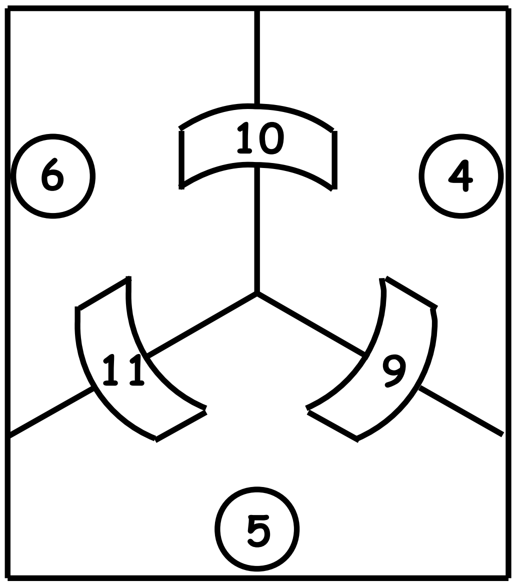
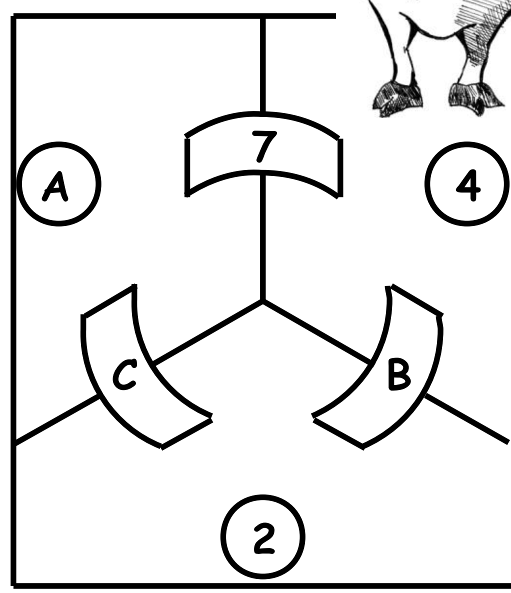
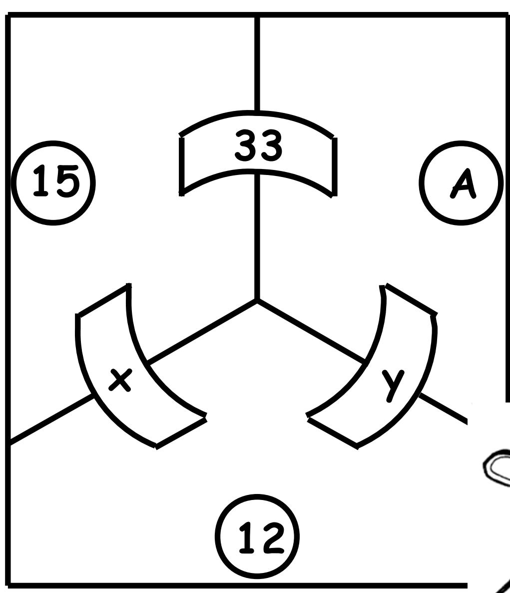
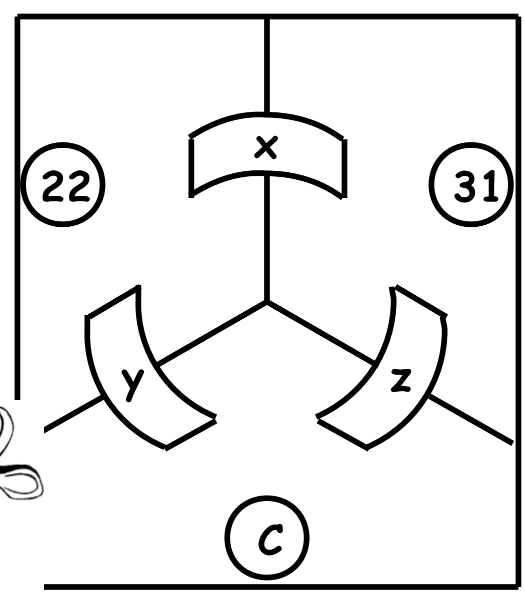
In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. Pasture one has been completed. Find all of the unknown values. *I.#1*



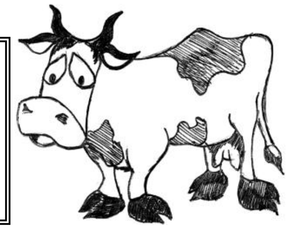


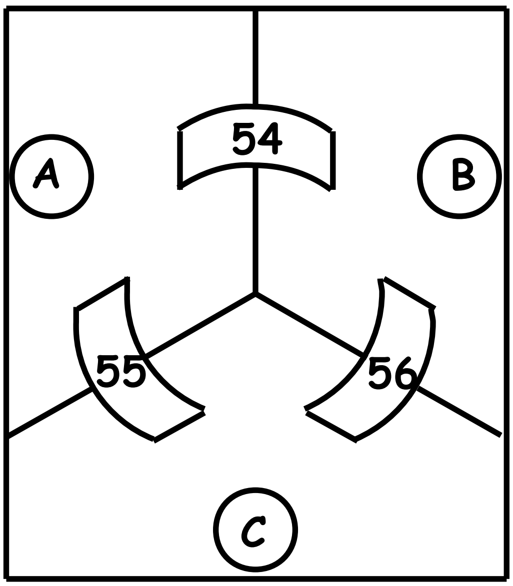


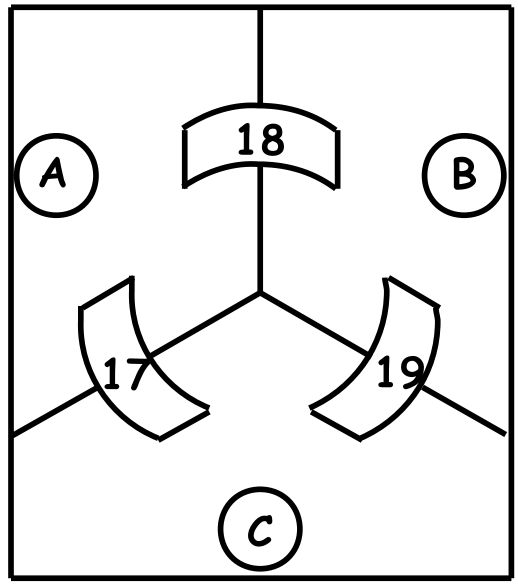


x + y + z = 140

In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. Find all of the unknown values. *I.#3*

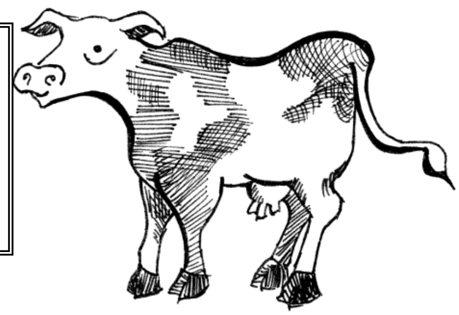


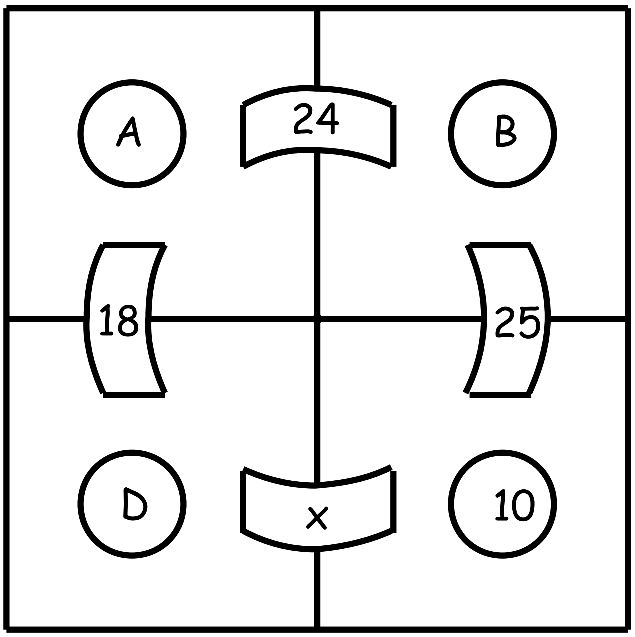


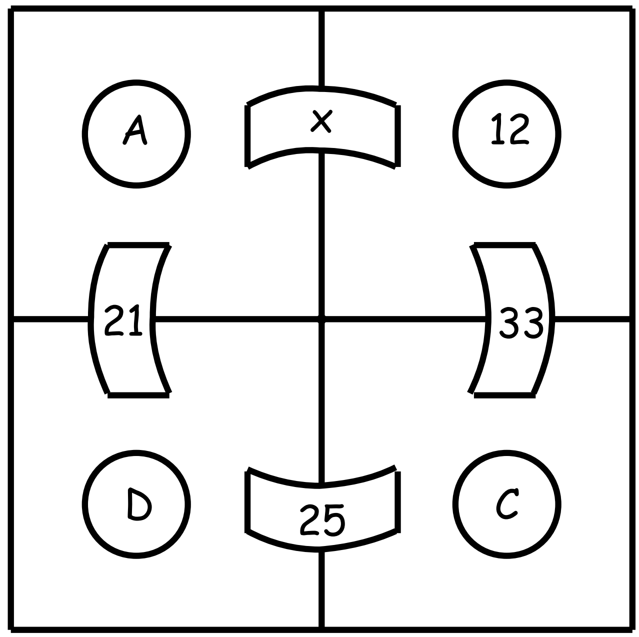


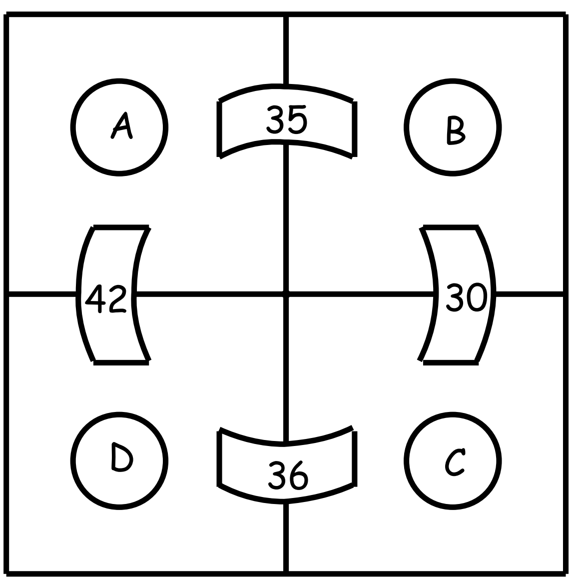
One of these two puzzles is solvable, the other is not. Which and Why?

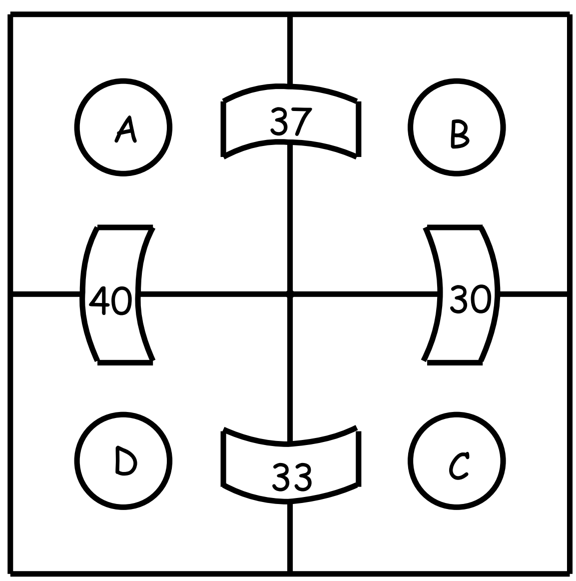
In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. Find all of the unknown values. *I.#4*





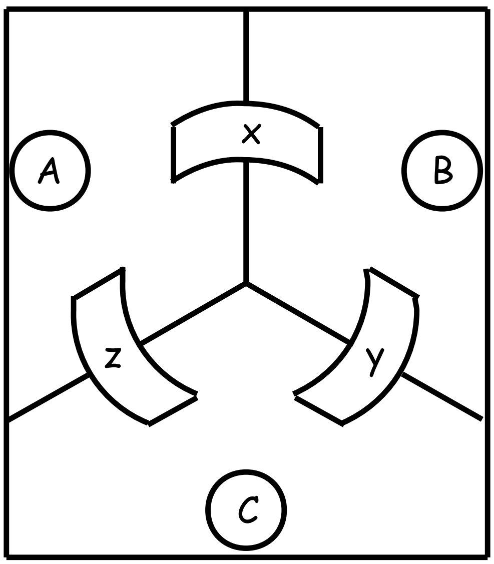






Which of these last two puzzles is solvable? Why?

In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. *I.#7*



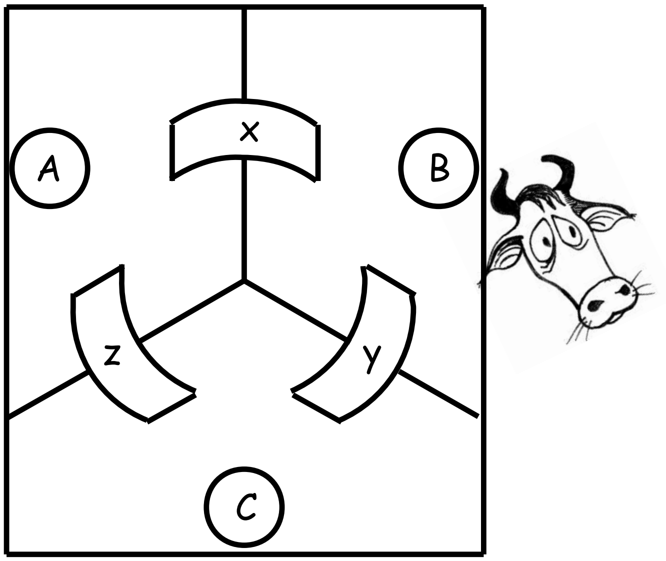
Show that i) $A = \dfrac{x - y + z}{2}$

ii) $B = \dfrac{x + y - z}{2}$

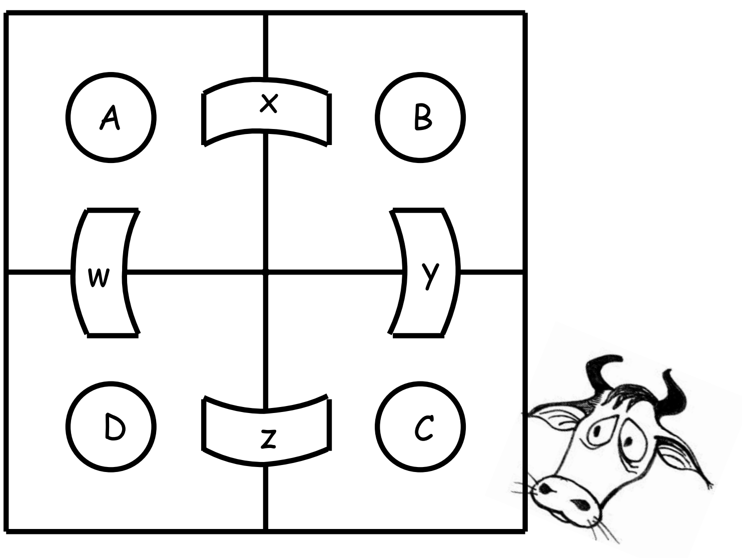
iii) $C = \dfrac{-x + y + z}{2}$

In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. If the numbers on the bridges are consecutive, is it possible that the numbers in the fields are also consecutive? Explain your answer. *I.#8*

a)

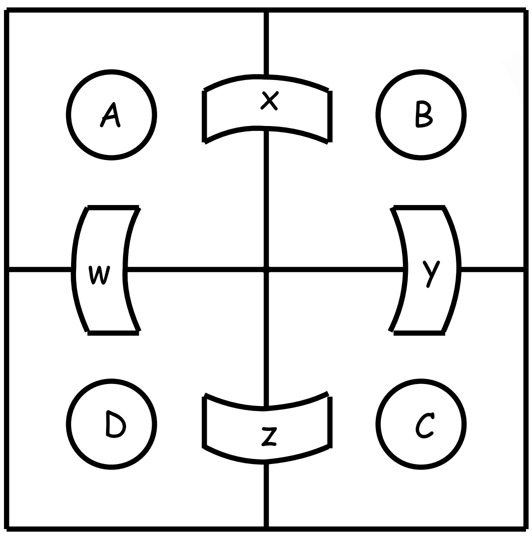


b)

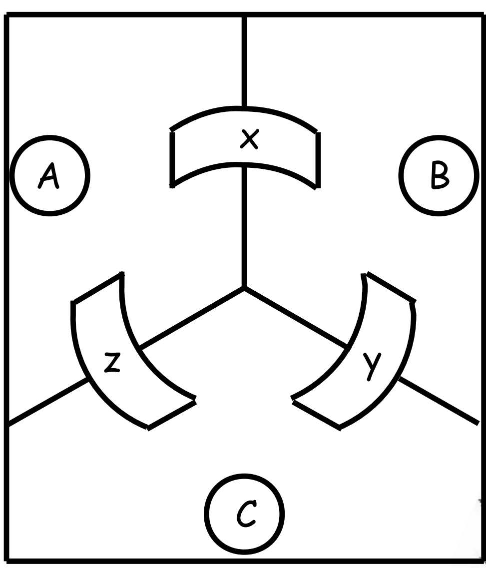


In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. Using only single digit numbers, without repetition, find all possible solutions to each puzzle. *I.#9*

a)

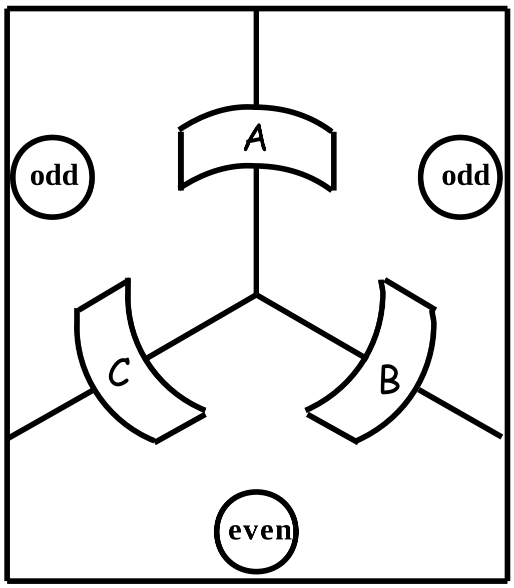


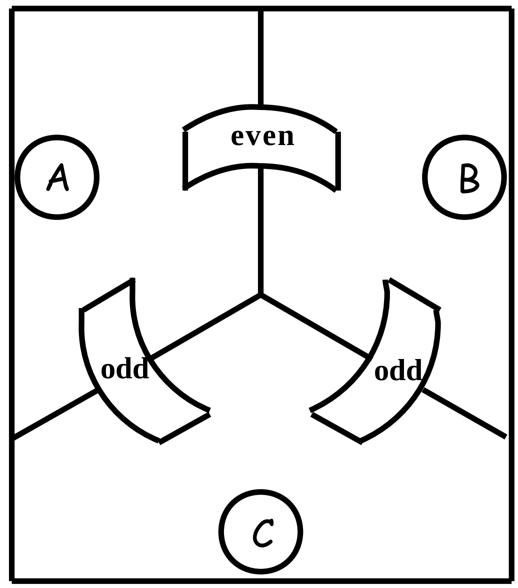
b)

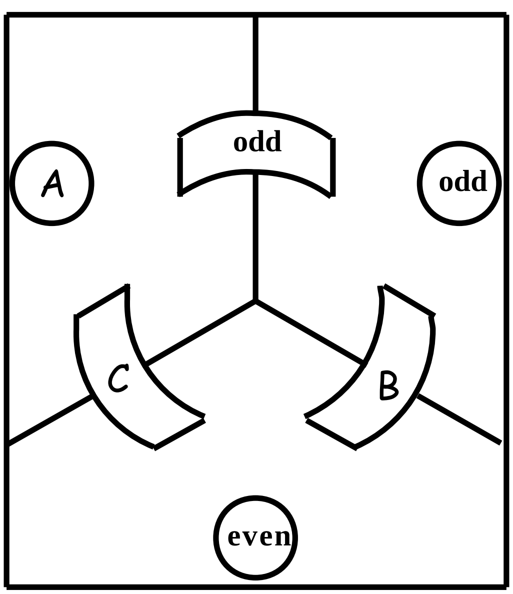


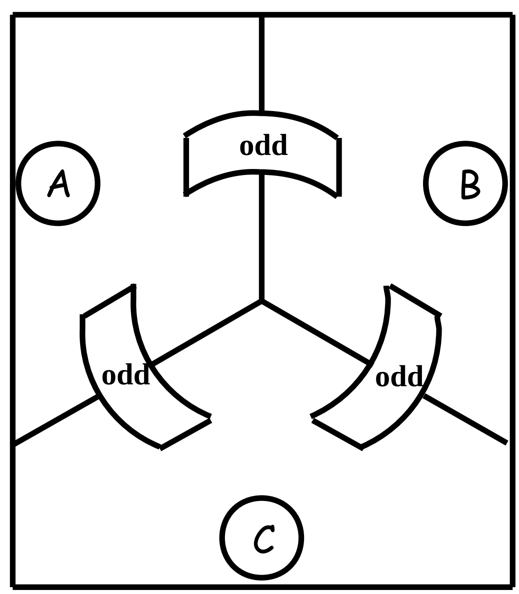
Odd Beef

In the following diagrams, the number on each bridge is the ***sum*** of the numbers of cows in each of the adjoining fields. Determine if A, B and C are ***odd*** or ***even***. *I.#10*

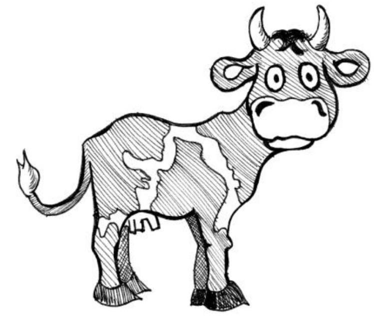


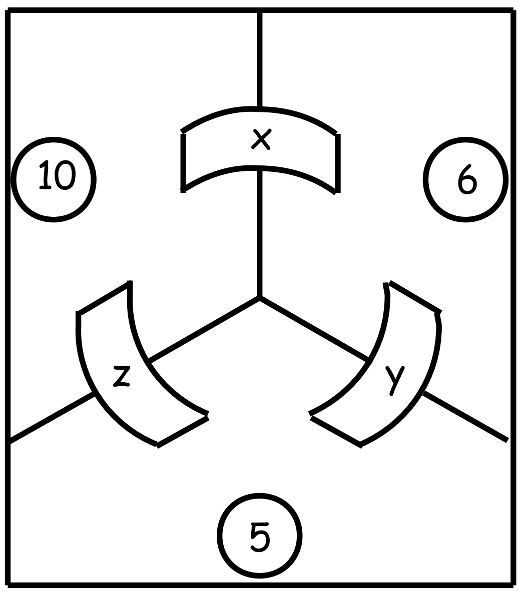


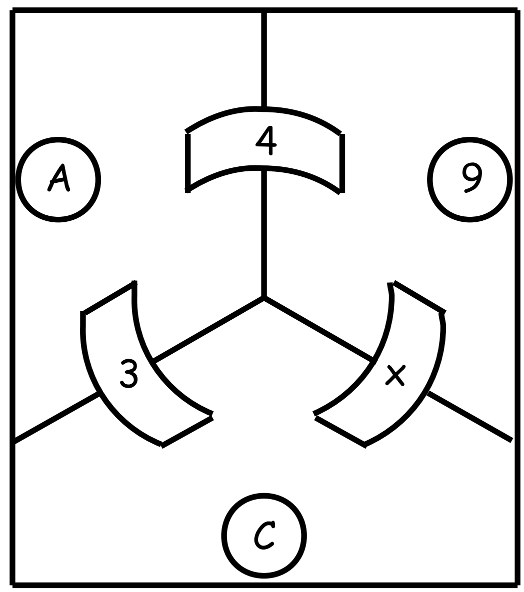


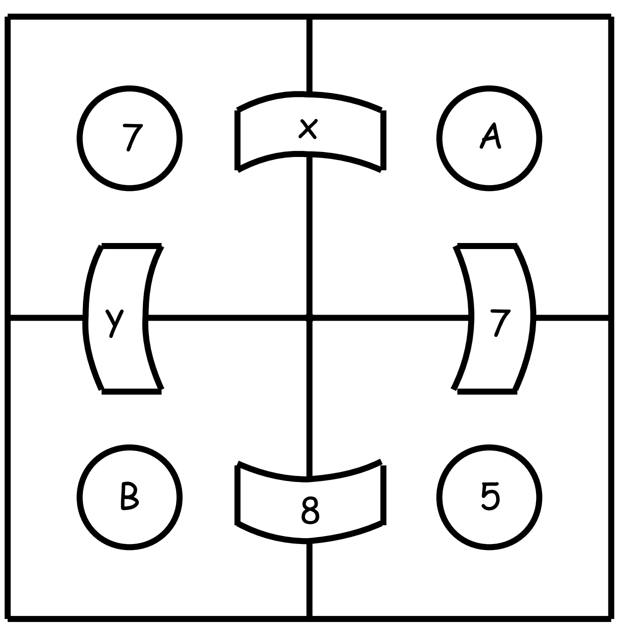


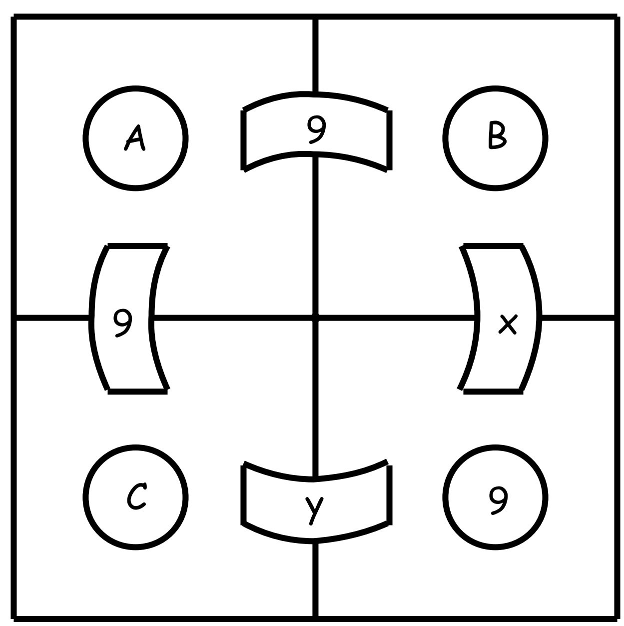
In the following diagrams, the number on each bridge is the ***difference*** between the positive numbers of cows in each of the adjoining fields. Find all of the unknown values. *I.#13*





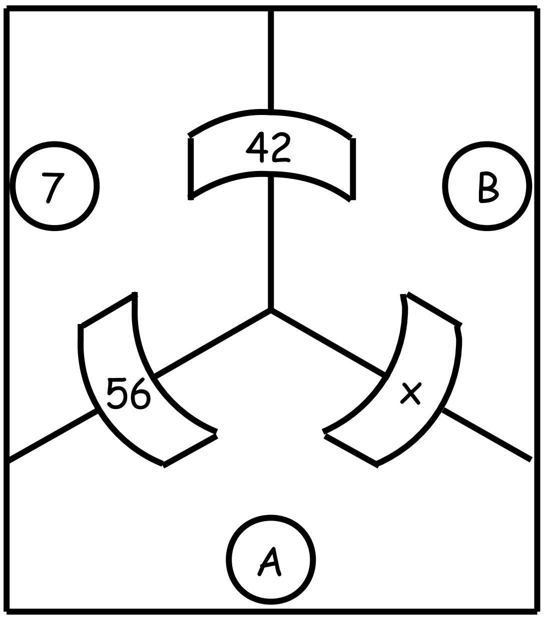


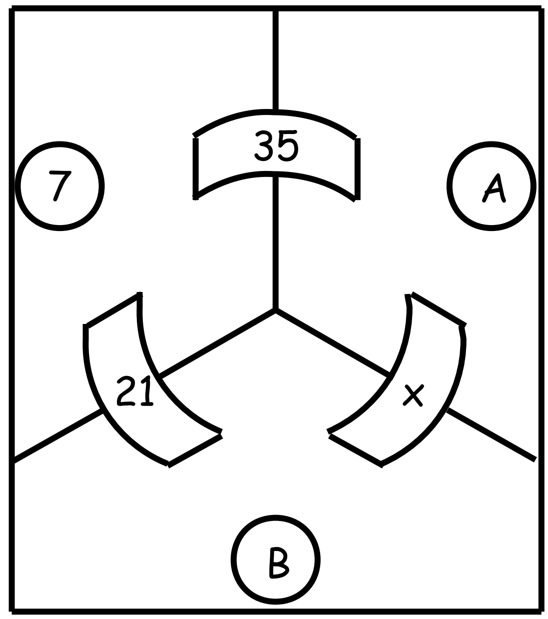


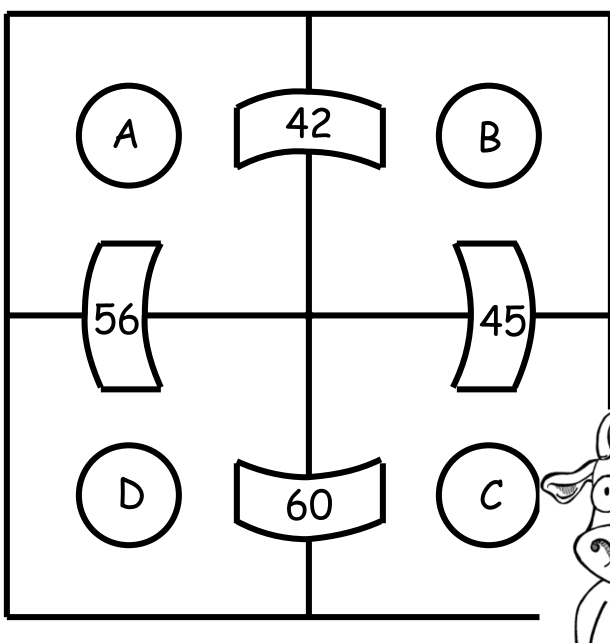


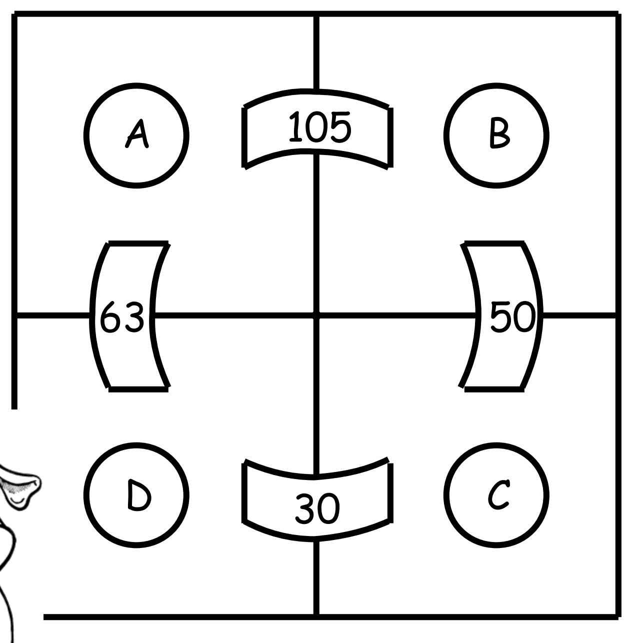
The total number of cows is 42
- with at least one cow in each field.

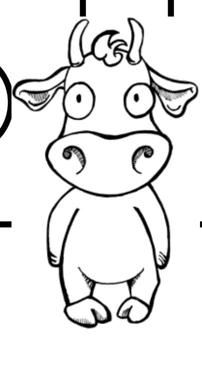
In the following diagrams, the number on each bridge is the ***product*** of the numbers of cows in each of the adjoining fields. Find all of the unknown values. *I.#17*



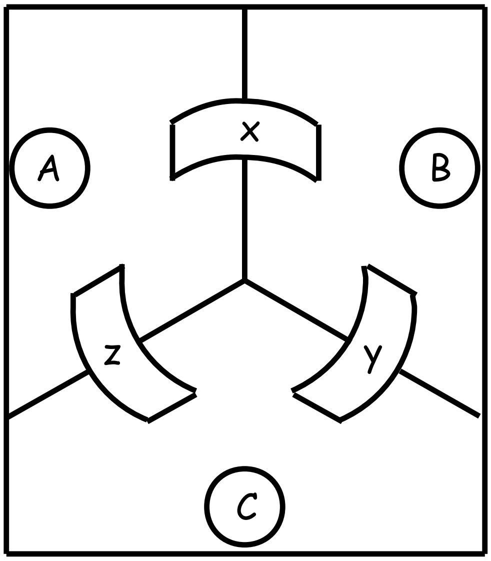




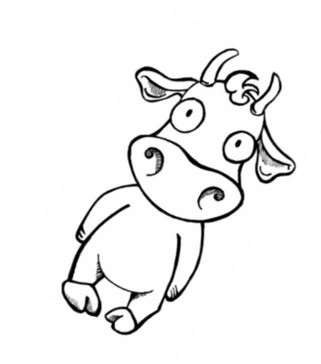


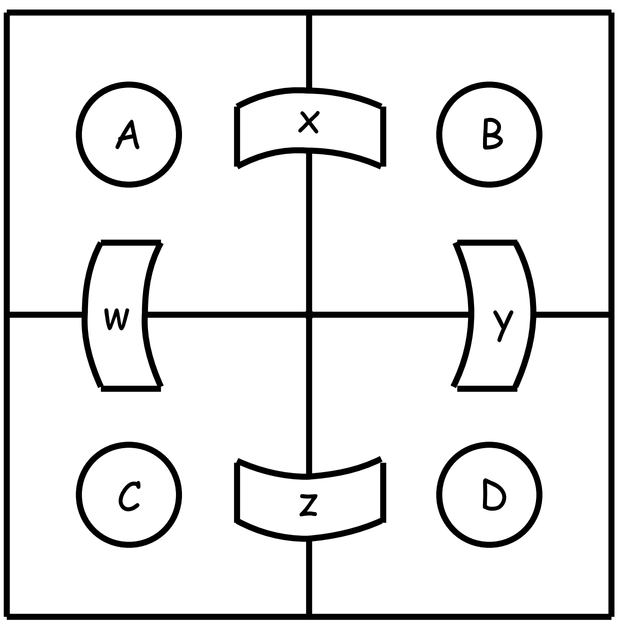


In the following diagrams, the number on each bridge is the ***product*** of the numbers of cows in each of the adjoining fields. *I.#19*



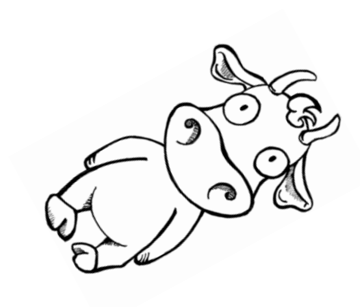
1) Show that: $A=\sqrt{\frac{xz}{y}}$, $B=\sqrt{\frac{xy}{z}}$ and $C=\sqrt{\frac{zy}{x}}$



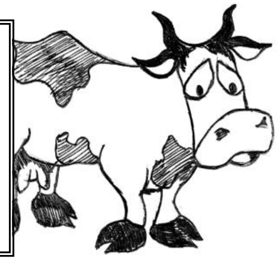


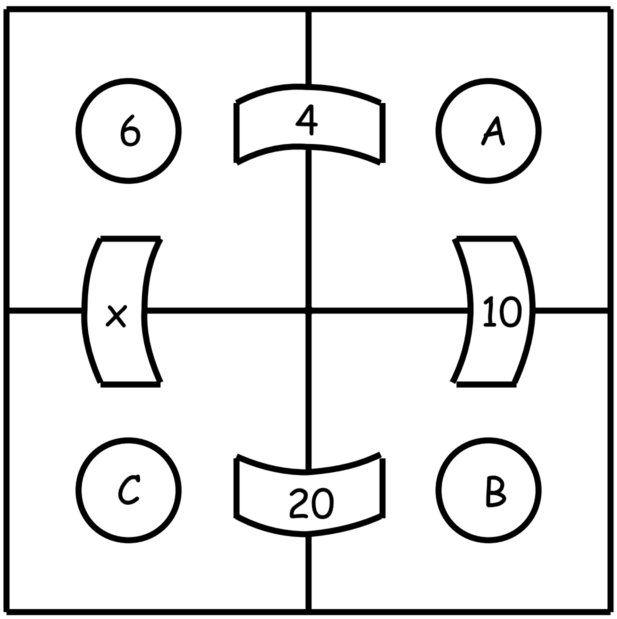
2i) Show that: $wy = zx$

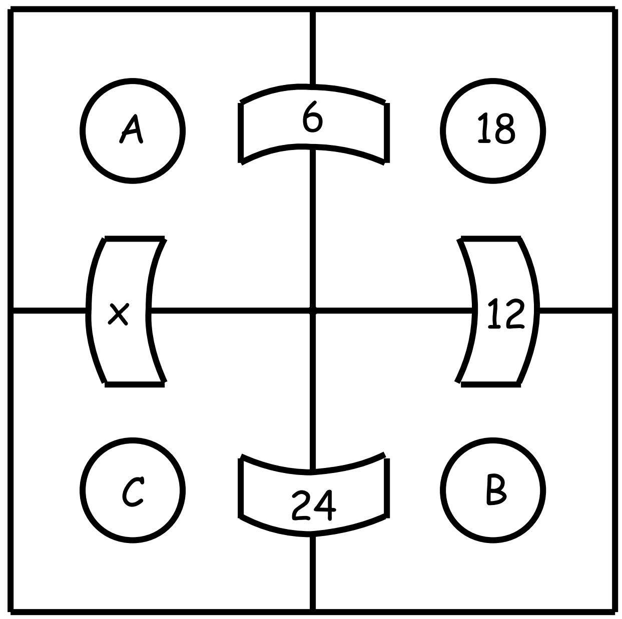
2ii) Show that: $\frac{A}{D}=\frac{x+w}{y+z}$ and $\frac{B}{C}=\frac{x+y}{z+w}$.

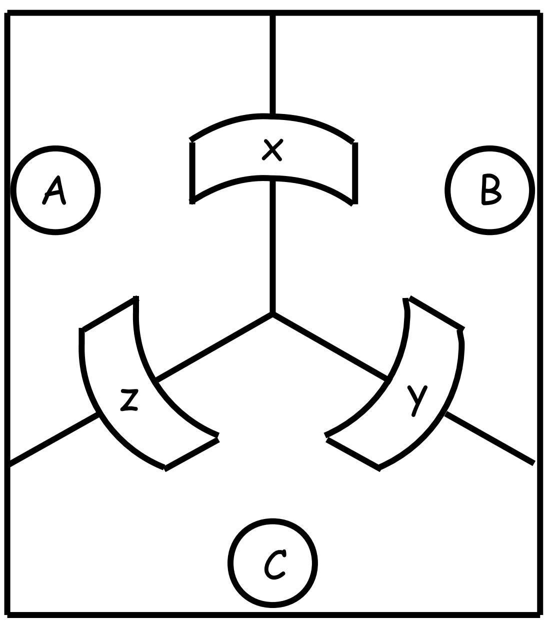


In the following diagrams, the number on each bridge is the ***result of dividing the product by the sum*** of the numbers in the two adjoining fields. Find the unknowns.









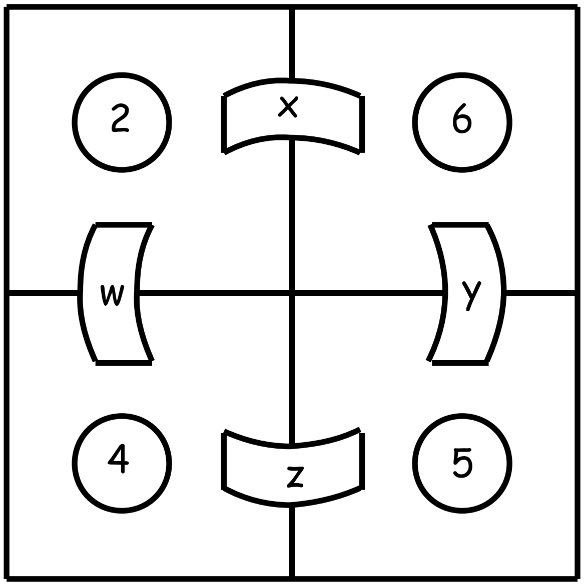
Show that:

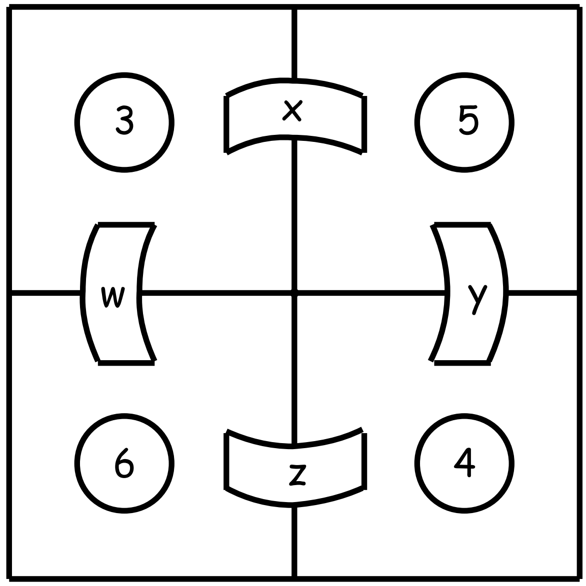
a) $A = \dfrac{2xyz}{xy-xz+yz}$

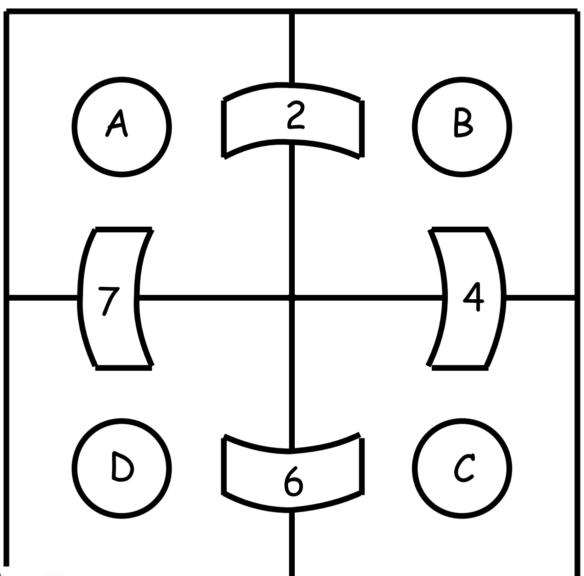
b) $B = \dfrac{2xyz}{xz-xy+yz}$

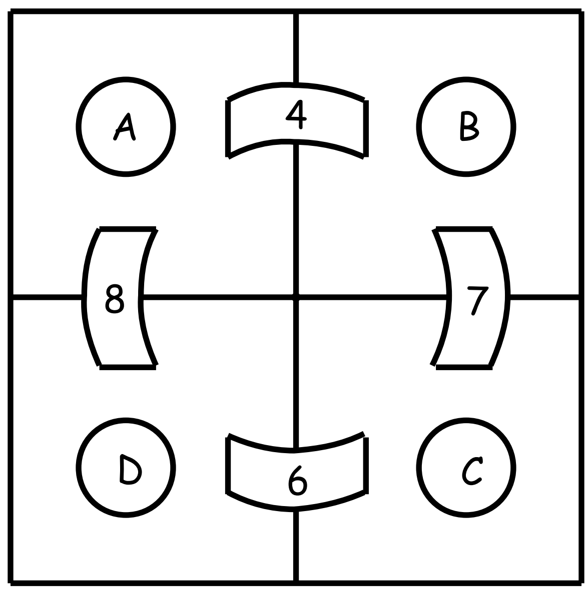
c) $C = \dfrac{2xyz}{xy-yz+xz}$

In the following diagrams, the number on each bridge and the two adjoining fields are ***the lengths of the sides of a triangle***. Each number is a single digit and no two numbers are the same. Find the unknown lengths.

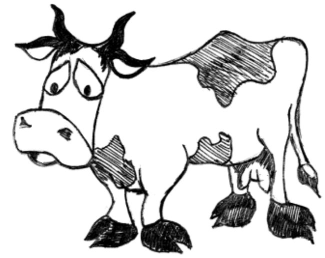


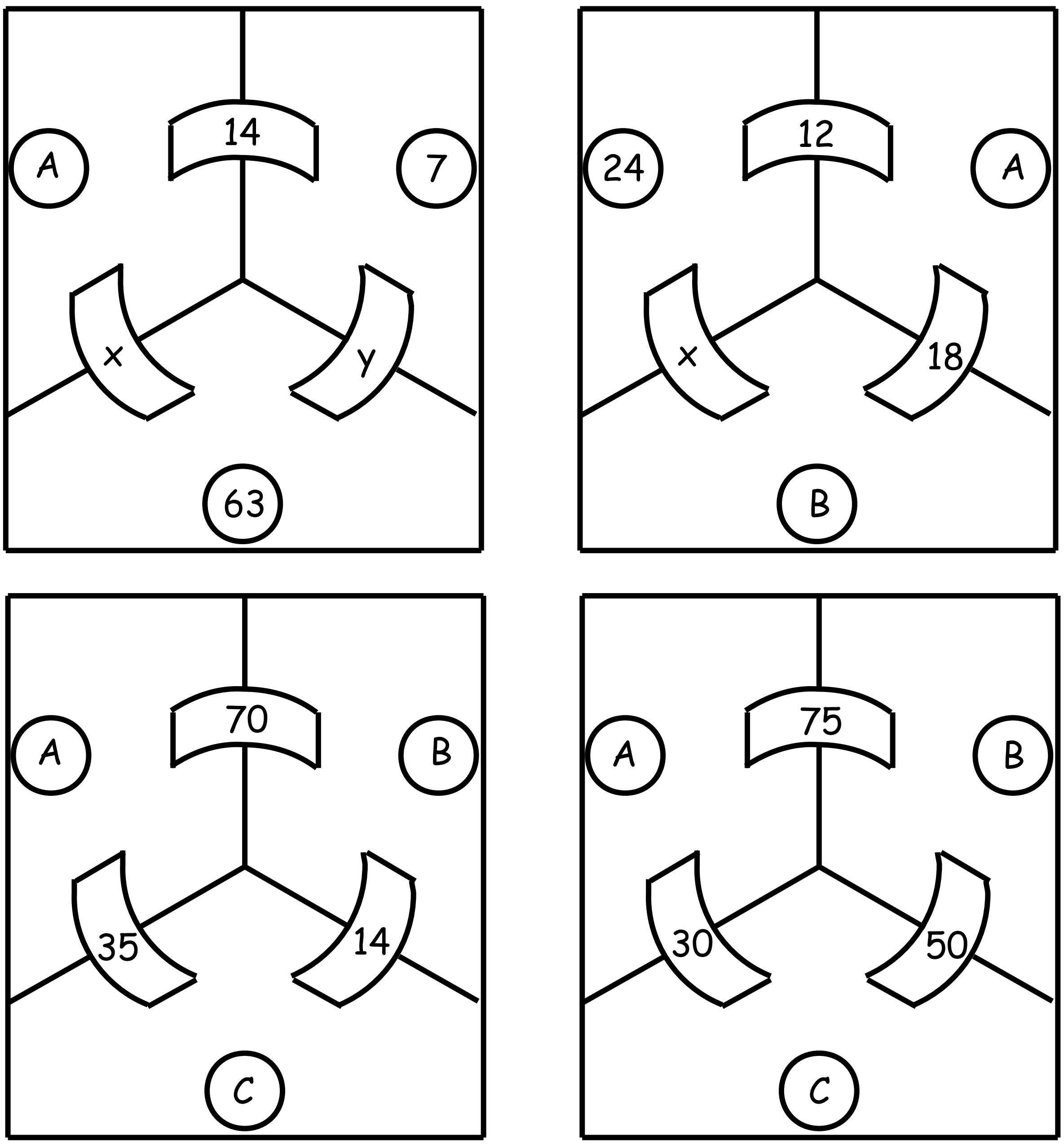






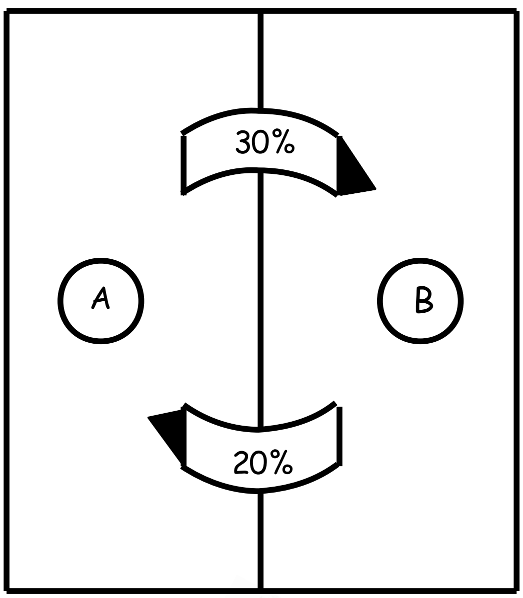
In the following diagrams, the number on each bridge is the ***square root of the product*** of the numbers in the two adjoining fields. Find the unknowns.





"Migrating" Cows

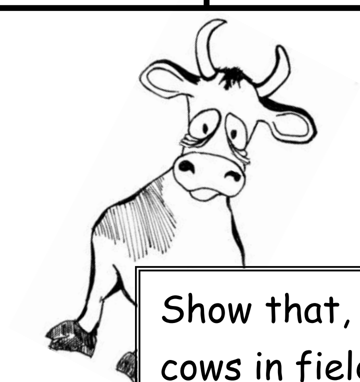
In the diagram below, the percentages and arrows on each bridge indicate the **daily rate of migration** of cows from one field to another.



Is it possible that the number of cows in **each** field doesn't change with migration? What is the smallest total number of cows that would make this happen? What is the ratio of A:B?

Starting with A = 90 and B = 10, create a spreadsheet to investigate what happens to the distribution of cows after several days of migration.

Repeat the above experiment with different initial distributions of cows. What do you notice? Can you draw any conclusions?



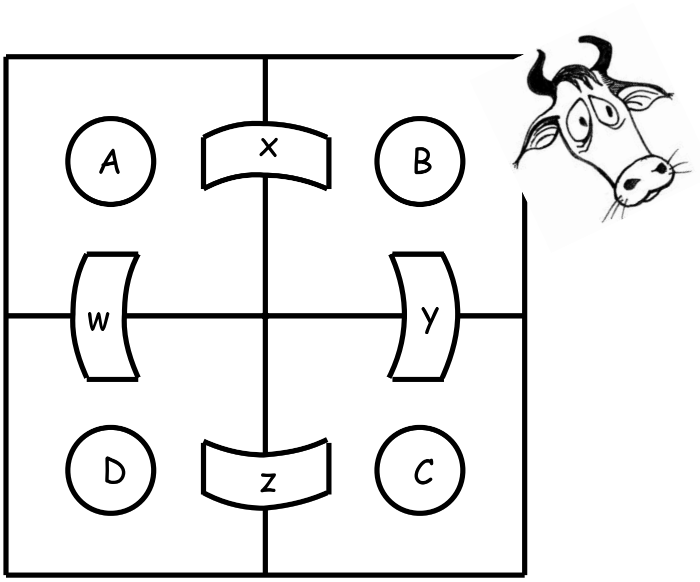
Show that, if $A_0 = 90$ and $B_0 = 10$, then the numbers of cows in fields **A** and **B** after ***n*** days will be:

$A_n = 40 + 50\left(\frac{1}{2}\right)^n$, $B_n = 60 - 50\left(\frac{1}{2}\right)^n$

How will these functions change if $A_0 = 50$ and $B_0 = 50$?

In the following diagrams, the number on each bridge is a **linear combination** of the numbers of cows in each of the adjoining fields. Is it possible that the same linear combination has been used for all of the bridges? Explain.

a)



b)