Nassau County Interscholastic Mathematics League

Contest 4 All answers must be in simplest exact form unless otherwise specified. 2006 –2007
Calculators Allowed

Problems 19-20. Time limit: 10 minutes

#19. In a pamphlet whose page numbers start "1", the product of the page numbers on the two pages across from each other in the middle of a pamphlet is 600. Compute the total number of pages in the pamphlet.

#20. The orthocenter of a triangle is the point of intersection of the lines containing its three altitudes. The centroid of a triangle is the point of intersection of its three medians. Determine the length of the segment joining the orthocenter and the centroid of a right triangle with sides measuring 30, 72, and 78.

Problems 21-22. Time limit: 10 minutes

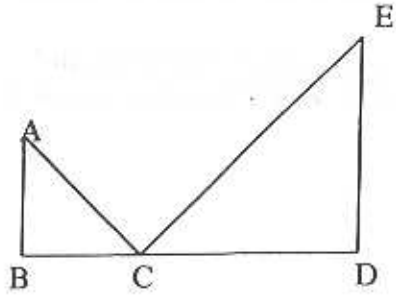
#21. A circle has the same area as that of a square whose side measures $\frac{4}{\pi}$. Compute the diameter of the circle to the nearest thousandth.

#22. Compute the positive value of x such that $\frac{x^6-1}{x^5-x^3+x^2-1}=4.2$.

Problems 23-24. Time limit: 12 minutes

#23. A fruit basket contains eight (8) valencia oranges, six (6) temple oranges, and four (4) navel oranges, all of the same shape, size, and color. Six (6) oranges are chosen at random. If the valencias sell for \$0.36 each, the temples for \$0.31 each, and the navels for \$0.26 each, compute the probability that the cost of the six oranges will exceed \$2.

#24. From the top of a building, A, a light beam is reflected at a point, C, on the ground, to the top of another building, E, 12 feet higher than A, as shown in the diagram below. If $\overline{AB} \perp \overline{BCD}$, $\overline{ED} \perp \overline{BCD}$, AE = 37 ft and AC + CE = 91 ft, find the number of feet in AB.



Answers:

#19. 48

#20. 26

#21. 1.437

#22. 4

#23. $\frac{317}{1326}$ or 0.2391

#24. 36