

NASSAU COUNTY INTERSCHOLASTIC MATHEMATICS LEAGUE

2007 – 2008

Acceptable Calculators Allowed

Contest #4

The degree of accuracy will be specified in the problem.

Problems 19-20. 10 minutes

19. Ted's present age is 3 times the age Bill was 6 years ago. 10 years from now, the sum of their ages will be 13 less than 5 times Bill's current age. In years, how old will Ted be 10 years from now?

20. Compute the remainder when $(3^{25} + 8^{31} - 7^{12})$ is divided by 10.

Problems 21-22. 10 minutes

21. The total distance along a route from city A to city B to city C in that order is 300 miles. If you travel from city A to city B at an average rate of 65 mph and from city B to city C at an average rate of 45 mph, the entire trip takes 6 hours. Compute the total number of miles between city B and city C along this route.

22. John invests \$30,000 for 90 days at an annual rate of interest of 2.8%, compounded daily. Stephanie invests \$29,000 for 270 days at an annual rate of interest of $x\%$, also compounded daily. If, to the nearest dollar, both investments had the same monetary value upon maturation, compute x to the nearest tenth. [Assume that the number of days in a year is 365, whether the year is a leap year or not.]

Problems 23-24. 10 minutes

23. Circle R and circle O are externally tangent as shown in the diagram below. Points B and D lie on circle R and points A and C lie on circle O such that PAB and PCD are tangents common to both circles. Given that $PA = 2$ and $AB = 6$, compute the area of circle O in terms of π .

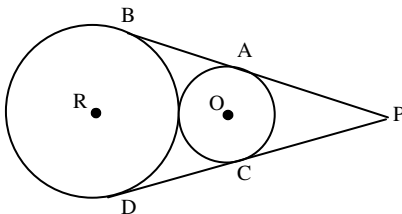


Figure not drawn to scale.

24. On a nonstop trip of 6,240 miles each way between two cities, an airplane experienced a steady wind speed of 20 mph. On one leg of the round trip, the wind was at its tail and, on the other leg, at its head. If one leg of the roundtrip took one hour longer than the other leg, compute, in miles per hour, the speed of the plane in still air.