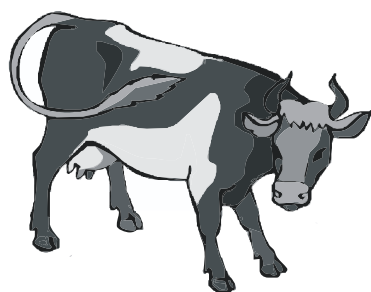


1. A man has a 100-acre ranch that he wishes to stock with cows and sheep. Cows require ten acres of grazing land per animal and sheep require three acres of grazing land per animal. If he wishes to fully utilize the land, how many ways are there to stock the ranch so that it includes at least one cow and at least one sheep?



1. _____ ways



2. Bill is sent to a donut shop to purchase exactly six donuts. If the shop has four kinds of donuts and Bill is to get at least one of each kind, how many combinations will satisfy Bill's order requirements?



2. _____ combinations

3. What is the shortest distance from the point $(6, 0)$ to the line $y = 2x - 2$? Express your answer in simplest radical form.

3. _____ units

4. Kendra has an unlimited supply of unbreakable sticks of length 2, 4 and 6 inches. Using these sticks, how many non-congruent triangles can she make? Two sticks can be joined only at a vertex of the triangle. (A triangle with sides of length 4, 6, 6 is an example of one such triangle to be included.)

4. _____ triangles

5. How many ordered triples (a, b, c) of positive integers satisfy the equation $a + b + c = 6$?

5. _____ triples

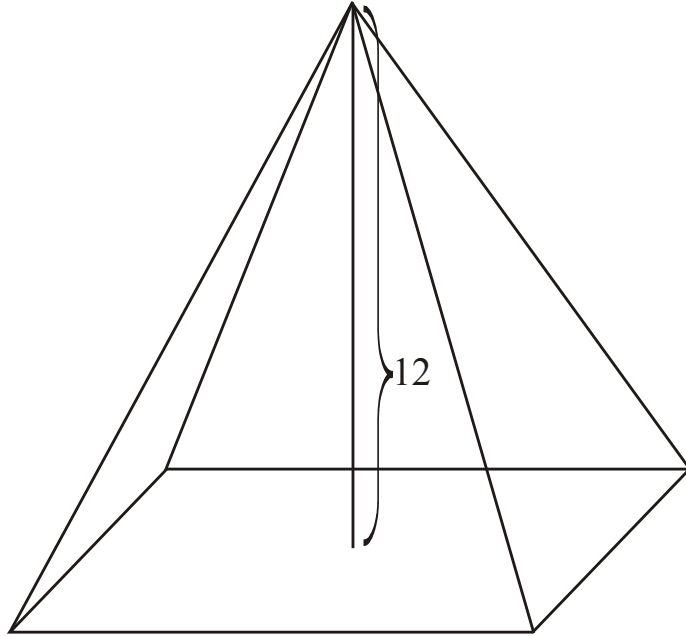
6. In a six-team softball league, each team played each other team exactly once during the season. No game ended in a tie. At the end of the season, n teams had the same best record. What is the maximum possible value of n ?

6. _____



7. A right pyramid has a square base that measures 10 cm on each side. Its peak is 12 cm above the center of its base. What is the sum of the lengths of the pyramid's eight edges? Express your answer as a decimal to the nearest whole number.

7. _____ centimeters



8. To transmit a positive integer less than 1000, the Networked Number Node offers two options.

8. _____

Option 1: Pay $\$d$ to send each digit d . Therefore, 987 would cost $\$9 + \$8 + \$7 = \24 to transmit.

Option 2: Encode integer into binary (base 2) first, and then pay $\$d$ to send each digit d . Therefore, 987 becomes 1111011011 and would cost $\$1 + \$1 + \$1 + \$1 + \$0 + \$1 + \$1 + \$0 + \$1 + \$1 = \$8$.

What is the largest integer less than 1000 that costs the same whether using Option 1 or Option 2?