

---

# MATHCOUNTS®

---

2018  
■ Chapter Competition ■  
Target Round  
Problems 1 & 2

Name \_\_\_\_\_

School \_\_\_\_\_

**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.

---

Problem 1	Problem 2	Scorer's Initials

## Raytheon

2018 MATHCOUNTS  
National Competition Sponsor

### NATIONAL SPONSORS

Raytheon Company  
Northrop Grumman Foundation  
U.S. Department of Defense  
National Society of Professional Engineers  
CNA Insurance  
Phillips 66  
Texas Instruments Incorporated  
3Mgives  
Art of Problem Solving  
NextThought

FOUNDING SPONSORS: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2017. All rights reserved.

0  
1  
2  
3  
4  
5  
6  
7  
8  
9

1. \_\_\_\_\_ minutes If a class starts at exactly 11:43 a.m. and ends at exactly 2:34 p.m. the same day, how many minutes long is the class?

2. \_\_\_\_\_ The solutions of the equation  $2x^2 + 5x - 12 = 0$  are  $m$  and  $n$ . What is the value of  $(m - 1)(n - 1)$ ? Express your answer as a common fraction.

---

# MATHCOUNTS®

---

2018  
■ Chapter Competition ■  
Target Round  
Problems 3 & 4

Name \_\_\_\_\_

School \_\_\_\_\_

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

---

Problem 3	Problem 4	Scorer's Initials

**Raytheon**

**2018 MATHCOUNTS  
National Competition Sponsor**

**NATIONAL SPONSORS**

Raytheon Company  
Northrop Grumman Foundation  
U.S. Department of Defense  
National Society of Professional Engineers  
CNA Insurance  
Phillips 66  
Texas Instruments Incorporated  
3Mgives  
Art of Problem Solving  
NextThought

FOUNDING SPONSORS: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2017. All rights reserved.

0
1
2
3
4
5
6
7
8
9

3. \_\_\_\_\_ The sum of two numbers is 35. The greater number is 4 less than twice the lesser number. What is the greater number?

4. \_\_\_\_\_ If the values 1, 2, 3 and 4, in some order, are assigned to the variables  $a$ ,  $b$ ,  $c$  and  $d$ , without using any value more than once, what is the greatest possible value of  $(a + b)^{(c + d)}$ ?

---

# MATHCOUNTS®

---

2018  
■ Chapter Competition ■  
Target Round  
Problems 5 & 6

Name \_\_\_\_\_

School \_\_\_\_\_

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

---

Problem 5	Problem 6	Scorer's Initials

**Raytheon**

**2018 MATHCOUNTS  
National Competition Sponsor**

**NATIONAL SPONSORS**

Raytheon Company  
Northrop Grumman Foundation  
U.S. Department of Defense  
National Society of Professional Engineers  
CNA Insurance  
Phillips 66  
Texas Instruments Incorporated  
3Mgives  
Art of Problem Solving  
NextThought

FOUNDING SPONSORS: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2017. All rights reserved.

0
1
2
3
4
5
6
7
8
9

5.           seconds Aiden and Bryce are racing around a race track. They begin together at the starting line, and Aiden's car completes a lap every 44 seconds, while Bryce's car completes a lap every 40 seconds. How many seconds after they begin the race will Aiden and Bryce first reach the starting line at the same time?

6.           percent Deb is watching an online movie with a playing time of 2 hours and 18 minutes not including ads. The website shows a 30-second ad prior to starting the movie. The website interrupts the movie after each 10 minutes that the movie has played and shows another 30-second ad. If Deb watches from the beginning of the first ad to the end of the movie, what percent of her total viewing time does she spend watching ads? Express your answer as a decimal to the nearest tenth.

---

# MATHCOUNTS®

---

2018  
■ Chapter Competition ■  
Target Round  
Problems 7 & 8

Name \_\_\_\_\_

School \_\_\_\_\_

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

---

Problem 7	Problem 8	Scorer's Initials

**Raytheon**

**2018 MATHCOUNTS  
National Competition Sponsor**

**NATIONAL SPONSORS**

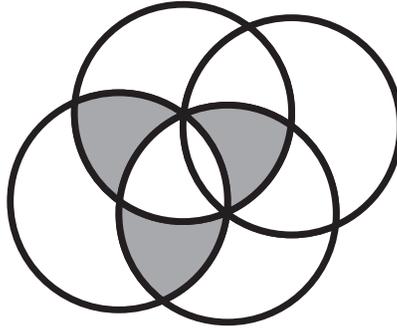
Raytheon Company  
Northrop Grumman Foundation  
U.S. Department of Defense  
National Society of Professional Engineers  
CNA Insurance  
Phillips 66  
Texas Instruments Incorporated  
3Mgives  
Art of Problem Solving  
NextThought

FOUNDING SPONSORS: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2017. All rights reserved.

0
1
2
3
4
5
6
7
8
9

7. \_\_\_\_\_  $\text{cm}^2$  Four congruent circles of radius 2 cm intersect with their centers at intersection points as shown. What is the area of the shaded region? Express your answer in terms of  $\pi$ .



8. \_\_\_\_\_ In the equation  $y = 3 - \sqrt{\frac{4-x}{2}}$ , what is the sum of all the integer values of  $x$  that make  $y$  nonnegative?