



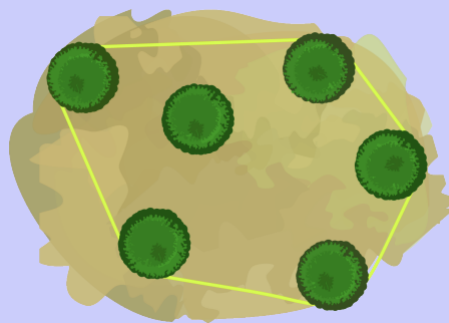
Grade 6 Math Circles

February 28 March 1/2, 2023
BCC/Gauss Prep - Problem Set

BCC Practice Problems

Roped Trees

Joni Beaver uses rope to mark groups of trees. The rope forms a very tight loop so that each tree either touches the rope or is entirely inside the loop. Below is an example where the rope touches exactly 5 trees when viewed from above.



How many trees will the rope touch if the trees are arranged as follows (when viewed from above)?



(A) 4

(B) 5

(C) 6

(D) 7



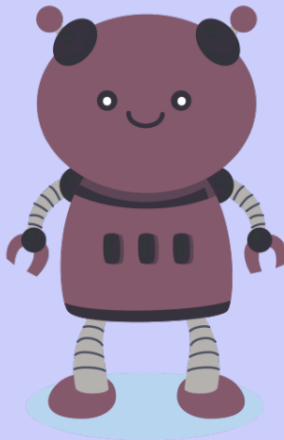
Robots

Consider these five statements describing the three robots below:

1. Bob and Moe are smiling.
2. Bob, Moe, and Lea each have two legs.
3. Moe has a round head and exactly one leg.
4. All three robots have five fingers.
5. Lea or Bob have their hands raised.



LEA



MOE



BOB

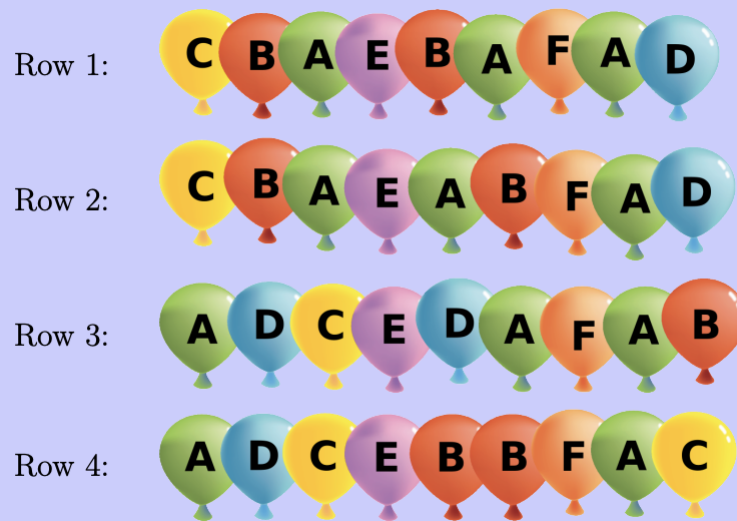
Which of these five statements are true?

- (A) 2 and 3 (B) 1 and 3 (C) 1 and 5 (D) None



Balloons

Mark goes to a birthday party. A room at the party is decorated with balloons in rows:



Mark can't see colours clearly. For him, yellow (C) looks the same as green (A), and blue (D) looks the same as red (B).

Which two rows of balloons look the same to Mark?

- (A) Row 1 and Row 4
- (B) Row 2 and Row 4
- (C) Row 1 and Row 2
- (D) Row 1 and Row 3



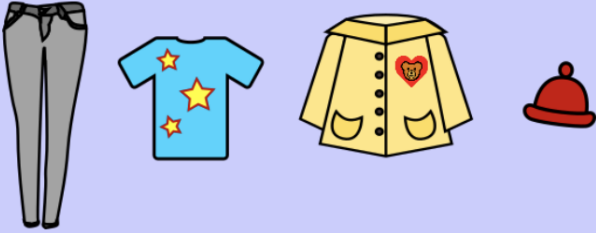



What to Wear?

Every morning Maja decides what to wear for the day. She uses the following rules:

1. If she wears pants, then she wears a T-shirt that is blank or has stars.
2. If she wears a skirt, then she wears a T-shirt with a beaver logo.
3. If she wears a T-shirt that is blank or has stars, then she wears a jacket with a heart.
4. If she wears a jacket with a heart, then she wears a cap with a drawing.

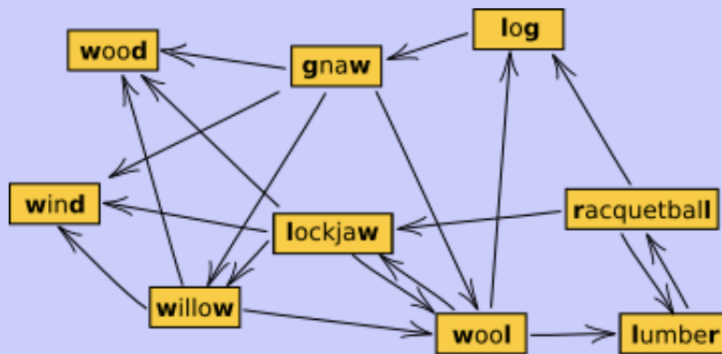
Which of the following combinations can Maja wear?

- (A) 
- (B) 
- (C) 
- (D) 



Longest Word Chain

Beavers play a word chain game. One beaver starts by saying a word. The other beaver must say a different word which begins with the last letter of the previous word. Then the first beaver says another word (which was not said yet) using this same rule, and so on. If a beaver is unable to say a new word, that beaver loses the game. These beavers do not know many words. In fact, they can draw their entire vocabulary like this:



Notice that an arrow out of a word points at the next possible word(s) that can be said.

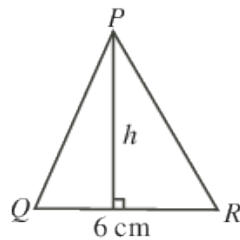
What is the largest possible number of words that can be said in one game?

- (A) 6 (B) 7 (C) 8 (D) 9



Gauss Practice Problems

1. Erin receives \$3 a day. How many days will it take Erin to receive a total of \$30?
(A) 8 (B) 12 (C) 14 (D) 27 (E) 10
2. A class begins at 8:30 a.m. and ends at 9:05 a.m. on the same day. In minutes, what is the length of the class?
(A) 15 (B) 25 (C) 35 (D) 45 (E) 75
3. Chaz gets on the elevator on the eleventh floor. The elevator goes down two floors, then stops. Then the elevator goes down four more floors and Chaz gets off the elevator. On what floor does Chaz get off the elevator?
(A) 7th floor (B) 9th floor (C) 4th floor (D) 5th floor (E) 6th floor
4. Alex pays \$2.25 to take the bus. Sam pays \$3.00 to take the bus. If they each take the bus 20 times, how much less would Alex pay than Sam in total?
(A) \$25 (B) \$10 (C) \$15 (D) \$45 (E) \$60
5. $\triangle PQR$ has an area of 27 cm and a base measuring 6 cm. What is the height, h , of $\triangle PQR$?



- (A) 9 cm (B) 18 cm (C) 4.5 cm (D) 2.25 cm (E) 7 cm
6. If the mean (average) of five consecutive integers is 21, the smallest of the five integers is
(A) 17 (B) 21 (C) 1 (D) 18 (E) 19
 7. Karl has 30 birds. Some of his birds are emus and the rest are chickens. Karl hands out 100 treats to his birds. Each emu gets 2 treats and each chicken gets 4 treats. How many chickens does Karl have?
(A) 10 (B) 15 (C) 25 (D) 20 (E) 6



8. In the diagram, which of the following squares should be shaded to make BD a line of symmetry of square $ABCD$?

- (A) P and S (B) Q and S (C) P and T (D) Q and T (E) P and R

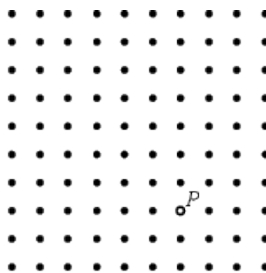
9. The mean (average) of the four integers 78, 83, 82, and x is 80. Which one of the following statements is true?

- (A) x is 2 greater than the mean
(B) x is 1 less than the mean
(C) x is 2 less than the mean
(D) x is 3 less than the mean
(E) x is equal to the mean

10. If x , y , and z are positive integers with $xy = 18$, $xz = 3$, and $yz = 6$, what is the value of $x + y + z$?

- (A) 6 (B) 10 (C) 25 (D) 11 (E) 8

11. A 10 by 10 grid is created using 100 points, as shown. Point P is given. One of the other 99 points is randomly chosen to be Q . What is the probability that the line segment PQ is vertical or horizontal?



- (A) $\frac{2}{11}$ (B) $\frac{1}{5}$ (C) $\frac{1}{10}$ (D) $\frac{4}{25}$ (E) $\frac{5}{33}$

12. Celyna bought 300 grams of candy A for \$5.00, and x grams of candy B for \$7.00. She calculated that the average price of all of the candy that she purchased was \$1.50 per 100 grams. What is the value of x ?

- (A) 525 (B) 600 (C) 500 (D) 450 (E) 900



13. In the addition of two 2-digit numbers, each blank space, including those in the answer, is to be filled with one of the digits 0, 1, 2, 3, 4, 5, 6, each used exactly once. The units digit (one's digit) of the sum is
(A) 2 (B) 3 (C) 4 (D) 5 (E) 6
14. How many of the five numbers 101, 148, 200, 512, 621 cannot be expressed as the sum of two or more consecutive positive integers?
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4
15. Two different 2-digit positive integers are called a reversal pair if the position of the digits in the first integer is switched in the second integer. For example, 52 and 25 are a reversal pair. The integer 2015 has the property that it is equal to the product of three different prime numbers, two of which are a reversal pair. Including 2015, how many positive integers less than 10,000 have this same property?
(A) 18 (B) 14 (C) 20 (D) 17 (E) 19

More Practice

To access any previous contest problems and solutions, go to:

https://www.cemc.uwaterloo.ca/contests/past_contests.html