MATHCOUNTS®

2014
■ Chapter Competition ■
Target Round
Problems 1 & 2

Name _____

School _____

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This section of the competition consists of eight problems, which will be presented in pairs. Work on one pair of problems will be completed and answers will be collected before the next pair is distributed. The time limit for each pair of problems is six minutes. The first pair of problems is on the other side of this sheet. When told to do so, turn the page over and begin working. This round assumes the use of calculators, and calculations also may be done on scratch paper, but no other aids are allowed. All answers must be complete, legible and simplified to lowest terms. Record only final answers in the blanks in the left-hand column of the problem sheets. If you complete the problems before time is called, use the time remaining to check your answers.

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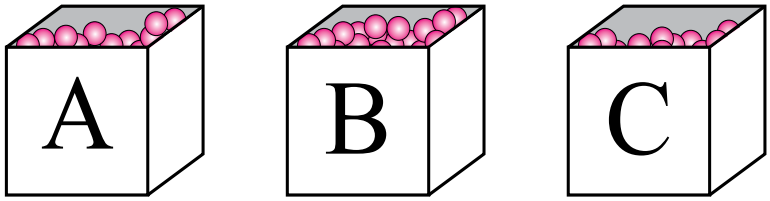
1. _____ marbles Box A contains 142 marbles, box B contains 152 marbles and box C contains 136 marbles. Marbles are transferred only from box B to box C. What is the least number of marbles that must be transferred so that box C contains more marbles than each of the other two boxes?



2. _____ What is the largest prime that divides both $20! + 14!$ and $20! - 14!$?

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Problems 3 & 4

Name _____

School _____

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3. _____ways In how many distinguishable ways can the four letters in the word NINE be arranged?

4. _____quantities A particular online vendor offers discounts for orders of 11 or more shirts, as the table shows. For how many different quantities of shirts would the cost exceed the cost of buying the least number of shirts at the next discount level?

Number of Shirts	**Discount**
1-10	no discount
11-25	10% off
26-50	15% off
51-100	20% off
101-250	30% off
251 or more	35% off

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Problems 5 & 6

Name _____

School _____

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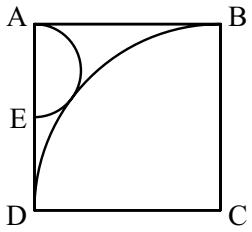
5. _____ Each term in the sequence that begins 13, 9, 18, … is the sum of three times the tens digit and two times the units digit of the previous term. What is the greatest value of any term in this sequence?

6. _____ cm In square ABCD, shown here, sector BCD was drawn with a center C and BC = 24 cm. A semicircle with diameter AE is drawn tangent to the sector BCD. If points A, E and D are collinear, what is AE?



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Target Round
Problems 7 & 8

Name _____

School _____

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7. _____ unit cubes

How many distinct unit cubes are there with two faces painted red, two faces painted green and two faces painted blue? Two unit cubes are considered distinct if one unit cube cannot be obtained by rotating the other.

8. _____ units^2

What is the greatest possible area of a triangle with vertices on or above the x-axis and on or below the parabola $y = -\left(x - \frac{1}{2}\right)^2 + 3$? Express your answer in simplest radical form.

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