International SoM Contest 2026 Grade Six Solutions

1) **D** Evaluate according to the order of operations: $44 - (4 \times 4 - 4) \div 4 + 4 = 44 - 12 \div 4 + 4$
$= 44 - 3 + 4$
$= 45$

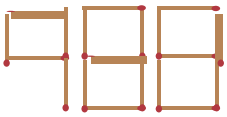
2) **C** In the given sequence, the second term is obtained by adding the prime number 2 to the first term. The third term is obtained by adding the next prime number, 3, to the second term. The sequence continues so that the prime number 11 must be added to 18. Therefore, the next term in the sequence is $18 + 11 = 29$.

3) **B** Each student receives $39 \div 17 = 2$ juice boxes and there are 5 juice boxes left over.

4) **D** If the clock gains three minutes every hour, and it displays a time that is 30 minutes ahead of the actual time, then the clock has been running $30 \div 3 = 10$ hours.

5) **C** The perimeter of a rhombus is equal to the side length multiplied by four. If the side length is doubled, then the new perimeter will be double the old perimeter. The ratio of the new perimeter to the old perimeter is 2:1.

6) **B** You can create the number 988 by adding one horizontal matchstick to the top of the 4 to make a 9, one horizontal matchstick in the middle of the 0 to make an 8, and one vertical matchstick to the 6 to make an 8.



7) **D** The LCM of 11 and 10 is 110. Convert each fraction to its equivalent with a denominator of 110, and compare the numerators. The fraction $\frac{4}{11}$ is equivalent to $\frac{40}{110}$, and the fraction $\frac{3}{10}$ is equivalent to $\frac{33}{110}$. Since 40 is bigger than 33, $\frac{4}{11}$ is bigger than $\frac{3}{10}$.

8) **B** 5% of 20 + 20% of $5 = 0.05 \times 20 + 0.2 \times 5$
$= 1 + 1$
$= 2$

9) **C** The sum of the completed column is $4 + 5 + 11 + 14 = 34$. Therefore, the missing number in the diagonal containing 13 is $34 - 13 - 10 - 4 = 7$. The value of the * is $34 - 7 - 14 - 1 = 12$.

10) **D** Review the given options to find one that is true.

i) False. The sum of all angles of a pentagon is 540°.

ii) False. $1^{\pi} = 1$ and $\pi^1 = \pi$, therefore 1^{π} is smaller than π^1.

iii) False. 2^3 has a units digit of 8 and 8^3 has a units digit of 2.

iv) The square root of 25 squared is 25, which is a perfect square because $5^2 = 25$.

11) **B** The prime numbers between 1 and 50 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47. There are 15 prime numbers.

12) **C** Simplify by converting the denominator to a single fraction: $3 + \frac{1}{\frac{1}{3} - \frac{1}{9}} = 3 + \frac{1}{\frac{2}{9}}$

A fraction line implies division.
$3 + 1 \div \frac{2}{9} = 3 + 1 \times \frac{9}{2}$
$= 7\frac{1}{2}$

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13) **B** There is a total of $12 + 6 + 7 = 25$ vegetables in the fridge. Six of the vegetables are carrots, so the probability of picking a carrot without looking is $\frac{6}{25}$.

14) **D** The prime factorization of 756 is $2^2 \times 3^3 \times 7$. The sum of all the prime factors of 756 is $2 + 2 + 3 + 3 + 3 + 7 = 20$.

15) **C** Increasing an amount of money by 50% means that the amount is multiplied by 1.5. Decreasing an amount of money by 20% means that the amount is multiplied by 0.8. Therefore, the overall net change is a multiplication of the original amount of money by $1.5 \times 0.8 = 1.2$. Multiplying by 1.2 implies a 20% increase.

16) **C** There are 5 choices for the first letter, and for each of these choices, there are 4 choices for the second letter, and for each of these choices, there are 3 choices and so on. Altogether, there are $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$ arrangements.

17) **A** Average speed is the total distance travelled divided by the total time taken to travel that distance. The total distance is $12 + 3.5 + 1 = 16.5$ km. The total time is $14 + 12 + 4 = 30$ minutes. Thirty minutes is equivalent to 0.5 hours. The average speed is $16.5 \div 0.5 = 33$ km/h.

18) **B** When the dish is $\frac{1}{8}$ full, one minute later it will be $\frac{2}{8}$ full. One minute after that it will be $\frac{4}{8}$ full, and one minute after that it will be $\frac{8}{8}$ full. It takes three minutes to go from being $\frac{1}{8}$ full to full, so it is $\frac{1}{8}$ full at 12:17.

19) **B** Solve by substitution. Attempt the addition with option A): $3^2 + 4^2 + 5^2 + 6^2 = 86$. Attempt the addition with option B): $4^2 + 5^2 + 6^2 + 7^2 = 126$.

20) **D** B is a carry over to the hundreds column, so B = 1. In the units column, B is 1 and C must be zero because $1 + 0 = 1$. Therefore, in the tens column, A + A must be the addition of two equal numbers, resulting in a zero and a carry over of 1. The only value of A that would give that result is 5.

21) **A** The probability of picking a yellow gem is 40% and the probability of picking a blue gem is 40%. Therefore the probability of picking a purple gem is $100 - 40 - 40 = 20\%$. If 20% of the total number of gems are 15 purple gems, then there are $15 \div 0.2 = 75$ gems in total. The number of yellow and blue gems added together is $75 - 15 = 60$. Therefore, the number of blue gems is $60 \div 2 = 30$.

22) **C** Applying the rules given, the number following 17 would be $17 \times 3 + 1 = 52$. The number following 52 would be $52 \div 2 = 26$. The complete sequence of numbers is: 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1. A total of 12 steps are required to reach the number 1.

23) **D** Set x to equal $0.1\overline{37}$. Since there are two repeating digits, multiply both sides of the equation by 10^2 and then subtract x from both sides of the equation. Solve for x as shown below.

$$100x = 13.7373737$$
$$100x - x = 13.7373737 - 0.137373737$$
$$99x = 13.6$$
$$x = 13.6 \div 99$$

Express x as the fraction $\frac{136}{990}$ and reduce to $\frac{68}{495}$.

24) **C** If three numbers are removed from the numbers –10 to 10 (10, –10 inclusive), then there are $21 - 3 = 18$ numbers remaining. From those, there are 9 remaining positive numbers which are 2, 3, 4, 5, 6, 7, 8, 9, and 10. Nine is half of 18, so 50% of the remaining numbers are positive.

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25) **A** One whole divided into fifteenths will contain 15 pieces. Nine of these 15 pieces are contained within three-fifths. This is illustrated in Option A.

26) **B** For a number to be a four-digit palindrome, the first two digits should mirror the last two digits. Numbers ending in zero and 5 are divisible by five, but we cannot consider numbers ending in zero because a four-digit number cannot start with the digit 0. The only four-digit palindromes that are divisible by five are 5005, 5115, 5225, 5335, 5445, 5555, 5665, 5775, 5885, 5995. There are 10.

27) **C** All rows in Pascal's triangle start and end with the number 1. Each of the remaining numbers in a row are obtained by adding the two numbers directly above the number.

n=6: 1 6 15 20 15 6 1
n=7 1 7 21 35 35 21 7 1
n=8 1 8 28 56 70 56 28 8 1
The fifth number in row n=8 is 70.

28) **C** If $a \lozenge b = a^2 - ab + b^2$ and $a \blacklozenge b = a^2 + ab + b^2$, find the value of $(5 \lozenge 3) \blacklozenge 2$
Evaluate the bracket first by inserting $a = 5$ and $b = 3$ into $a^2 - ab + b^2$.
$5 \lozenge 3 = 5^2 - 5 \times 3 + 3^2$
$= 25 - 15 + 9$
$= 19$
Then, evaluate $19 \blacklozenge 2$ by inserting $a = 19$ and $b = 2$ into $a^2 + ab + b^2$.
$19 \blacklozenge 2 = 19^2 + 19 \times 2 + 2^2$
$= 361 + 38 + 4$
$= 403$

29) **C** Both pitchers start with the same volume of liquid. After the transfer of one cup of tea into the lemonade, and one cup of tea-lemonade mixture back into the tea, the total amount of liquid in each pitcher is back to what it was at the start. Whatever amount of tea that left the tea pitcher and stayed in the lemonade pitcher must be exactly the same as the amount of lemonade that ended up in the tea pitcher. Therefore, the amounts of tea in the lemonade and lemonade in the tea are the same.

30) **C** For there to be exactly the same number of heads and tails after all 500 flips, there should be 250 heads and 250 tails. After 100 flips, there are 42 tails. Therefore, $250 - 42 = 208$ tails are needed in the remaining 400 flips.

31) **C** Option C because each letter in the question in the grid occurs five letters before each letter in the grid in Option C in the English alphabet. K is five letters before P. G is five letters before L. O is five letters before T, and C is five letters before H.

32) **C** The formula for the area of a triangle is half of the base × height. The area of triangle ABC is $12 \times 10 \div 2 = 60$ cm^2. The height of triangle ADE is $10 - 4 = 6$ cm. The area of triangle ADE is $7.2 \times 6 \div 2 = 21.6$ cm^2. The area of the shaded triangle inside ADE is $3 \times 6 \div 2 = 9$ cm^2. The total area of the shaded region is equal to the area of triangle ABC, less the area of triangle ADE, plus the area of the shaded part of triangle ADE. Therefore, the total area of the shaded region is $60 - 21.6 + 9 = 47.4$ cm^2.

33) **A** If the ratio of boys to girls is 3:5, this means that the class is divided into $3 + 5 = 8$ equal parts, and girls have 2 more parts than boys. If there are 16 more girls than boys, these 16 girls must represent 2 parts of the whole class. If 16 students is equal to 2 parts, then 8 parts must be equal to $16 \times 4 = 64$ students. There are 64 students in the class.

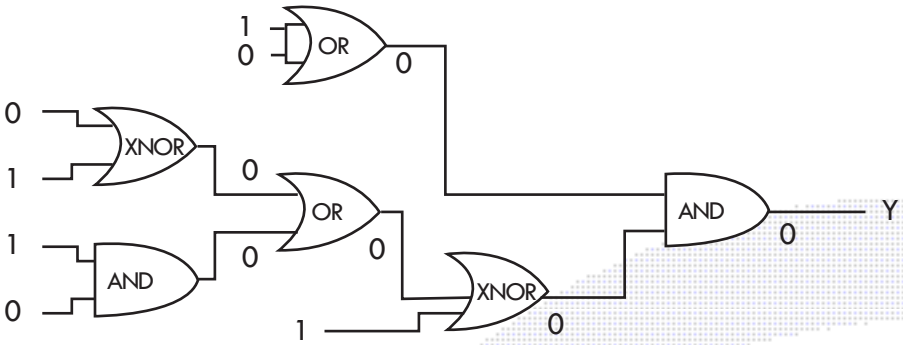
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34) **B** The larger lawn has an area of 60 m × 60 m = 3600 m^2. The smaller lawn has an area of 15 m × 15 m = 225 m^2. The larger lawn is 3600 ÷ 225 = 16 times larger than the smaller lawn. Therefore, it will take 4 ÷ 16 = 0.25 hours, or 15 minutes, to mow the smaller lawn.

35) **B** If a shape is rotated 2026° clockwise, it rotates 2026 ÷ 360 = 5 complete turns of 360° and a remaining 226°. Starting at 0° and moving clockwise, 226° is the same as moving 360 – 226 = 134°counterclockwise.

36) **B** Moving from left to right, label each arrow with the output of the corresponding logic gate to find the output of the final logic gate.



37) **B** Estimate the cubed root of 19656. 20^3 is 8000 and 30^3 is 27000. So, the cubed root of 19656 must be close to the middle in between 20 and 30. Cubing 26 gives 17576. Multiplying 26, 27 and 28 yields a units digit of 6. The consecutive integers are likely to be 26, 27, and 28 but they can be multiplied to be sure. Indeed, 26 × 27 × 28 = 19656. The value of the smallest integer plus twice the largest integer is 26 + 28 × 2 = 82.

38) **C** If Sophie pays $51 for three pants, the discounted price of each pants is 51 ÷ 3 = $17. The discount on buying three pants is 15%, therefore the regular price of one pants is 17 ÷ 0.85 = $20. A pair of shoes and two pants cost $75, therefore the cost of a pair of shoes is 75 – 2 × 20 = $35. Two pairs of shoes, discounted at 10%, cost 2 × 35 × 0.9 = $63.

39) **D** For January to have five Fridays, the first Friday of January must either be January 1, 2, or 3. If the first Friday is January 1, then the sum of the calendar dates of the five Fridays would be 1 + 8 + 15 + 22 + 29 = 75. Trying January 3 as the first Friday of January, the sum of the calendar dates of the five Fridays would be 3 + 10 + 17 + 24 + 31 = 85. This is the sum we are looking for, and January 12th falls on a Sunday.

40) **C** Test Options A to D by dividing them by 3 and calculating the remainder. Option A and Option C both yield a remainder of 2 when divided by 3 because 59 ÷ 3 = 19 remainder 2 and 83 ÷ 3 = 27 remainder 2. Continue testing Options A and C by dividing them by 4, 6, and 7 one at a time. When Option A is divided by 7, the remainder is 3. When Option C is divided by 7, the remainder is 6. Option C is the only number that yields the remainders defined in the question.

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