MATHCOUNTS®

2011
■ Chapter Competition ■
Team Round
Problems 1–10

School _____

Team Members _____ , Captain

_____

_____

_____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This section of the competition consists of 10 problems which the team has 20 minutes to complete. Team members may work together in any way to solve the problems. Team members may talk to each other during this section of the competition. 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. The team captain must record the team's official answers on his/her own competition booklet, which is the only booklet that will be scored. If the team completes the problems before time is called, use the remaining time to check your answers.

Total Correct	Scorer's Initials

1. Three vertices of square ABCD are located at the points A(5, –1), B(7, 1) and D(3, 1). What are the coordinates of point C? Express your answer as an ordered pair.

1. ____(,)____

2. What is the units digit when 3^{2011} is multiplied out?

2. _____

3. An ad indicates that a store is offering a sale on carpet that is priced per square foot. Mr. Adams said that the sale price he paid for a piece of carpet measuring 10-feet by 12-feet was the same as the non-sale price for a piece of the same type of carpet measuring 6-feet by 8-feet. What percent off the original carpet price is the store's sale price?

3. _____ %

4. Zeta always runs around the track at a rate of 30 laps per 75 minutes, and Ray always runs around the track at a rate of 20 laps per 40 minutes. If they start at the same time, how many minutes will it take them to run a combined distance of 99 laps?

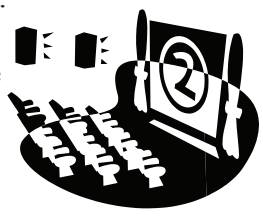
4. _____ minutes

5. Line L passes through the points $(0, \frac{1}{2})$ and $(4, k)$ and is perpendicular to the line $y = -4x + 5$. What is the value of k? Express your answer as a common fraction.

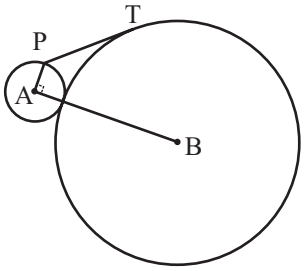
5. _____

6. At the MC Theater, the first showing of a particular movie starts at 11:15 a.m. Each showing begins with 10 minutes of previews followed by the 105-minute featured movie. Twenty minutes are needed between showings to clean the theater and seat the audience. There are five showings of the movie prior to midnight. According to a 12-hour clock, what is the earliest possible time the last showing could begin?

6. ____: ____ p.m.



7. Circles A and B are externally tangent. Angle PAB is a right angle. Segment PT is tangent to circle B at T. If the radius of circle A is 1 cm and the radius of circle B is 7 cm, what is the length of segment PT?



7. _____ cm

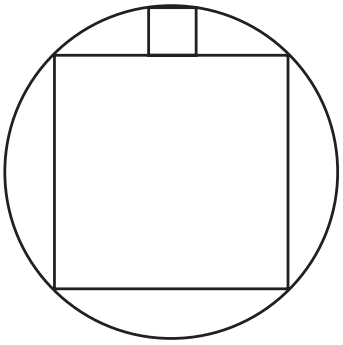
8. When 3-digit area codes were first used, the first digit could not be a 0 or a 1, and the second digit could *only* be a 0 or a 1. There were no restrictions on the third digit. In 1995 the restrictions on the second digit were lifted. How many more 3-digit area codes are possible today than were possible prior to 1995?

8. _____ area codes

9. Suppose each of the nine digits $\{1, 2, 3, \ldots, 9\}$ is used exactly once as a digit in either the four-digit positive integer a or the five-digit positive integer b. What is the smallest possible value of a if $\frac{a}{b} = \frac{1}{2}$?

9. _____

10. A square is inscribed in a circle. A smaller square has one side coinciding with a side of the larger square and has two vertices on the circle, as shown. What percent of the area of the larger square is the area of the smaller square?



10. _____ %