

Answers for Problems in Jan. 2020 issue

Problems to Ponder

1 Blocks that contain the same number of dots match.

2 Multiple patterns could be created. One example is the following:



3 The problem has multiple solutions:

- 2, 4, 4
- 2, 3, 5
- 3, 3, 4

4 $2 + 5 + 5 + 2 = 14$ blocks

5 All sums between 6 and 23 inclusive can be made. Here are some examples of how to add to 6 through 11:

- $2 + 2 + 2 = 6$
- $2 + 5 = 7$
- $2 + 2 + 2 + 2 = 8$
- $5 + 2 + 2 = 9$
- $5 + 5 = 10$
- $5 + 2 + 2 + 2 = 11$

Eighteen can be made 5 ways:

- $5 + 5 + 8 = 18$
- $5 + 5 + 2 + 2 + 2 + 2 = 18$
- $2 + 2 + 2 + 2 + 2 + 8 = 18$
- $2 + 8 + 8 = 18$
- $2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 18$

6 15 and 5

7 There are three possible answers:
P11 Y3 R1
P9 Y5 R1
P7 Y5 R3

For further thought: No. The sum of three even numbers will always be an even number and could not sum to 15.

8 There are multiple solutions; here are two (there are many more):
 $8 + 47 + 2 = 52 + 5$
 $9 + 47 + 2 = 52 + 6$

9 There are multiple ways to continue this pattern:
→ Dog, Elephant, Fox, . . . (beginning letter A, B, C, D, E, F, . . .)
→ Antelope, Bobcat, Chameleon, . . . (ABCABC pattern)
→ Walrus, Meerkat, Kangaroo, . . . (number of letters in the name of the animal 3, 4, 5, 6, 7, 8, . . .)

10 Here are two of the multiple possible solutions:
3 quadrilaterals or
2 triangles and 1 hexagon.

11 There are 4 pieces frosted on three sides and 2 pieces frosted on only one side.

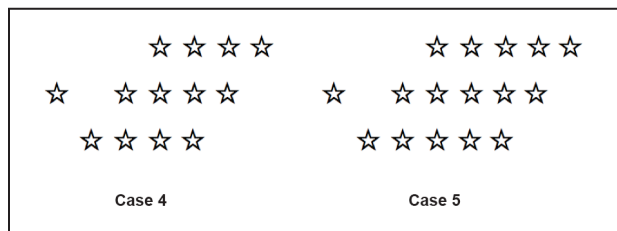
12 There are multiple solutions. Here are two:

$$2 + 67 + 31 = 100$$

$$2 + 157 + 241 = 400$$

For further thought: 0, 1, and 4 are probably the only perfect squares that are not the sum of three primes. If you are curious why there may not be any others, read about and investigate the Goldbach conjecture.

13 Case 11 will have 34 stars.



14 $a = 0.85$ $b = 0.78$ $c = 0.9$

15 Five socks must be removed to ensure a match.

For further thought: There is no change if there are 10 socks of each color. However, if you add a fifth color, then six socks must be removed to ensure a match.

16 Answers may vary. The sequence 4, -1, 3, 2, 5, . . . is one example.

For further thought: There are an infinite number of distinct Fibonacci-like sequences whose fifth term has a value of 5.

17 The rope is ~15,708 meters long.

18 The average speed is 50 miles per hour.

19 Alice was 6 years old when Belle was born.

20 The square pizza should be approximately 15 inches on each side.

For further thought: No. The box is 15 inches wide to fit the square pizza, but it would need to be 16 inches wide to fit the circular pizza.

21 From smallest to largest: Merchant C, Merchant A, Merchant B.

22 Jill walks farther than Jack.

23 Gauss will return to point A before Newton.

24 From smallest to largest: CAUTION, YIELD, R/R, STOP.

25 Linear model: \$5.25 million. Exponential model: ~\$5.511 million.

26 Starting temperature is 82°F (~27.778°C).

27 The chance of rain at least once during the week is ~97.2%.

28 The next closest approach will occur in approximately 768.09 days.

For further thought: The opposition will occur approximately 384.04 days after closest approach.