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# MATHCOUNTS®

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2015  
■ State Competition ■  
Target Round  
Problems 1 & 2

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Name \_\_\_\_\_

School \_\_\_\_\_

Chapter \_\_\_\_\_

**DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.**

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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NextThought

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1. \_\_\_\_\_ years old     Julia's age is a two-digit multiple of 5, and when Julia's age is divided by 2, 3, 4, 6 or 8, the remainder is always 1. If Julia is five times as old as Bart, how old is Bart?

2. \_\_\_\_\_     If  $p$  is the maximum number of points of intersection possible of  $n$  distinct lines, and the ratio  $p:n = 6:1$ , what is the value of  $n$ ?

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# MATHCOUNTS®

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2015  
■ State Competition ■  
Target Round  
Problems 3 & 4

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Name \_\_\_\_\_

School \_\_\_\_\_

Chapter \_\_\_\_\_

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3. \_\_\_\_\_ If  $p$  is the greatest prime whose digits are distinct prime numbers, what is the units digit of  $p^2$ ?

4. \_\_\_\_\_ If  $\frac{a}{4-a} = \frac{b}{5-b} = \frac{c}{7-c} = 3$ , what is the value of  $a + b + c$ ?

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# MATHCOUNTS®

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2015  
■ State Competition ■  
Target Round  
Problems 5 & 6

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Name \_\_\_\_\_

School \_\_\_\_\_

Chapter \_\_\_\_\_

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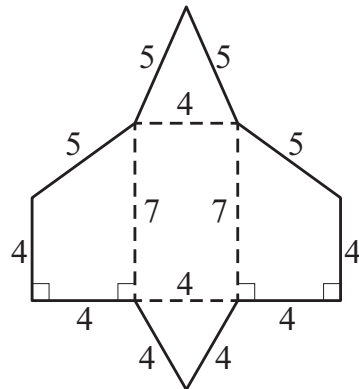
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5. \_\_\_\_\_ A building constructed in January of the year 2000 will celebrate its 1-month anniversary in February of 2000 and its 12-month anniversary in January of 2001. If during the year  $n$  this building will celebrate its  $n$  month anniversary, what is the value of  $n$ ?

6. \_\_\_\_\_  $\text{in}^3$  The shape below can be folded along the dashed lines and taped together along the edges to form a three-dimensional polyhedron. All lengths in the diagram are given in inches. What is the volume of the resulting polyhedron? Express your answer in simplest radical form.



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# MATHCOUNTS®

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2015  
■ State Competition ■  
Target Round  
Problems 7 & 8

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Name \_\_\_\_\_

School \_\_\_\_\_

Chapter \_\_\_\_\_

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7. \_\_\_\_\_ years old

When trying to recall some facts about the ages of his three aunts, Josh made the following claims:

- Alice is fifteen years younger than twice Catherine's age.
- Beatrice is twelve years older than half of Alice's age.
- Catherine is eight years younger than Beatrice.
- The three women's ages add to exactly one-hundred years.

However, Josh's memory is not perfect, and in fact only three of these four claims are true. If each aunt's age is an integer number of years, how old is Beatrice?

8. \_\_\_\_\_

Circle O is tangent to two sides of equilateral triangle XYZ. If the two shaded regions have areas  $50 \text{ cm}^2$  and  $100 \text{ cm}^2$  as indicated, what is the ratio of the area of triangle XYZ to the area of circle O? Express your answer as a decimal to the nearest hundredth.

