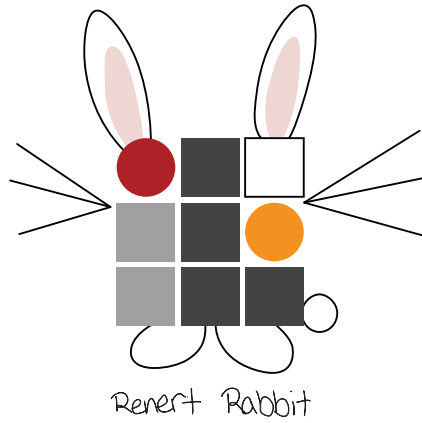


Renert Rabbit  
Gr 6  
March 23, 2023

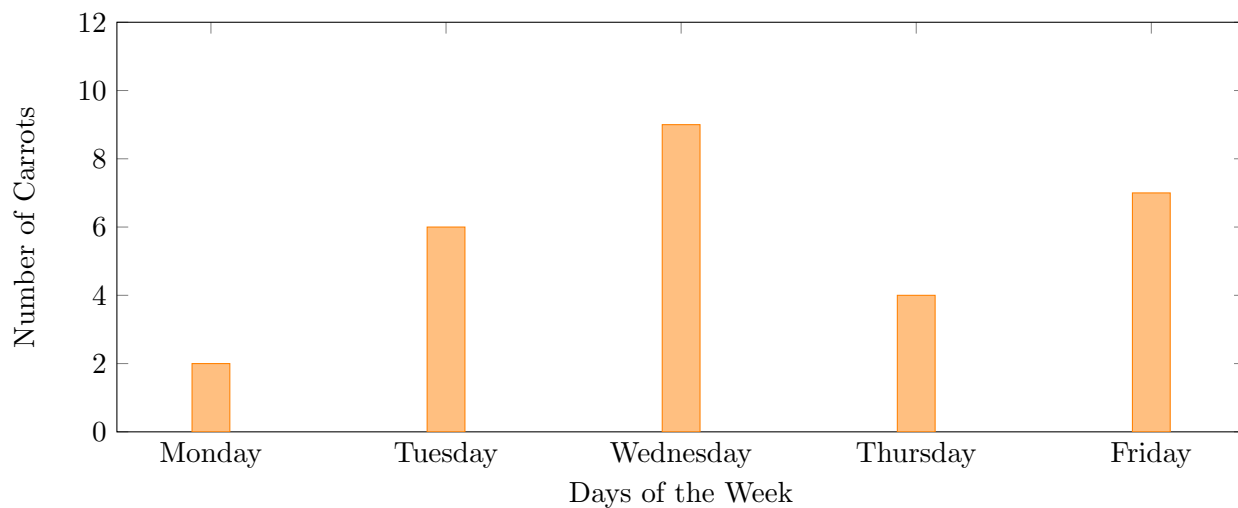
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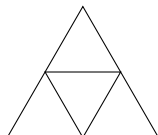
**SOLUTIONS**

**Part A (4 points each)**

1. The graph shows the number of carrots Renert Rabbit ate each day of the week. On which day did he eat the most carrots?



- (A) Monday      (B) Tuesday      **(C) Wednesday**      (D) Thursday      (E) Friday
2. If  $2023 + 2023 - 2023 = 2023 - \square$ , then what is  $\square$ ?  
(A) 0      (B) 1      (C)  $2 \times 2023$       (D)  $-2023$       (E) 2023
3. Which of the following integers is closest to 0?  
(A)  $-100$       (B) 11      (C)  $-10$       (D) 8      **(E)  $-4$**
4. What is  $1 - 2 \times 3 + 4 - 5 \times 6 + 7 - 8 \times 9$ ?  
(A)  $-96$       (B)  $-225$       (C)  $-118$       (D)  $-279$       (E)  $-112$
5. Wendy the woodcutter has a log that is 10 m long. She cuts the log into 2-meter long pieces. How many cuts does she need to make?  
(A) 10      (B) 5      **(C) 4**      (D) 2      (E) 20
6. An equilateral triangle is divided into 4 smaller equilateral triangles. The perimeter of each small triangle is 24 cm. What is the perimeter of the original triangle?



- (A) 18 cm      (B) 24 cm      **(C) 48 cm**      (D) 72 cm      (E) 96 cm

7. Which of the following is the 3rd largest?

- (A) 20.3      **(B) 20.19**      (C) 9.99      (D)  $40 - 100 \div 3$       (E)  $20 + 1 \div 3$

8. In quadrilateral  $MNPQ$ ,  $\angle M = \angle P$ ,  $\angle Q = 74^\circ$ , and  $\angle N = 58^\circ$ . What is the measure of  $\angle M$ ?

- (A)  $58^\circ$       (B)  $74^\circ$       (C)  $132^\circ$       **(D)  $114^\circ$**       (E)  $228^\circ$

9. What is the product of 351 and 690?

- (A) 184 590      (B) 2 452 900      (C) 312 179      **(D) 242 190**      (E) 184 500

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**Part B (5 points each)**

10.  $\Delta$  is a new math operation. If  $a\Delta b = (a + b) \times (a \times b)$ , what is  $4\Delta 3$ ?

- (A) 84      **(B) 12**      (C) 7      (D) 19      (E) 49

11. Ajeet and Jayen each rolled two 6-sided dice to see who would get the larger sum. Ajeet rolled the dice and got a sum of 9. What is the probability that Jayen will roll the dice and get a larger sum?

- (A)  $3/11$       **(B)  $1/6$**       (C)  $1/4$       (D)  $1/2$       (E)  $1/12$

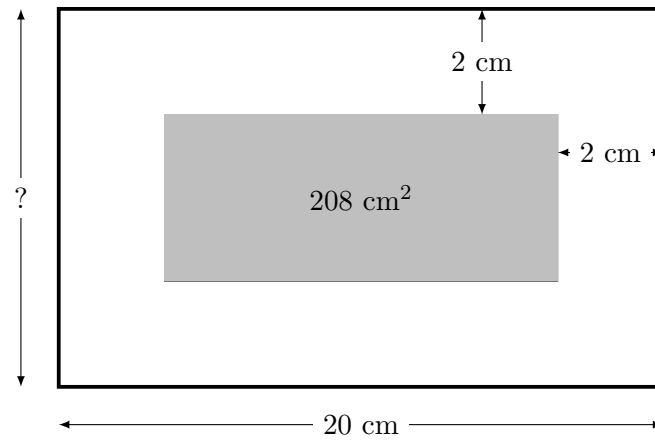
12. Composite numbers are positive integers that are not prime (with the exception of 1). If James wrote the prime factorization of all composite numbers from 11 to 19, how many times would he write the number “2”? For example, he would say “2” three times for the number 8 ( $2 \times 2 \times 2$ ) but zero times for the number 9 ( $3 \times 3$ ).

- (A) 4      (B) 6      **(C) 8**      (D) 9      (E) 10

13. A rabbit is going on vacation and would like to take two of his three chipmunk friends (Kiana, Yahya, and Arin) and two of his four squirrel friends (Eli, Sunsaar, Isla, and Jovan). How many different friend combinations are possible?

- (A) 12      **(B) 18**      (C) 4      (D) 72      (E) 36

14. A picture frame has a length of 20 cm. The picture has a border that is 2 cm wide around it. If the area of the picture itself is  $208 \text{ cm}^2$ , what is the width of the frame?



(A) 13 cm

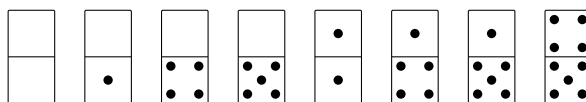
(B) 15 cm

**(C) 17 cm**

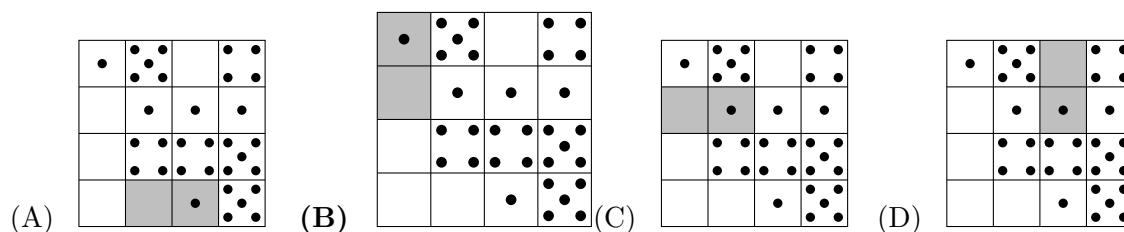
(D) 11 cm

(E) 14 cm

15. Naveen has 8 dominoes:

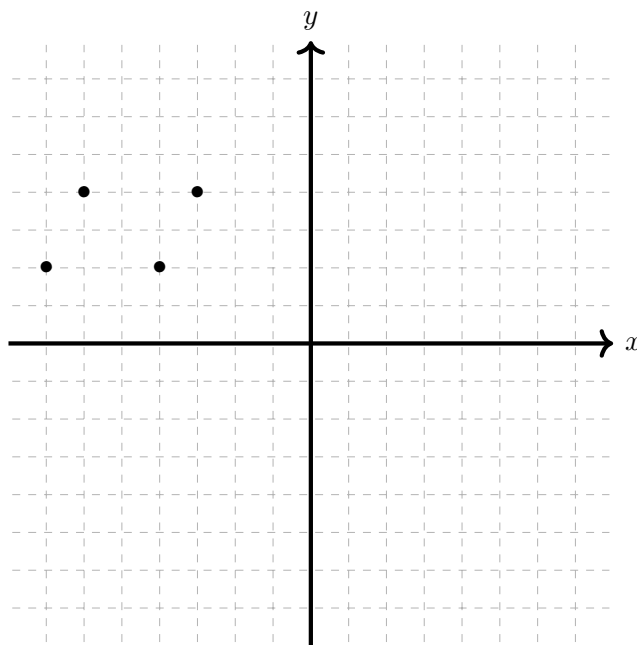


He arranges them into a  $4 \times 4$  square by putting them side-by-side. Where did he put the domino with 1 and 0? (Dominoes can be rotated)



(E) impossible to determine

16. The four vertices of a parallelogram has coordinates at  $(-7, 2)$ ,  $(-4, 2)$ ,  $(-3, 4)$ , and  $(-6, 4)$ . When translated 3 units down and then reflected across the  $y$ -axis, which of the following points could be a vertex of the final image?



(A)  $(6, 4)$

(B)  $(7, 4)$

(C)  $(4, -3)$

(D)  $(-3, -1)$

(E)  $(6, 1)$

17. There were 23 animals sitting side by side to watch a concert: 12 foxes, 6 rabbits, and 5 squirrels. Mr. Adam noticed that no two of the same animal were sitting side by side (for example, no rabbit sat beside another rabbit). Which of the following must be true?
- (A) At least one rabbit is sitting beside a squirrel.
  - (B) One of the animals at one of the ends of the row is a rabbit.
  - (C) At least one rabbit is sitting between two squirrels.
  - (D) At least one squirrel is sitting between two foxes.**
  - (E) The seating arrangement is impossible.
18. One of Sukhman's friends borrowed his math book. They said:
- Andre said that Raine borrowed it.
  - Scott said that he did not borrow anything.
  - Connor said that it was a person whose name starts with "R".
  - Raine said that it was not Ruby.
  - Ruby said that it was not Raine.

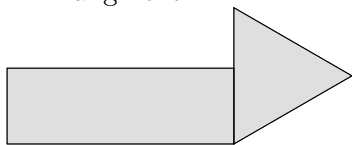
If exactly one of them is lying, who borrowed his math book?

- (A) Andre      (B) Scott      (C) Connor      (D) Raine      **(E) Ruby**

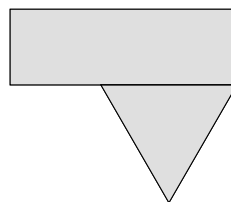
**Part C (6 points each)**

19. Mr. Rabbit has a rectangular table and another one in the shape of an equilateral triangle. The sum of their perimeters is 32 meters. In arrangement *A*, the perimeter is 28 meters and in arrangement *B*, the perimeter is 24 meters. What is the perimeter of the rectangular table?

Arrangement A



Arrangement B



**Solution: 17**

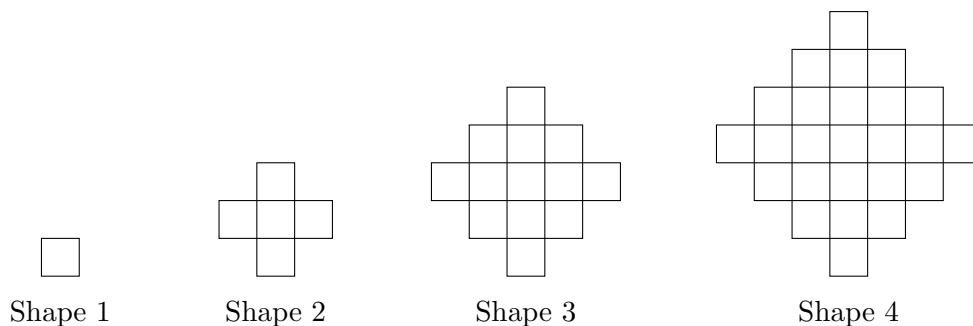
20. The prime factorization of 288 can be expressed in this form:  $288 = A^B \times C^A$ . What is  $A + B + C$ ?

**Solution:**  $288 = 2^5 \cdot 3^2$ , so  $A = 2$ ,  $B = 5$ , and  $C = 3$ . Then  $A + B + C = 10$

21. Marshall drew a right triangle and a square. The triangle has side lengths 60, 63, and 87. The ratio of the perimeter of the triangle to the area of the triangle is equal to the ratio of the perimeter of the square to the area of the square. What is the side length of the square?

**Solution:**  $4s : s^2 = (60 + 63 + 87) : (60 \cdot 63)/2$ , so  $4 : s = 210 : 30 \cdot 63 = 1 : 9$ , leaving  $s = 9 \cdot 4 = 36$ .

22. Jayden makes the pattern below by using square tiles. The first four shapes have heights of 1, 3, 5, and 7.



If  $N$  is the number of tiles he needs to make the shape of height 23, what are the first two digits of  $N$ ?

**Solution:** General solution:  $2(1 + 3 + \cdots + (2n - 3)) + (2n - 1) = 2(n - 1)^2 + 2n - 1$ . For  $n = 12$ , we get 265, so 26 is our answer.

23. Royal Vista Link has a community of 1000 rabbits. Each rabbit can be classified as either:

- young or old;
- tall or short;
- married or single.

Of these rabbits:

- 300 are young,
- 460 are tall,
- 700 are married.

We also know that:

- 132 young rabbits are tall,
- 301 married rabbits are tall,
- 140 young rabbits are married,
- 60 rabbits are young, married, and tall.

How many rabbits are old, short, and single?

**Solution:**

$$1000 - (300 + 460 + 700 - 132 - 301 - 140 + 60) = 1000 - 947 = 53$$