Geometry Notes S - 7: Perimeters, Areas and Volumes of Similar Figures

Review: Lengths are measured in

     Areas are measured in

     Volumes are measured in

Facts: If two figures are similar,
1. All pairs of corresponding segments (lengths) are in the same ratio.
    This includes: sides, medians, altitudes, angle bisectors, diagonals, perimeters
2. The ratio of areas is the *square* of the ratio of the sides.
3. The ratio of volumes is the *cube* of the ratio of sides.

Ex: The lengths of the longest sides of two similar quadrilaterals are 8 and 12.

    a. If a diagonal of the smaller quadrilateral measures 10, find the length of the corresponding diagonal in the second quadrilateral.

    b. if the area of the smaller quadrilateral is 60, find the area of the larger quadrilateral.

Ex: Joe A. Guy is 6 feet tall. He weighs 175 pounds and the total volume of his body is 2.8 cubic feet. In a science experiment gone horribly wrong, Joe manages to enlarge himself by a factor of 8; he is now 48 feet tall.

    a. What is Joe's new volume?

    b. What is Joe's new weight?

1. The sides of a triangle measure 4, 6 and 8. The perimeter of a similar triangle is 63. Find the length of the longest side of the larger triangle.

2. The area of a triangle is 36 and one side measures 12. If the corresponding side of a similar triangle measures 10, find the area of this triangle.

3. In two similar triangles, the ratio of the lengths of two corresponding sides is 5:8. If the perimeter of the larger triangle is 10 less than twice the perimeter of the smaller triangle, find the perimeter of each triangle.

4. Arka Tek's model of her proposed new skyscraper measures 18 inches along the longer side of its base. It has a total volume of 4250 cubic inches. The actual building is supposed to measure 432 feet along the long side of its base. What will be its volume?

5. Two similar triangles have perimeters 54 and 72. If an altitude of the smaller triangle measures 12, find the length of the corresponding altitude in the larger triangle.

6. Two similar triangles have areas 45 and 80. If a median of the smaller triangle measures 15, find the length of the corresponding median in the larger triangle.

7. The sides of a rectangle measure 14 and 21. The perimeter of a similar rectangle is 40. What are the lengths of its sides?

8. The sides of a rectangle measure 8 and 12. The area of a similar rectangle is 216. Find its dimensions.

9. In the diagram at right, $\triangle ABC \sim \triangle PQR$, $AC = 12$, $PR = 9$, $m\angle A = (5x + 4)°$ and $m\angle P = (2x + 31)°$.
   a. Find the numerical value of $m\angle A$.
   b. If $AB = 9.15$, find PQ to the nearest hundredth.
   c. If the area of $\triangle ABC$ is 41.4, find the area of $\triangle PQR$ to the nearest tenth.
   d. The triangles are faces of two similar pyramids. If the volume of the larger pyramid is 31, find the volume of the smaller pyramid to the nearest whole number.