

Print ID # \_\_\_\_\_

/90

School Name \_\_\_\_\_

Student Name \_\_\_\_\_

(Print First, Last )

### 2009 Edmonton Junior High Math Contest

Part I: Multiple Choice (PRINT neatly, use CAPITAL letters, 4 points each)

1.	6.	11.
2.	7.	12.
3.	8.	13.
4.	9.	14.
5.	10.	15.

Part II: Short Answers (PRINT small but legible, 6 points each)

16. \_\_\_\_\_ 17. \_\_\_\_\_ 18. \_\_\_\_\_ 19. \_\_\_\_\_ 20. \_\_\_\_\_

Part I: _____ x 4 + _____ x 2 = _____ (be sure blanks ≤ 3)	<b>MARKER ONLY</b>
Correct                      Blank	
Part II: _____ x 6 = _____	
Correct	
Total = _____ (enter total score on top)	

Instruction:

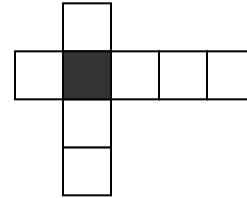
1. Calculator, grid paper and scrap paper are permitted. You may write on the booklet.
2. Programmable calculator and Cell phones are not allowed to be brought into class.
3. Don't write your answers too LARGE to avoid others seeing your answers. COVER your answers at all time.
4. All fractions must be proper and reduced to lowest terms.
5. Each correct answer is worth 4 points for multiple choices and 6 points for short answers.
6. Each incorrect answer is worth 0 point.
7. Each unanswered question in Part I is worth 2 points up to a maximum of 6 points.
8. Unanswered questions in Part II is worth 0 point.
9. You have 90 minutes of writing time.
10. When done, carefully REMOVE and HAND IN only page 1.

## Part I: Multiple Choices

1. Each of the eight squares in the figure at the right must contain one digit. The sum of the eight digits is 38. Reading from top to bottom, the four digits in the vertical column form a number that is a power with 3 as its base. Reading from left to right, the five digits in the horizontal row form a number that is a power with 4 as its base.

What digit will be in the square of the shaded box?

- a. 6
- b. 5
- c. 3
- d. 1



2. How many whole numbers from 10 to 60, inclusive, are divisible by both its units digit as well as its tens digit?

(E.g., Although 39 is divisible by 3, it is not divisible by 9. Therefore, 39 is not one of the numbers in the solution.)

- a. ten numbers
- b. eleven numbers
- c. seventeen numbers
- d. eighteen numbers

3. Twenty people at Snow Lodge came either to ski or to snowboard. (*Nobody does both activities.*) The ratio of skiers to snowboarders is 3 to 2. The ratio of male skiers to female skiers is 5 to 1. The ratio of children snowboarders to adult snowboarders is 1 to 3. What is the sum of the number of male skiers and child snowboarders at Snow Lodge?

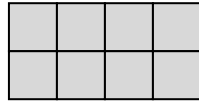
- a. 6
- b. 8
- c. 10
- d. 12

4. Rectangles can be formed by joining unit squares. Some of the line segments are part of their perimeters and some are not. For the three examples shown below, their perimeters are, respectively, 8 units, 12 units, and 16 units. The number of line segments that are not part of their perimeters are, respectively, 2, 10, and 22.

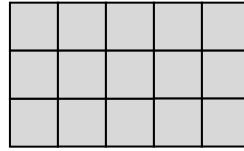
1 by 3 rectangle



2 by 4 rectangle

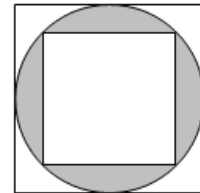


3 by 5 rectangle



If a 50 by 100 rectangle is formed with unit squares, how many line segments would **not** be part of the perimeter?

- a. 4900  
 b. 4950  
 c. 9050  
 d. 9850
5. In the figure at the right, the smaller square is inscribed in a circle, which is inscribed in a larger square with a side of 10 cm. Approximately what area of the entire figure is **not** shaded?



- a.  $21.5 \text{ cm}^2$   
 b.  $28.5 \text{ cm}^2$   
 c.  $71.5 \text{ cm}^2$   
 d.  $78.5 \text{ cm}^2$
6. The front wheel of a tricycle has a diameter of 25 cm; the rear wheels have a diameter of 15 cm. If the tricycle travels 100 m, about how many more rotations will the rear wheels make than the front wheel?
- a. 212  
 b. 127  
 c. 85  
 d. 31

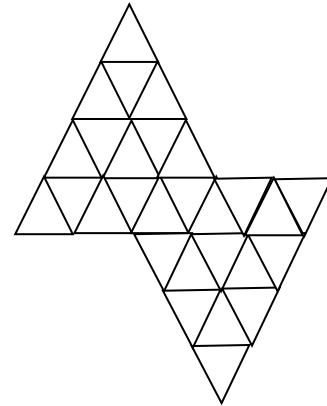
7. The year 1961 has  $180^\circ$  rotational symmetry because it reads the same when it is turned upside down. How many years since 1000 have  $180^\circ$  rotational symmetry?
- a. 3
  - b. 5
  - c. 8
  - d. 10
8. Which of the numbers in the set  $\{-50, -1.5, -1, -0.2, 0, \sqrt{2}, \frac{4}{5}, \pi, 40\}$  are greater than their reciprocals?
- a.  $-0.2, \sqrt{2}, \pi, 40$
  - b.  $-50, -1.5, -1, 0, \frac{4}{5}$
  - c.  $-0.2, 0, \sqrt{2}, \pi, 40$
  - d.  $\sqrt{2}, \frac{4}{5}, \pi, 40$
9. On her last test, Crystal scored 92%, and in doing so, raised her average by 2%, to 82%. What percent must she get on her next test to raise her average one more percent, to 83%?
- a. 89%
  - b. 86%
  - c. 83%
  - d. 82%

10. Erhan has a pair of special dice. The six faces of each die are labelled 1, 4, 5, 7, 11, and 14. He rolls the pair of dice and finds the sum of the two numbers. What is the probability that the sum will be both even and less than 20?
- a.  $\frac{5}{12}$
  - b.  $\frac{1}{2}$
  - c.  $\frac{5}{9}$
  - d.  $\frac{5}{6}$
11. The tens digit of the square of an integer is 5. The ones digit
- a. must be 6
  - b. must be 4
  - c. can be 4 or 6
  - d. none of the above
12. In the quadrilateral ABCD,  $\angle ABC = \angle BCD = 90^\circ$ ,  $\angle CAB = 45^\circ$  and  $\angle CBD = 60^\circ$ . The diagonals AC and BD intersect at point E. The ratio of the areas of the triangles CDE and ABE is
- a.  $\sqrt{2} : 1$
  - b.  $\sqrt{3} : 1$
  - c. 2:1
  - d. 3:1

13. A small box of chocolate costs \$21 while a large box costs \$41. How many different combinations of small and large boxes cost exactly \$2009?
- 1
  - 2
  - 3
  - 4

14. What is the total number of downward-pointing triangles in the diagram below?  
(Consider all sizes of triangles.)

- 14
- 25
- 28
- 32



15. A square has its vertices at  $(1, 1)$ ,  $(1, 3)$ ,  $(3, 1)$  and  $(3, 3)$ . It is reflected by a mirror line that runs through  $(3, 1)$  and  $(3, 3)$ . Then, anchored at vertex  $(3, 3)$ , the first image is magnified to form a second image whose area is quadruple that of the original. The second image is then rotated  $90^\circ$  clockwise using  $(1, 3)$  as the turn centre. What are the coordinates of the final image?
- $(1, 1)$ ,  $(-1, 3)$ ,  $(1, 7)$  and  $(-3, -1)$
  - $(1, 5)$ ,  $(5, 5)$ ,  $(1, 9)$  and  $(5, 9)$
  - $(1, 1)$ ,  $(-3, -3)$ ,  $(1, -3)$ , and  $(-3, 1)$
  - $(1, 1)$ ,  $(1, -7)$ ,  $(-7, 1)$  and  $(-7, -7)$

**Part II: Short Answers. Enter answers on answer sheet.**

16. Find a positive integer  $n$  so that  $\frac{6n+2013}{3n+2}$  is an integer.

17. Emily earned some spending money by running a lemonade stand. She paid her mother 5% of what she earned for the supplies that she used. She spent  $\frac{3}{5}$  of what was left on entertainment and then saved the remaining \$114. How much money did Emily pay her mom for supplies?

18. Laura, Svitlana and Robert deliver flyers. In one week, they delivered a total of 270 flyers. If Laura delivered 50% less flyers than Svitlana, and if Robert delivered 50% more flyers than Laura, how many flyers did Robert deliver?

19. The table at the right shows input and output values for a function machine. Find the missing output value.

Input ( $x$ )	Output ( $y$ )
-1	0
0	1.5
1	?
5	9
10	16.5
15	24

20. The solid 3-D object shown below is composed of layers of unit cubes. The top layer has 18 cubes, the middle layer has 28 cubes, and the bottom layer has 40 cubes. If the object is completely dipped in paint, how many unit cubes will have exactly two faces painted?

