

Sixth Grade - Excellence in Mathematics Contest - 2018

1. A message is coded from letters to numbers using this code:

**A = 5; B = 4; C = 3; B = 2; E = 1; F = 26; G = 25; H = 24;.....; Y = 7; Z = 6**

When the word **MISSISSIPPI** is coded, what is the sum of all eleven numbers?

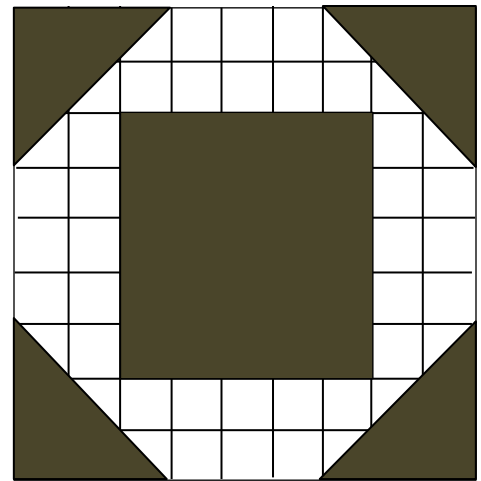
- A. 176      B. 190      C. 195      D. 199      E. 212

2. Marley can do 200 sit-ups at one time. If he averages 2 sit-ups every 5 seconds, how many minutes does it take him to complete 200 sit-ups?

- A.  $8\frac{1}{6}$       B.  $8\frac{1}{4}$       C.  $8\frac{1}{3}$       D.  $8\frac{1}{2}$       E.  $8\frac{2}{3}$

3. What per cent of this square quilt pattern is shaded?  
Round to the nearest per cent.

- A. 50%      B. 51%      C. 52%  
D. 53%      E. 54%



4. The product of two whole numbers is 48.  
The positive difference between these two numbers CANNOT be:

- A. 2      B. 6      C. 8      D. 13      E. 47

5. Evaluate:  $\frac{20-18+16-14+12-10+8-6+4-2}{1-4+7-10+13-16+19-22}$

- A.  $-5/6$       B.  $-5/4$       C.  $3/2$       D.  $5/4$       E.  $5/6$

6. Given a 9 by 9 square made with 1 by 1 square tiles, the tiles on each diagonal are painted white while the rest of the tiles are painted black. How many more black tiles are there than white tiles?

- A. 43      B. 44      C. 45      D. 46      E. 47

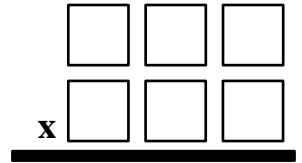
7. How many different numbers can be formed when you divide two different numbers from this set **{ 0 , 2 , 4 , 8 , 16 }**?

- A. 6      B. 7      C. 8      D. 9      E. 10

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8. What is the least possible product that can be obtained when these six digits: **1, 2, 3, 7, 8, 9** are placed in these six boxes?

- A. 38,642    B. 38,502    C. 39,593    D. 42,542    E. 97,047



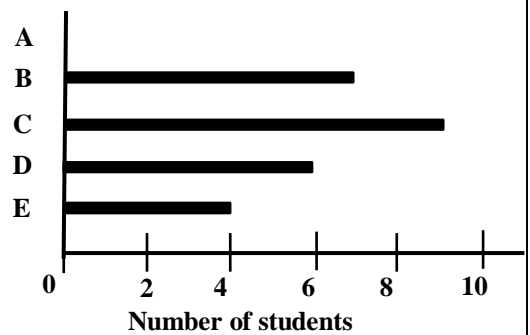
9. A pair of jeans selling for \$36.80 was put on sale for 25% off. Then a 10% sales tax was applied to the sale price. When she bought this pair of jeans, how much change from a \$50 bill did the customer receive?

- A. \$9.52    B. \$18.08    C. \$19.64    D. \$22.40    E. \$39.88

10. When Ms. Drew drew the bar graph of her students' test grades, she forgot to draw a bar for the students who scored an A. Twice as many students scored C or better than students who scored less than C.

What per cent of the students scored an A?  
Round to the nearest per cent.

- A. 10%    B. 12%    C. 13%  
D. 15%    E. 17%



11. The desks in Ms. Sonderman's classroom are in a rectangular array and all seats are taken. Audrey sits in the 4<sup>th</sup> row from the front and the 2<sup>nd</sup> row from the back. Audrey also sits in the 3<sup>rd</sup> row from the left and the 4<sup>th</sup> row from the right. How many students are in this class?

- A. 30    B. 32    C. 35    D. 36    E. 42

12. Select four numbers so that each column and each row contains one of the four numbers. What is the largest possible product of four such numbers?

- A. 40,320    B. 80,640    C. 120,960  
D. 161,280    E. 201,600

<b>2</b>	<b>6</b>	<b>10</b>	<b>14</b>
<b>4</b>	<b>12</b>	<b>20</b>	<b>28</b>
<b>6</b>	<b>18</b>	<b>30</b>	<b>42</b>
<b>8</b>	<b>24</b>	<b>40</b>	<b>56</b>

13. Which of these five numbers is closest to 1?

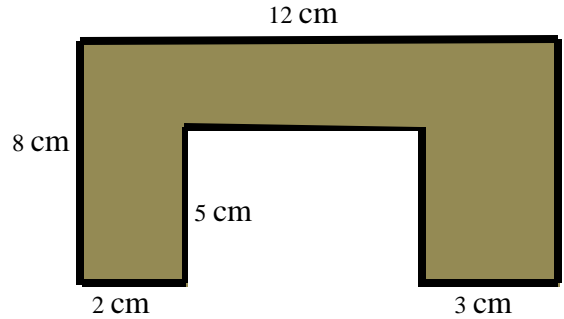
- A.  $0.99^2$     B.  $1.01^2$     C.  $\frac{101}{99}$     D.  $\frac{50}{49}$     E.  $\frac{49}{50}$

14. What is the sum of the three prime numbers closest to 50?

- A. 141    B. 143    C. 151    D. 157    E. 159

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15. Using the given measurements, what is the area of the shaded region? Assume that all angles are right angles.



- A. 50 square cm    B. 61 square cm    C. 66 square cm  
D. 71 square cm    E. Cannot be determined

16. In his gold medal snowboarding halfpipe run in the 2018 Winter Olympics, Shaun White performed five tricks. On these five tricks, his degrees of rotation were  $1440^\circ$ ,  $1440^\circ$ ,  $540^\circ$ ,  $1260^\circ$ , and  $1260^\circ$ . What is the total number of complete rotations that he made?

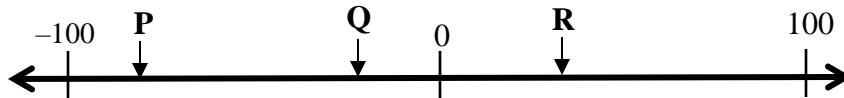
- A. 16            B.  $16\frac{1}{2}$             C. 17            D.  $17\frac{1}{2}$             E. 18

17. In the following sequence, how many sets of consecutive numbers sum to 12? For example,  $6+1+5$   
Note: It is possible that some of these sets overlap.

**2, 5, 1, 4, 2, 3, 7, 6, 1, 5, 2, 4, 8, 4, 1, 5**

- A. Fewer than 6    B. 6            C. 7            D. 8            E. More than 8

18. P, Q, and R represent numbers located on the number line as shown.



How many of the following five expressions represent a negative number?

**$R - P$  ;     $Q - P$  ;     $P + Q + R$  ;     $R \cdot Q + P$  ;     $\frac{Q}{P} \cdot R$**

- A. 1            B. 2            C. 3            D. 4            E. 5

19. What is the perimeter of a semicircle of diameter 24 cm?  
Round to the nearest centimeter.

- A. 50 cm    B. 62 cm    C. 72 cm    D. 75 cm    E. 226 cm

20. How many 3-digit multiples of 9 can be formed by selecting three distinct digits from the set: **{4, 5, 6, 7, 8}**?

- A. 1            B. 2            C. 6            D. 12            E. 18

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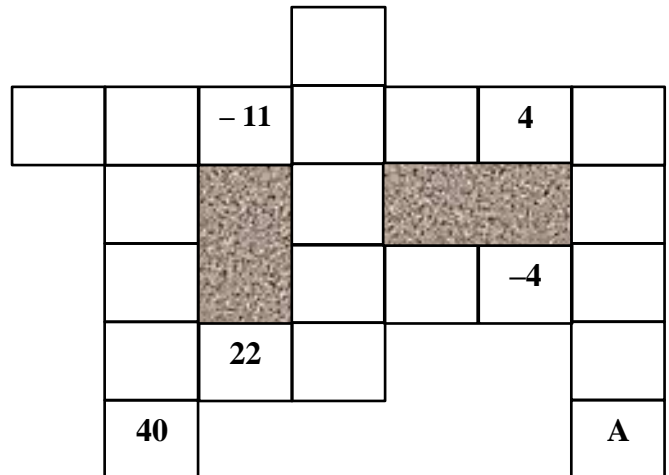
21. A box contains five tiles numbered **3, 4, 5, 6,** and **7**.  
If two tiles are selected simultaneously at random, what is the probability that their sum is 10?
- A.  $1/5$       B.  $2/25$       C.  $3/25$       D.  $1/10$       E.  $2/5$
22. M and N are positive integers such that  $M^2 + N^2 = 2018$ . What is  $M + N$ ?
- A. 56      B. 58      C. 60      D. 62      E. 64
23. What is the 1000<sup>th</sup> digit (to the right of the decimal point) of the decimal expansion of  $4/7$  ?
- A. 2      B. 4      C. 5      D. 7      E. 8

24. The numbers in each row and in each column of white (unshaded) squares form an increasing arithmetic sequence or a decreasing arithmetic sequence.

For example: 3, 7, 10, 13,... OR 16, 6, -4, -14,...

What number is in the cell marked "A"?

- A. 49      B. 13      C. -33  
D. -39      E. -31

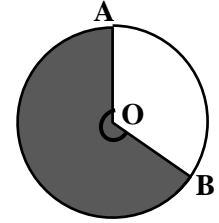


25. ABCD is a 12 cm by 12 cm square. Points P and Q are on AB such that  $AP = PQ = QB$ . Point M is the midpoint of BC. In square centimeters, what is the area of triangle MPQ?
- A. 12      B.  $6\sqrt{12}$       C.  $12\sqrt{12}$       D. 18      E. 24
26. How many more diagonals does a regular hexagon have than a regular pentagon?  
Note: A *diagonal* is any segment that joins two vertices of a convex polygon but is not an edge of the polygon.
- A. 1      B. 4      C. 5      D. 6      E. 8
27.  $2^6 * 4^3 * 8 = 2^N$  What does N equal?
- A. 10      B. 12      C. 13      D. 14      E. 15

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28. One sector of a pie chart is shaded to represent 62.5% of the area of a circle. What is the measure of angle AOB?

A.  $210^\circ$       B.  $225^\circ$       C.  $240^\circ$       D.  $250^\circ$       E.  $270^\circ$



29. Determine the sum of the two numbers which are twice as far from 20 as from 32.

A. 36      B. 52      C. 68      D. 72      E. 84

30. In 2018, Chris Mazdzer finished second to become the first American male to win an Olympic medal in luge. His total time in four races was only 0.026 seconds behind Austrian David Gleirscher. At a speed of 80 miles per hour, how many inches would Mazdzer travel in 0.026 seconds? Round to the nearest inch. There are 5280 feet in 1 mile.

A. 20      B. 37      C. 44      D. 56      E. 64

31. When Nance does not use his cell phone, a full charge lasts 36 hours. While using the phone, a full charge would last 4 hours. Nance's phone is fully charged at 6 AM. From 6 AM to 10 AM, Nance used his phone for 2.5 hours. Then his father took it away and set the phone aside. At what time will Nance's phone become fully discharged?

A. 7:30 PM    B. 8:00 PM    C. 9:30 PM    D. 10:00 PM    E. 11:30 PM

32. Use the clues below to place these seven numbers in the proper sequence: **2, 3, 7, 8, 9, 10, 13**

- The odd numbers and even numbers alternate
- 10 and 7 are adjacent [in either order]
- 3 is left of the 10 and the 7 but is not adjacent to either one
- The sum of the 5<sup>th</sup> and 7<sup>th</sup> numbers is 16
- No two consecutive numbers are adjacent to each other

\_\_\_\_\_ ; \_\_\_\_\_ ; \_\_\_\_\_ ; \_\_\_\_\_ ; \_\_\_\_\_ ; \_\_\_\_\_ ; \_\_\_\_\_

The sum of the 1<sup>st</sup> and 7<sup>th</sup> numbers in the sequence is:

A. 10      B. 12      C. 16      D. 20      E. 22

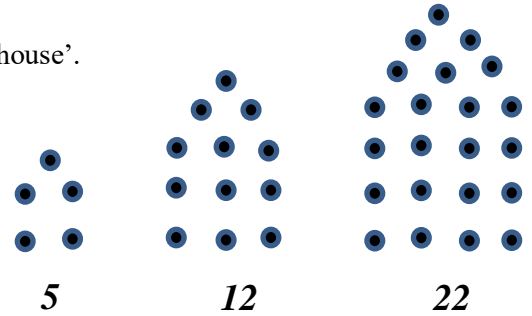
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33. In the given sum, A, B, C, D, and E represent different digits. Neither A nor C represent "0". What is the sum  $A + B + C + D + E$ ?

$$\begin{array}{r}
 A \ B \ C \\
 + \ C \ B \ C \\
 \hline
 C \ D \ E \ B
 \end{array}$$

- A. Less than 15    B. 16    C. 17  
 D. 18    E. More than 18

34. *House numbers* are associated with arrays of dots in the form of a 'house'. The first three *House Numbers*, as illustrated, are 5; 12; and 22.



With 5 as the 1<sup>st</sup> *House Number*, what is the 20<sup>th</sup> *House Number*?

- A. 590    B. 610    C. 631    D. 641    E. 651

35. Like Sudoku, the numbers 1, 2, 3, and 4 occur in every row and in every column. In addition, the four greater than and less than symbols indicate which of the two adjacent numbers is larger.

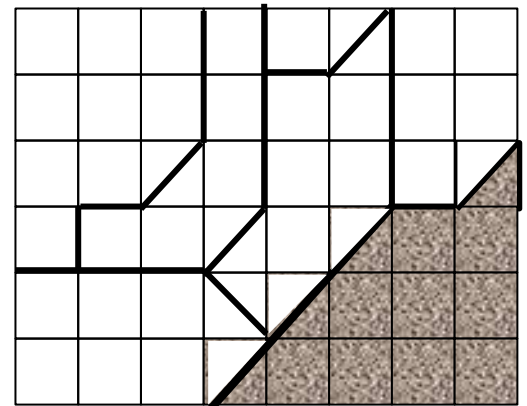
What is the sequence of numbers in the BOTTOM row?

		<	
4		<	
	v		
		^	

- A. 3124    B. 1243    C. 2341  
 D. 1234    E. 3241

36. This 6 by 8 rectangle has been broken by heavy lines into seven regions. One region is shaded. Chloe decides that exactly half of the area of the rectangle should be shaded. Each of the seven regions must be completely shaded or completely white.

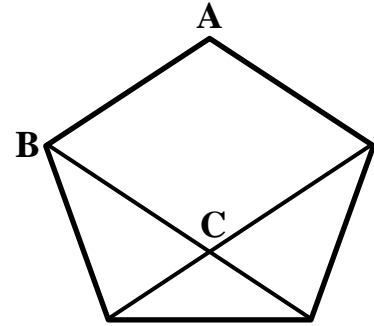
How many different sets of regions could Chloe shade so that exactly one-half of the rectangle is shaded?



- A. 0    B. 1    C. 2  
 D. 3    E. More than 3

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37. Starting at one of the three given points (A or B or C), your goal is trace each segment exactly once. You are allowed to visit the same point more than once.



At which point could you start?

- A. A only      B. B only      C. C only  
 D. A or C only      E. None of these
38. Alpha, Beta, Gamma, Delta, and Epsilon have their birthdays on consecutive days but not in that order. Alpha's birthday is as many days before Gamma's as Beta's birthday is after Epsilon's. Delta's birthday is two days before Epsilon's. If Gamma's birthday is on a Wednesday, on what day is Epsilon's birthday?

- A. Monday    B. Tuesday    C. Thursday    D. Friday    E. Saturday

39. Six points are equally spaced on a circle. How many sets of three points form an isosceles triangle?  
 Note: An equilateral triangle does count as one isosceles triangle.

- A. 6            B. 8            C. 9            D. 12           E. 20

40. Use these clues to place a digit 1 through 9 in each box. In each row and column, digits may be repeated.

ACROSS:

1. Sum of digits is 13
3. The four digits form an increasing or decreasing arithmetic sequence
5. Each digit is even and their sum is 12
6. A perfect square

DOWN:

1. The sum of the digits is the same as the sum of the digits of 4 Down.
2. The sum of the first two digits is the same as the sum of the last two digits of 1 Down
3. A perfect cube.
4. A perfect cube and a perfect square.

	1	2	
	<b>A</b>		
3			4
5			
		6	

What number is in the square marked "A"?

- A. 4            B. 5            C. 7            D. 8            E. 9