You must show all steps to receive credit.

1. In (a)-(c), determine which pairs of triangles are similar, note the correspondence of the vertices, and write an appropriate similarity statement. Also, explain why the triangles are similar.

2. In (a)-(c), pairs of similar triangles are shown. Find the missing measures. Give exact answers rather than decimal approximations.
3. Prove that $\triangle ABC \sim \triangle A'B'C'$ if their corresponding sides are parallel to each other.

![Diagram showing similar triangles]

4. For (a)-(c), find the given length if $BC \parallel DE$.

![Diagram showing parallel lines]

(a) If $AE = 3$, $AB = 5$, and $AD = 4$, find $AC$.
(b) If $BD = 3$, $EC = 4$, and $AC = 9$, find $AD$.
(c) If $DE = 5$, $BC = 7$, and $AD = 4$, find $AB$.

5. In the trapezoid $ABCD$, $M$ and $N$ are midpoints of $AB$ and $CD$ respectively. If $MN = 15$ cm and $BE = 17$ cm, find the area of $ABCD$.

![Diagram showing midpoints]

6. Prove that the midpoint of the hypotenuse of a right triangle is equidistant from its vertices.

7. In (a)-(c) refer to the following figure.

![Diagram showing angles and sides]

(a) What is the measure of $\angle B$?
(b) What is the measure of $\angle CEB$?
(c) What is the measure of $\angle AD$?
8. In circle $O$, $\overparen{AE} = 120^\circ$ and $\overparen{CD} = 42^\circ$. Find the measures of each of the five angles in pentagon $ABCDE$.

![Diagram of pentagon ABCDE]

9. A wheel of cheese is 22 inches in diameter and 4 inches thick. If a wedge of cheese with a central angle of $14^\circ$ is cut from the wheel, find the volume of the cheese wedge. Round to the nearest hundredth.

![Diagram of cheese wedge]

10. In (a) and (b) refer to the figure below.

![Diagram of figure]

(a) If $BF = 7''$, $EF = 18''$, and $FD = 15''$, find $AF$.

(b) If $EF = 3.9FB$, $AF = 5.2$ cm, and $FD = 12$ cm, find $BF$.

11. In (a) and (b) refer to the following figure.

![Diagram of figure]

(a) If $\angle BDC = 42^\circ$, $\angle D = 30^\circ$, and $\angle AE = 95^\circ$, find $\angle AFE$.

(b) If $\angle BDC = 33^\circ$, $\angle CGD = 62^\circ$, $\angle BFG = 123^\circ$, and $\overparen{ED} = 5\overparen{AB}$, find $\overparen{ED}$, $\overparen{BC}$, and $\overparen{CD}$. 
12. Only an arc of a circle is drawn below. Using a compass and straightedge, construct the entire circle.
12. (a) \( \triangle ABC \sim \triangle DEC \) by AA similarity
(b) \( \triangle FGH \sim \triangle IJK \) by SSS similarity
(c) \( \triangle LMN \sim \triangle OPQ \) by LL similarity

12. (a) \( \frac{AB}{3} = \frac{15}{5} \) \( AB = 9 \) 
   \( AC = \sqrt{15^2 - 9^2} = 3\sqrt{5^2 - 3^2} = 12 \)
(b) \( HI = \sqrt{3^2 - 1^2} = \sqrt{9 - 1} = \sqrt{8} = 3.0 \)
   \( FH = 3 \sqrt{3} \)
   \( EG = \frac{6}{3} = 2 \)
   \( TV = \frac{16}{3} \)
   \( WX = 20 \)
12. (c) \( \triangle ABC \) is similar to \( \triangle AC \) by AA criterion.

12. (a) \( \angle B = \frac{1}{2} \angle C = \frac{35}{2} \)
(b) \( \angle CEB = 180^\circ - \angle C - \angle B \)
   \( = 180^\circ - 40^\circ - 35^\circ = 105^\circ \)
(c) \( \angle A = 360^\circ - 70^\circ - 100^\circ - 80^\circ = 110^\circ \)

12. (a) \( V = \frac{14}{3} \times 11.4 \times 4 \approx 59.13 \text{ in}^3 \)

12. (a) \( 7.18 = 15 \), \( AF = \frac{7.18}{15} = \frac{7}{15} = \frac{42}{45} \)
(b) \( FB = \sqrt{5.2^2 - 2.9^2} = 4 \text{ cm} \)
(c) \( \angle AFE = \frac{1}{2} (\angle B + \angle D) \)
   \( = \frac{1}{2} (95^\circ + 84^\circ + 30^\circ) = \frac{209}{2} \)
12. (a) \( \angle AFE = \frac{1}{2} (\angle B + \angle D) \)
   \( = \frac{1}{2} (95^\circ + 84^\circ + 30^\circ) = \frac{209}{2} \)
(b) \( \angle AFE = \frac{1}{2} (\angle B + \angle D) = 42^\circ \)
   \( \angle C = 180^\circ - 95^\circ - 84^\circ = 17\frac{1}{2}^\circ \)
   \( \angle AFE = \frac{1}{2} (\angle B + \angle D) = 42^\circ \)

12. (a) \( \triangle ABC \sim \triangle DEC \) by AA similarity
(b) \( PM = \frac{1}{2} \angle B \) (midsegment theorem)
(c) \( PN = \frac{1}{2} \angle B \) (midsegment theorem)

\( \frac{1}{2} (AB + BD) = 57^\circ \)
\( AB = 9^\circ \)
\( 2AB = 57^\circ \)
\( AB = 9^\circ \)