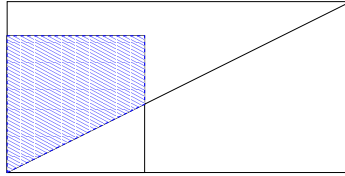
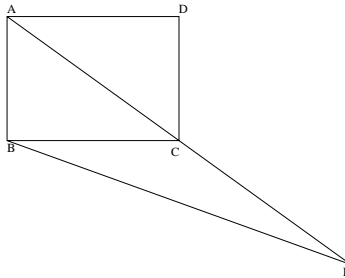


BC EXAM
TAMU High School Mathematics Contest
November 2001

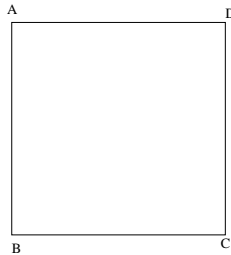
1. The sketch shows a 4 by 4 square inside a 5 by 10 rectangle. Find the area of the shaded region.



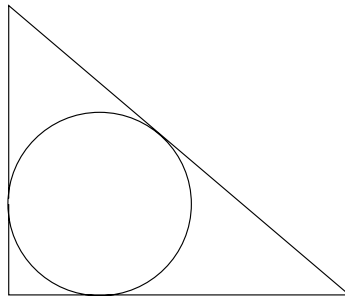
2. Find the area of a right triangle with perimeter 20 and hypotenuse 8.
3. The sketch shows a rectangle $ABCD$ with side lengths $AB = 2$ and $BC = 3$. The line segment joining A and C is a diagonal of the rectangle and $AC = CE$. Find the length of the line segment joining B and E .



4. Given a square $ABCD$ with side length 8 a circle is drawn through vertices A and D and tangent to side BC . Find the radius of the circle.



5. The circle in the sketch is tangent to all three sides of the right triangle. The triangle has sides of length 8, 15 and 17. Find the radius of the circle.



6. Let C be the circle in the xy -plane which is centered at $(1,2)$ and passes through $(4,3)$. Let S be the set of all points in the xy -plane that are within a distance 1 from the circle. What is the area of S ?
7. Find the smallest altitude of a triangle with side lengths 4, 6 and 8.
8. Simplify $\frac{(a+5)^3 + (a-5)^3 - 2a^3}{(a+5)^2 - (a-5)^2}$.
9. Solve the inequality $\frac{x+1}{x-3} \geq 2$.
10. The symbol 25_b represents a two digit number in base b . If the number 52_b is double the number 25_b , what does b equal?
11. Find all values of a for which the parabolas $y = 1 + 2x - x^2$ and $y = x^2 + a$ intersect.
12. How many pairs (n, m) of integers satisfy the three inequalities $1 \leq n \leq 100$, $1 \leq m \leq 100$ and $m \leq 2n$?
13. The length of a rectangular field is twice its width. If x feet of fencing is used to enclose the entire field, what is the area of the field in terms of x ?
14. Solar powered cycles A and B start at the same time in a race from Bryan, north to Marlin. It is 60 miles from Bryan to Marlin. The cycles move at constant speeds, with A moving 4 miles per hour slower than B . B reaches Marlin and immediately turns back, meeting A 12 miles south of Marlin. How fast does cycle A travel in miles per hour?
15. The interior angles of a certain convex polygon add up to 900 degrees. How many sides does the polygon have?