

Practice: Write the contrapositive of the conditional $p \rightarrow q$

Ans: $\sim q \rightarrow \sim p$

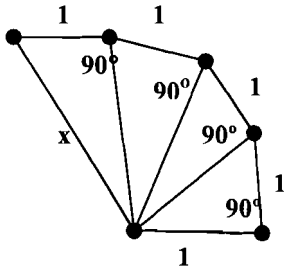
1.1 A cone of height 10 is inscribed in a sphere of radius 8. What is the area of its base? Ans: 60π

1.2 Find the distance from point $(1,1)$ to the line $y = \frac{2-x}{4}$. Simplify your answer.

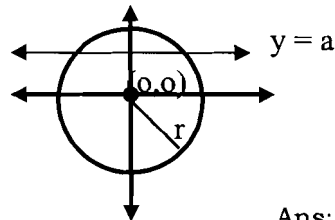
Ans: $\frac{3\sqrt{17}}{17}$

1.3 Find x in the following figure.

Ans: $\sqrt{5}$

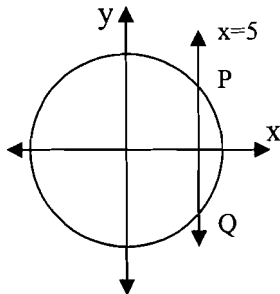


1.4 The length of the arc of the circle with radius r , that is above the line $y = a$ is exactly one quarter the circumference of the circle. Find $\frac{a}{r}$



Ans: $\frac{\sqrt{2}}{2}$

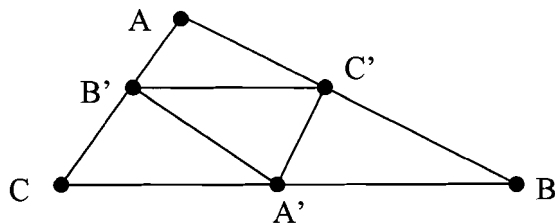
1.5 A circle with radius of 10 and center $(0,0)$ is intersected by the line $x = 5$ at points P and Q . At what point will the lines tangent to the circle at P and Q cross each other? Ans: $(20,0)$



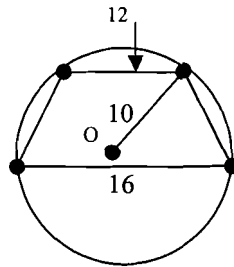
2.1 A', B', C' are midpoints. The area of triangle ABC is 10.

Find the area of triangle $A'B'C'$

Ans: $\frac{5}{2}$

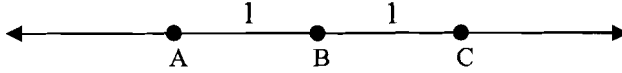


2.2 Find the area of the trapezoid inscribed in circle O.



Ans: 196

2.3 Let S_1 be the sphere centered at A with radius 2, and let S_2 be the sphere centered at C with radius 2. Find the area of the circle of intersection between the two spheres.

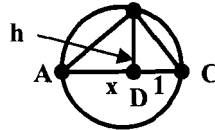


Ans: 3π

2.4 If the length, width, and space diagonal of a right rectangular prism are 6, 8, and 12 respectively, find the height of the prism.

Ans: $2\sqrt{11}$

2.5 In the following figure, assume \overline{AC} is a diameter of the circle. Find h in terms of x , if $h \perp \overline{AC}$.



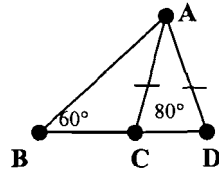
Ans: \sqrt{x}

3.1 A, B, and C are points on a circle of radius ten. $AB=20$, $AC=10$; $BC=?$

Ans: $10\sqrt{3}$

3.2 In the figure

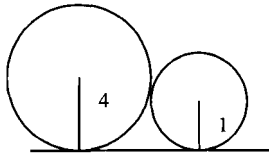
Let $r = \frac{BC}{AB}$



Find AD in terms of r .

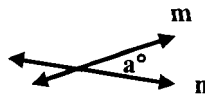
Ans: $\frac{3}{r}$

3.3 Find the radius of a small circle inscribed between the given circles and line.



Ans: $\frac{4}{9}$

3.4 The reflection, of this figure. with respect to n followed by reflection with respect to m is the same as a certain rotation by how many degrees and in what direction?



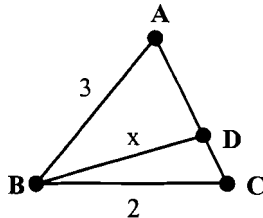
Ans: $2a^\circ$, clockwise

3.5 The base of a prism consists of n non-overlapping equilateral triangles with sides of 2. Find n if the height of the prism is \sqrt{n} and the volume of the prism is $64\sqrt{3}$.

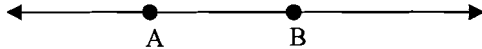
Ans: 16

4.1 \overline{BD} contains the orthocenter of $\triangle ABC$. $AC = 3$. Find BD .

Ans: $\frac{4\sqrt{2}}{3}$

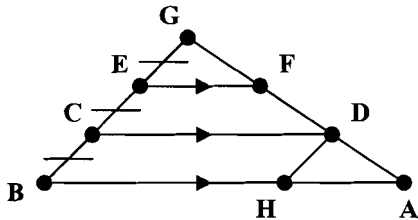


4.2 Let X be the locus of points P so that $\frac{PA}{PB} = 3$. Then X intersects \overline{AB} in how many points?



Ans: 2

4.3 $\overline{BG} \parallel \overline{HD}$ and the area of $\triangle ABG$ is 2. Find the area of the trapezoid $ABCD$. Ans: $\frac{10}{9}$



4.4 The hypotenuse of a 45-45-90 triangle is 10. Find the long leg of a 30-60-90 triangle which has its short leg as the leg in the 45-45-90.

Ans: $5\sqrt{6}$

4.5 A right circular frustum has a height of π and circumferences of the bases 6 and 8 inch. What is the volume of the frustum?

Ans: $\frac{37}{3}$

E.1 A certain rectangle has the property that when a square is cut off of one end, the resulting rectangle has the ratio of the length to the width equal to twice the corresponding ratio of the original rectangle; see diagram. What is the ratio of the length to the width on the original rectangle?



Ans: $\frac{1+\sqrt{3}}{2}$

E.2 A line intersects the union of two different coplanar circles in x points. If A is the set of all possible x values, list the elements of A .

Ans: $\{0, 1, 2, 3, 4\}$

E.3 Suppose the two acute angles of a rhombus measure θ° . Also, suppose the ratio of the area of the rhombus to the square of its perimeter is $2^{-\frac{1}{2}}$. Find θ . Ans: 45°