Student Name (**Print** First, Last) _____________________, _________________________

School Name ____ ____ /100

2018 Edmonton Junior High Math Contest

Part A: Multiple Choice	Part B (short answer)	Part C (short answer)
1.	8.	14.
2.	9.	15.
3.	10.	16.
4.	11.	17.
5.	12.	18.
6.	13.	19.
7.		

Part A: _________× 4 + _______ × 2 = __________ Blank answers ≤ 3.
Correct blank
Part B: _________× 5 = _________ MARKER
Correct ONLY
Part C: _________× 7 = _________
Correct
Total: = _________

Instructions:

1. Calculator, grid paper and scrap paper are permitted. You may write on the booklet.
2. Programmable calculators and cell phones are not allowed.
3. Each correct answer in Part A is worth 4 points, each correct answer in Part B is worth 5 points, and each correct answer in Part C is worth 7 points. In Part A each blank is worth 2 points each up to a maximum of 3 blanks.
4. Each incorrect answer is worth 0 points.
5. Unanswered questions in Parts B and C are worth 0 points.
6. You have 60 minutes of writing time.
7. All participants (grade 7 to 9) in the same school MUST write at the same time.
8. When done, carefully REMOVE and HAND IN this TOP page. You may keep the contest.
9. DO NOT discuss or post any answers on social media.

GOOD LUCK!

Part A: **Multiple Choice:** Each correct answer is worth 4 points. Each unanswered question is worth 2 points to a maximum of 3 unanswered questions.

1. In a triangle, all angles are integer values. The measure of the smallest angle is 20°. What is the measure of the largest possible angle?

A) 80° B) 89° C) 139° D) 140° E) 160°

2. The original price of an item is reduced by 20% and the new price is further reduced by 20%. The final sale price is the same as a single reduction of what percentage of the original price?

A) 30% B) 36% C) 40% D) 60% E) 64%

3. 16, 24, 36, … are the first three terms of a **geometric** sequence. With the exception of the first term, each term thereafter is the product of the previous term and a constant.
30, 45, 60, … are the first three terms of an **arithmetic** sequence. With the exception of the first term, each term thereafter is the sum of the previous term and a constant.
If both sequences are to continue, for which n does the n^{th} term of the geometric sequence {16, 24, 36, ...} first become larger than the n^{th} term of the arithmetic sequence {30,45,60, ...}

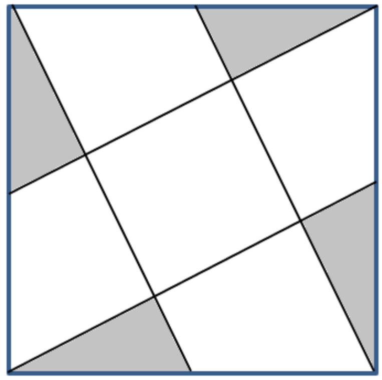
A) 4 B) 5 C) 6 D) 7 E) 8

4. Solve for x

$$\frac{x}{2018}+\frac{2017(2019)}{2018}-2019= -1$$

A) –2018 B) 2018 C) 0 D) –1 E) 1

5. Midpoints of each side are connected to one of the vertices of a square. What percent of the square is shaded?



A) 20% B) 25% C) 30% D) 35% E) 15%

6. In the sequence of numbers: 1, 3, 2, –1, ... each term after the first two is equal to the term preceding it minus the term preceding that, $t_n = t_{n-1} - t_{n-2}$.
What is the sum of the first one hundred terms of the sequence?

A) 0 B) –1 C) 21 D) 16 E) 5

7. A woman, her brother, her son and her daughter (all relations by birth) are chess players. The worst player's twin (who is one of the four players) and the best player are of opposite sex. The worst player and the best player are the same age. Who is the worst player?

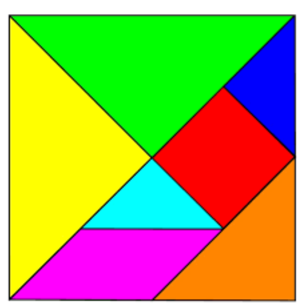
A) woman B) son C) brother D) daughter E) insufficient information to determine

Part B: Short Answer: Place the answer in the blank provided on the answer sheet. Each correct answer is worth 5 points.

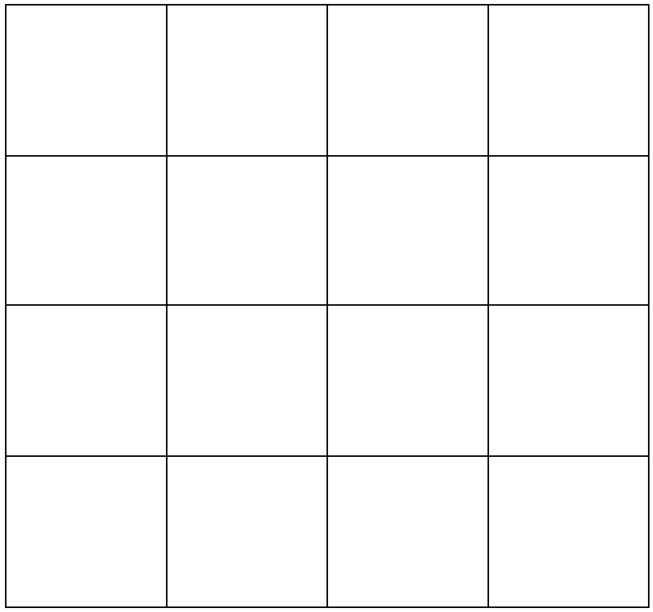
8. A large cube is assembled together with 125 smaller identical cubes. This large cube is placed on a table top and spray painted on five of the faces. After drying, the large cube is disassembled with all the smaller cubes placed in a bag. How many cubes have exactly 2 faces painted?

9. Juice cans are sold in a pack of 6 or 12. There are 12 448 cans in the warehouse waiting to be put into different packs. If the cans are placed in any combination of 6 and 12 packs, how many cans would be left over?

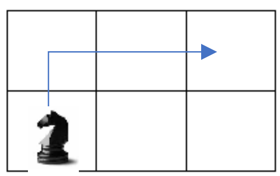
10. Below is a picture of an ancient Chinese puzzle, called a tangram. The seven pieces are arranged to form a large square. If the edge of the large square is one unit, find the perimeter of the smaller square in the picture. Leave the answer in simplest radical form.



11. Sally places 4 knights on a 4 by 4 board.

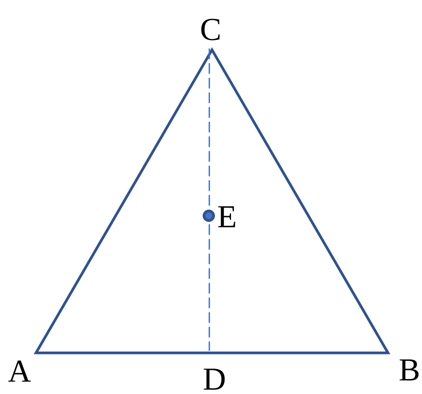


Knights can only attack a square that is 2 by 3 away.



If any square is attacked by at least two different knights, Sally colours the square black. What is the maximum number of black squares possible?

12. ABC is an equilateral triangle with a height of $2\sqrt{3}$. E is the midpoint of the altitude CD. Find distance $\overline{AE}$. Leave answer in radical form.



13. In triangle *ABC*, $\measuredangle CAB = 108°$ and $AB = AC$. The bisector of $\measuredangle ABC$ meets *CA* at *E*, and the perpendicular to *BE* at *E* meets *BC* at *D*. Determine $\measuredangle ADE$.

Part C: Short Answer: Place the answer in the blank provided on the answer sheet. Each correct answer is worth 7 points.

14. Each of the digits 0 to 9 is written on a card. You can select any number of cards from the group. The digit(s) can then be rearranged in any order to form a number. What is the minimum number of cards from which a multiple of 3 with up to three digits can always be formed?

15. A class of 31 students invite some students from another school to the Valentine dinner. There are 19 tables at which one or two students may sit. If each boy has exchanged Valentine cards with exactly three girls and each girl with exactly two boys, how many students have attended the dinner?

16. How many different five-digit numbers have the property that if one digit is removed from it, reading from left to right, the number 2018 will be obtained?

17. In the school badminton club, there are 18 boys and 18 girls, with 12 in each of Grades 7, 8 and 9. The school wants to enter as many mixed-double teams as possible in the City Championship. The partners in each pair must be from the same grade. What is the minimum number of mixed-double pairs the school can enter?

18. Consider a non-negative number boring if it is made of only the same digits, and cool if it is made of only distinct digits. Single digits i.e. 1, 4, 3 etc. are only cool. Note that digits with repeats such as 21330 are neither cool nor boring. What is the smallest positive integer greater than or equal to 11 that cannot be represented as the sum of a boring and a cool number?

19. In triangle BAD, BD=3, AD=4 and AB=5. C is the point on the extension of BD such that DC=1. $PQRS$ is a rectangle with P and S on BC, Q on AB and R on AC. Determine the maximum perimeter of $PQRS$.