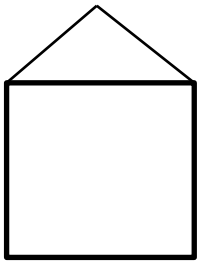
Week twenty one solutions

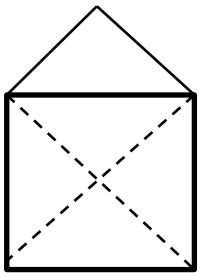
Week Twenty-one

Question 1.

A pentagon is drawn by placing an isosceles right-angled triangle on top of a square as pictured below. What fraction of the area of the pentagon is the area of the triangle?



Solution



The diagram illustrates how the pentagon can be divided in to 5 identical triangles, each with area 1/5 of the area of the pentagon.

Question 2.

The average of 12 numbers is 24 and the average of an additional 24 numbers is 12. What is the average of all 36 numbers?

Solution

Let a be the average of all 36 numbers.

Then 36a = (12 * 24) + (24 * 12) = 288 + 288 = 576

So, the total average, a = 576 / 36 = 16

Question 3.

Terence has a square lawn and wishes to extend it by 25% to be able to have enough length to pitch a tent. At the same time, he is intending to make the lawn narrower so that the resulting rectangular lawn will have the same area as the original lawn. How much narrower will the new lawn have to be?

Solution

Let s be the side length of the original square lawn, of area s^2

The new lawn will have length 1.25s

If the new lawn has width w then its area = $1.25sw = s^2$

So, $w = s/1.25 = 0.8s$, a decrease in width of 20%

Question 4.

Teams A and B are playing a series of games. The odds for either team to win any game are even and Team A must win two or Team B three games to win the series. What are the odds favouring Team A to win the series?

Solution

The series would last at most 4 games before either Team B has won three games or has lost (to Team A) in two games.

B wins the first three games with results BBB

Probability 1/8

B loses just one of the first three games with results ABBB, BABB, BBAB
Probability 3/16

Hence probability of B winning the series is 1/8 + 3/16 = 5/16

The odds are 11:5 in favour of A.