

# MATHCOUNTS<sup>®</sup>

## 2021 CHAPTER INVITATIONAL COMPETITION Target Round Problems 1–8

Name \_\_\_\_\_

### 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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1.            hot dogs      Max is buying hot dogs and buns for dinner. If hot dogs are sold in packages of six and buns are sold in packages of eight, what is the least positive number of hot dogs that Max must buy so that he can purchase exactly the same number of buns?

2.            units<sup>2</sup>      The square card shown in Figure A, with area 16 units<sup>2</sup>, is folded twice along the dashed lines to get the square shown in Figure B. Then, scissors are used to cut through the folded square, and one-fourth of the folded card, shown shaded in Figure C, is removed. When unfolded, what is the area of what remains of the card after the removal?

Figure A

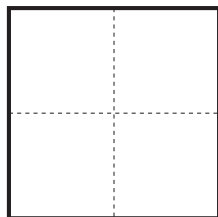
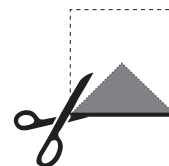


Figure B



Figure C



3. \_\_\_\_\_ orders Cindy has been given four chores to complete today: vacuum, mop, dust and laundry. Because Cindy finds doing laundry especially unpleasant, she wants to do that chore last. Given this, in how many different orders can Cindy complete her chores?

4. \_\_\_\_\_ In the dice game Zero, a player rolls six standard six-sided dice and then scores points for certain combinations, as shown in the table. A die cannot be used in more than one combination. For example, a player who rolls 1 5 6 4 4 6 scores 50 points, while a player who rolls 1 4 4 4 1 4 scores 250 points. What is the probability that a player scores 0 points on a roll? Express your answer as a common fraction.

<b>Player's Roll</b>	<b>Points Scored</b>
Three of a kind (ex. 2 2 2 4 6 3)	100
Four of a kind	200
Five of a kind	400
Six of a kind	900
Three pair (ex. 2 2 3 3 4 4)	200
Six distinct (1 2 3 4 5 6)	300
The number 1	25
The number 5	25

5. \_\_\_\_\_ miles A U.S. quarter is 0.069 inches thick. Clayton Kershaw earned 33 million dollars for the 2017 Major League Baseball season. If Kershaw received his entire 2017 salary in the form of a single stack of quarters, what would be the height of the stack, in miles? There are 5280 feet in a mile. Express your answer as a decimal to the nearest hundredth.

6. \_\_\_\_\_ In rectangle ABCD, the length of side AB is less than the length of side BC. When diagonal AC is drawn, and a line segment from vertex B to diagonal AC is drawn so that the segment meets AC at a right angle, rectangle ABCD is divided into three regions whose areas form an arithmetic progression. The ratio AB:BC, expressed as a common fraction in simplest radical form, is  $\frac{\sqrt{a}}{b}$ . What is the value of  $ab$ ?

7. \_\_\_\_\_ °C If  $C$  is the temperature in degrees Celsius, the temperature in degrees Fahrenheit is given by the formula  $F = \frac{9}{5}C + 32$ . On a cold winter day, the temperature in degrees Fahrenheit is the additive inverse of the temperature in degrees Celsius. What is the temperature in degrees Celsius? Express your answer as a decimal to the nearest tenth.

8. \_\_\_\_\_ ways How many ways are there to color the  $4 \times 4$  grid shown, so that each unit square is red, blue, green or yellow, and so that each unit square is the same color as exactly two of the unit squares that share a side with it?

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16