

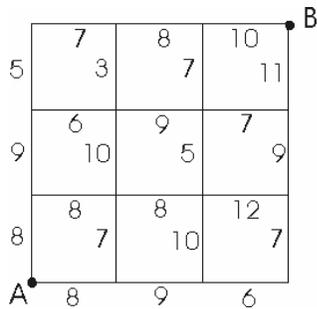
SOML MEET I
EVENT III
Problem Solving

NAME: _____
TEAM: _____
SCHOOL: _____

1. [2 Points] In a third rate rock band, three members are able to play guitar, four can play keyboard and two do both. Six have no talent for guitar or keyboard so they sing and dance. How many people are in the rock band?

ANS:

2. [3 Points] The city maintenance crew needs to lay a phone line from point A to point B. The cost in thousands of dollars for each block is listed below on the street map. Assume that the line must be placed under a street so you have to follow the grid. Find the minimum cost of laying this phone line.



ANS:

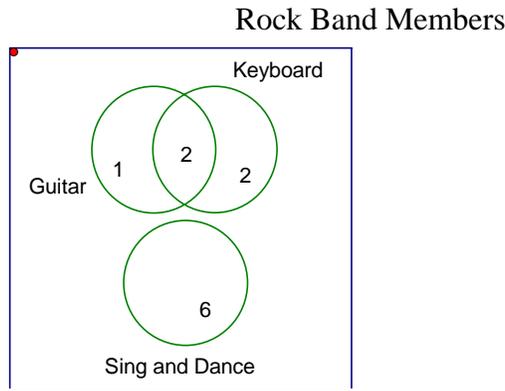
3. [5 Points] A farmer goes to market and buys a hundred animals at a cost of \$1,000. The price of cows is \$50 each, sheep \$10 each and rabbits \$0.50 each. Assuming positive integer values for the quantities bought. How many of each did the farmer buy? (Note: there is a unique solution)

ANS:

**SOML MEET I
EVENT III
Problem Solving**

NAME: KEY
TEAM: _____
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1. [2 Points] In a third rate rock band, three members are able to play guitar, four can play keyboard and two do both. Six have no talent for guitar or keyboard so they sing and dance. How many people are in the rock band?



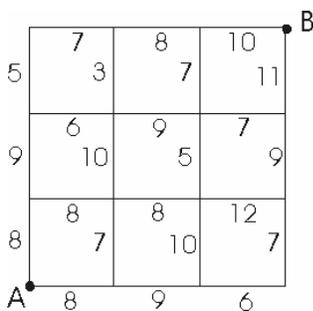
Solution: $1+2+2+6 = 11$

ANS: 11

2. [3 Points] The city maintenance crew needs to lay a phone line from point A to point B. The cost in thousands of dollars for each block is listed below on the street map. Assume that the line must be placed under a street so you have to follow the grid. Find the minimum cost of laying this phone line.

Solution:

the minimum cost from the starting arrow.



ANS: \$44,000

$8+9+6+3+8+10 = 44$

3. [5 Points] A farmer goes to market and buys a hundred animals at a cost of \$1,000. The price of cows is \$50 each, sheep \$10 each and rabbits \$0.50 each. Assuming positive integer values for the quantities bought, how many of each did the farmer buy? (**Note:** there is a unique solution)

Solution:

There must be less than 20 cows because there is a positive number of each kind of animal and buying 20 cows would leave no money for sheep or rabbits because $20(50) = 1000$.

So, $1 \leq C \leq 19$.

$$\text{Now } C + S + R = 100 \text{ so } R = 100 - C - S$$

$$\text{and } 50C + 10S + .5R = 1000$$

$$\text{so } 50C + 10S + .5(100 - C - S) = 1000,$$

$$\text{meaning } S = -\frac{99}{19}C + 100, \text{ which implies } C \text{ is a multiple of } 19 \text{ (remember, } S \text{ is an}$$

integer).

$$\text{So } 1 \leq C \leq 19$$

and C is a multiple of 19 $\Rightarrow C = 19$, meaning $19(50) = 950$ was spent on cows.

$$\text{Thus } S + R = 81 \text{ and } 10S + .5R = 50$$

$$\text{so } 20S + R = 100$$

$$20S + R - (S + R) = 100 - 81$$

$$19S = 19$$

$$S = 1$$

$$\text{and } C + S + R = 100 \Rightarrow 19 + 1 + R = 100 \text{ so } R = 80$$

ANS: C = 19, S = 1 and R = 80