**Critical Path**

* Problems that are based on completing a task involving multiple steps
* Some steps have prerequisites or can be done at the same time
* The critical path is ALWAYS the MAXIMUM VALUE in a directed chain

Example:

Shaving Routine

|  |  |  |  |
| --- | --- | --- | --- |
| **Task** | **Step** | **Time (sec)** | **Prerequisite Steps** |
| A | Wash Face | 30 | None |
| B | Rinse Razor | 10 | None |
| C | Apply Shaving Cream | 30 | A |
| D | Rinse Hands | 10 | C |
| E | Shave Face | 100 | C |
| F | Clean Razor | 20 | E |
| G | Rinse Face | 20 | E |
| H | Apply Moisturizer | 15 | G |

Beginning

A

B

C

D

E

F

G

H

30

30

10

10

20

20

15

100

What would be the minimum time required to shave?

**195 seconds**

**Color Theory**

* Color theory states that the vertices that are connected MUST have different colors
* The minimum # of colors used to color a graph is called the CHROMATIC NUMBER
* Conflicts or Incompatibilities are the links (edges) between two vertices

Example:

Mr. Cloutier needs to create a new seating plan because certain students are overly talkative and cannot sit near each other.

|  |  |
| --- | --- |
| Student | Incompatibilities |
| Dylan | A,P,S |
| Andrew | D,S |
| Patrick | D,K |
| Sandra | K |
| Kess | S,A |

**Step 1 – Assign a color to the vertex with the highest degree**

A

D

P

S

K

Pick your highest degree - A, D, S and K have a degree of 3 – therefore pick one of them.

BLUE

A

D

P

S

K

**Step 2 – Color the other vertices by following the rules that two connected vertices cannot have the same color**

A

D

P

S

K

BLUE

RED

BLUE

RED

GREEN

The minimum number of colors used (**chromatic number**) would be 3.