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The CENTRE for EDUCATION in MATHEMATICS and COMPUTING cemc.uwaterloo.ca

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## Pascal Contest

(Grade 9)

Tuesday, February 24, 2015 (in North America and South America)

Wednesday, February 25, 2015 (outside of North America and South America)



## Time: 60 minutes

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Calculators are allowed, with the following restriction: you may not use a device that has internet access, that can communicate with other devices, or that contains previously stored information. For example, you may not use a smartphone or a tablet.

## Instructions

1. Do not open the Contest booklet until you are told to do so.

- 2. You may use rulers, compasses and paper for rough work.
- 3. Be sure that you understand the coding system for your response form. If you are not sure, ask your teacher to clarify it. All coding must be done with a pencil, preferably HB. Fill in circles completely.
- 4. On your response form, print your school name and city/town in the box in the upper right corner.
- 5. Be certain that you code your name, age, grade, and the Contest you are writing in the response form. Only those who do so can be counted as eligible students.
- 6. 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. After making your choice, fill in the appropriate circle on the response form.
- 7. Scoring: Each correct answer is worth 5 in Part A, 6 in Part B, and 8 in Part C. There is *no penalty* for an incorrect answer.
- Each unanswered question is worth 2, to a maximum of 10 unanswered questions. 8. Diagrams are *not* drawn to scale. They are intended as aids only.
- When your supervisor tells you to begin, you will have sixty minutes of working time.
   You may not write more than one of the Pascal, Cayley or Fermat Contest in any given year.

Do not discuss the problems or solutions from this contest online for the next 48 hours.

柳林海像

The name, grade, school and location, and score range of some top-scoring students will be published on our website, cemc.uwaterloo.ca. In addition, the name, grade, school and location, and score of some top-scoring students may be shared with other mathematical organizations for other recognition opportunities.

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	. The value of (A) 2 <sup>1</sup>	$\sqrt{16 \times \sqrt{16}}$ is (B) $2^2$ rrect answer i	(C) 2 <sup>3</sup> s worth 6.	( <b>D</b> ) 2 <sup>4</sup>	(E) 2 <sup>5</sup>	matinte ## # 'S P	6 Institute
11.	<ul> <li>Jim wrote the more ♡ symb</li> <li>(A) 50</li> <li>What is the s</li> <li>(A) 35</li> </ul>	<ul> <li>sequence of sym</li> <li>ols than ♠ symb</li> <li>(B) 150</li> <li>mallest positive</li> <li>(B) 105</li> </ul>	bols $\heartsuit \clubsuit \clubsuit \heartsuit \diamondsuit$ ools did he write (C) 200 integer that is a (C) 210	$\heartsuit \heartsuit \heartsuit \diamondsuit \diamondsuit \diamond$ a total c ? (D) 250 a multiple of each (D) 315	(E) 275 (E) 275 of 3, 5, 7, and (E) 630	9? Sittle # ******	R.
13.	. Sixteen square Each square by the path — exactly once. by the inner of how far did A	es are arranged thas an area of 4 formed by the Aaron walks ald edges of the reg nna and Aaron	to form a region 400 m <sup>2</sup> . Anna v e outer edges of ong the path ion exactly once walk?	, as shown. valks along the region ••• formed e. In total,		matitute # # ** *	R.
	<ul> <li>(A) 160 m</li> <li>(D) 400 m</li> <li>The operation</li> <li>(A) <sup>1</sup>/<sub>2</sub></li> </ul>	<ul> <li>(B) 240 m</li> <li>(E) 640 m</li> <li>n ⊗ is defined by</li> <li>(B) 1</li> </ul>	(C) 320 m $a \otimes b = \frac{a}{b} + \frac{b}{a}$ (C) $\frac{5}{4}$	What is the val	ue of $4 \otimes 8$ ? (E) $\frac{5}{2}$	matinte ## # *	R.
K 15.	At the end of of each follow previous year year. At the o time? (A) 2002	f the year 2000, ing year, Steve and Wayne had end of which yea ( <b>B</b> ) 2003	Steve had \$100 had twice as much half as much mo or did Steve have	and Wayne had uch money as he oney as he did at t e more money th (D) 2005	did at the end the end of the pr an Wayne for th	he end of the revious ne first	R.
	Anca and Bru They drove a Staton. Bruc at 60 km/h, h They both ar For how long	(D) 2000 a ce left Mathville long a straight e drove at 50 k out stopped alon rived at Staton did Anca stop t	e at the same tim highway towar m/h. Anca dro ag the way to res at the same tim o rest?	te. ds ve Mathville e.	200 km	Staton	R. Institut
Toritute #	<ul> <li>(A) 40 minut</li> <li>(D) 33 minut</li> <li>In the diagram rectangle PQ. circles. The construction of the second second</li></ul>	es ( <b>B</b> ) 10 minut es ( <b>E</b> ) 27 minut a, six identical ci RS and each circ entres $T, V, W, Y$	tes (C) 67 minu res rcles just touch t le just touches the of four of these	tes the edges of the adjacent $P_{adj}$			tinstitut"
PS Institute #	a smaller recta X lie on this r what is the ar (A) 600 (D) 1200	<ul> <li>angle TVWY, as</li> <li>rectangle. If the</li> <li>rea of PQRS?</li> <li>(B) 900</li> <li>(E) 1000</li> </ul>	s shown. The cer perimeter of $TV$ (C) 400	$\begin{array}{c} \text{ tres } U \text{ and } \\ WY \text{ is } 60, \\ S \end{array}$	Y X M	Rittle # 3 P	&
<b>%</b> 。	· 法 %	频 按 %	如 频 法 後 邻	如旅校资料	的旅来资料	如城水 後	<b>в</b> о 20



加加加新林塔梯 23. How many triples (a, b, c) of positive integers satisfy the conditions  $6ab = c^2$  and  $a < b < c \le 35?$ mtn ka

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(C) 6

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**(B)** 8 **(A)** 10

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24. Paula, Quinn, Rufus, and Sarah are suspects in a crime. The police found links between exactly four pairs of suspects: Paula and Quinn, Quinn and Rufus, Rufus and Paula, and Quinn and Sarah. These links can be shown in a diagram by drawing two corresponding suspects are linked. An example of a drawing that represents this information is:

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Ali, Bob, Cai, Dee, Eve, and Fay are suspects in a second crime. The police found 物体资料 links between exactly eight pairs of suspects: Ali and Bob, Bob and Cai, Cai and Dee, Dee and Eve, Eve and Fay, Fay and Ali, Ali and Dee, and Bob and Eve. For how many of the following drawings can the six dots be labelled with the names of the six suspects so that each of the eight links given is represented by a line or curve in that drawing?

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加加斯林省際 Y. tute ## **(B)** 2 (D) 3 **(E)** 5 (A) 4 (C) 1 海滨学 · 13 (%) Y. 25.The first four rows of a table with columns V, W, X, Y, and Z are shown. For each row, whenever integer

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n appears in column V, column W contains the integer 2n + 1, column X contains 3n + 1, column Y contains 5n+1, and column Z contains 7n+1. For every row after integer that does not yet appear in any previous row. The integer 2731 appears in column  $W_{-}$  T the first, the number in column V is the smallest positive columns in which 2731 appears is

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	1	N AN			、 按 <sup>x</sup>
$V_{0}$	$\setminus W$	X	Y	Z	$W_{C}$
1	3	4	6	8	
2	5	7	11	15	
9	19	28	46	64	.30
10	21	31	51	71	y the the
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(B) W, X, Y, and Z(D) W, Y and Z(E) W8h (C) W, X and Z

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## Pascal \*\* Contest (English) Institute # # 'S PR maximue ## # 13 PR multille 新林 诺 序 面对机能称林塔梯 2015mutute # \*\* R titute # The CENTRE for EDUCATION mistille # # '\$ 1% millitute mar # 3 PR N. in MATHEMATICS and COMPUTING tinstitute the te cemc.uwaterloo.ca For students... TUNINR # # 3 PR Ro Thank you for writing the 2015 Pascal Contest! Each year, more than 额状 200 000 students from more than 60 countries register to write the CEMC's Contests. Encourage your teacher to register you for the Fryer Contest mutale # \*\* \*\* which will be written in April. maximue # # 'S PS Ro Visit our website cemc.uwaterloo.ca to find • More information about the Fryer Contest • Free copies of past contests 面前挑批新样等席 • Math Circles videos and handouts that will help you learn more Ro mathematics and prepare for future contests • Information about careers in and applications of mathematics and computer science For teachers... Tustitute ## # B PR Visit our website cemc.uwaterloo.ca to Ro 城林 • Register your students for the Fryer, Galois and Hypatia Contests which will be written in April • Look at our free online courseware for senior high school students • Learn about our face-to-face workshops and our web resources 而如桃桃新林塔梯 Ro • Subscribe to our free Problem of the Week 物冰 • Investigate our online Master of Mathematics for Teachers • Find your school's contest results mutate # # B 面的机机都林塔张 mutule ## # 12 1% matine # # 3 PK matinue ## # '& K mythte # # '& K Y.

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