**Part 1**

**A Cat, a Parrot, and a Bag of Seed:**

A man finds himself on a riverbank with a cat, a parrot and a bag of seed. He needs to transport all three to the other side of the river in his boat. However, the boat has room for only the man himself and one other item (the cat, parrot, or seed). In his absence, the cat could eat the parrot and the parrot would eat the bag of seed. Show how he can get all the passengers to the other side without leaving the wrong ones alone together.

**Define the problem**

The man needs to transport three items across the river with him, but there is only room for two in the boat. The man needs to choose wisely which one he takes first because in his absence the cat could eat the parrot and the parrot could eat the bag of seed. The main goal will be to cross the river by getting those three safely to the other side of the river without losing any of them.

**Break the problem apart**

The boat has room only for the man and one other item.

The cat can eat the parrot and the parrot can eat the bag of seed.

**Identify potential solutions**

The only safe solution would be to leave the cat with the seed. The man would need to transport the parrot three times.

**Evaluate each potential solution**

The man transports the parrot to the other side of the river. The parrot stays on the other side of the river and the man transports back to the riverbank to get the cat.

Next the man transports the cat to the other side of the river. The cat stays on the other side of the river and the man grabs the parrot and transports back to the riverbank with the parrot.

Next the man leaves the parrot at the riverbank and takes the bag of seed and transports the the bag of seed to the other side of the river.

The man leaves the bag of seed on the other side of the river with the cat and goes back to the riverbank and gets the parrot and transports to the other side of the river. Now the man, cat, parrot and bag of seed have been transported on the boat to the other side of the river.

**Choose a solution and develop a plan to implement it.**

**R**= riverbank **O**= other side of the river, **M**= man, **C**= cat, **P**= parrot, **B**= bag of Seed

**O**

**R**

**B**

Part 2

**R**

**R**

**O**

**R**

**O**

**O**

Part 2

**Socks in the Dark:**

There are 20 socks in a drawer: 5 pairs of black socks, 3 pairs of brown and 2 pairs of white. You select the socks in the dark and can check them only after a selection has been made. What is the smallest number of socks you need to select to guarantee getting at least one matching pair or at least one matching pair of each color.

**Define the problem**

Grab at least one matching pair in the dark.

**Break the problem apart**

Total of 20 pair of socks, 5 pairs of black, 3 pairs of brown, and 2 pairs of white.

**Identify potential solutions**

There are only 3 different colors, if 4 socks are selected it can guarantee at least one matching pair.

Black 10 + Brown 6 + White 4 = 20

For option 1) Since black has the most pairs I divided the total of 20/5 pairs = 4

For option 2) To guarantee at least one matching pair of each color he would have to pick 14 pairs.

**Evaluate each potential solution**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Pairs | Pairs | Pairs | Pairs | Pairs | Total |
| Black | **2** | **2** | **2** | **2** | **2** | **10** |
| Brown | **2** | **2** | **2** |  |  | **6** |
| White | **2** | **2** |  |  |  | **4** |
| Total | **6** | **6** | **4** | **2** | **2** | **20** |

**Part 3**

**Predicting Fingers:**

A little girl counts using the fingers of her left hand as follows: She starts by calling her thumb 1, the first finger 2, middle finger 3, ring finger 4, and little finger 5. Then she reverses direction, calling the ring finger 6, middle finger 7, first finger 8, and thumb 9, after which she calls her first finger 10 and so on. If she continues to count in this manner, on which finger will she stop?

a) What if the girl counts from 1 to 10

b) What if the girl counts from 1 to 100

c) What if the girl counts from 1 to 1000

**Define the problem**

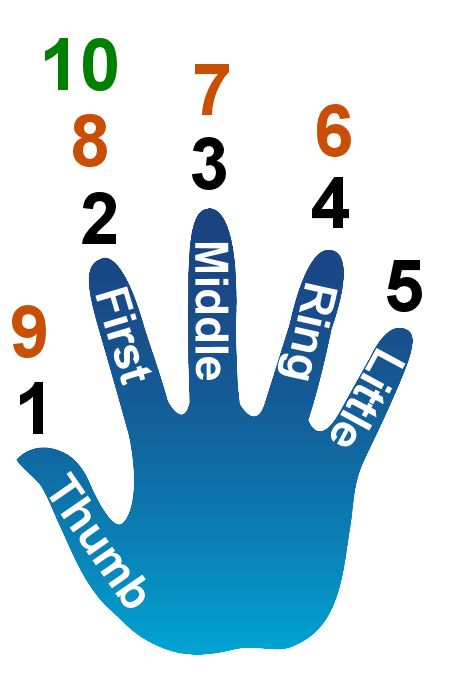
The problem is how to figure out which finger the little girl will stop counting on.

**Break the problem apart**

To start, you must know which finger she will land on for each number. The count falls on the same finger every 8 number called. Therefore, there is a pattern in which she follows and results in an easy way to tell which finger she will land on while counting.

**Identify potential solutions**

Make an Excel table with a row for fingers as headings. Now label a row for counting. Since the count falls in the same finger every 8 numbers called, I will make a formula that will add (+) the number 8 to result on each row from top to bottom for each cell until the count of 1,000 is reached. For example, the row for Thumb is 1, then 9, then 17. 17 minus 9 is 8. By doing this for each finger you will see the pattern of +8.

**Evaluate each potential solution**

+8

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Finger | Thumb | First | Middle | Ring | Little | Ring | Middle | First |
| Count | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| Count | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| Count | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| Count | **25** | **26** | **27** | **28** | **29** | **30** | **31** | **32** |
| Count | **33** | **34** | **35** | **36** | **37** | **38** | **39** | **40** |
| Count | **41** | **42** | **43** | **44** | **45** | **46** | **47** | **48** |
| Count | **49** | **50** | **51** | **52** | **53** | **54** | **55** | **56** |
| Count | **57** | **58** | **59** | **60** | **61** | **62** | **63** | **64** |
| Count | **65** | **66** | **67** | **68** | **69** | **70** | **71** | **72** |
| Count | **73** | **74** | **75** | **76** | **77** | **78** | **79** | **80** |
| Count | **81** | **82** | **83** | **84** | **85** | **86** | **87** | **88** |
| Count | **89** | **90** | **91** | **92** | **93** | **94** | **95** | **96** |
| Count | **97** | **98** | **99** | **100** | **101** | **102** | **103** | **104** |
| Count | **105** | **106** | **107** | **108** | **109** | **110** | **111** | **112** |
| Count | **113** | **114** | **115** | **116** | **117** | **118** | **119** | **120** |
| Count | **121** | **122** | **123** | **124** | **125** | **126** | **127** | **128** |
| Count | **129** | **130** | **131** | **132** | **133** | **134** | **135** | **136** |
| Count | **137** | **138** | **139** | **140** | **141** | **142** | **143** | **144** |
| Count | **145** | **146** | **147** | **148** | **149** | **150** | **151** | **152** |
| Count | **153** | **154** | **155** | **156** | **157** | **158** | **159** | **160** |
| Count | **161** | **162** | **163** | **164** | **165** | **166** | **167** | **168** |
| Count | **169** | **170** | **171** | **172** | **173** | **174** | **175** | **176** |
| Count | **177** | **178** | **179** | **180** | **181** | **182** | **183** | **184** |
| Count | **185** | **186** | **187** | **188** | **189** | **190** | **191** | **192** |
| Count | **193** | **194** | **195** | **196** | **197** | **198** | **199** | **200** |
| Count | **201** | **202** | **203** | **204** | **205** | **206** | **207** | **208** |
| Count | **209** | **210** | **211** | **212** | **213** | **214** | **215** | **216** |
| Count | **217** | **218** | **219** | **220** | **221** | **222** | **223** | **224** |
| Count | **225** | **226** | **227** | **228** | **229** | **230** | **231** | **232** |
| Count | **233** | **234** | **235** | **236** | **237** | **238** | **239** | **240** |
| Count | **241** | **242** | **243** | **244** | **245** | **246** | **247** | **248** |
| Count | **249** | **250** | **251** | **252** | **253** | **254** | **255** | **256** |
| Count | **257** | **258** | **259** | **260** | **261** | **262** | **263** | **264** |
| Count | **265** | **266** | **267** | **268** | **269** | **270** | **271** | **272** |
| Count | **273** | **274** | **275** | **276** | **277** | **278** | **279** | **280** |
| Count | **281** | **282** | **283** | **284** | **285** | **286** | **287** | **288** |
| Count | **289** | **290** | **291** | **292** | **293** | **294** | **295** | **296** |
| Count | **297** | **298** | **299** | **300** | **301** | **302** | **303** | **304** |
| Count | **305** | **306** | **307** | **308** | **309** | **310** | **311** | **312** |
| Count | **313** | **314** | **315** | **316** | **317** | **318** | **319** | **320** |
| Count | **321** | **322** | **323** | **324** | **325** | **326** | **327** | **328** |
| Count | **329** | **330** | **331** | **332** | **333** | **334** | **335** | **336** |
| Count | **337** | **338** | **339** | **340** | **341** | **342** | **343** | **344** |
| Count | **345** | **346** | **347** | **348** | **349** | **350** | **351** | **352** |
| Count | **353** | **354** | **355** | **356** | **357** | **358** | **359** | **360** |
| Count | **361** | **362** | **363** | **364** | **365** | **366** | **367** | **368** |
| Count | **369** | **370** | **371** | **372** | **373** | **374** | **375** | **376** |
| Count | **377** | **378** | **379** | **380** | **381** | **382** | **383** | **384** |
| Count | **385** | **386** | **387** | **388** | **389** | **390** | **391** | **392** |
| Count | **393** | **394** | **395** | **396** | **397** | **398** | **399** | **400** |
| Count | **401** | **402** | **403** | **404** | **405** | **406** | **407** | **408** |
| Count | **409** | **410** | **411** | **412** | **413** | **414** | **415** | **416** |
| Count | **417** | **418** | **419** | **420** | **421** | **422** | **423** | **424** |
| Count | **425** | **426** | **427** | **428** | **429** | **430** | **431** | **432** |
| Count | **433** | **434** | **435** | **436** | **437** | **438** | **439** | **440** |
| Count | **441** | **442** | **443** | **444** | **445** | **446** | **447** | **448** |
| Count | **449** | **450** | **451** | **452** | **453** | **454** | **455** | **456** |
| Count | **457** | **458** | **459** | **460** | **461** | **462** | **463** | **464** |
| Count | **465** | **466** | **467** | **468** | **469** | **470** | **471** | **472** |
| Count | **473** | **474** | **475** | **476** | **477** | **478** | **479** | **480** |
| Count | **481** | **482** | **483** | **484** | **485** | **486** | **487** | **488** |
| Count | **489** | **490** | **491** | **492** | **493** | **494** | **495** | **496** |
| Count | **497** | **498** | **499** | **500** | **501** | **502** | **503** | **504** |
| Count | **505** | **506** | **507** | **508** | **509** | **510** | **511** | **512** |
| Count | **513** | **514** | **515** | **516** | **517** | **518** | **519** | **520** |
| Count | **521** | **522** | **523** | **524** | **525** | **526** | **527** | **528** |
| Count | **529** | **530** | **531** | **532** | **533** | **534** | **535** | **536** |
| Count | **537** | **538** | **539** | **540** | **541** | **542** | **543** | **544** |
| Count | **545** | **546** | **547** | **548** | **549** | **550** | **551** | **552** |
| Count | **553** | **554** | **555** | **556** | **557** | **558** | **559** | **560** |
| Count | **561** | **562** | **563** | **564** | **565** | **566** | **567** | **568** |
| Count | **569** | **570** | **571** | **572** | **573** | **574** | **575** | **576** |
| Count | **577** | **578** | **579** | **580** | **581** | **582** | **583** | **584** |
| Count | **585** | **586** | **587** | **588** | **589** | **590** | **591** | **592** |
| Count | **593** | **594** | **595** | **596** | **597** | **598** | **599** | **600** |
| Count | **601** | **602** | **603** | **604** | **605** | **606** | **607** | **608** |
| Count | **609** | **610** | **611** | **612** | **613** | **614** | **615** | **616** |
| Count | **617** | **618** | **619** | **620** | **621** | **622** | **623** | **624** |
| Count | **625** | **626** | **627** | **628** | **629** | **630** | **631** | **632** |
| Count | **633** | **634** | **635** | **636** | **637** | **638** | **639** | **640** |
| Count | **641** | **642** | **643** | **644** | **645** | **646** | **647** | **648** |
| Count | **649** | **650** | **651** | **652** | **653** | **654** | **655** | **656** |
| Count | **657** | **658** | **659** | **660** | **661** | **662** | **663** | **664** |
| Count | **665** | **666** | **667** | **668** | **669** | **670** | **671** | **672** |
| Count | **673** | **674** | **675** | **676** | **677** | **678** | **679** | **680** |
| Count | **681** | **682** | **683** | **684** | **685** | **686** | **687** | **688** |
| Count | **689** | **690** | **691** | **692** | **693** | **694** | **695** | **696** |
| Count | **697** | **698** | **699** | **700** | **701** | **702** | **703** | **704** |
| Count | **705** | **706** | **707** | **708** | **709** | **710** | **711** | **712** |
| Count | **713** | **714** | **715** | **716** | **717** | **718** | **719** | **720** |
| Count | **721** | **722** | **723** | **724** | **725** | **726** | **727** | **728** |
| Count | **729** | **730** | **731** | **732** | **733** | **734** | **735** | **736** |
| Count | **737** | **738** | **739** | **740** | **741** | **742** | **743** | **744** |
| Count | **745** | **746** | **747** | **748** | **749** | **750** | **751** | **752** |
| Count | **753** | **754** | **755** | **756** | **757** | **758** | **759** | **760** |
| Count | **761** | **762** | **763** | **764** | **765** | **766** | **767** | **768** |
| Count | **769** | **770** | **771** | **772** | **773** | **774** | **775** | **776** |
| Count | **777** | **778** | **779** | **780** | **781** | **782** | **783** | **784** |
| Count | **785** | **786** | **787** | **788** | **789** | **790** | **791** | **792** |
| Count | **793** | **794** | **795** | **796** | **797** | **798** | **799** | **800** |
| Count | **801** | **802** | **803** | **804** | **805** | **806** | **807** | **808** |
| Count | **809** | **810** | **811** | **812** | **813** | **814** | **815** | **816** |
| Count | **817** | **818** | **819** | **820** | **821** | **822** | **823** | **824** |
| Count | **825** | **826** | **827** | **828** | **829** | **830** | **831** | **832** |
| Count | **833** | **834** | **835** | **836** | **837** | **838** | **839** | **840** |
| Count | **841** | **842** | **843** | **844** | **845** | **846** | **847** | **848** |
| Count | **849** | **850** | **851** | **852** | **853** | **854** | **855** | **856** |
| Count | **857** | **858** | **859** | **860** | **861** | **862** | **863** | **864** |
| Count | **865** | **866** | **867** | **868** | **869** | **870** | **871** | **872** |
| Count | **873** | **874** | **875** | **876** | **877** | **878** | **879** | **880** |
| Count | **881** | **882** | **883** | **884** | **885** | **886** | **887** | **888** |
| Count | **889** | **890** | **891** | **892** | **893** | **894** | **895** | **896** |
| Count | **897** | **898** | **899** | **900** | **901** | **902** | **903** | **904** |
| Count | **905** | **906** | **907** | **908** | **909** | **910** | **911** | **912** |
| Count | **913** | **914** | **915** | **916** | **917** | **918** | **919** | **920** |
| Count | **921** | **922** | **923** | **924** | **925** | **926** | **927** | **928** |
| Count | **929** | **930** | **931** | **932** | **933** | **934** | **935** | **936** |
| Count | **937** | **938** | **939** | **940** | **941** | **942** | **943** | **944** |
| Count | **945** | **946** | **947** | **948** | **949** | **950** | **951** | **952** |
| Count | **953** | **954** | **955** | **956** | **957** | **958** | **959** | **960** |
| Count | **961** | **962** | **963** | **964** | **965** | **966** | **967** | **968** |
| Count | **969** | **970** | **971** | **972** | **973** | **974** | **975** | **976** |
| Count | **977** | **978** | **979** | **980** | **981** | **982** | **983** | **984** |
| Count | **985** | **986** | **987** | **988** | **989** | **990** | **991** | **992** |
| Count | **993** | **994** | **995** | **996** | **997** | **998** | **999** | **1000** |

a) What if the girl counts from 1 to 10? She will end up on the First finger.

b) What if the girl counts from 1 to 100? She will end up on the Ring finger.

c) What if the girl counts from 1 to 1000? She will end up on the First finger.