



Math Workshop Geometry

Workshop Objective: Once a student successfully completes the Prealgebra Math Workshop, s/he will achieve a basic understanding the material taught in a MAT 080 course offered at Oakton. Students will be offered the skills and knowledge required of them to demonstrate competency on the Math Placement Test in any of the topics covered during the workshop.

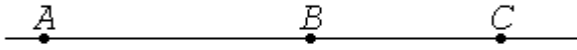
Workshop Topics: Linear Measurements, Angles, Congruence and Similarity of Triangles, Area and Perimeter of Polygons, Area and Circumference of Circles, The Pythagorean Theorem, Composite Shapes, Volumes of Solids.

Workshop Overview: The workshop will identify and explain all of the various topics listed above. The topics covered during the workshop are found on the Oakton Math Placement Test. The supplementary exercises provided are a review of what a student would expect to learn in a MAT 053 course. **Any exercise sets labeled with an asterisk (*) are additional topics not necessarily found on the Math Placement Test.**

Once a student feels confident with all of these workshop topics, then another, more advanced Math Workshop is recommended. A student may re-take any workshop. Each student has an opportunity to re-take the Math Placement Test one time, if they are not satisfied with their test performance. Please feel free to discuss any of your concerns with your Math Workshop instructor. This workshop is not intended to be a substitute for taking/completing MAT 053 over a normal semester setting. Command in the topic material, and supplementary exercises, is not a guarantee that a student has qualified to place into a higher math course (above MAT 053). However, if a student does have a solid understanding of the topics covered, then that student should place into a higher math course (above MAT 053).

Linear Measurements

1) Find the length of \overline{AB} , given $\overline{BC} = 13$ and $\overline{AC} = 25$.

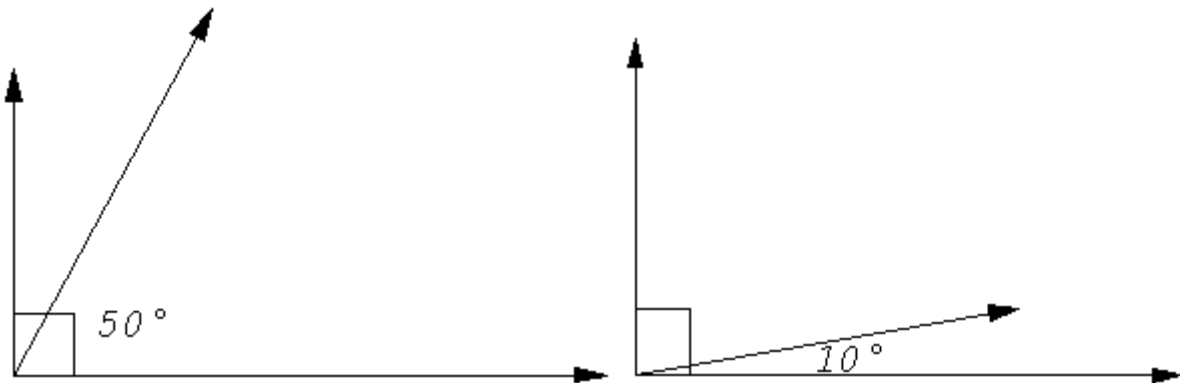


2) Find the length of \overline{AC} , given $\overline{BC} = 10$ and $\overline{AB} = 6$.

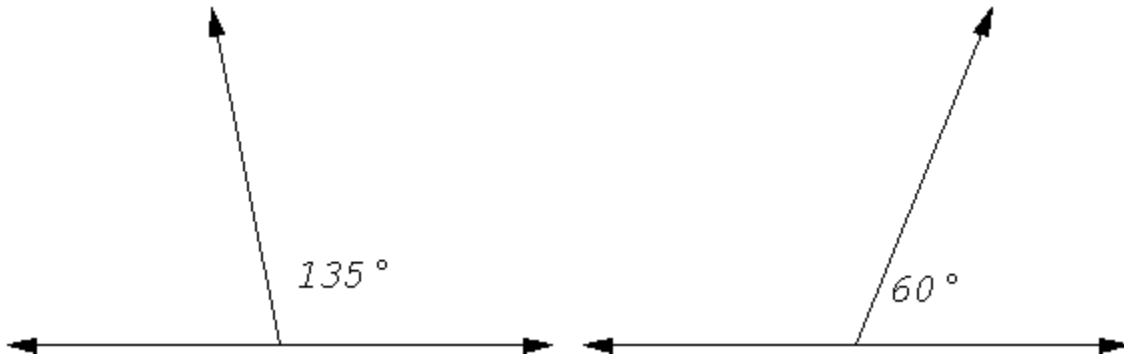


Angles

3) Find the complement of each given angle.

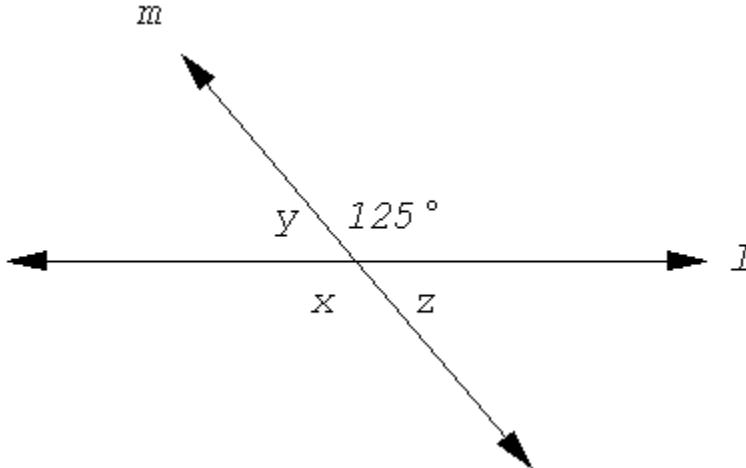


4) Find the supplement of each angle.

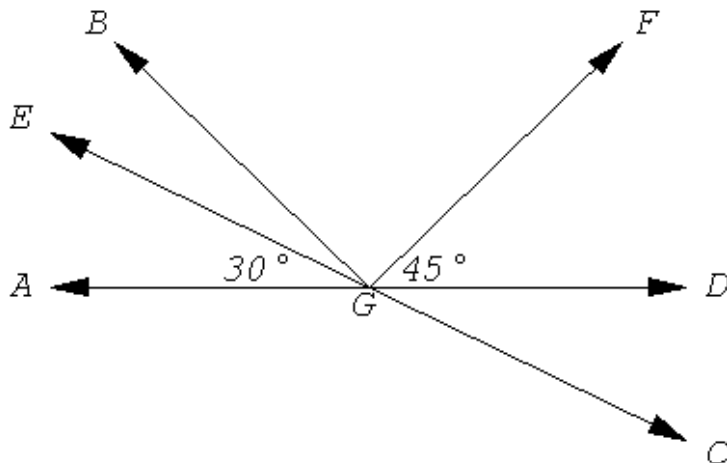


Find the following.

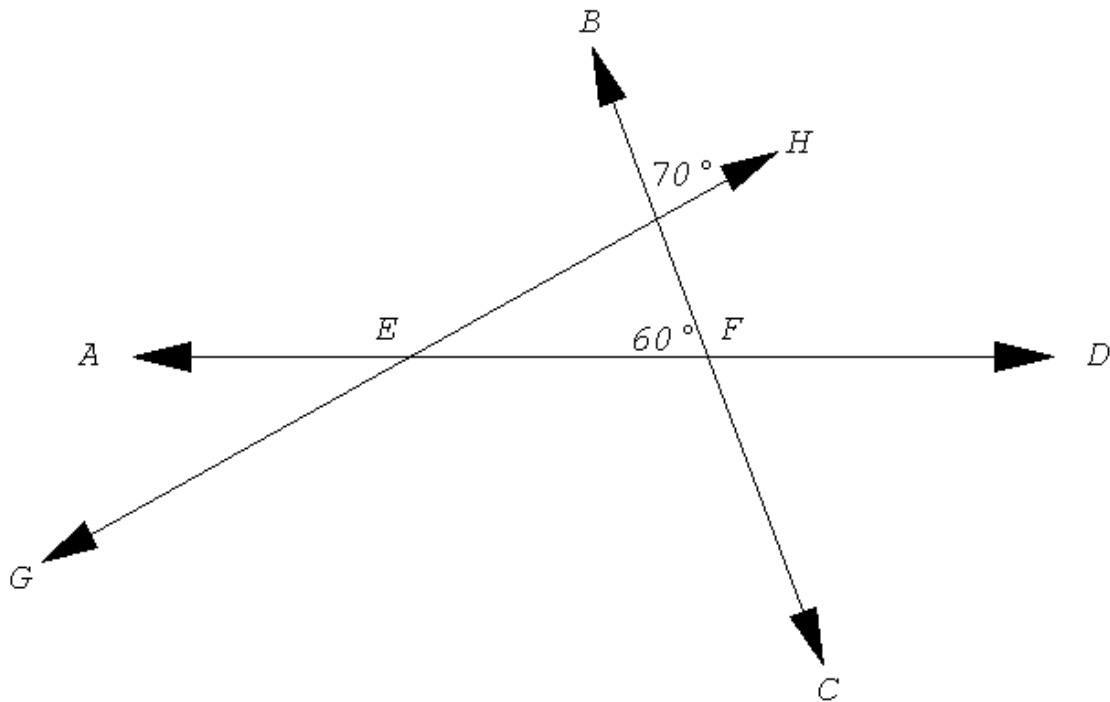
- 5) What is the supplement of a 56° angle?
- 6) What is the complement of a 32° angle?
- 7) Find the measure of the missing angles.



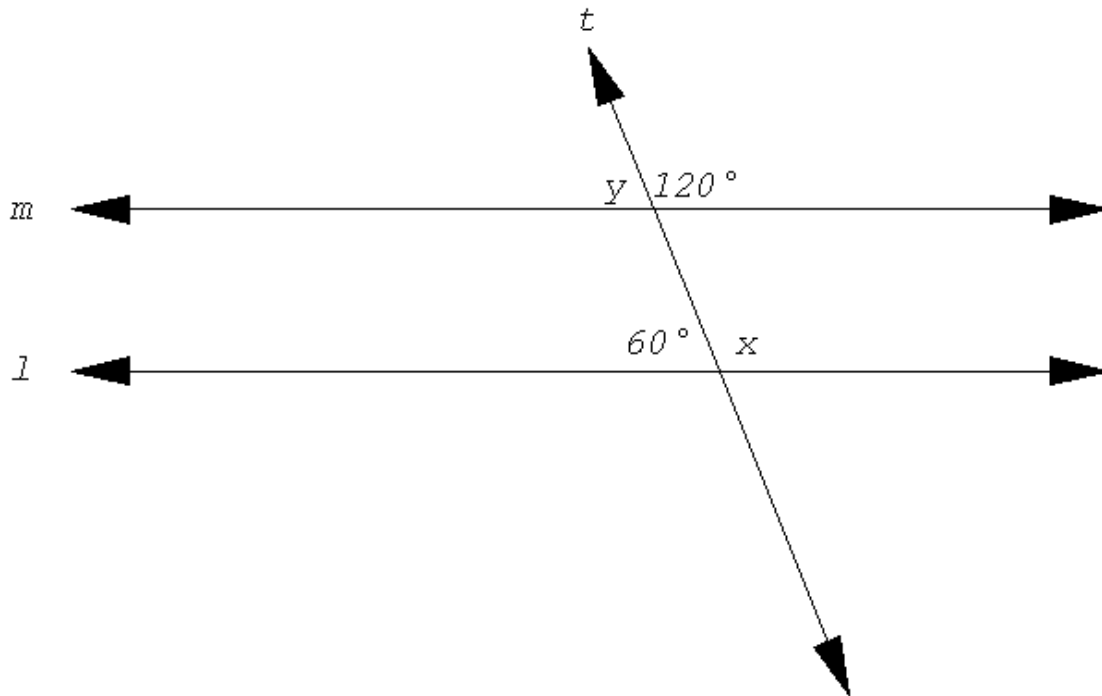
- 8) The rays \overrightarrow{GB} and \overrightarrow{GF} form a 90° angle. EC and AD are lines. Find the missing angles: $\angle CGD$, $\angle AGC$, and $\angle BGE$.



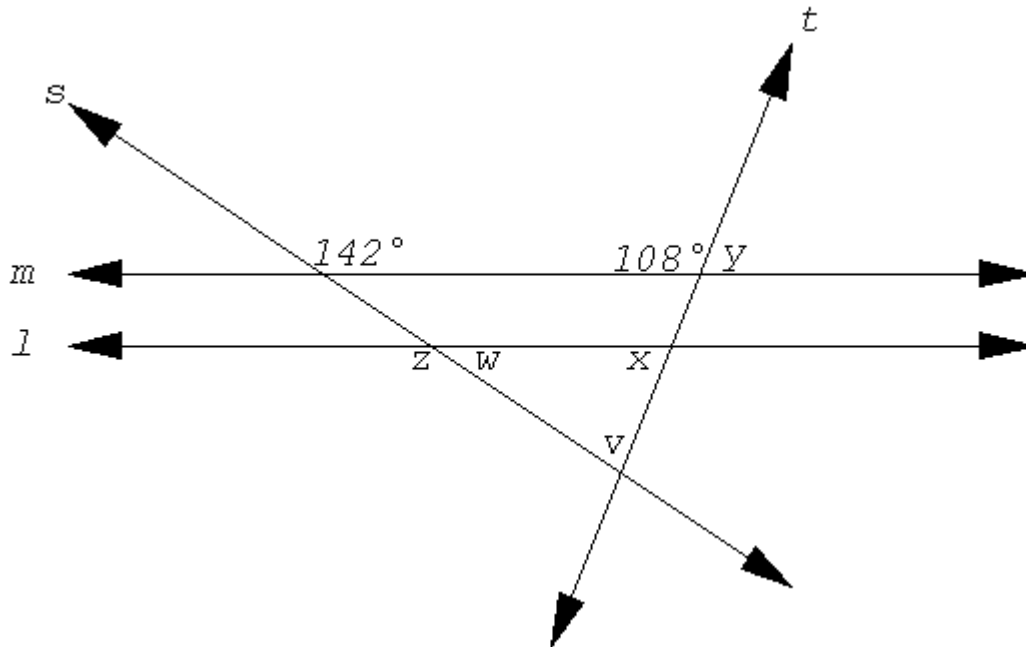
9) Find the missing angles: $\angle BFD$, $\angle AEH$, $\angle HED$.



10) In the following drawing, lines l and m are parallel, and line t is a transversal. Find the missing angles: $\angle x$, $\angle y$.



- 11) In the following drawing, lines l and m are parallel, and lines t and s are transversals. Find the missing angles: $\angle x$, $\angle y$, $\angle z$, $\angle w$, $\angle v$.



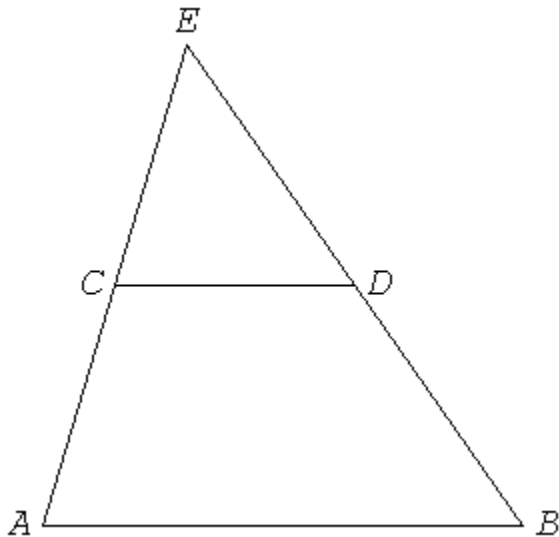
Congruence and Similarity of Triangles

- 12) The following triangles, $\triangle AEB$ and $\triangle CED$, are similar.

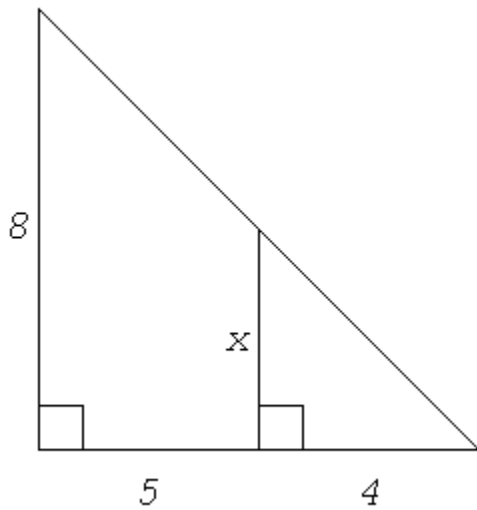
If $\frac{\overline{AC}}{\overline{CE}} = \frac{5}{3}$, then $\frac{\overline{ED}}{\overline{EB}} = ?$

- 13) If $\angle EAB = 55^\circ$, then $\angle DCE = ?$

- 14) If $\overline{ED} = 5$, $\overline{EB} = 15$, and $\overline{CE} = 4$, then $\overline{AC} = ?$



15) Given the following two similar triangles, find x .



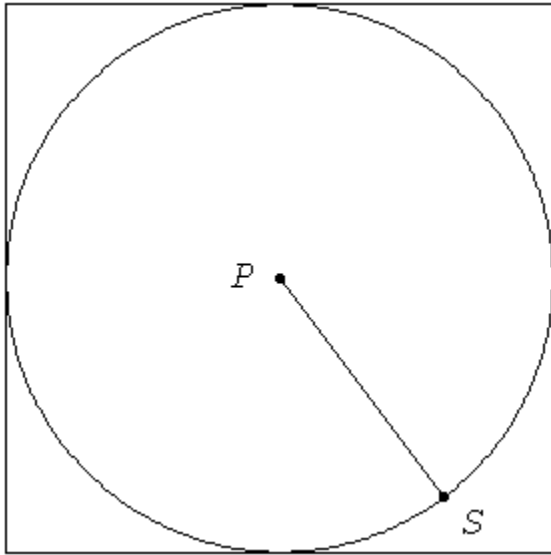
The Pythagorean Theorem

- 16) The length of the legs of a right triangle are 3, and 4, respectively. Find the length of the hypotenuse.
- 17) A ladder is 13 feet long. It leans against a wall from 5 feet away. How high does the ladder go up the wall?
- 18) The hypotenuse of a right triangle is 6 inches. One of its legs is 3 inches. Find the length of the other leg.
- 19) Find the length of a diagonal of a rectangle with a length of 4 ft and a height of 6 ft.

Area and Circumference of Circles

- 20) The area of a circle is 100π . Find the radius.
- 21) If the radius of some circle is 4 feet and the radius of another circle is 20 feet, how many times larger is the area of the circle with the radius of 20 feet?

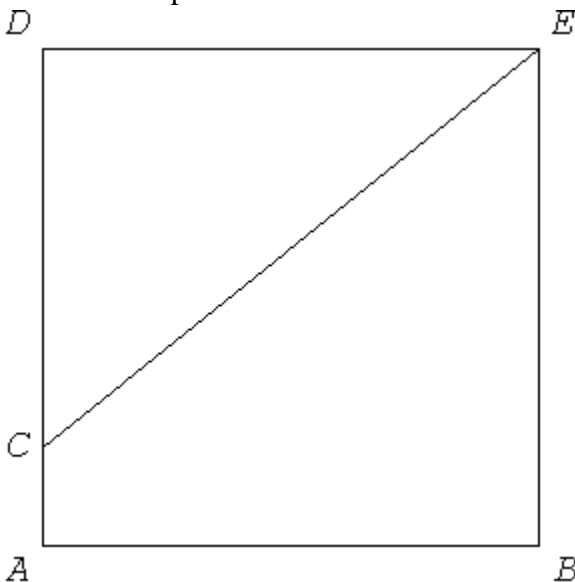
- 22) Find the area of the region where the circle and square don't intersect.
 The circle is inscribed within the square.
 The distance from point P to point S is 5 inches.



- 23) Find the circumference of a circle with an area of 25π square meters.

Area and Perimeter of Polygons

- 24) A square has an area of 36 ft^2 . Find the length of each side.
 25) The perimeter of a rectangle is 14 ft. One of the sides is 2 ft.
 Find the length of the other sides.
 26) The following square has an area of 144 ft^2 . $\overline{AC} = 2 \text{ ft}$.
 Find the perimeter of $\square CED$.

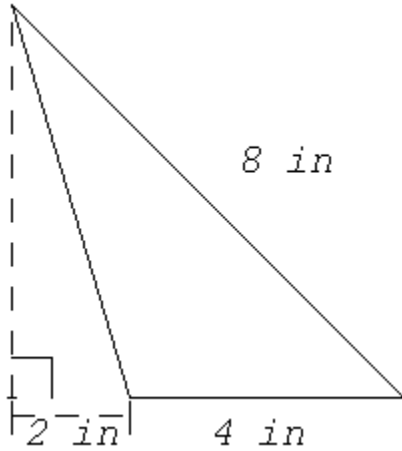


27) The diagonal of a rectangle is 15 units. One of its sides is 9 units.

What is the area of the rectangle?

28) A square has a perimeter of 36 units. Find its area.

29) Find the area of the following triangle.

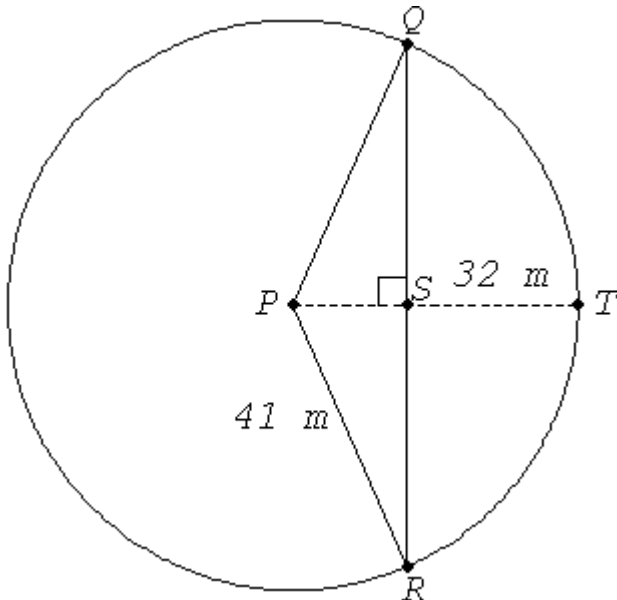


30) $\triangle PQR$ is an isosceles triangle. \overline{PT} bisects \overline{QR} . $\overline{ST} = 32\text{ m}$. $\overline{PR} = 41\text{ m}$.

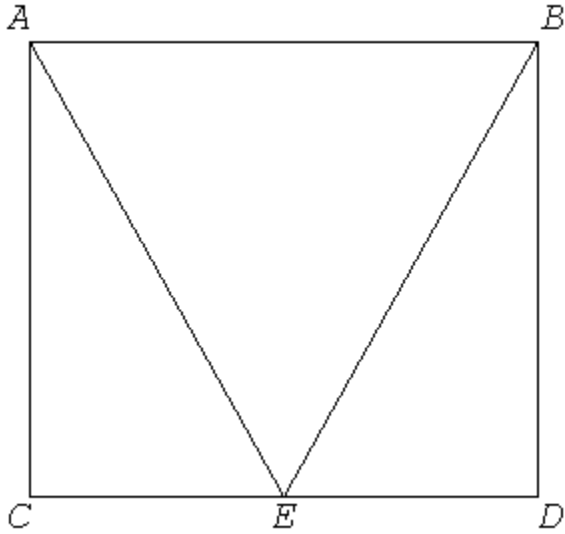
a) Find \overline{PS} .

b) Find \overline{QR} .

c) Find the area of $\triangle PQR$.

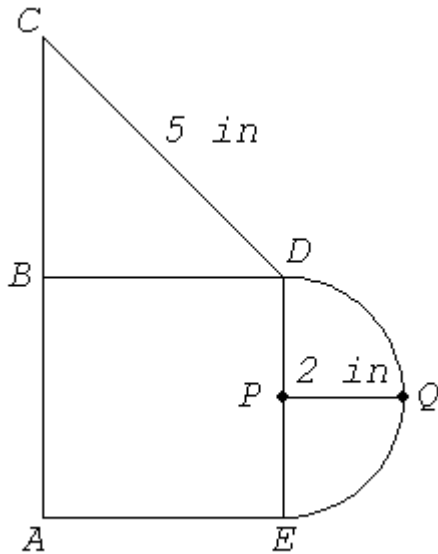


- 31) Given the rectangle $\square ABDC$, $\overline{AB} = 8$ ft, $\overline{BD} = 6$ ft,
and E is the midpoint of \overline{CD} , find the perimeter of $\square ABE$.

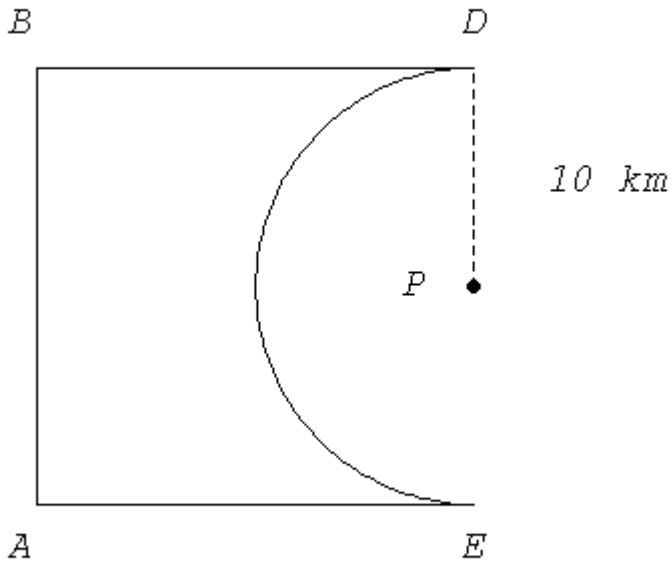


Composite Shapes

- 32) Find the area of the following figure. $\square CBD$ is an isosceles triangle,
 $\square ABDE$ is a square, and \overline{DE} is the diameter of the semicircle.

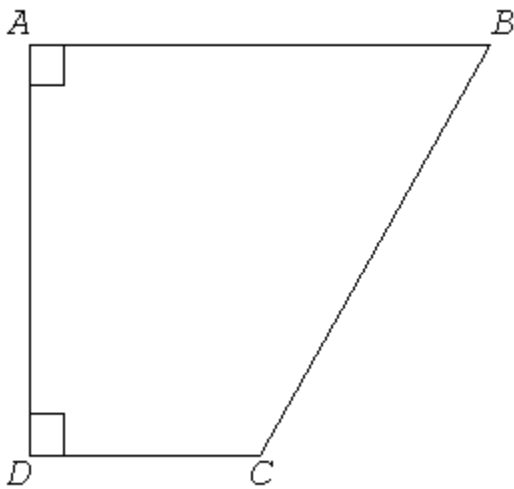


33) Find the area of the square $\square ABDE$ when the semicircle with center P is removed.

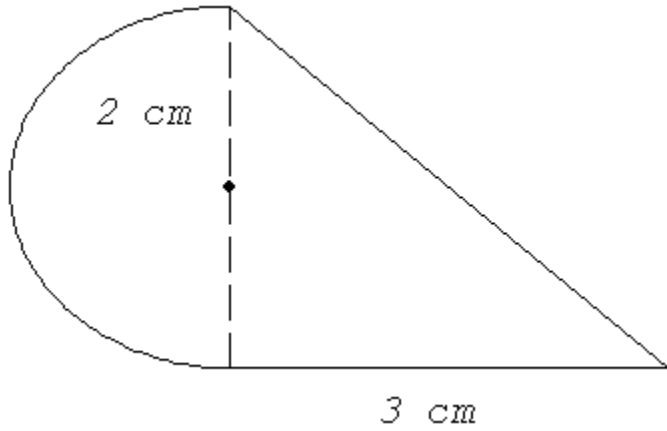


34) Given $\overline{AB} = 10$ inches, $\overline{AD} = 6$ inches, and $\overline{CD} = 8$ inches, find:

- the area of the polygon $ABCD$
- the perimeter of the polygon $ABCD$.

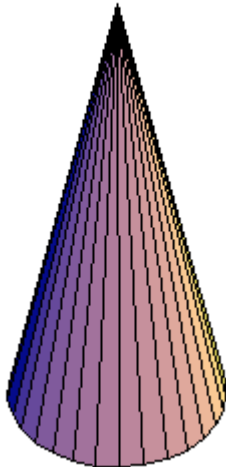


35) Find the area of the following figure.

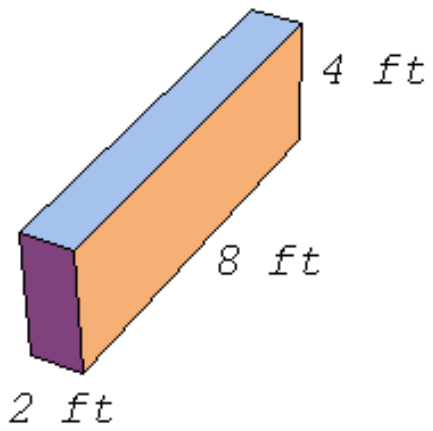


Volumes of Solids

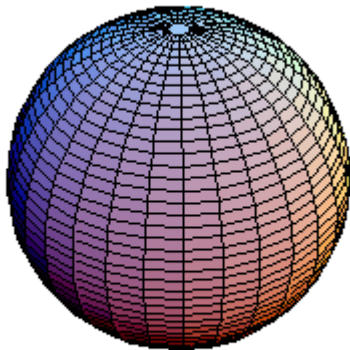
36) Find the volume of the solid cone with a radius of 8 in and a height of 25 in.



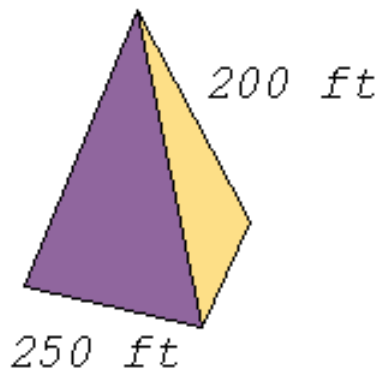
37) Find the volume of the following parallelepiped.



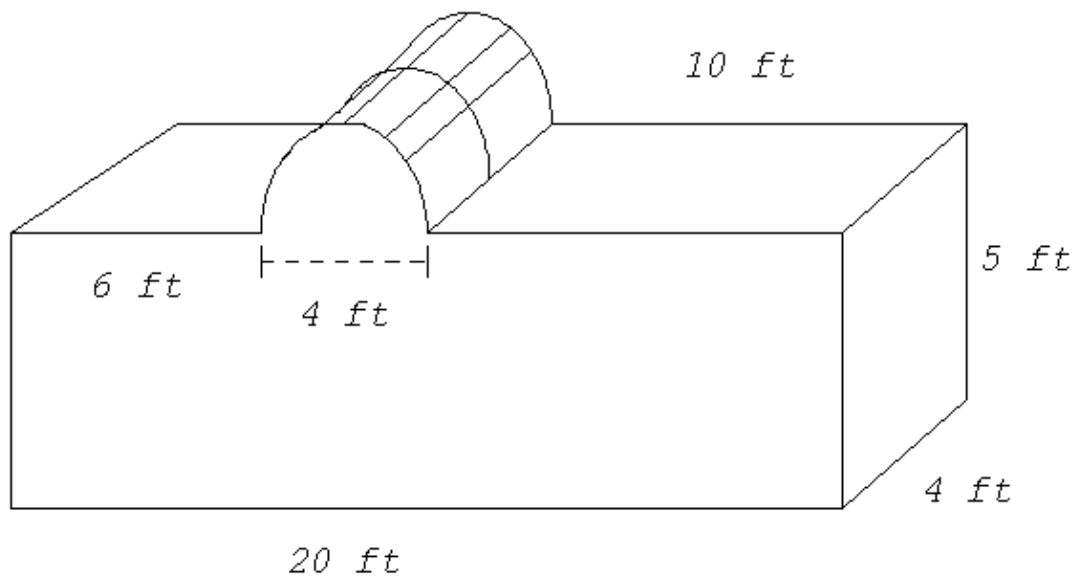
38) Find the volume of the following sphere with radius 1 ft.



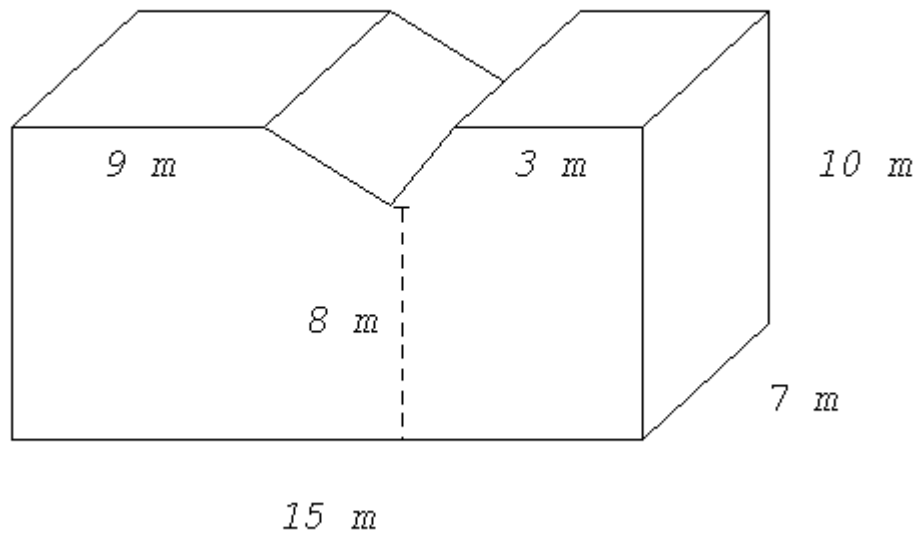
39) Find the volume of the following pyramid with a square base and slant height of 200 ft.



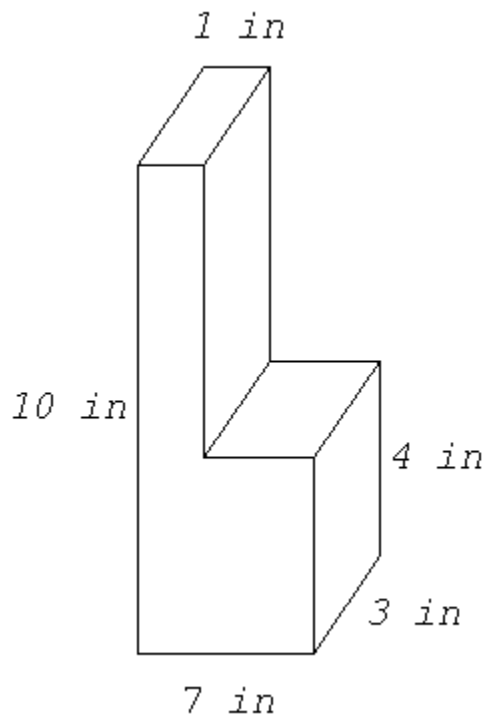
40) Find the volume of the following irregular solid.



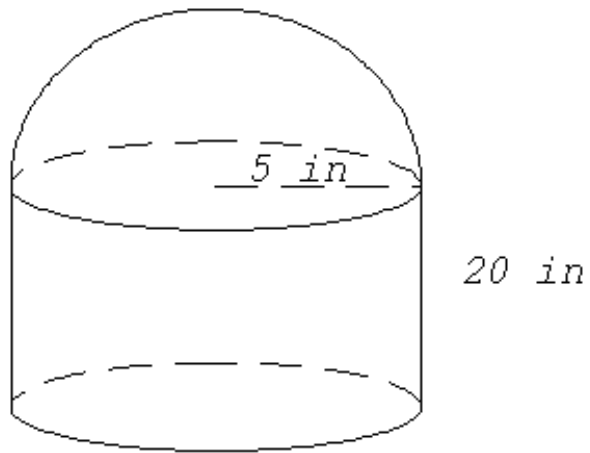
41) Find the volume of the following irregular solid.



42) Find the volume of the following irregular solid.



43) Find the volume of the following irregular solid.



Created by: Ivan Temesvari

Geometry Math Workshop Solutions

- 1) $\overline{AB} = 12$
- 2) $\overline{AC} = 16$
- 3) $40^\circ, 80^\circ$
- 4) $45^\circ, 120^\circ$
- 5) 124°
- 6) 58°
- 7) $\angle x = 125^\circ, \angle y = 55^\circ, \angle z = 55^\circ$
- 8) $\angle BGE = 15^\circ, \angle AGC = 150^\circ, \angle CGD = 30^\circ$
- 9) $\angle BFD = 120^\circ, \angle AEH = 130^\circ, \angle HED = 50^\circ$
- 10) $\angle x = 120^\circ, \angle y = 60^\circ$
- 11) $\angle x = 72^\circ, \angle y = 72^\circ, \angle z = 142^\circ, \angle w = 38^\circ, \angle v = 70^\circ$
- 12) $\frac{3}{8}$
- 13) 55°
- 14) 8
- 15) $x = \frac{32}{9}$
- 16) 5
- 17) $x = 12$ ft
- 18) $\sqrt{27} \approx 5.2$ in
- 19) $\sqrt{52} \approx 7.21$ ft
- 20) $r = 10$
- 21) 25 times larger
- 22) $-25 \quad \pi \approx 21.46$ in²
- 23) $10\pi \approx 31.42$ m
- 24) 6 ft
- 25) 5 ft
- 26) $22 + 2\sqrt{61} \approx 37.62$ ft
- 27) 108 units²
- 28) 81 units²
- 29) $4\sqrt{7} \approx 10.58$ in²
- 30) a) 9 m
b) 80 m
c) 360 m²
- 31) $8 + 4\sqrt{13} \approx 22.42$ ft
- 32) $24 + 2\pi \approx 30.28$ in²
- 33) $400 - 50\pi \approx 242.92$ km²
- 34) a) 54 in²
b) $24 + 2\sqrt{10} \approx 30.32$ in
- 35) $6 + 2\pi \approx 12.28$ cm²

$$36) \frac{1600\pi}{3} \approx 1675.52 \text{ in}^3$$

$$37) 64 \text{ ft}^2$$

$$38) \frac{4\pi}{3} \approx 4.19 \text{ ft}^3$$

$$39) \frac{1,562,500\sqrt{39}}{3} \approx 3,252,603.12 \text{ ft}^3 \text{ (NB: } 1,948,779.89 \text{ ft}^3 \text{ is the answer if } 200 \text{ ft is the } \underline{\text{edge length}}, \text{ NOT the slant height.)}$$

$$40) 400 + 8\pi \approx 425.13 \text{ ft}^3$$

$$41) 1029 \text{ m}^3$$

$$42) 102 \text{ in}^3$$

$$43) \frac{1750\pi}{3} \approx 1832.596 \text{ in}^3$$