



Canadian Mathematics Competition

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

Pascal Contest (Grade 9)

Tuesday, February 19, 2008

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Time: 60 minutes

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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. The value of $\frac{2 + 3 + 4}{2 \times 3 \times 4}$ is

- (A) 1 (B) $\frac{5}{6}$ (C) $\frac{7}{12}$ (D) 3 (E) $\frac{3}{8}$

2. If $3x - 9 = 12$, then the value of $6x$ is

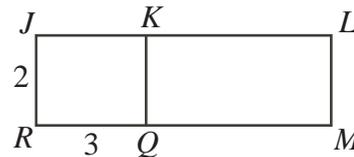
- (A) 42 (B) 24 (C) 6 (D) 32 (E) 52

3. $\sqrt{5^2 - 4^2}$ is equal to

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

4. In the diagram, $JLMR$ and $JKQR$ are rectangles. Also, $JR = 2$, $RQ = 3$ and $JL = 8$. What is the area of rectangle $KLMQ$?

- (A) 6 (B) 16 (C) 10
 (D) 15 (E) 24

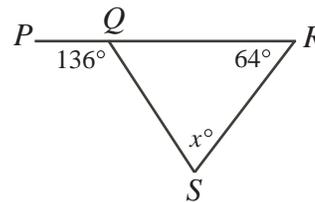


5. If $x = 12$ and $y = -6$, then the value of $\frac{3x + y}{x - y}$ is

- (A) 3 (B) 7 (C) $\frac{5}{3}$ (D) 5 (E) $\frac{7}{3}$

6. In the diagram, PQR is a straight line. The value of x is

- (A) 72 (B) 44 (C) 58
 (D) 64 (E) 52



7. A bag contains 5 red, 6 green, 7 yellow, and 8 blue jelly beans. A jelly bean is selected at random. What is the probability that it is blue?

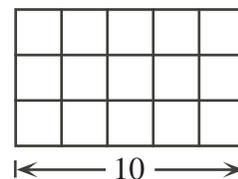
- (A) $\frac{5}{26}$ (B) $\frac{3}{13}$ (C) $\frac{7}{26}$ (D) $\frac{4}{13}$ (E) $\frac{6}{13}$

8. Olave sold 108 apples at a constant rate over 6 hours. If she continues to sell apples at the same rate, how many apples will she sell in the next 1 hour and 30 minutes?

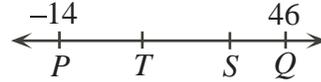
- (A) 27 (B) 33 (C) 45 (D) 36 (E) 21

9. In the diagram, the rectangular wire grid contains 15 identical squares. The length of the rectangular grid is 10. What is the length of wire needed to construct the grid?

- (A) 60 (B) 70 (C) 120
 (D) 66 (E) 76



10. On the number line, S is three-quarters of the way from P to Q . Also, T is one-third of the way from P to Q . What is the distance along the number line from T to S ?



- (A) 20 (B) 15 (C) 6
(D) 25 (E) 31

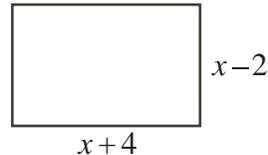
Part B: Each correct answer is worth 6.

11. At Mathville Junior High School, 30 boys and 20 girls wrote the Pascal Contest. Certificates were awarded to 30% of the boys and 40% of the girls. What percentage of all of the participating students received certificates?

- (A) 34 (B) 35 (C) 36 (D) 17 (E) 70

12. In the diagram, the perimeter of the rectangle is 56. What is its area?

- (A) 247 (B) 187 (C) 169
(D) 135 (E) 775



13. $2^3 \times 2^2 \times 3^3 \times 3^2$ is equal to

- (A) 6^5 (B) 6^6 (C) 6^{10} (D) 36^{10} (E) 36^{36}

14. Two 3-digit numbers, abc and def , have the following property:

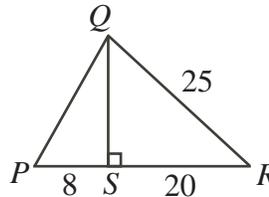
$$\begin{array}{r} \\ \\ + \\ \hline 1 \end{array}$$

None of a , b , c , d , e , or f is 0. What is $a + b + c + d + e + f$?

- (A) 10 (B) 19 (C) 21 (D) 28 (E) 30

15. In the diagram, what is the perimeter of $\triangle PQR$?

- (A) 63 (B) 60 (C) 55
(D) 85 (E) 70



16. A circle has an area of M cm^2 and a circumference of N cm. If $\frac{M}{N} = 20$, what is the radius of the circle, in cm?

- (A) 10 (B) 20 (C) 40 (D) $\frac{1}{10}$ (E) $\frac{1}{20}$

17. The surface area of a large cube is 5400 cm^2 . This cube is cut into a number of identical smaller cubes. Each smaller cube has a volume of 216 cm^3 . How many smaller cubes are there?

- (A) 25 (B) 125 (C) 164 (D) 180 (E) 216

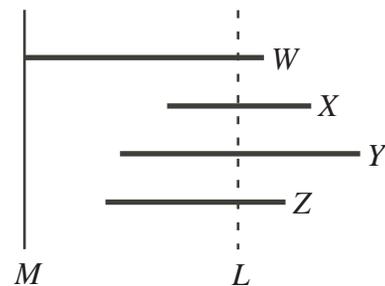
18. Alex has \$2.65. He has only dimes (worth \$0.10 each) and quarters (worth \$0.25 each). He has more dimes than quarters. What is the smallest number of coins that Alex could have?
 (A) 25 (B) 16 (C) 13 (D) 19 (E) 22
19. An integer is defined to be *upright* if the sum of its first two digits equals its third digit. For example, 145 is an upright integer since $1 + 4 = 5$. How many positive 3-digit integers are upright?
 (A) 28 (B) 39 (C) 36 (D) 45 (E) 50
20. Four of the six numbers 1867, 1993, 2019, 2025, 2109, and 2121 have a mean (average) of 2008. What is the mean (average) of the other two numbers?
 (A) 1994 (B) 2006 (C) 2022 (D) 2051 (E) 2064

Part C: Each correct answer is worth 8.

21. If $3 \leq p \leq 10$ and $12 \leq q \leq 21$, then the difference between the largest and smallest possible values of $\frac{p}{q}$ is
 (A) $\frac{29}{42}$ (B) $\frac{29}{5}$ (C) $\frac{19}{70}$ (D) $\frac{19}{12}$ (E) $\frac{19}{84}$
22. Ginger walks at 4 km/h and runs at 6 km/h. She saves $3\frac{3}{4}$ minutes by running instead of walking from her home to her school. What is the distance, in kilometres, from her home to her school?
 (A) $7\frac{1}{2}$ (B) $3\frac{3}{4}$ (C) $1\frac{7}{8}$ (D) $1\frac{1}{4}$ (E) $\frac{3}{4}$

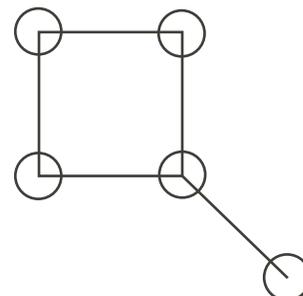
23. Four pieces of lumber are placed in parallel positions, as shown, perpendicular to line M :

- Piece W is 5 m long
- Piece X is 3 m long and its left end is 3 m from line M
- Piece Y is 5 m long and is 2 m from line M
- Piece Z is 4 m long and is 1.5 m from from line M



A single cut, perpendicular to the pieces of lumber, is made along the dotted line L . The total length of lumber on each side of L is the same. What is the length, in metres, of the part of piece W to the left of the cut?

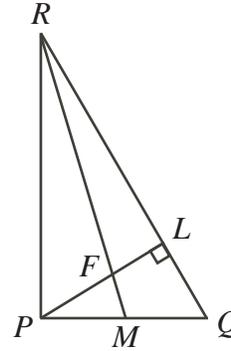
- (A) 4.25 (B) 3.5 (C) 3.25
 (D) 3.75 (E) 4.0
24. Five circles are drawn on a piece of paper and connected as shown. Each circle must be coloured red, blue or green. Two circles connected by a straight line may not be coloured the same. How many different ways are there to colour the circles?



- (A) 24 (B) 60 (C) 72
 (D) 36 (E) 48

25. In the diagram, $\triangle PQR$ is right-angled at P and has $PQ = 2$ and $PR = 2\sqrt{3}$. Altitude PL intersects median RM at F . What is the length of PF ?

- (A) $\frac{\sqrt{3}}{2}$ (B) $\frac{3\sqrt{3}}{7}$ (C) $\frac{4\sqrt{3}}{7}$
(D) $\frac{5\sqrt{3}}{9}$ (E) $\frac{3\sqrt{3}}{5}$





Canadian Mathematics Competition



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Thank you for writing the 2008 Pascal Contest!
In 2007, more than 86 000 students around the world registered to write the Pascal, Cayley and Fermat Contests.

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