BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2018

Junior Preliminary

1. If 6 is the average of the four numbers $3, 4, 5$, and x, then the value of x is:

   (A) 7 (B) 9 (C) 10 (D) 12 (E) 18

2. A one pound bag of mixed nuts contains 60% peanuts, and a three-pound bag contains 40% peanuts. If these bags are mixed together to obtain a four-pound bag of nuts, then the percentage of peanuts in the bag is:

   (A) 42 (B) 42.5 (C) 45 (D) 50 (E) 55

3. We say a positive integer is "happy" if it is less than 100 and is divisible by either 3 or 7, or both. For example, $3, 70$ and 84 are all happy. The number of happy numbers is:

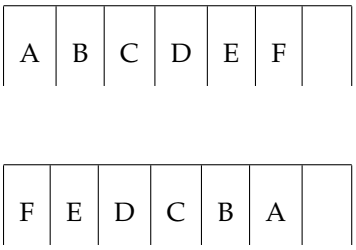
   (A) 39 (B) 40 (C) 43 (D) 45 (E) 47

4. Andre, Bert, Curtis and David are playing on a see-saw. Andre is heavier than Bert and Curtis together. Andre and Bert together balance perfectly with Curtis and David together. Bert and David together are heavier than Andre and Curtis together. Listed from lightest to heaviest, the order of the boys is:

   (A) Bert, Curtis, David, Andre (B) Curtis, Bert, Andre, David (C) Curtis, Bert, David, Andre

   (D) David, Bert, Curtis, Andre (E) David, Curtis, Bert, Andre

5. Six cars, labelled A, B, C, D, E, and F, are parked adjacent to one another in six of seven adjacent parking spaces, as shown in the top picture to the right. If a "move" means moving a car to an empty space (not necessarily an adjacent space), then the smallest number of moves needed to put the cars in reverse order, as shown in the lower picture, is:



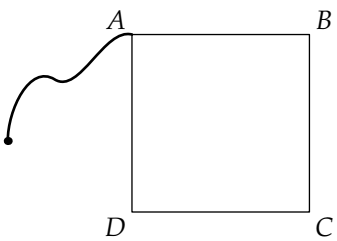
   (A) 7 (B) 8 (C) 9

   (D) 10 (E) 12

6. If four fair coins are flipped, then the probability of at least two coins coming up "heads" is:

   (A) $\frac{2}{5}$ (B) $\frac{3}{5}$ (C) $\frac{5}{8}$ (D) $\frac{3}{4}$ (E) $\frac{11}{16}$

7. A cow is tied with a rope to the corner of the square shed $ABCD$, as shown. If the length of the rope is 6 and the length of each side of the shed if 4, then the area the cow can graze is:



   (A) 28π (B) 29π (C) $36\pi - 16$

   (D) $40\pi - 16$ (E) 36π

8. A straight line passes through three points with coordinates $(0, 12)$, $(x, 93)$ and $(100, 120)$. The value of x is:

   (A) 69 (B) 70 (C) 72 (D) 75 (E) 77

9. If a quadrilateral is drawn with vertices at the points $(0, 3)$, $(2, 1)$, $(6, 3)$ and $(4, 6)$, then its area in square units is:

   (A) 12 (B) 15 (C) 16 (D) 18 (E) 19

10. Joshua thinks of a 3-digit number, and you are supposed to determine the number by asking questions. The only type of question you may ask is one that has an answer of “yes" or “no". The minimum number of questions in a strategy that is sure to determine the number (because it does not rely on luck) is:

    (A) 8 or fewer (B) 9 to 11 (C) 12 to 19 (D) 20 to 100 (E) more than 100

11. The remainder when $1^{2018} + 3^{2018} + 5^{2018} + 7^{2018} + 9^{2018}$ is divided by 20 is:

    (A) 5 (B) 7 (C) 13 (D) 15 (E) 17

12. Each of the letters $A, B, C, D, E, F, G, H, I$, and J is assigned to exactly one digit from 0 through 9, with no two letters being assigned to the same digit. The digits have the property that $ABABFJAI \div ABC = DEFGD$, with no remainder. To the right is the completed long division. The digit assigned to H is:

    (A) 5 (B) 6 (C) 7

    (D) 8 (E) 9

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\begin{array}{r}
DEFGD \\
\hline
ABC\,\big)\,ABABFJAI \\
AAAI \\
\hline
DIF \\
FIF \\
\hline
AGGJ \\
DDB \\
\hline
AAA \\
GGG \\
\hline
AAAI \\
AAAI
\end{array}
$$