26. Using *A*, *B*, *C*, *D*, and *E* as the ingredients, the possible combinations are *ABC*, *ABD*, *ABE*, *ACD*, *ACE*, *ADE*, *BCD*, *BCE*, *BDE*, and *CDE*.

    A) 6     B) 8     C) 10     D) 60

    **26. C**

27. The sum of six consecutive integers must be odd.

    A) 81     B) 88     C) 92     D) 98

    **27. A**

28. 1 day = 1440 min.; 288 min. = (288/1440) = 20%.

    A) 10     B) 15     C) 20     D) 40

    **28. C**

29. Two cousins visited Jane today. One cousin visits every 42 days. The other visits every 429 days. Since the l.c.m of 42 and 429 is 6006, they will next visit on the same day in 6006 days.

    A) 4296     B) 6006     C) 9009     D) 18018

    **29. B**

30. $3^{2013} - 3^{2012} = 3^{2012} \times (3-1) = 2 \times 3^{2012}$.

    A) $3^1$     B) $3^{2011}$     C) $2 \times 3^{2012}$     D) $6^{1006}$

    **30. C**

31. At 3 P.M. the hands form a 90° angle; 14 mins. earlier the min. hand was $14/60 \times 360° = 84°$ back and the hr. hand was 7° back, so it's 167°.

    A) 84°     B) 137°     C) 167°     D) 174°

    **31. C**

32. The median of 6 numbers is the average of the middle ones: $(\frac{3}{4} + \frac{4}{3}) \div 2$.

    A) 1     B) $\frac{669}{360}$     C) $\frac{7}{12}$     D) $\frac{25}{24}$

    **32. D**

33. This is a weighted average. Since the Master mix's sunflower percent is 10% less than the Blue mix's and 15% more than the Rye mix's, the ratio of Blue mix to Rye mix is 15:10. (The ratio is the reverse of the percents.) Thus, 15/25 of the Master mix is Blue mix. In 1000 g the part that is Blue mix is $15/25 \times 1000 = 600$ g.

    A) 350 g    B) 400 g    C) 600 g    D) 650 g

    **33. C**

34. There are 50 multiples of 2 on the list, 25 multiples of 4, 12 of 8, 6 of 16, 3 of 32, and 1 of 64. That's $2^{97}$ or $2 \times 4^{48}$.

    A) $4^{25}$     B) $4^{32}$     C) $4^{48}$     D) $4^{50}$

    **34. C**

35. The ratio of the fraction of new books that are biographies to the fraction of used books that are biographies is (0.7/0.85) : (0.3/0.15). This is equivalent to (7/85) : (3/15) = (7/85) : (17/85). This simplifies to 7:17.

    A) 7:17     B) 14:17     C) 17:14     D) 17:7

    **35. A**

*The end of the contest* ✍ **7**

**Visit our Web site at http://www.mathleague.com**
*Steven R. Conrad, Daniel Flegler,* and *Adam Raichel,* contest authors

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# Information *&* Solutions

## 2012-2013 Annual 7th Grade Contest

*Tuesday, February 26 (alternate date: February 19), 2013*

### Directions for Grading

**7**

- ■ **Security and Solutions** *Do not look at these solutions until after the contest.* 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.

- ■ **Urgent Questions?** For appeals or answers to urgent questions, write to comments@mathleague.com or call 1-201-568-6328.

- ■ **Scores** Please remember that *this is a contest, and not a test*—there is no "passing" or "failing" score. Few students score as high as 28 points (80% correct). Students with half that, 14 points, should be commended.

- ■ **Awards & Results** The original contest package contained 5 *Certificates of Merit*—1 each for the 3 highest scoring students on the contest, plus extras for ties. **Do you need more Certificates of Merit?** If so, include your name, school, and school mailing address in a letter to: ***Math Certificates, P.O. Box 17, Tenafly, NJ 07670-0017***, and *include a self-addressed, stamped envelope (**three 1st Class stamps req'd.**) large enough to hold certificates.* Only scores submitted to our Internet Score Report Center by Tues., March 8, 2011 can be used in our *Summary of Contest Results newsletter,* which will be posted online no later than Fri., April 15, 2011.

- ■ **Return of Student Papers** *Originals* of contest papers with scores of 30 or more *must* be held until June 1. *Copies* of these papers, and originals of all other papers, should be returned to students after grading. Students scoring 30 points or more must confirm an *understanding* of the contest rules by signing the *Selected Math League Rules* (on the colored sheet of information and rules that accompanied the contests). Keep this signed sheet with the original contests until June 1. Please do not mail these to the League unless we ask you to do so.

1. The difference between 10.98 and 11.00 = 0.02, so 11.00 is closest.

   A) 10.00      B) 10.90      C) 10.95      D) 11.00

   **1. D**

2. $\sqrt{4 \times 9 \times 16} = 2 \times 3 \times 4 = 24$.

   A) 9      B) 24      C) 29      D) 36

   **2. B**

3. The only choice that leaves a remainder of 4 when divided into 256 is 6. Thus, Mr. Barry could have 6 cubs.

   A) 5      B) 6      C) 8      D) 11

   **3. B**

4. The tenths digit of 543.21 is 2, and its hundredths digit is 1.

   A) 543.21      B) 231.23      C) 654.56      D) 642.46

   **4. A**

5. $3^2 + 3^2 + 3^2 = 9 + 9 + 9 = 27 = 3^3$.

   A) $3^3$      B) $3^6$      C) $9^3$      D) $9^6$

   **5. A**

6. $3 \div \frac{1}{6} = (3 \times 3) \div (3 \times \frac{1}{6}) = 9 \div \frac{3}{6} = 9 \div \frac{1}{2}$.

   A) $\frac{1}{18}$      B) $\frac{1}{12}$      C) $\frac{1}{2}$      D) $\frac{9}{2}$

   **6. C**

7. Since $2013 = 3 \times 11 \times 61$ and $418 = 2 \times 11 \times 19$, the correct answer is 418.

   A) 231      B) 365      C) 418      D) 542

   **7. C**

8. If 3 times a number is 36, the number is 12; one-third of 12 is 4.

   A) 4      B) 12      C) 36      D) 108

   **8. A**

9. If a case of eggs contains $12 \times 12 = 144$ eggs, then two crates of 12 cases contain $2 \times 12 \times 144 = 3456$ eggs.

   A) 48      B) 144      C) 288      D) 3456

   **9. D**

10. $100\,000\,000 \div 10\,000 = 10\,000$.

    A) 10      B) 100      C) 1000      D) 10 000

    **10. D**

11. As shown in the diagram, a diameter of the circular brim is equal to the length of a side of the square. The square has a side-length of 1 m. Since a radius of a circle is half of a diameter, the radius of the brim is 0.5 m.

    A) 0.5 m      B) 1 m      C) 2 m      D) 4 m

    **11. A**

12. $\frac{1}{\cancel{3}} \times \frac{\cancel{2}}{\cancel{4}} \times \frac{\cancel{3}}{\cancel{5}} \times \frac{\cancel{4}}{\cancel{6}} \times \frac{\cancel{5}}{\cancel{7}} \times \frac{\cancel{6}}{\cancel{8}} \times \frac{\cancel{7}}{9} \times \frac{\cancel{8}}{10} = \frac{1}{10} \times \frac{2}{9}$.

    A) $\frac{3}{19}$      B) $\frac{2}{9}$      C) $\frac{1}{9}$      D) $\frac{2}{90}$

    **12. B**

13. $20 + 30 + 40 - (20 + 30 + 40) \div 3 = 90 - 30 = 60$.

    A) 0      B) 45      C) 60      D) 90

    **13. C**

14. If 130 of Del's last meals were sandwiches, then 120 were not. Since $120 \div 250 = 0.48$, 48% of those last 250 meals were not sandwiches.

    A) 40%      B) 44%      C) 48%      D) 52%

    **14. C**

15. The two least odd divisors of 120 are 1 and 3.

    A) 4      B) 5      C) 8      D) 15

    **15. A**

16. Every $4 \times 30$ min. = 2 hours, I collect $4 \times 20 = 80$ seashells and drop 3 seashells. In 2 hours I have a total of 77 seashells, so in 8 hours I have $77 \times 4 = 308$ seashells.

    A) 68      B) 136      C) 296      D) 308

    **16. D**

17. The number of nickels in $3.00 is $300 \div 5 = 60$. The number of dimes in $6.00 is $600 \div 10 = 60$. That's 120 coins; 240 quarters = $60.00.

    A) $12.00      B) $15.00      C) $30.00      D) $60.00

    **17. D**

18. 0.05% of $10\,000 = 0.0005 \times 10\,000 = 5$.

    A) 5      B) 50      C) 500      D) 5 000

    **18. A**

19. The middle number is $13 \div 13$. The integers are $-5, -4, -3 \ldots, 5, 6$, and 7.

    A) 6      B) 7      C) 9      D) 13

    **19. B**

20. One apple plus one orange costs $1.50. If I spend $5 \times \$1.50 = \$7.50$, I'll have $1.30 left to buy 2 more apples. That's a total of 12 pieces.

    A) 11      B) 12      C) 13      D) 14

    **20. B**

21. Since $10 = 2 + 3 + 5$, $12 = 2 + 3 + 7$, and $15 = 3 + 5 + 7$, Dragon Doug cannot read 13 books in 3 months.

    A) 10      B) 12      C) 13      D) 15

    **21. C**

22. The average of $45\,674\,567$ and $67\,896\,789$ is $(45\,674\,567 + 67\,896\,789) \div 2 = 56\,785\,678$.

    A) $55\,443\,322$      B) $55\,556\,666$

    C) $56\,565\,656$      D) $56\,785\,678$

    **22. D**

23. $\sqrt{49} - \sqrt{16} = 7 - 4 = 3 = \sqrt{9}$.

    A) $\sqrt{33}$      B) $\sqrt{25}$      C) $\sqrt{9}$      D) $\sqrt{3}$

    **23. C**

24. $2016^{2013} = (2^5 \times 3^2 \times 7)^{2013} = 2^{10065} \times 3^{4026} \times 7^{2013}$.

    A) $3^{2013}$      B) $3^{2015}$      C) $3^{4026}$      D) $3^{6039}$

    **24. C**

25. Friday, Mar. 4, is the 3rd day it's open. Three weeks later, Mar. 25, is the 18th day. Monday, Mar. 28, is day 19, so Mar. 30 is the 21st day.

    A) March 22      B) March 23      C) March 30      D) March 31

    **25. C**