Math Circles 9 / 10
Preparing to Write
Pascal, Cayley, Fermat

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Agenda

1. Contest Information
2. Contest Format
3. Some General Comments About Preparing Through Examples
4. Working on Problems

Contest Information

Pascal for students in grade 9 or lower

Cayley for students in grade 10 or lower

Fermat for students in grade 11 or lower

Thursday, February 23, 2012

Registration Deadline has passed.

The Contest Format

From the instructions:

This is a multiple-choice test. Each question is followed by five possible answers marked A, B, C, D, and E. Only one of these is correct.

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This is a multiple-choice test. Each question is followed by five possible answers marked A, B, C, D, and E. Only one of these is correct.

- 60 minutes
- 150 total marks

  10 questions in A part worth 5 marks each
  10 questions in B part worth 6 marks each
  5 questions in C part worth 8 marks each
- Each unanswered question is worth 2 marks each to a maximum of 10 unanswered questions.
- calculator permitted

The Contest: Should I Guess?

150 total marks (A) 10×5 (B) 10×6 (C) 5×8

Unanswered questions 2 marks each to a maximum of 10 blank

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Unanswered questions 2 marks each to a maximum of 10 blank

Score With **Random** Guessing:

Part A 10 right, Part B 8 right 2 wrong, Part C 2 right 3 wrong

Score $10 \times 5 + 8 \times 6 + 2 \times 8 = 114$

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150 total marks (A) 10×5 (B) 10×6 (C) 5×8

Unanswered questions 2 marks each to a maximum of 10 blank

Score With **Random** Guessing:

Part A 10 right, Part B 8 right 2 wrong, Part C 2 right 3 wrong

Score $10 \times 5 + 8 \times 6 + 2 \times 8 = 114$

Score With **No** Guessing:

Part A 10 right, Part B 8 right 2 blank, Part C 2 right 3 blank

Score $10 \times 5 + 8 \times 6 + 2 \times 8 + 5 \times 2 = 124$

The Contest: Should I Guess?

150 total marks (A) 10×5 (B) 10×6 (C) 5×8

Unanswered questions 2 marks each to a maximum of 10 blank

Score With **Random** Guessing:

Part A 10 right, Part B 8 right 2 wrong, Part C 2 right 3 wrong

Score $10 \times 5 + 8 \times 6 + 2 \times 8 = 114$

Score With **No** Guessing:

Part A 10 right, Part B 8 right 2 blank, Part C 2 right 3 blank

Score $10 \times 5 + 8 \times 6 + 2 \times 8 + 5 \times 2 = 124$

There is a difference between a random guess and an educated guess.

Contest Preparation

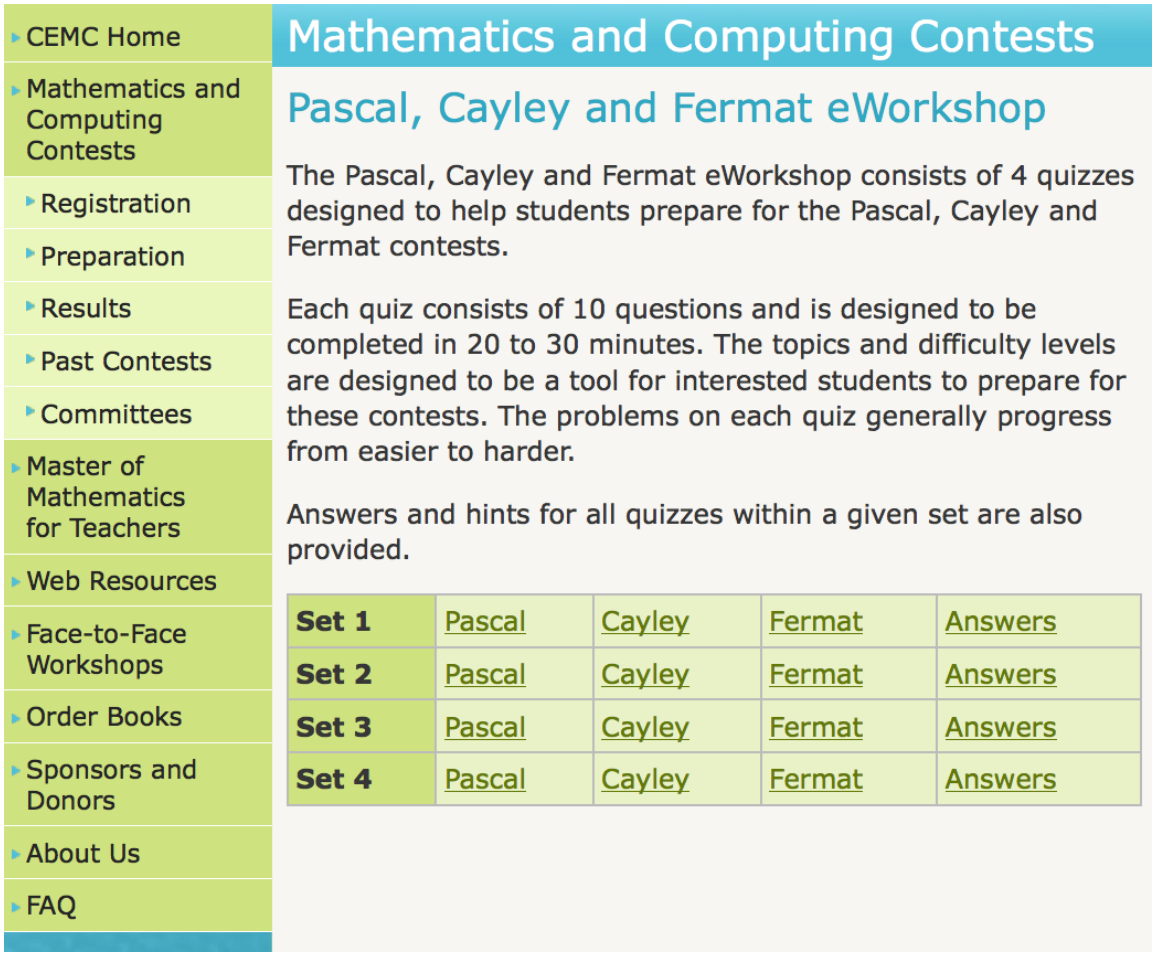
Most of the problems that we will look at have been taken from past Pascal and Cayley contests.

The key to success on any math contest is _____.

Writing a Math contest is different than solving math problems in general. The contest is timed! By doing many old contests you will pick up some tricks and techniques which will help you to write a good contest.

Contest Resources

Go to http://www.cemc.uwaterloo.ca/contests/pcf_eWorkshop.html for the Pascal, Cayley, Fermat E-workshop.



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Mathematics and Computing Contests

Pascal, Cayley and Fermat eWorkshop

The Pascal, Cayley and Fermat eWorkshop consists of 4 quizzes designed to help students prepare for the Pascal, Cayley and Fermat contests.

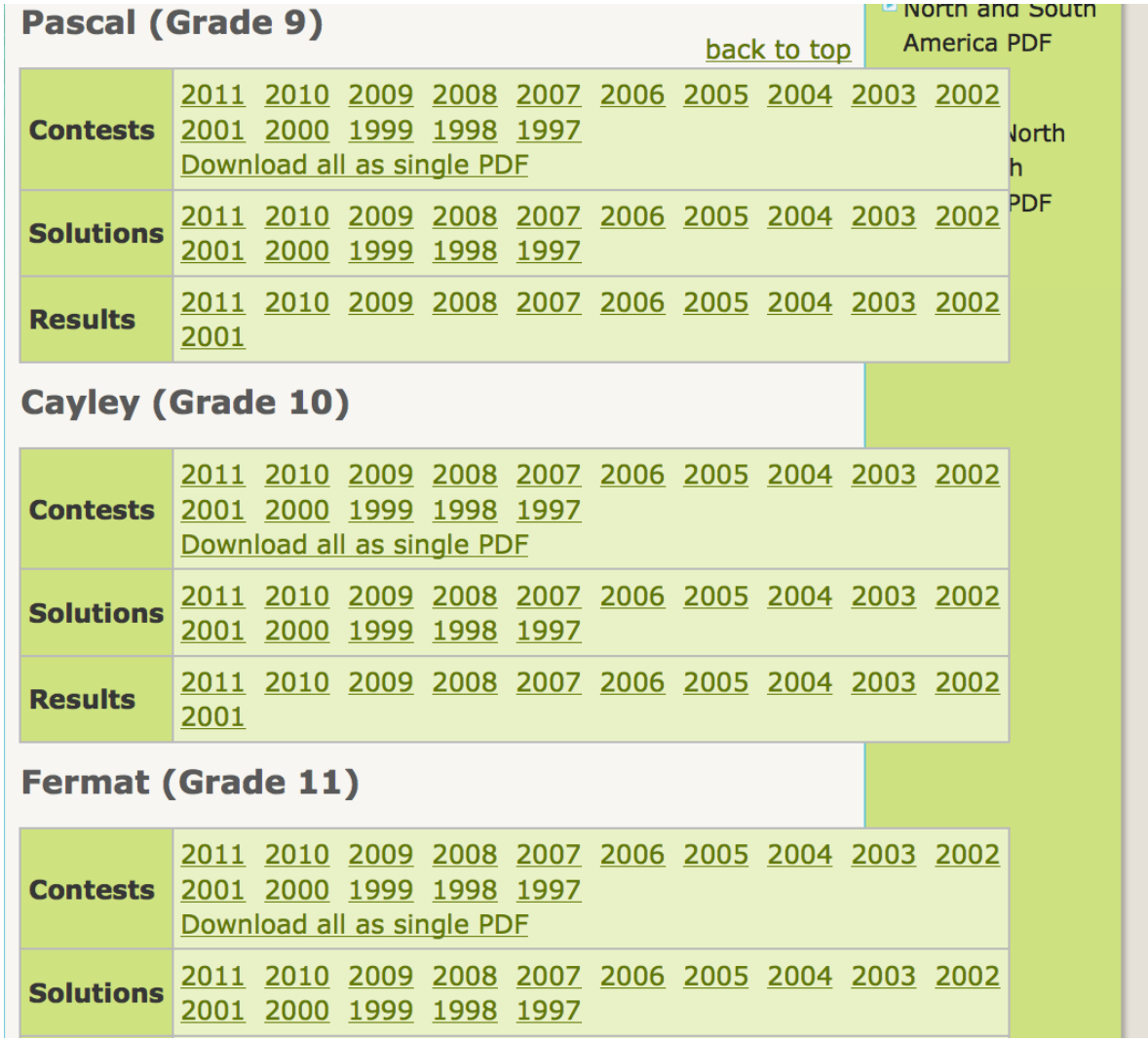
Each quiz consists of 10 questions and is designed to be completed in 20 to 30 minutes. The topics and difficulty levels are designed to be a tool for interested students to prepare for these contests. The problems on each quiz generally progress from easier to harder.

Answers and hints for all quizzes within a given set are also provided.

Set 1	Pascal	Cayley	Fermat	Answers
Set 2	Pascal	Cayley	Fermat	Answers
Set 3	Pascal	Cayley	Fermat	Answers
Set 4	Pascal	Cayley	Fermat	Answers

Contest Resources

You can also find old contests at:
http://www.cemc.uwaterloo.ca/contests/past_contests.html#pcf



Pascal (Grade 9) back to top

Contests	2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000 1999 1998 1997 Download all as single PDF
Solutions	2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000 1999 1998 1997
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Cayley (Grade 10)

Contests	2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000 1999 1998 1997 Download all as single PDF
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Results	2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001

Fermat (Grade 11)

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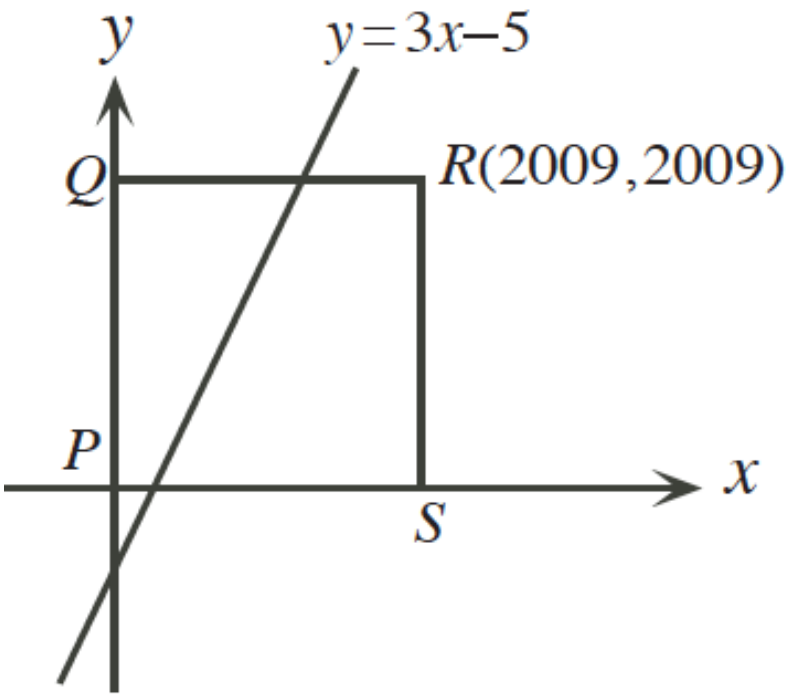
WARM-UP #1

A *lattice point* is a point with integer coordinates. (For example, $(1, 4)$ is a lattice point but $(\frac{3}{2}, 4)$ is not.) The line $y = 3x - 5$ passes through the square $PQRS$ as shown in the diagram. If the coordinates of R are $(2009, 2009)$, then the number of lattice points on the line which are inside the square is

(A) 666 (B) 667 (C) 668 (D) 669 (E) 670

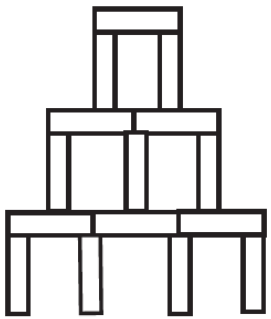


WARM-UP #2

From PCF EWorkshop Practice Pascal #1 Question 9

Dean is building a tower with blocks as shown in the diagram. The tower shown has three stories and uses 15 blocks. How many blocks are required for a tower of 80 stories?

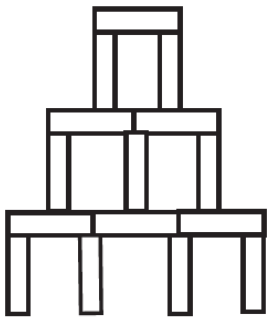
(A) 400 (B) 6399 (C) 6496 (D) 6560 (E) 6723



WARM-UP #2 Solution 2

Dean is building a tower with blocks as shown in the diagram. The tower shown has three stories and uses 15 blocks. How many blocks are required for a tower of 80 stories?

(A) 400 (B) 6399 (C) 6496 (D) 6560 (E) 6723



Problem Set #1

Work on these problems for the next 15 minutes. Try to work independently as much as possible. We will discuss the problems a little after the work time.

Problem Set #1 Answers

Answers to Problem Set 1:

1 D	2 A	3 D	4 B	5 D	6 D
7 E	8 D	9 E	10 B	11 E	12 D

Read Problems Carefully

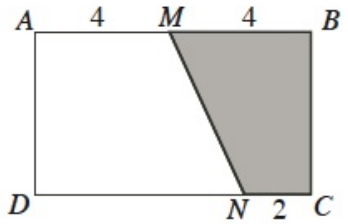
Were there any of the questions from Problem Set 1 that you had to read especially carefully?

Narrowing Down the Choices

Were there any of the questions from Problem Set 1 that you could have easily eliminated choices from?

Narrowing Down the Choices - Try this one

1. In the diagram, the area of rectangle $ABCD$ is 40. The area of $MBCN$ is



(A) 15 (B) 10 (C) 30 (D) 12 (E) 16

Plug in the Given Values!

When $x = 9$, which of the following has the largest value?

(A) $\sqrt{x}$ (B) $\frac{x}{2}$ (C) $x - 5$ (D) $\frac{40}{x}$ (E) $\frac{x^2}{20}$

Plug in the Given Values!

If $a = 7$ and $b = 13$, the number of even positive integers less than ab is

(A) $\frac{ab-1}{2}$ (B) $\frac{ab}{2}$ (C) $ab-1$

(D) $\frac{a+b}{4}$ (E) $(a-1)(b-1)$

Try writing out a few cases!

When three consecutive positive integers are multiplied together, the answer is always

(A) odd (B) a multiple of 6 (C) a multiple of 12

(D) a multiple of 4 (E) a multiple of 5

Try writing out a few cases!

The increasing list of five different integers $\{3,4,5,8,9\}$ has a sum of 33. How many increasing lists of five different single-digit positive integers have a sum of 33?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

Work Time

Work on **Problem Set 2 and 3**.

For next week, check out the EWorkshop for whichever contest you are writing.