

---

---

# MATHCOUNTS®

---

2013

■ School Competition ■  
Target Round  
Problems 1 and 2

---

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.

---

Total Correct	Scorer's Initials

## National Sponsors

---

Raytheon Company \* Northrop Grumman Foundation \*  
U.S. Department of Defense \*  
National Society of Professional Engineers \* CNA Foundation \*  
ConocoPhillips \* Texas Instruments Incorporated \*  
3M Foundation \* Art of Problem Solving \* NextThought

**Raytheon**

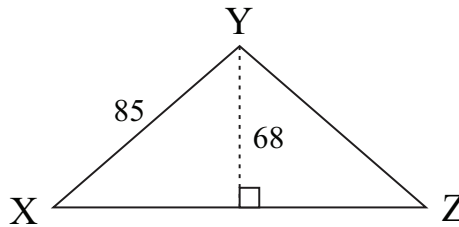
2013 MATHCOUNTS  
National Competition Sponsor

Founding Sponsors: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2012. All rights reserved.

1. \_\_\_\_\_ integers How many integers between 9 and 100 have a 4 or 5 in the tens place and a 7, 8 or 9 in the units place?

2. \_\_\_\_\_ cm Isosceles triangle XYZ, shown here, has a height of 68 cm. If  $XY = YZ = 85$  cm, what is length of segment XZ?



---

---

# MATHCOUNTS®

---

2013

■ School Competition ■

Target Round

Problems 3 and 4

---

Name \_\_\_\_\_

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

---

Total Correct	Scorer's Initials

## National Sponsors

---

Raytheon Company \* Northrop Grumman Foundation \*  
U.S. Department of Defense \*  
National Society of Professional Engineers \* CNA Foundation \*  
ConocoPhillips \* Texas Instruments Incorporated \*  
3M Foundation \* Art of Problem Solving \* NextThought

**Raytheon**

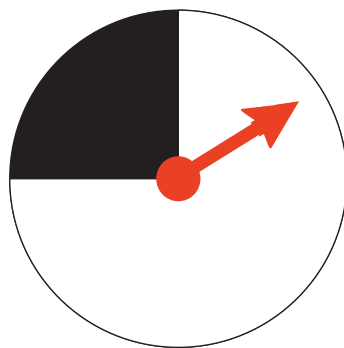
2013 MATHCOUNTS  
National Competition Sponsor

Founding Sponsors: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2012. All rights reserved.

3. \_\_\_\_\_ minutes A laptop computer can run for 3 hours and 40 minutes when the battery has 97% of a full charge. Assuming the battery started with a full charge and decreases at a constant rate, for how many minutes has the computer already been powered on when the battery has 97% of a full charge? Express your answer to the nearest whole number.

4. \_\_\_\_\_ One-fourth of the spinner shown is painted black, while the rest is painted white. The spinner will be spun five times. What is the probability that the spinner stops in the white section only on the fifth spin and stops in the black section on each of the first four spins? Express your answer as a common fraction.



---

---

# MATHCOUNTS<sup>®</sup>

---

2013

■ School Competition ■

Target Round

Problems 5 and 6

---

Name \_\_\_\_\_

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

---

Total Correct	Scorer's Initials

## National Sponsors

---

Raytheon Company \* Northrop Grumman Foundation \*  
U.S. Department of Defense \*  
National Society of Professional Engineers \* CNA Foundation \*  
ConocoPhillips \* Texas Instruments Incorporated \*  
3M Foundation \* Art of Problem Solving \* NextThought

**Raytheon**

2013 MATHCOUNTS  
National Competition Sponsor

Founding Sponsors: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

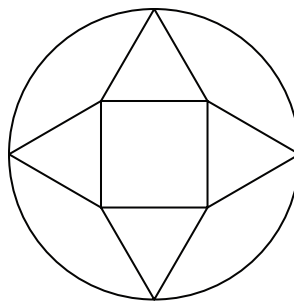
Copyright MATHCOUNTS, Inc. 2012. All rights reserved.

5. \$ \_\_\_\_\_

If the price of an item is \$51.51, which includes a 6.25% sales tax, what is the price of the item before tax?

6. \_\_\_\_\_ cm

An equilateral triangle is constructed on each side of a square, as shown. All side lengths are 2 cm each. One vertex of each triangle lies on the circle. What is the length of the radius of the circle? Express your answer in simplest radical form.



---

---

# MATHCOUNTS®

---

2013

■ School Competition ■

Target Round

Problems 7 and 8

---

Name \_\_\_\_\_

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

---

Total Correct	Scorer's Initials

## National Sponsors

---

Raytheon Company \* Northrop Grumman Foundation \*  
U.S. Department of Defense \*  
National Society of Professional Engineers \* CNA Foundation \*  
ConocoPhillips \* Texas Instruments Incorporated \*  
3M Foundation \* Art of Problem Solving \* NextThought

**Raytheon**

2013 MATHCOUNTS  
National Competition Sponsor

Founding Sponsors: National Society of Professional Engineers, National Council of Teachers of Mathematics and CNA Foundation

Copyright MATHCOUNTS, Inc. 2012. All rights reserved.

7. \_\_\_\_\_  $\text{ft}^3$  A hose that is 100 feet long has an inner diameter of 2 inches. How many cubic feet of water can the hose hold? Express your answer to the nearest whole number.

8. \_\_\_\_\_ years On-Time Airlines assigns a lowercase six-letter “record locator” to each reservation. Two such record locators are *efftsf* and *rgftpz*. The airline takes 100 million reservations every year. What is the greatest number of full years for which the airline can operate before having to reuse a record locator? Express your answer to the nearest whole number.