Special features

- Common metaphors for problem solving:
  - Moving forward
  - Making progress
- When you are stuck, how do you move forward?
- Hints can help… if you can get one
- How do you “give yourself” a hint?
- Look for special features in the problem.

Searching the Problem Space

```
  L E T S
+ W A V E
---------
L A T E R
```

- Standard rules:
  - Letters consistently map to numbers
  - No leading zero (common use of numbers)
  - The numbers must work to add up correctly
- What is special here, to get us started?

Another Addition Problem

```
  D O N A L D
+ G E R A L D
-------------
  R O B E R T
```

Given: D = 5.

Division Problems

```
           xx8xx
       _________
   xxx|xxxxxxxx
        xxx
       ----
         xxxx
          xxx
         ----
           xxxx
           xxxx
           ----
```

Sudoku Puzzles

		1				8	9	
	2	7			9		5	
		4		8	2			
	6		9	2		1	4	
				5				
	9	8		6	1		3	
			2	1		4		
	1		7			3	6	
	7	9				2		

Problem

A man leaves his camp by traveling due north for 1 mile. He then makes a right turn (90 degrees) and travels due east for 1 mile. He makes another right turn and travels dues south for 1 mile and finds himself precisely at the point he departed from, that is, back at his campsite. Where is the campsite located (or where on earth could such a sequence of events take place)?

This is searching the space of the solutions for special cases.

Go to Extremes

- Manipulate the problem space
- Look at extreme limits of the problem space.

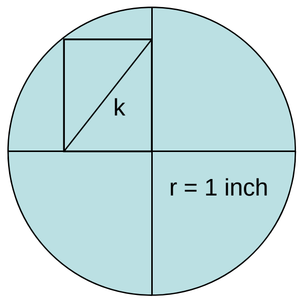
Example Problem

Two flagpoles are standing, each 100 feet tall. A 150-foot rope is strung from the top of one of the flagpoles to the top of the other and hangs freely between them. The lowest point of the rope is 25 feet above the ground. How far apart are the two flagpoles?

Hint: Start by drawing pictures.

Another example

- What is the length of k?
- Important fact: k remains the same no matter what rectangle is inscribed.



Another Example

You have a large, solid sphere of gold. A cylinder of space is "bored" through this sphere, producing a ring. The length of that cylindrical line is 6 inches. You want to know how much gold you have left in the ring. Specifically, what is the volume of the ring? Note: For any sphere,

$$V = \pi D^3/6.$$