

EMMY NOETHER MIDDLE SCHOOL MATHEMATICS DAY
Texas Tech University
May 8, 2008

Write your name, the name of your school and your current grade level on the front of the blue book. Show your reasoning and clearly indicate your answer to each problem. Each problem is worth 10 points. If you are not sure how to approach a problem, you are strongly encouraged to experiment and to try to discover.

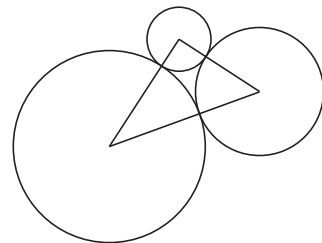
1.) When Rachel divides her favorite number by 7 she gets a remainder of 5. What will the remainder be if she multiplies her favorite number by 3 and then divides by 7?

2.) Susan initially has nine coins, each of which is either a nickel (5 cent piece) or a quarter (25 cent piece). She gives a clerk 55 cents for a snack, receiving a penny (1 cent piece) back. She now has seven coins (the penny, plus the remaining nickels and quarters) totaling 51 cents. How many nickels and how many quarters did Susan start out with?

3.) How many three letter words can be formed from the letters N O E T H E R? A word is any ordered sequence of three letters from the above collection, e.g. RNE. A “word” does not necessarily have “meaning” in any particular “language.”

4.) Determine the exact number of degrees in the smaller angle between the hour and minute hands of an analog clock at 10:16. Remember that there are 360° in a complete circle. Assume that each hand moves at a uniform constant angular rate. Thus the hour hand moves uniformly between 10 and 11 on the clock face between 10:00 and 11:00, being a proportionate angle between them at 10:16.

5.) Three circles with radii of 2, 4 and 6 are tangent to each other as shown in the diagram. Determine the area of the triangle whose vertices are A , B and C , the centers of the circles.



6.) Lassie has two litters of puppies. There are six puppies in the first litter and five puppies in the second litter. Each puppy is either sable and white in color or tricolor. There are six sable and white puppies in the two litters combined. Each litter has one tricolor female puppy. How many tricolor male puppies are there in the two litters combined?