Name: _____ **HOMEWORK: Math Lovelace Lesson 25**

1. Mia says that she knows four numbers whose sum and product are odd numbers. Is this possible?

2. Paint was spilled on a chessboard. Can the number of squares with paint on them be 17 less than the number of clean squares? Why or why not?

3. On a chessboard, the knight started on A1, made several moves and returned to his starting point A1. Prove that he made an even number of moves.

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4. Six numbers are written on the board: 1, 2, 3, 4, 5, 6. By the game rules, in each move, you are allowed to add 1 to any two of these numbers. Is it possible to make all the numbers equal in a few moves?

5. Seven natural numbers are written in a circle. Prove that you can find two neighboring numbers that have an even sum.

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6. The STEAM Olympiad had competitions in math, physics, chemistry, biology and ballroom dancing. When the Olympiad was done, it turned out that each subject competition had an odd number of participants and that each participant participated in an odd number of competitions. Was the number of participants in the Olympiad even or odd?

7. On planet Mars, inhabitants can have a random number of arms. One time, all inhabitants of Mars stood and held hands in such a way that no free arms were left. Can the number of Martians that have an odd number of arms be odd?

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II. Math Kangaroo Problems (optional).

18. Instead of digits Hannes uses the letters A, B, C and D in a calculation. Different letters stand for different digits. Which digit does the letter B stand for?

(A) 0 (B) 2 (C) 4 (D) 5 (E) 6

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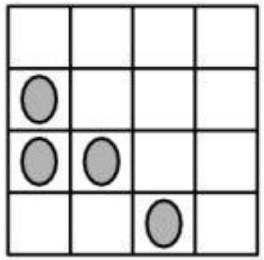
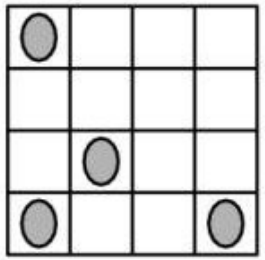
  A B C
+ C B A
-------
D D D D
```

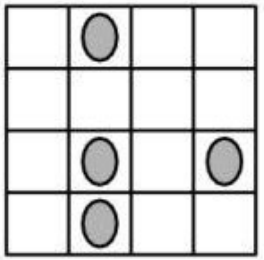
19. Four ladybirds each sit on a different cell of a 4 x 4 grid. One is asleep and does not move. On a whistle the other three each move to an adjacent free cell.
They can crawl up, down, to the right or to the left but are not allowed on any account to move back to the cell that they have just come from.
Where could the ladybirds be after the fourth whistle?



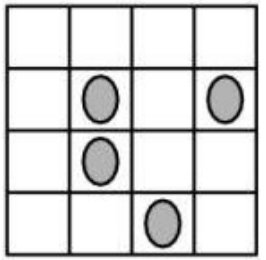
Initial position



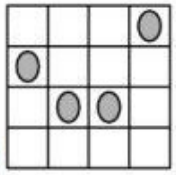
After the first whistle

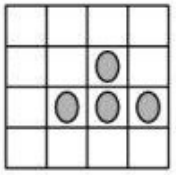


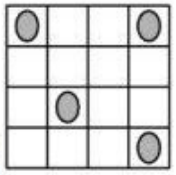
After the second whistle

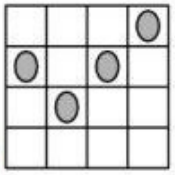


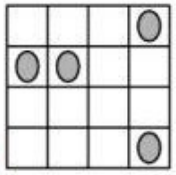
After the third whistle

(A) 

(B) 

(C) 

(D) 

(E) 

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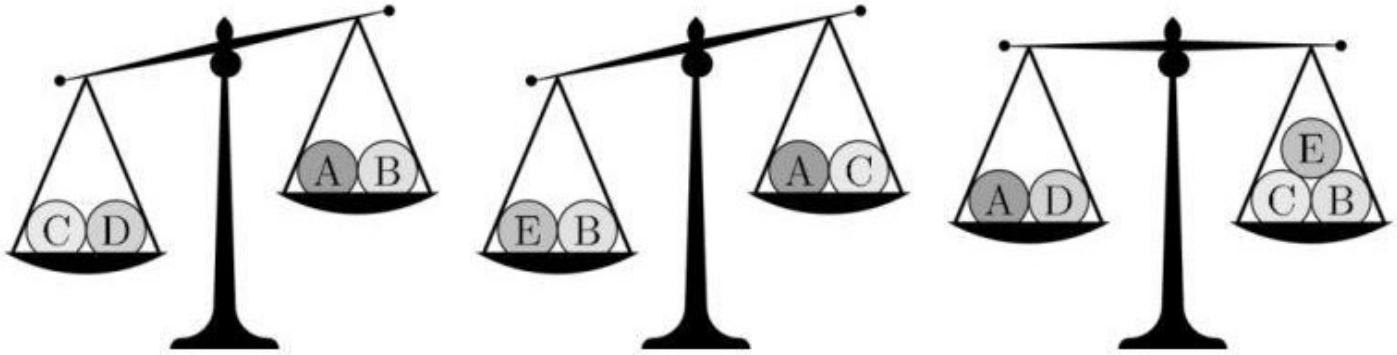
20. The five balls weigh 30 g, 50 g, 50 g, 50 g and 80 g. Which of the balls weighs 30 g?



(A) A (B) B (C) C (D) D (E) E

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21. Three different digits A, B and C are chosen. Then the biggest possible six-digit number is built where the digit A appears 3 times, the digit B 2 times and the digit C 1 time.
Which representation is definitely not possible for this number?

(A) AAABBC (B) CAAABB (C) BBAAAC (D) AAABCB (E) AAACBB

22. The sum of Kathi's age and the age of her mother is 36. The sum of the age of her mother and the age of her grandmother is 81. How old was Kathi's grandmother when Kathi was born?

(A) 28 (B) 38 (C) 45 (D) 53 (E) 56

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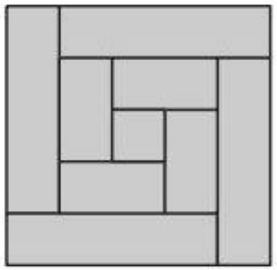
23. Nick wants to split the numbers 2, 3, 4, 5, 6, 7, 8, 9, 10 into some groups so that the sum of the numbers in each group is equally big. What is the biggest number of groups he can build this way?

(A) 2 (B) 3 (C) 4 (D) 6 (E) another number

24. The figure shown on the right consists of one square part and eight rectangular parts. Each part is 8 cm wide. Peter assembles all parts to form one long, 8 cm wide rectangle. How long is this rectangle?



(A) 150 cm (B) 168 cm (C) 196 cm (D) 200 cm (E) 232 cm

END OF HOMEWORK!

Name: _____ **CLASSWORK: Math Lovelace Lesson 26**

1. How many trailing zeros does the product of all natural numbers from 10 to 25 have? (a trailing zero is a zero at the end of a number, with no non-zero digits to the right of it)

2. Is the value of the expression (11 x 21 x 31 x 41 x 51−1) divisible by 10?

3. Prove that a natural number made up of more than two digits is divisible by 4 if and only if the number made up of its last two digits is divisible by 4.

Name: _____ **CLASSWORK: Math Lovelace Lesson 26**

4. Cowboy Bill went into a bar and asked to buy a bottle of beer for $3 and six packs of matches, the price of which he did not know. The barman said, “$11.80”. This made Cowboy so angry that the barman quickly recalculated the total and corrected his mistake. How did Bill know that the barman gave him the wrong total?

5. Write the same digit to the right and to the left of the number 10 so that the resulting four digit number is divisible by 12.

6. In the number 59*4*, replace the stars with digits so that the resulting number is divisible by 36. Find all possible solutions.

7. Nine identical sparrows eat fewer than 1001 seeds, and ten of the same sparrows eat more than 1100 seeds altogether. How many seeds does one sparrow eat?