Canadian Mathematics Competition

An activity of the Centre for Education in Mathematics and Computing, University of Waterloo, Waterloo, Ontario

Pascal Contest (Grade 9)

Thursday, February 25, 2010

STRONGER COMMUNITIES TOGETHER™

Time: 60 minutes
Calculators are permitted

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, city/town, and province in the box in the upper left corner.
5. **Be certain that you code your name, age, sex, grade, and the Contest you are writing in the response form. Only those who do so can be counted as official contestants.**
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.
9. When your supervisor tells you to begin, you will have *sixty* minutes of working time.

The names of some top-scoring students will be published in the PCF Results on our Web site, http://www.cemc.uwaterloo.ca.

Scoring:	There is *no penalty* for an incorrect answer. Each unanswered question is worth 2, to a maximum of 10 unanswered questions.

Part A: Each correct answer is worth 5.

1. Which of the following is closest in value to \$1.00?

   (A) \$0.50 **(B)** \$0.90 **(C)** \$0.95 **(D)** \$1.01 **(E)** \$1.15

2. The value of $\dfrac{(20-16)\times(12+8)}{4}$ is

   (A) 5 **(B)** 9 **(C)** 20 **(D)** 44 **(E)** 56

3. To make pizza dough, Luca mixes 50 mL of milk for every 250 mL of flour. How much milk does he mix with 750 mL of flour?

   (A) 100 mL **(B)** 125 mL **(C)** 150 mL **(D)** 200 mL **(E)** 250 mL

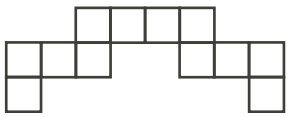
4. One of the following 8 figures is randomly chosen. What is the probability that the chosen figure is a triangle?

   (A) $\frac{3}{8}$ **(B)** $\frac{3}{4}$ **(C)** $\frac{1}{8}$ **(D)** $\frac{1}{2}$ **(E)** $\frac{1}{3}$

5. If $\dfrac{1}{9}+\dfrac{1}{18}=\dfrac{1}{\square}$, then the number that replaces the $\square$ to make the equation true is

   (A) 2 **(B)** 3 **(C)** 6 **(D)** 9 **(E)** 18

6. Squares of side length 1 are arranged to form the figure shown. What is the perimeter of the figure?



   (A) 12 **(B)** 16 **(C)** 20
   (D) 24 **(E)** 26

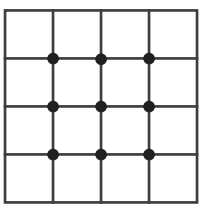
7. The value of $\sqrt{3^3+3^3+3^3}$ is

   (A) 3 **(B)** 9 **(C)** 27 **(D)** 81 **(E)** 243

8. In the diagram, the points are equally spaced on the number line. What number is represented by point P?

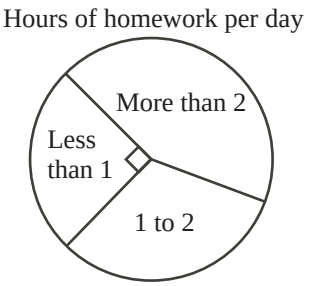
   (A) 7.48 **(B)** 7.49 **(C)** 7.50
   (D) 7.51 **(E)** 7.52

9. The nine interior intersection points on a 4 by 4 grid of squares are shown. How many interior intersection points are there on a 12 by 12 grid of squares?



   (A) 100 **(B)** 121 **(C)** 132
   (D) 144 **(E)** 169

10. The diagram shows a circle graph which shows the amount of homework done each day by Mr. Auckland's Grade 9 class. Based on the circle graph, what percentage of students do at least one hour of homework per day?



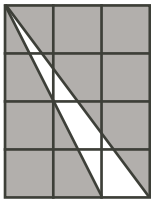
(A) 25% **(B)** 33% **(C)** 50%
(D) 67% **(E)** 75%

Part B: Each correct answer is worth 6.

11. Several three-legged tables and four-legged tables have a total of 23 legs. If there is more than one table of each type, what is the number of three-legged tables?

(A) 6 **(B)** 7 **(C)** 3 **(D)** 4 **(E)** 5

12. Twelve 1 by 1 squares form a rectangle, as shown. What is the total area of the shaded regions?

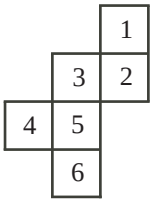


(A) 8 **(B)** 9 **(C)** 10
(D) 11 **(E)** 12

13. There are 400 students at Cayley H.S., where the ratio of boys to girls is 3 : 2. There are 600 students at Fermat C.I., where the ratio of boys to girls is 2 : 3. When considering all the students from both schools, what is the ratio of boys to girls?

(A) 2 : 3 **(B)** 12 : 13 **(C)** 1 : 1 **(D)** 6 : 5 **(E)** 3 : 2

14. The numbered net shown is folded to form a cube. What is the product of the numbers on the four faces sharing an edge with the face numbered 1?

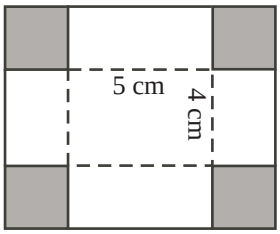


(A) 120 **(B)** 144 **(C)** 180
(D) 240 **(E)** 360

15. If 10% of s is t, then s equals

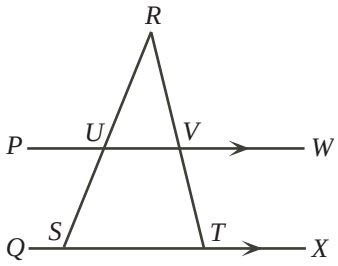
(A) $0.1t$ **(B)** $0.9t$ **(C)** $9t$ **(D)** $10t$ **(E)** $90t$

16. Four identical squares are cut from the corners of the rectangular sheet of cardboard shown. This sheet is then folded along the dotted lines and taped to make a box with an open top. The base of the box measures 5 cm by 4 cm. The volume of the box is 60 cm^3. What was the area of the original sheet of cardboard?



(A) 56 cm^2 **(B)** 110 cm^2 **(C)** 156 cm^2
(D) 180 cm^2 **(E)** 210 cm^2

17. In the diagram, PW is parallel to QX, S and T lie on QX, and U and V are the points of intersection of PW with SR and TR, respectively. If $\angle SUV = 120°$ and $\angle VTX = 112°$, what is the measure of $\angle URV$?

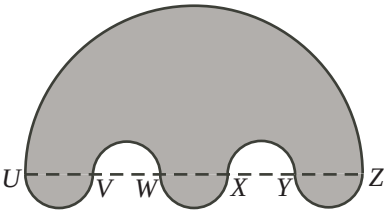


(A) 52° **(B)** 56° **(C)** 60°
(D) 64° **(E)** 68°

18. The gas tank in Catherine's car is $\frac{1}{8}$ full. When 30 litres of gas are added, the tank becomes $\frac{3}{4}$ full. If the gas costs Catherine \$1.38 per litre, how much will it cost her to fill the remaining quarter of the tank?

(A) \$8.80 **(B)** \$13.80 **(C)** \$16.56 **(D)** \$24.84 **(E)** \$41.40

19. In the diagram, points U, V, W, X, Y, and Z lie on a straight line with $UV = VW = WX = XY = YZ = 5$. Semicircles with diameters UZ, UV, VW, WX, XY, and YZ create the shape shown. What is the area of the shaded region?



(A) $\frac{325\pi}{4}$ **(B)** $\frac{375\pi}{4}$ **(C)** $\frac{325\pi}{2}$
(D) $\frac{625\pi}{4}$ **(E)** $\frac{625\pi}{2}$

20. The odd integers from 5 to 21 are used to build a 3 by 3 magic square. (In a magic square, the numbers in each row, the numbers in each column, and the numbers on each diagonal have the same sum.) If 5, 9 and 17 are placed as shown, what is the value of x?

	5	
9		17
x		

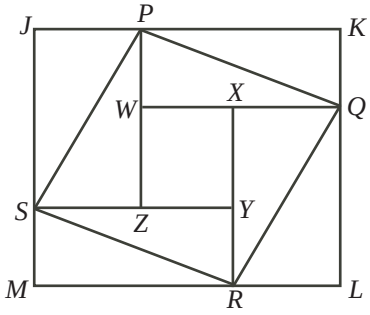
(A) 7 **(B)** 11 **(C)** 13
(D) 15 **(E)** 19

Part C: Each correct answer is worth 8.

21. In the diagram, each of the five boxes is to contain a number. Each number in a shaded box must be the average of the number in the box to the left of it and the number in the box to the right of it. What is the value of x?

(A) 28 **(B)** 30 **(C)** 31
(D) 32 **(E)** 34

22. Rhombus $PQRS$ is inscribed in rectangle $JKLM$, as shown. (A *rhombus* is a quadrilateral with four equal side lengths.) Segments PZ and XR are parallel to JM. Segments QW and YS are parallel to JK. If $JP = 39$, $JS = 52$, and $KQ = 25$, what is the perimeter of rectangle $WXYZ$?



(A) 48 **(B)** 58 **(C)** 84
(D) 96 **(E)** 108

23. The product of N consecutive four-digit positive integers is divisible by 2010^2. What is the least possible value of N?

(A) 5 **(B)** 12 **(C)** 10 **(D)** 6 **(E)** 7

24. A sequence consists of 2010 terms. Each term after the first is 1 larger than the previous term. The sum of the 2010 terms is 5307. When every second term is added up, starting with the first term and ending with the second last term, the sum is

(A) 2155 **(B)** 2153 **(C)** 2151 **(D)** 2149 **(E)** 2147

25. Six soccer teams are competing in a tournament in Waterloo. Every team is to play three games, each against a different team. (Note that not every pair of teams plays a game together.) Judene is in charge of pairing up the teams to create a schedule of games that will be played. Ignoring the order and times of the games, how many different schedules are possible?

(A) 90 **(B)** 100 **(C)** 80 **(D)** 60 **(E)** 70

The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

For students...

Thank you for writing the 2010 Pascal Contest!
In 2009, more than 84 000 students around the world registered to write the Pascal, Cayley and Fermat Contests.

Check out the CEMC's group on Facebook, called "Who is The Mathiest?".

Encourage your teacher to register you for the Fryer Contest which will be written on April 9, 2010.
Visit our website

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to find

- **More information about the Fryer Contest**
- **Free copies of past contests**
- **Workshops to help you prepare for future contests**
- **Information about our publications for mathematics enrichment and contest preparation**

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