16, 20.

8. Evaluate $\frac{4}{5} \times 0.09 \div 0.00072$.

9. Simplify $\frac{1}{3} + \frac{2}{5} + \frac{3}{4} + \frac{5}{6} + \frac{1}{6} + \frac{2}{3} + \frac{1}{4} + \frac{3}{5}$.

10. Find the sum of
    \[
    \left(\frac{1}{5}\right)\text{ of } 6 \frac{2}{3} + \left(\frac{1}{4}\right)\text{ of } 3 \frac{1}{5}.
    \]

11. Find the value of $\frac{1}{6} + \frac{1}{60} + \frac{1}{600}$.

12. Simplify and express as a common fraction: $0.5 \times \frac{2}{5} \times 0.75 \times 0.6 \times \frac{2}{9}$.

13. When 0.000315 is multiplied by 7,928,564, the product is closest to which of the following?
    (a) 210  (b) 240  (c) 2100  (d) 2400  (e) 24000

14. A lake is 18.47 meters deep at the beginning of the year. The annual rainfall is 0.67 meters and the annual evaporation is 0.24 meters. The lake at the end of that year is ____ meters.

15. $5!$ means $5 \times 4 \times 3 \times 2 \times 1 = 120$. Similarly, $3!$ means $3 \times 2 \times 1 = 6$. How much larger is $4! - 3!$ than $3! - 2!$?
Session 1 Week ②
Mean, Median, Mode, and Range

1. Former NBA superstar Michael Jordan scored 32,292 points in 1,072 games. What was his average number of points scored per game? Round your answer to the nearest tenth.

2. In the first three of four tests in a Prealgebra class, Isaac scored 87, 92, and 85. What must he score on the fourth test to raise his average to 90?

3. In their first 5 games in 2017 – 18 season, Dallas Mavericks averaged 99.2 points per game. In their next 5 games, the Mavericks averaged 96.4 points. What was the Mavericks’ average score for the first 10 games?

4. According to ESPN.com, in the last 7 games of 2017 – 18 season, Dallas Mavericks scored: 92, 87, 115, 100, 106, 97, 97. Find the average, median, mode, and range of the points scored in last 7 games.

5. After trick-or-treating, Melinda put all her candies into five bags. The numbers of pieces in the bags are 13, 15, 19, 21, and 22.
   (a) What is the average number of pieces per bag?
   (b) Melinda’s mother added 5 pieces of candy to each bag. Now what is the average number of pieces per bag? Can you find a quick way to calculate? Explain your approach.

6. Find the average of following 5 numbers:
   9457516, 9457514, 9457522, 9457535, 9457523.

7. The average of 6 numbers is 20. If the 1st number is increased by 1, the 2nd number by 2, the 3rd number by 3, the 4th number by 4, the 5th number by 5, the 6th number by 6, then what is the average of the list of increased numbers?

8. The mean of a set of 5 different positive integers is 21. The median is 25. What is the maximum possible value of the largest of these 5 integers?

9. The mean, median, and mode of 5 numbers 5, 10, 12, B, B are equal. Find the value of B?

10. There are 5 positive integers that have a mean of 31, a median of 33, a mode of 34, and a range of 8. Find the values of these 5 numbers.

11. Lucille was making fruit baskets. She could put 12 apples in each basket, or she could use smaller baskets and put 10 apples in each basket. Either way, there would be no apples left over. What numbers of apples could Lucille have?
12. Simplify:
   (a) \((-1)^{100} - (-1)^{99} - (-1)^{98} - (-1)^{97} - (-1)^{96} - (-1)^{95}\)
   (b) \(\left[ (0.8 + \frac{1}{5}) \times 24 + 6.6 \right] \div \frac{9}{14} = 57.6\)

13. Express the value of the following fraction in the form of \(\frac{a}{b}\) where \(a\) and \(b\) are natural numbers having no common factor larger than 1:
   \[
   \frac{1}{2 + \frac{3}{4 + \frac{5}{6 + \frac{7}{8}}}}
   \]

14. Arrange the following fractions from the smallest to the largest: \(\frac{16}{17}, \frac{11}{12}, \frac{12}{13}, \frac{14}{15}\).

15. Mary cut off \(\frac{2}{5}\) of a piece of string. Later, she cut off another 14 inches. The ratio of the length of string remaining to the total length cut off is 1 : 3. What is the length of the remaining string?
Session 1  Week⑫ Key Points #S1-12

(a) **Data:** A collection of facts, such as numbers, words, measurements, observations or even just descriptions of things.

(b) **Average:** The average of a group of numbers is the sum of the numbers divided by the number of numbers in the group. For example, the average of 3, 7, 8, 10 is \( (3 + 7 + 8 + 10) \div 4 \), which is 7. The average is also called the *mean* or the *arithmetic mean*.

(c) **Median:** The median is the middle number in a sorted/ordered (from smallest to largest) group of numbers. If there is an even number in the group of numbers, then the median is the average of the middle two numbers. For example, the median of 4, 5, 6, 8, 10 is 6. The median for 4, 5, 6, 8, 10, 12 is \( (6 + 8) \div 2 = 7 \).

(d) **Mode:** The mode of a group of numbers is the number that appears most frequently in the group. For example, the mode of 3, 3, 6, 7, 9 is 3. A group can have multiple modes if there are multiple numbers that appear the same number of times. For example, the mode of 3, 7, 8, 8, 11, 13, 13, 25 is 8 and 13.

(e) **Range:** The range of a group of numbers is the difference between the largest and smallest number. For example, the range of 9, 13, 2, 11, 6 is 13 – 2 = 11.
1. Find the average, median, mode, and range of the following list of numbers:
   32, 13, 37, 24, 25, 13, 40, 23, 30, 32.

2. To get an A in her Algebra class, Allen must score an average of 90 on all tests. On the first four tests, his scores were 88, 97, 86, and 88. What is the lowest score the Allen can get on the last test and still get an A? Use at least two methods to find the answer.

3. What number should be removed from the list
   2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
   so that the average of the remaining numbers is 7?

4. Because of poor grade on the fifth test, Jessica’s average test grade fell from 90.5 to 84.0. What did Jessica score on the fifth test? Assume that all tests are equally important.

5. In a list of positive integers, all have different values. Their sum is 384. The mean is 48. If one of the integers is 102, then what is the largest integer that can be in the list?

6. The order set of data 18, 21, 24, a, 36, 37, b, 45 has a median of 30 and mean of 31. Find a and b.

7. There are 5 positive integers that have a mean of 4, a median of 3, a mode of 3, and a range of 10. What could these numbers be?

8. Amy offers $3200 for a pre-owned Honda Civic listed for sell at $4000. The first counteroffer from Jimmy, the car’s owner, is to “split the difference” and sell the car for ($3200 + 4000) ÷ 2, or $3600. Amy’s 2nd offer is to split the difference between Jimmy’s counteroffer and her 1st offer. Jimmy’s 2nd counteroffer is to split the difference between Amy’s 2nd offer and his 1st counteroffer. If this pattern continues and Amy accepts Jimmy’s 3rd (and final) counteroffer, how much will she pay for the car?

9. The Honda Insight, a gas/electric hybrid car; averages 61 mpg in city driving and has a 10.5 gallon gas tank. How much city drive can be done on $\frac{3}{4}$ of a tank of gas?

10. Simplify $(-2)^2 \cdot (-1)^4 - |{-12}| \div \left[ -\left( -\frac{1}{2} \right) \right]^2$.

11. Which of the following fractions is between $\frac{1}{4}$ and $\frac{1}{3}$: $\frac{1}{7}$, $\frac{4}{13}$, $\frac{6}{17}$, $\frac{6}{25}$?

12. Which of following fractions has the largest value: $\frac{3}{7}$, $\frac{4}{9}$, $\frac{100}{201}$, $\frac{151}{301}$?
Session 2  Week 3

Mixed Review and Problem Solving Strategy III

1. Without resorting to decimals, find equivalences among the following nine expressions:

\[
\frac{2 \cdot 3}{5} \cdot (\frac{2}{3}) = 2 \cdot (\frac{2}{5}) \cdot (\frac{2}{3}) \cdot (\frac{1}{3})^{-1} = \left(\frac{3}{5}\right)^2 = 2 \div \frac{5}{3} = \frac{2}{5} \div \frac{1}{2} = \frac{3}{5} / 2
\]

2. Simplify \(9 - 5[x + 2(3 - 4x)] + 14\).

3. Collect like terms to form an equivalent expression \(\frac{3}{4}(p + 1) - \frac{1}{8}(p - 3)\).

4. For what values of \(x\) will \(8 - x^3\) be negative?

5. Simplify:
   (a) \(7 \cdot \sqrt{8}\)
   (b) \(5\sqrt{3} - 2\sqrt{3}\)
   (c) \(\sqrt{32} - \sqrt{18}\)

6. For each of the following, find the value of \(x\) that makes the equation true:
   (a) \(3x + 1 = 19\)
   (b) \(-5x - 5 = 25\)
   (c) \(ax - c = b\)

7. Solve for \(t\): \(2 - (4 - 12t) = 3t + 2(7 - 3t)\).

8. Solve the equation \(0.12(y - 6) + 0.06y = 0.08y - 0.7\).

9. Find the solution for the equation \(\frac{x-3}{4} + \frac{x-1}{5} - \frac{x-2}{3} = 1\).

10. Solve the following inequalities:
    (a) \(4(z + 2) - 1 > 22\)
    (b) \(5 - 7(4 + z) \leq 12\)

11. Solve for \(x\): \(|2 - 4x| = 1\).

12. There are 765 marbles in a box colored either red, blue or green. There are twice as many blue marbles as green marbles. There are three times as many red marbles as blue. How many blue marbles are there in the box?

13. So that it will be handy for paying tolls and parking meters, Lee puts pocket change (dimes and quarters only) into a cup attached to the dashboard. There are currently 62 coins in the cup, and their monetary value is $9.65. How many of the coins are dimes?
14. Fred drives his car a certain distance at a rate of 45 mph and arrives at his destination one hour later than if he had driven at 50 mph. How far did he drive?

15. The population of a small town increased by 25% two years ago and then decreased by 25% last year. The population is now 4500 people. What was the population before the two changes?
Session 2  Week 3  Key Points #S2-03

(a) $\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$, where $a$, $b$ are nonnegative.

(b) If $b \neq 0$, then $\sqrt{a + b} = \sqrt{a} + \sqrt{b}$, where $a$, $b$ are nonnegative.

(c) $m\sqrt{a} + n\sqrt{a} = (m + n)\sqrt{a}$, where $a$ is nonnegative.

(d) $m\sqrt{a} - n\sqrt{a} = (m - n)\sqrt{a}$, where $a$ is nonnegative.

(e) If $a$ and $b$ are positive and $a \geq b$:
   
   $\sqrt{a + b} \neq \sqrt{a} + \sqrt{b}$
   $\sqrt{a - b} \neq \sqrt{a} - \sqrt{b}$
   $\sqrt{a^2 + b^2} \neq a + b$
   $\sqrt{a^2 - b^2} \neq a - b$
Session 2  Week 3  Homework #S2-03

1. Simplify $15x + 3(2x - 7) - 9(4 + 5x)$.

2. Collect like terms to form an equivalent expression $\frac{1}{4}(4p - q) - \frac{1}{16}(3p - 7q)$.

3. For what values of $x$ is $|x| > x^2$?

4. Simplify.
   (a) $5 \cdot \sqrt{12}$
   (b) $\sqrt{50} - \sqrt{8}$

5. For each of the following, find the value of $x$ that makes the equation true:
   (a) $2x - 3 = 51$
   (b) $7 - 5x = 47$
   (c) $-ax - c = b$

6. Solve for $y$: $5(y - 1) = 3(2y - 5) - (1 - 3y)$.

7. Solve the equation $0.04x + 0.06(10000 - x) = 480$.

8. Find the solution for the equation $\frac{4-2z}{3} = \frac{3}{4} - \frac{5z}{6}$.

9. Solve the following inequalities:
   (a) $12 - 3(5 + 6x) > 3$
   (b) $7x + 2(4 - x) < 20$

10. Solve for $u$: $|8u + 9| = 9$.

11. Evaluate $5a^{3a-4}$ for $a = 2$.

12. You bought a chocolate bar. After you gave away $1/3$ of the bar, a friend broke off $3/4$ of the remaining piece. What part of the original chocolate bar do you had left? Answer this question by drawing a diagram.

13. Ryan earns $x$ dollars every seven days. Write an expression for how much Ryan earns in one day. Ryan's spouse Lisa is paid twice as much as Ryan. Write an expression for how much Lisa earns in one day. Write an expression for their combined daily earnings.

14. The bag contains marbles of three different solid colors. All but two of the marbles are red. All but two of them are green. All but two of them are blue. How many marbles are in the bag?

15. What number must be added to both the numerator and denominator of $\frac{2}{15}$ to get a number equivalent to $\frac{2}{3}$?
Session 2  Week 10
Right Triangles and Pythagorean Theorem

Right Triangle: A triangle with one angle is right angle (90°). The side of the triangle opposite to the right angle is called the hypotenuse, and the other two sides are called the legs.

Pythagorean Theorem: In any right triangle, the sum of the squares of the legs equals to the square of the hypotenuse.

\[ a^2 + b^2 = c^2 \]

The Pythagorean Theorem also works in reverse: If the sum of the squares of the two sides of a triangle equals the square of the third side, then the triangles is a right triangle.

1. Find the missing side length for the right triangle in Figure 8.2.1.
2. Find the missing side length for the right triangle in Figure 8.2.2.
3. Find the length of \( BC \) for the triangle in Figure 8.2.3.

4. Use Pythagorean triples such as \{3, 4, 5\} \((3^2 + 4^2 = 5^2)\) and \{5, 12, 13\} \((5^2 + 12^2 = 13^2)\) to solve the following:
   (a) Find the hypotenuse of a right triangle whose legs are \( 3 \cdot 4 \) and \( 4 \cdot 4 \).
   (b) Find the other leg of a right triangle if one leg is \( 3 \cdot 2019 \) and the hypotenuse is \( 5 \cdot 2019 \).
   (c) Find the hypotenuse of a right triangle whose legs are \( \frac{5}{2019} \) and \( \frac{12}{2019} \).

5. A flagpole broke in a storm. 7 meters are still sticking straight out of the ground (where it snapped), but the remaining piece has hinged over and touches the ground at a point 24 meters away horizontally. How tall was the flagpole before it broke?

6. Mr. Chen’s front door is 42 inches wide and 84 inches tall. He purchased a circular table that is 96 inches in diameter. Will the table fit through the front door?

7. The bottom of a ladder must be placed 3 feet from a wall. The ladder is 12 feet long. How far above the ground does the ladder touch the wall? (Write your answer in the simplest radical form.)
8. A ramp has two straight ramps, each of which is 4 ft. high and 10 ft. long, with a flat space of 20 ft. in between. Find the distance a skater travels from the top of one ramp to the top of the other—from point $P$ to point $R$ (round your answer to the nearest hundredth).

9. In $\triangle TON$ (Figure 8.2.5), $NW = 80$, $OT = 60$, and $\overline{OT} \perp \overline{TN}$. Is enough information given to find the area of $\triangle NOW$? If so, find its area. If not, explain why.

10. Joseph walks $\frac{1}{2}$ mile south, then $\frac{3}{4}$ mile east, and finally $\frac{1}{2}$ mile south. How many miles is he, in a direct line, from his starting point?

11. In Figure 8.2.6, $ABDF$ is a rectangle. If $BD = 16$ cm, $BC = 7$ cm, $FD = 24$ cm, and $E$ is the middle point of $FD$, what is the perimeter of $\triangle ACE$?

12. Find the missing length in terms of variable(s) provided (Figure 8.2.7)
   (a) $AC = 2$, $BC = y$, $AB = \_?\_$
   (b) $AC = x$, $BC = y$, $AB = \_?\_$
   (c) $AC = 8a$, $BC = 15a$, $AB = \_?\_$
   (d) $AB = 13c$, $AC = 5c$, $BC = \_?\_$

13. The circle in the diagram at the right (Figure 8.2.8) has radius of 7 inches and center $O$. Points $X$ and $Y$ are on the circumference of the circle such that $\angle XOY = 90^\circ$. Find the area of the region between $\overline{XY}$ and the shorter arc from $X$ to $Y$. (Take $\pi = \frac{22}{7}$ if needed)
14. If $ABCD$ is a rectangle, and $\triangle EDC$ is an equilateral (Figure 8.2.9), find the measure of $\angle x$, $\angle y$, $\angle z$. Can you show $E$ is the middle point of $\overline{AB}$?

15. The sides of a triangle are given as $3x$, $x - 1$ and $3x + 1$. If the perimeter is 56m, find the area.

**Session 2  Week 10  Key Points #S2-10**

(a) **Pythagorean Triple:** A group of three positive integers that satisfy the Pythagorean Theorem equation. Example:

- $\{3, 4, 5\} \rightarrow (3^2 + 4^2 = 5^2)$
- $\{5, 12, 13\} \rightarrow (5^2 + 12^2 = 13^2)$
- $\{7, 24, 25\} \rightarrow (7^2 + 24^2 = 25^2)$
- $\{8, 15, 17\} \rightarrow (8^2 + 15^2 = 17^2)$
- $\{9, 40, 41\} \rightarrow (9^2 + 40^2 = 41^2)$

More Pythagorean triples:

<table>
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<th>3, 4, 5</th>
<th>5, 12, 13</th>
<th>7, 24, 25</th>
<th>8, 15, 17</th>
<th>9, 40, 41</th>
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<td>14, 48, 50</td>
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<td>21, 72, 75</td>
<td>24, 45, 51</td>
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</tr>
<tr>
<td>3n, 4n, 5n</td>
<td>5n, 12n, 13n</td>
<td>7n, 24n, 25n</td>
<td>8n, 15n, 17n</td>
<td>9n, 40n, 41n</td>
</tr>
</tbody>
</table>

where $n$ is a positive integer.

(b) **Isosceles Right Triangle:** a right triangle with two equal legs (congruent). The hypotenuse is $\sqrt{2}$ times as long as each leg. The angles are $45^\circ, 45^\circ$, and $90^\circ$. An isosceles right triangle is often called 45-45-90 triangle.
Session 2  Week⑩  Homework #S2-10

1. Find $x$ and $y$ in Figure 8.2.10.

2. The triangle $\triangle ABC$ is an isosceles triangle with $AB = AC = 16$ cm and $BC = 20$ cm.
   (a) Suppose $M$ is on the base $BC$ such that $AM$ is an altitude of the isosceles triangle. Why must $M$ be the middle point of $BC$? (Hint, show that $BM = MC$.)
   (b) Find the area of $\triangle ABC$.

3. The base of an isosceles triangle is 24 and its area is 60. What is the length of one of the equal sides?

4. A baseball “diamond” (Figure 8.2.11) is actually a square with sides of 90 feet. If a runner tries to steal second base, how far must the catcher, at home plate, throw to get the runner “out”? Given this information, explain why runners more often try to steal the second base than the third.

5. Solve for $x$ in the partial spiral in Figure 8.2.12.

6. In $\triangle ABC$, if $\angle A = \angle B = 45^\circ$, and $AB = 6$, find $BC$, $AC$, and the area of $\triangle ABC$.

7. A square and a right triangle have equal perimeters. The leg of the right triangle are 5 inches and 12 inches. What is the area of the square?

8. Find the hypotenuse of a right triangle whose legs have lengths of 14014 and 48048.

9. Find the area and perimeter of triangle $\triangle ABC$ in Figure 8.2.13.

10. A right triangle is drawn on the exterior of equilateral triangle $ABC$ as shown in Figure 8.2.14 so that the hypotenuse of the right triangle is one side of the equilateral triangle. If the shorter leg $AD$ of the right triangle is 5 inches, and the hypotenuse $AC$ is 10 inches, find the length of $BD$.

11. Calculate $(\frac{1}{4})^2 \div (\frac{1}{2})^3 \cdot 2^4 + (10.3)(-4)$.

12. Simplify $14 \div [-33 \div 11 - 3(3 - 18)]$. 

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Figure 8.2.10

Figure 8.2.11

Figure 8.2.12

Figure 8.2.13

Figure 8.2.14