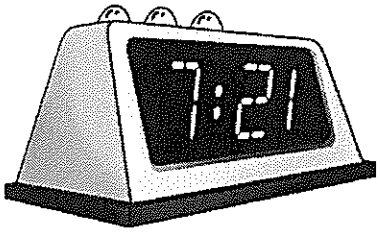
This brainteaser was supplied by the Mathematical Olympiads for Elementary and Middle Schools (www.moems.org).

If 18 students occupy 3/5 of the seats in the classroom, how many students would occupy 2/3 of the seats in the room?

This brainteaser was written by Derrick Niederman.

Starting at 12:00 midnight, you wait a number of minutes that is a perfect square and then look at a digital clock. The number you see (with the colon removed) is also a perfect square.

What is the first time after midnight that this happens?

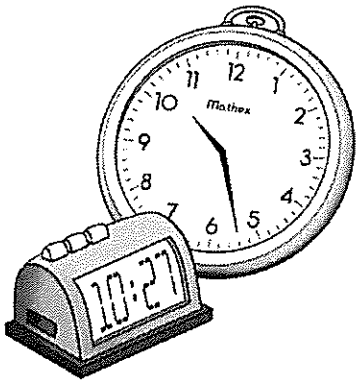


Puzzle provided by Noetic Learning Math Contest

There are 5 houses on a street: house A, B, C, D and E. The distance between any two adjacent houses is 100 feet. There are 2 children living in house A, 3 children living in house B, 4 children living in house C, 5 children living in house D and 6 children living in house E. If the school bus can only make one stop on that street, in front of which house should the bus stop so that the sum of walking distance among all children will be the least?

This brainteaser was written by Derrick Niederman.

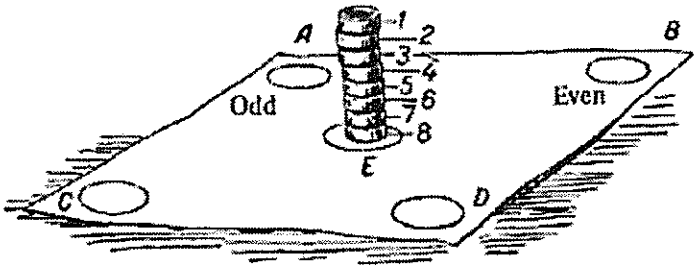
A pocket watch is placed next to a digital clock. Several times a day, the product of the hours and minutes on the digital clock is equal to the number of degrees between the hands of the watch. (The watch does not have a second hand.) As you can see, 10:27 is not one of those times — the angle between the hands is not 270°. If fractional minutes aren't allowed, find the times at which the product of the hours and minutes is equal to the number of degrees between the hands.



Puzzle provided by Kordemsky: The Moscow Puzzles (Dover)

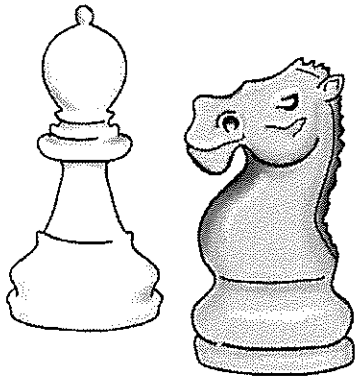
Number 8 checkers and pile them up as shown. Use a minimum of moves to shift checkers 1, 3, 5, and 7 from the center to the "Odd" side circles and checkers 2, 4, 6, and 8 to the "even" side circles. To move, shift the top checker from one pile to the top of another. It is against the rules to put a checker with a higher number on a checker with a lower one, or to place an odd-numbered check on an evenonumbered checker or vice versa.

Thus, you can put checker 1 on 3, 3 on 7, or 2 on 6 – not 3 on 1 or 1 on 2.



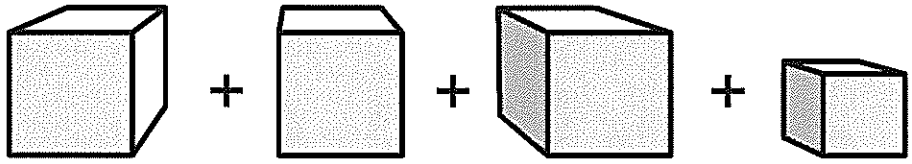
This brainteaser was written by Derrick Niederman.

Two chess players compete in a best-of-five match. If Chekmatova has a 60% chance of winning any particular game, what is the likelihood that she will win the match?



This brainteaser was written by Derrick Niederman.

According to Waring's theorem, any positive integer can be represented as the sum of nine or fewer perfect cubes (not necessarily distinct).

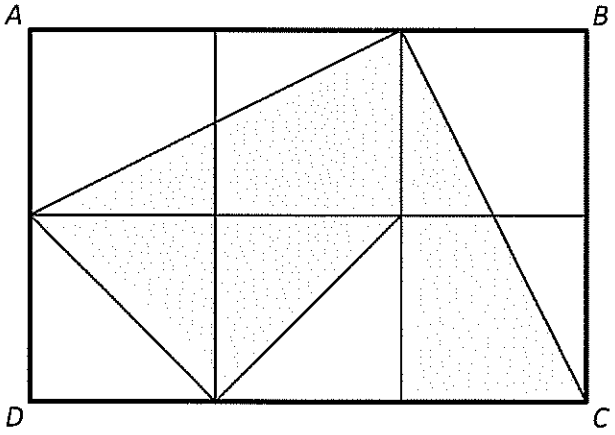


For instance, 89 can be represented as the sum of four perfect cubes: $27 + 27 + 27 + 8 = 89$.

Can you express 239 as a sum of nine or fewer perfect cubes?

This brainteaser was supplied by the Mathematical Olympiads for Elementary and Middle Schools (www.moems.org).

Three lines cut rectangle *ABCD* into six congruent (identical) squares. The perimeter of rectangle *ABCD* is 30 cm. What is the area of the shaded region, in square centimeters?



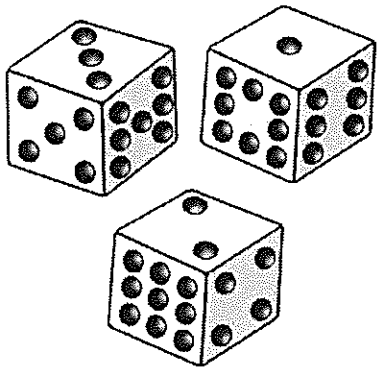
This brainteaser was written by Derrick Niederman.

Consider three six-sided dice A, B, and C, with the following numbers on their sides:

A: 2, 2, 4, 4, 9, 9

B: 1, 1, 6, 6, 8, 8

C: 3, 3, 5, 5, 7, 7



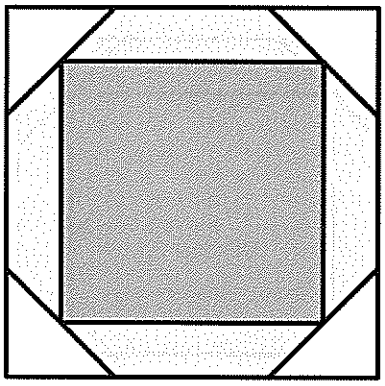
What is the probability that:

- A produces a higher number than B?
- B produces a higher number than C?
- C produces a higher number than A?

Can you find another set of face values for A, B, and C that yield the same properties? (Does such a set even exist?)

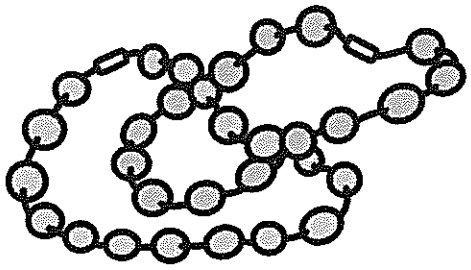
This brainteaser was written by Derrick Niederman.

A regular octagon is inscribed inside a square. Another square is inscribed inside the octagon. What is the ratio of the area of the smaller square to the area of the larger square?



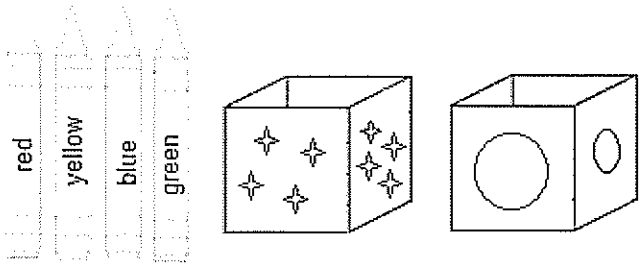
Puzzle provided by Noetic Learning Math Contest

Juliet bought 10 beads for $18. The beads she bought are red, blue or silver. Red beads are $1 each, blue beads are $2 each and silver beads are $5 each. If she bought at least one of each, how many red beads did she buy?



Puzzle provided by Noetic Learning Math Contest

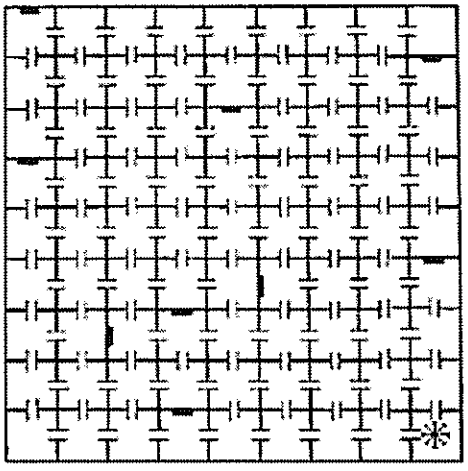
Melanie has 4 different colored crayons and 2 different boxes as shown below. How many different ways can Melanie put all 4 crayons into the 2 boxes so that each box has at least 1 crayon?



Puzzle provided by Kordemsky: The Moscow Puzzles (Dover)

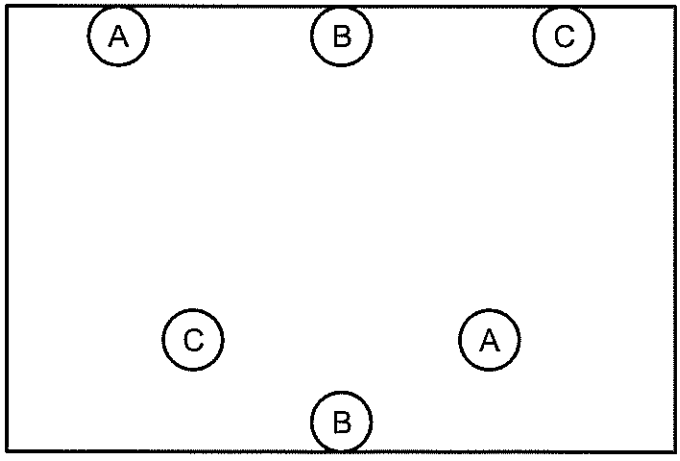
A prisoner was thrown into a medieval dungeon with 145 doors. Nine, shown by black bars, are locked, but each one will open if before you reach it you pass through exactly 8 open doors. You don't have to go through every open door but you do have to go through every cell and all 9 locked doors. If you enter a cell or go through a door a second time, the doors clang shut, trapping you.

The prisoner (in the lower right corner cell) had a drawing of the dungeon. He thought a long time before he set out. He went through all the locked doors and escaped through the last, upper left corner one. What was his route?



This brainteaser was written by Patrick Vennebush.

Draw three lines (not necessarily straight) so that each circle is connected to another circle with the same letter (that is, A to A, B to B, and C to shining C). The lines may not intersect one another, and they may not extend beyond the rectangle.



This brainteaser was supplied by the Mathematical Olympiads for Elementary and Middle Schools (www.moems.org).

Mara has 3 times as many dollars as her brother, Timmy. If Mara is given $20 by their mother, she will have 7 times as many dollars as Timmy. How many dollars does Timmy have?

This brainteaser was supplied by the Mathematical Olympiads for Elementary and Middle Schools (www.moems.org).

In the diagram below, each "path" from top to bottom correctly spells the word MATCH. What is the total number of different paths in the diagram?

```
      M
     A A
    T T T
   C   C
    H
```

This brainteaser was written by Derrick Niederman.

Two bowlers play a game against each other. The first player rolls a strike in the first frame, a spare in the second frame, and then alternately throws strikes and spares the rest of the game. The second player doesn't throw a single strike. The first player wins, of course, but what is the smallest possible margin of victory under these circumstances?

This brainteaser was written by Derrick Niederman.

If $x^2 + y^2 = 36$, $xy = 32$, what is the positive value of $x + y$?

This brainteaser was written by Derrick Niederman.

The number 4 can be expressed as the sum of three positive integers in only one way:

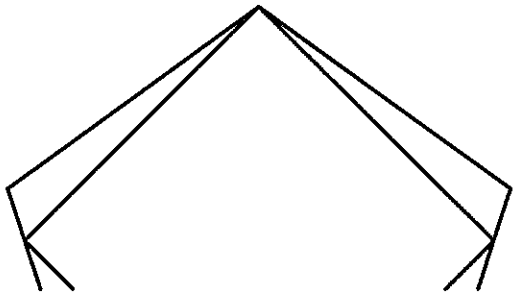
$$4 = 1 + 1 + 2$$

However, the number 50 can be expressed as the sum of three positive integers in 200 ways.

Somewhere in between, there is a number n that can be expressed as the sum of three positive integers in precisely n ways. Can you find n?

This brainteaser was written by Derrick Niederman.

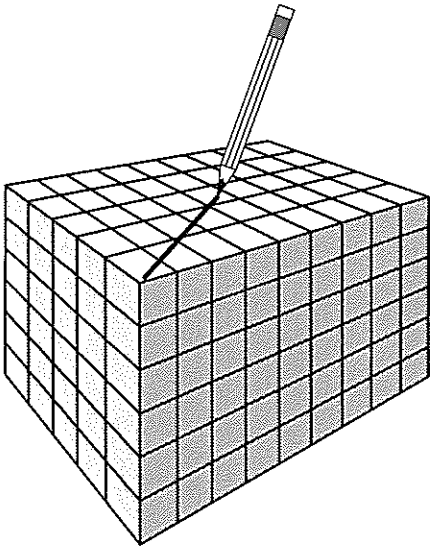
The diagram below shows the top of a regular pentagon with the top of a square inscribed in it. The shapes share a vertex at the top, and the other two vertices of the square lie on the sides of the pentagon. If the diagram were continued to include the entire pentagon and the entire square, which shape would extend below the other?



In other words, does the whole square fit inside the pentagon, does the square protrude at the bottom, or do the square and pentagon meet at a single point?

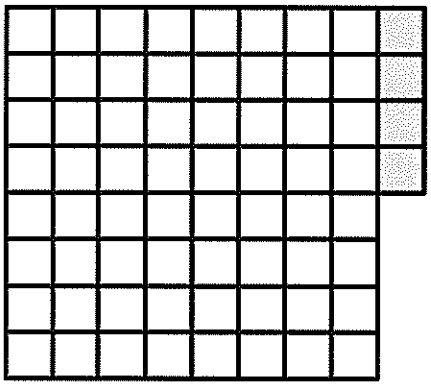
This brainteaser was written by Patrick Vennebush.

A brick measures 5 × 6 × 9 inches, and all faces are covered with 1-inch square tiles. If you were to draw a straight line connecting opposite corners of each face, on which face would the diagonal line cross the most tiles?



This brainteaser was supplied by the Mathematical Olympiads for Elementary and Middle Schools (www.moems.org).

When 68 is divided by a certain number, the remainder is 4. Find the sum of all possible divisors.



This brainteaser was created by Julia Zurkovsky.

When the ends of the rope below are pulled in opposite directions, how many knots will be formed along the rope's length?

Brainteasers

This brainteaser was created by Julia Zurkovsky.

When the ends of the rope below are pulled in opposite directions, how many knots will be formed along the rope's length?

This brainteaser was written by Derrick Niederman.

Find four positive integers a, b, c, and d such that the product $abcd$ is equal to the sum of the squares, $a^2 + b^2 + c^2 + d^2$.

$$\boldsymbol{abcd = a^2 + b^2 + c^2 + d^2}$$

What? That's too easy, you say? You're probably right. But can you find four different solutions —

- One that uses the same number four times?
- One that uses the same number three times?
- One that uses the same number twice?
- And, one that uses four different numbers?

This brainteaser was written by Derrick Niederman.

It's not too hard to form the number 9 using three 3's and any of the four standard mathematical operations +, −, × and ÷. But can you come up with four different solutions, each of which uses only one of the four operations? (Other standard mathematical symbols can be used as needed.)

$9 = 3 + 3 + 3$

This brainteaser was written by Patrick Vennebush.

IlluminAir is a small international airline that provides service between Toronto, Ontario; Reston, Virginia; and Doha, Qatar. There are 17 different routes from Doha to Reston, including those that go through Toronto. There are 11 different routes from Reston to Toronto, including those that go through Doha. How many routes are there from Doha to Toronto?