

MA 202: Exam 1 Review Problems

Note: These problems pertain primarily to sections 9.1, 9.3, and 10.3. See your text for more problems from 9.2, 10.1, and 10.2.

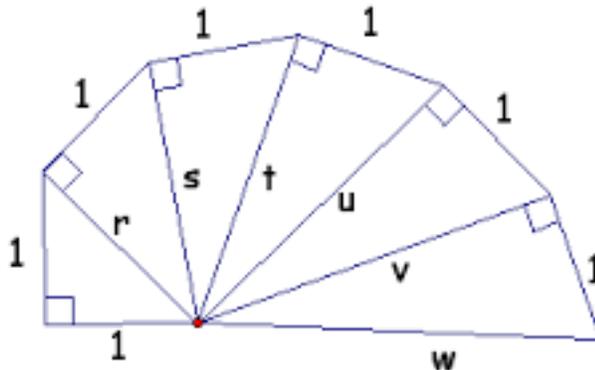
- Graph the following on the real number line:

$$\frac{1}{4}, -\frac{3}{8}, -\frac{5}{4}, \frac{3}{2}, \frac{\pi}{6}, \sqrt{3}, -\frac{e}{10}$$

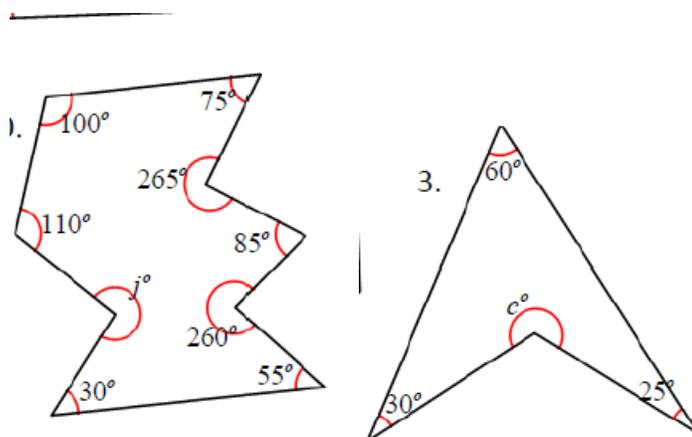
- Explain why the set of rational numbers is closed under multiplication
 - Show that the set of fractions is not closed under subtraction, but the set of rational numbers is.
- The initial elevation of a snorkeler is $-4\frac{3}{5}$ meters. The snorkeler dives to three times the initial elevation and then swims $8\frac{1}{2}$ meters upward. What is the snorkeler's final elevation?
- A man started college $\frac{1}{4}$ of the way through his life, was unmarried for the next $\frac{1}{6}$ of his life, and then had a child six years after his marriage. The child's birth coincided with the half-way point of this life. How old did the man live to be?
- Without looking at your notes or book, try to create an argument that $\sqrt{2}$ is irrational.
- Find two irrational numbers between 0.1 and $0.\bar{6}$.
- Determine if the following statement is true or false. Explain your reasoning.

The set of rationals is a subset of the irrationals.

- Describe a pair of irrational numbers whose sum is a rational number.
Note: This shows that the set of irrationals is not closed under addition.
- Determine lengths r, s, t, u, v, w . Which hypotenuse is the longest? Use only exact answers in your calculations.
 - Add two more right triangles to the figure, and find the length of the longest hypotenuse. Use only exact answers in your calculations.



10. Determine whether each of the following statements is **always**, **sometimes**, or **never** true. Justify your answers.
- A right trapezoid has a pair of congruent sides.
 - An irrational number is not an integer.
 - Multiplying both sides of an equation by the same rational number does not change its validity.
 - A hexagon has at least 3 obtuse angles.
 - The diagonals of a parallelogram are the same length.
 - The median, orthocenter, and circumcenter of a triangle coincide.
 - The square root of a natural number is either a natural number or irrational.
11. Is it possible to arrange three regular heptagons so that all three share a vertex and each pair of heptagons shares exactly one side?
12. Classify the polygons below in as many ways as you can, then find the missing angles.



13. Use a Venn diagram to represent the relationship between scalene and obtuse triangles.
14. (a) How many different hexagons can you draw that have exactly 5 right angles? (None? Just one? Many?)
- (b) How many different kinds of quadrilaterals can you make that have exactly two opposite right angles? (None? Just one? Many?)
15. What is the relationship between the number of sides in a polygon and the total number of diagonals in that polygon?
A *diagonal* is a line segment that joins two nonadjacent vertices in a polygon.