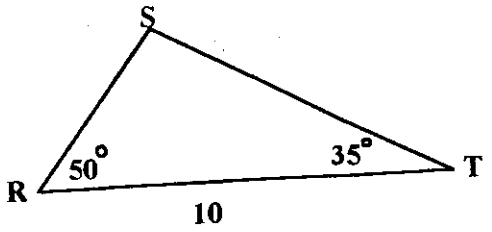
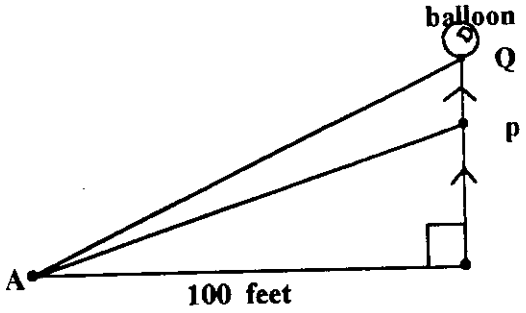
PRECALCULUS TEAM QUESTIONS

1. To the nearest tenth of a unit, find the perimeter of ΔRST.



2. A balloon rises from a height of 50 feet to a height of 70 feet. To the nearest tenth of a degree, find the change between the angles of elevation from an observer at point A (the measure of $\angle PAQ$).



3. The function defined by $f(x) = Ax^4 + Bx^3 + Cx^2 + Dx + E$ has integral coefficients with no common factor greater than 1. The roots of f include $1+\sqrt{3}$ and $-5i$. Find the value of B.

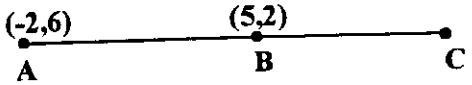
4. Let $x = 100 + 100(\cos\frac{\pi}{3}) + 100(\cos\frac{7\pi}{3})^2 + 100(\cos\frac{13\pi}{3})^3 + 100(\cos\frac{19\pi}{3})^4 + \ldots$

Find the value of x.

5. Let $n = \sqrt{1+\sqrt{2+\sqrt{1+\sqrt{2+\sqrt{\ldots}}}}}$.

Find the value of $n^4 - 2n^2 - n + 5$.

6. Points A, B and C are collinear, as shown. The ratio of **AB:BC** is **3:1**. The coordinates of point C are (x_1, y_1). Find the sum $(x_1 + y_1)$.



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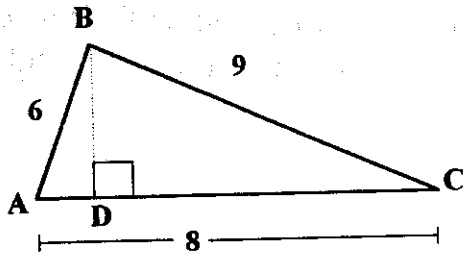
7. $\cos(Arc\sin(\frac{3}{5})) = \log_{32}(3x-4)$

and

$$\begin{bmatrix} 3 & 4 \\ 1 & -2 \end{bmatrix}^{-1} = \frac{1}{k}\begin{bmatrix} 4 & 8 \\ 2 & -6 \end{bmatrix}.$$

Find the value of $\frac{x}{k}$.

8. Find the length of the altitude $\overline{BD}$ to side $\overline{AC}$, to the nearest hundredth of a unit.

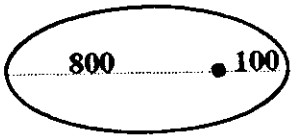


9. Given that $\frac{1}{\cos(\pi+x)} = -\tan(\frac{\pi}{3})$ and $0 < x < \frac{\pi}{2}$

find the exact value of $\sin x$.

10. In ΔABC, BC=8 and $m\angle C = 18.7°$, and AC=13. Find $m\angle B$ to the nearest degree.

11. A satellite orbits a planet in an elliptical orbit such that the planet is at one of the foci. At the nearest point of the orbit, the planet and satellite are 100 miles apart, and at the farthest they are 800 apart. Find the length of the minor axis of the elliptical orbit, to the nearest unit.



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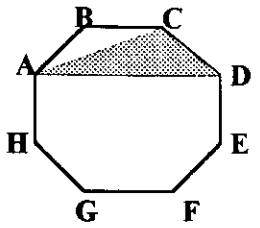
12. In regular octagon ABCDEFGH, each side has length 8. Find the area of ΔACD to the nearest tenth of a square unit.



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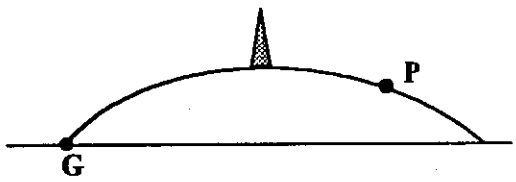
13. Two air-conditioners are being considered for purchase. The first initially costs \$1500 and costs \$20 per month to operate, for electricity. The second costs \$1800 for the initial purchase and a monthly cost for electricity. If it is not financially advantageous to buy the second unit until after the end of the 70th month (the end of 70th month is "break even" time), how much does it cost to operate the second unit monthly for electricity? Round to the nearest cent.

14. A ship travels 50 miles from point S, on a course of 130 degrees (clockwise off of the north). It then turns to a course of 20 degrees, and travels 70 more miles. To the nearest hundredth of a mile, how far has the ship traveled from point S?

15. A 100-foot tall radio tower is at the top of a hill whose vertical cross-section is a parabola, of equation $f(x) = 1000 + 500x - x^2$. The value of f determines feet above sea level of a point P on the hill, and x measures the distance horizontally from point G, shown. How many feet above sea level is the top of the tower?



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