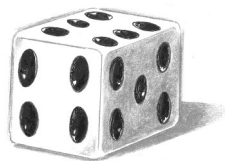


23. There are  $6 \times 6 \times 6$  such 3-digit numbers. Of those,  $6 \times 5 \times 4$  are numbers with 3 *different* digits, since for each hundreds digit chosen, there are 5 tens digits that differ from it and 4 ones digits that differ from the other 2 digits. So  $216 - 120 = 96$  3-digit numbers have at least 2 identical digits .



23.  
A

24. Since  $20 < 2019 \div 99 < 21$ , 2019 is the sum of at least 21 2-digit numbers.  
A) 20                      B) 21                      C) 200                      D) 201

24.  
B

25. A teacher divides her students into groups so there are at most 2 more boys than girls in each group. She must divide the 7 additional boys into groups of 2, 2, 2, and 1 to get the lowest number of groups.  
A) 3                      B) 4                      C) 6                      D) 7

25.  
B

26. The even factors of each choice are: A) 2,4; B) 2,4,8,10,16,20,40,80; C) 2,4,10,20,50,100; D) 2,4,8,16,32,64,128. Choice D has 7 even factors.  
A) 4                      B) 80                      C) 100                      D) 128

26.  
D

27. Kaz finished 12 places ahead of last and 4 places behind the top half. So,  $3 + 1 + 12$  places are the bottom half. Kaz finished 4 places after 16th, so he was 20th, with 19 ahead of him.  
A) 18                      B) 19                      C) 20                      D) 21



27.  
B

28. The average of 1, 2, 3, 5, 6, 10, 15, and 30 is  $72 \div 8 = 9$ .  
A) 6                      B) 7                      C) 8                      D) 9

28.  
D

29. If the average of the first 99 numbers I counted was 100, 100 must be the middle number. There are 49 numbers less than 100, so my first number was 51. The sum of the digits of my first number is  $5 + 1 = 6$ .  
A) 5                      B) 6                      C) 7                      D) 8

29.  
B

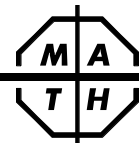
30. My favorite positive number multiplied by itself is a perfect square. Double each choice and find the perfect square. Since 576 is the square of 24, half of 576 (288) is the correct answer.  
A) 48                      B) 144                      C) 240                      D) 288

30.  
D

The end of the contest 5

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Steven R. Conrad, Daniel Flegler, Jeanmine Kolbush, and Adam Raichel, contest authors



Information & Solutions

Spring, 2019

Directions for Grading

5

- **Date** You may give this contest any time after April 15. The *5th Grade Contest* is for use in your own school or district. We've enclosed a registration form for next year. Instructions for optionally submitting results are included on a separate sheet entitled "Using the Score Report Center."
- **Urgent questions?** Write to [comments@mathleague.com](mailto:comments@mathleague.com), or call 1-201-568-6328 or 1-516-365-5656.
- **Scores** Remind students that *this is a contest, and not a test*—there is no "passing" or "failing" score. Few students score as high as 24 points (80% correct); students with half that, 12 points, *should be commended!*
- **Solutions** Detailed solutions appear in each question box, and letter answers are in the *Answers* columns on the right. You may copy this solution key and give a copy to every student who took this contest.
- **Awards** The original contest package contained 1 book award (and a bookplate you should affix to the book's inside front cover) for the 1st place student. We also enclosed 5 *Certificates of Merit*—1 for each runner-up, plus extras for ties.
- **Additional Book Awards & Additional Certificates** If you want to give more than 1 book award, you may purchase additional books as described below. Do you need more Certificates of Merit? If so, send your name, school, and school mailing address to our mailer at: **Math Certificates, P.O. Box 17, Tenafly, NJ 07670**, and include a self-addressed, stamped envelope (**2 stamps required**) large enough to hold certificates.

The school's top scorer will receive the book *Math Contests—Grades 4,5,6 (Vol. 4)*. Other high scorers will receive Certificates of Merit. In any one school year, no student may win both a book and a certificate. The book and certificates were in the original contest package.

*If needed, duplicate book awards may be ordered as described below.*

Twenty-one books of past contests, *Grades 4, 5, & 6 (Vols. 1, 2, 3, 4, 5, 6, 7)*, *Grades 7 & 8 (Vols. 1, 2, 3, 4, 5, 6, 7)*, and *High School (Vols. 1, 2, 3, 4, 5, 6, 7)*, are available, for \$12.95 per volume, from Math League Press, P.O. Box 17, Tenafly, NJ 07670-0017.

2018-2019 5TH GRADE CONTEST SOLUTIONS

Answers

1. $700 + 80 + 9 = 700 + (80 + 9) = 700 + 89$ . A) 7                      B) 70                      C) 700                      D) 780	1. C
2. Of every 6 animals I counted, 5 were sheep and 1 was a cow. Of 1800 animals, 1500 were sheep and 300 were cows. A) 400    B) 600    C) 1200    D) 1500	2. C
3. The product of 2018 and 2019 has 7 digits, Their sum has 4 digits, 3 digits less. A) 3    B) 4    C) 5    D) 7	3. A
4. $250 \times 100 = 100 \times 250 = (2 \times 50) \times (25 \times 10)$ . A) 10                      B) 20                      C) 25                      D) 50	4. C
5. Adding 20 to my age doubles it. I must now be 20. I was 18 2 years ago. A) 8                      B) 18                      C) 22                      D) 38	5. B
6. $2019 - (19 \times 1 + 19 \times 5) = (2019 - 19) - (19 \times 5)$ . A) 0                      B) 5                      C) 6                      D) 7	6. B
7. A weed grew 1 cm every 6 days. It grew 20 cm in $6 \times 20$ days. A) 20                      B) 40                      C) 60                      D) 120	7. A
8. $10 \times 10 \times 10 = 1000 = 100 \times 100 \times 100 \div 1000$ . A) 10                      B) $10 \times 10 \times 10$ C) $90 \times 90 \times 90$ D) $100 \times 100 \times 100$	8. B
9. A triangle with even side-lengths could <i>not</i> have an odd perimeter. A) 9    B) 16    C) 36    D) 64	9. A
10. The whole numbers less than 25 that are 1 less than a prime are 1, 2, 4, 6, 10, 12, 16, 18, and 22. The multiples of 4 are 4, 12, and 16. A) 0    B) 1    C) 2    D) 3	10. D
11. Since $8760 \div 60 = 146$ , my balloon rose $146 \times 10$ m in 8760 seconds. A) 146 m    B) 365 m    C) 1046 m    D) 1460 m	11. D
12. If May 1st was a Tuesday, then the 7th, 14th, 21st, and 28th would be Mondays. A) Sunday    B) Monday    C) Tuesday    D) Saturday	12. C



2018-2019 5TH GRADE CONTEST SOLUTIONS

Answers

13. My hat size is 1.5 times my shoe size. If my hat size is 18 more than my shoe size, then half my shoe size is 18. Their sizes are 36 and 54. A) 36    B) 54    C) 90    D) 108	13. C
14. One summand must be 2. The least such sum is $2 + 101 = 103$ . A) 101                      B) 103                      C) 105                      D) 107	14. B
15. I ran each of the first two km twice as fast as I ran the third km. If I ran the entire race in 36 minutes, it took me as long to run the 3rd km as the first two combined. So I took 18 minutes for the 3rd km. A) 12 minutes    B) 18 minutes    C) 24 minutes    D) 27 minutes	15. B
16. My favorite number is 2019. The sum of the smallest factor and the greatest factor of my favorite number is $1 + 2019 = 2020$ . A) 674                      B) 676                      C) 2020                      D) 2022	16. C
17. Each day, including weekend days, I play video games for half as much time as I spend doing homework that day. If I spent a total of 182 minutes playing video games last week, I spent $182 \div 7 = 26$ minutes playing games each day and 52 minutes doing homework. A) 16 minutes    B) 26 minutes    C) 36 minutes    D) 52 minutes	17. D
18. If each number has a ones digit of 9, the product is $9 \times 9 \times 9 \times 9 = 6561$ . A) 9                      B) 105                      C) 945                      D) 6561	18. D
19. For my average to decrease 5 points, my third game score was $3 \times 5$ points lower than the average of my first two game scores. A) 5    B) 10    C) 15    D) 25	19. C
20. If Elle shelled 1 nut the 1st day, she shelled $1+2+4+8 = 15$ nuts in 4 days. She actually shelled 24 times as many, so she shelled 24 the 1st day and 192 the 4th day. A) 90    B) 168    C) 192    D) 270	20. B
21. The remainders for each choice in order are 1, 1, 10, and 1. A) $10 \div 9$ B) $100 \div 99$ C) $1000 \div 99$ D) $10000 \div 99$	21. C
22. A certain number has exactly 3 different factors. If the second greatest factor is 7, the number is 49 and the sum of its digits is 13. A) 5                      B) 7                      C) 12                      D) 13	22. D

