TEST PLANNING

SCENARIO 1

Does increasing the price of hamburgers cause an increase in revenue?

Conduct a test using two similar locations. One location will receive the current pricing and the other location will receive an increased burger price.

Response Variable:

Revenue

Factor:

Price

$ *Control* or $$ *Increased*

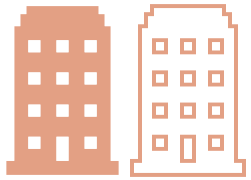
We believe that increasing the price of hamburgers will cause an increase in revenue because customers who spend time at the park will still need to eat and will most likely not leave the park to do so.

SCENARIO 1

Does increasing the price of hamburgers cause an increase in revenue?

SAMPLE SELECTION

We conducted a Market Matching analysis of properties based on monthly revenue



TEST DESIGN

A/B Test
One Factor
Two Levels

Response Variable:

Revenue

Factor:

Price

$ *Control* or $$ *Increased*

OPERATIONALIZATION

Matched Pairs:

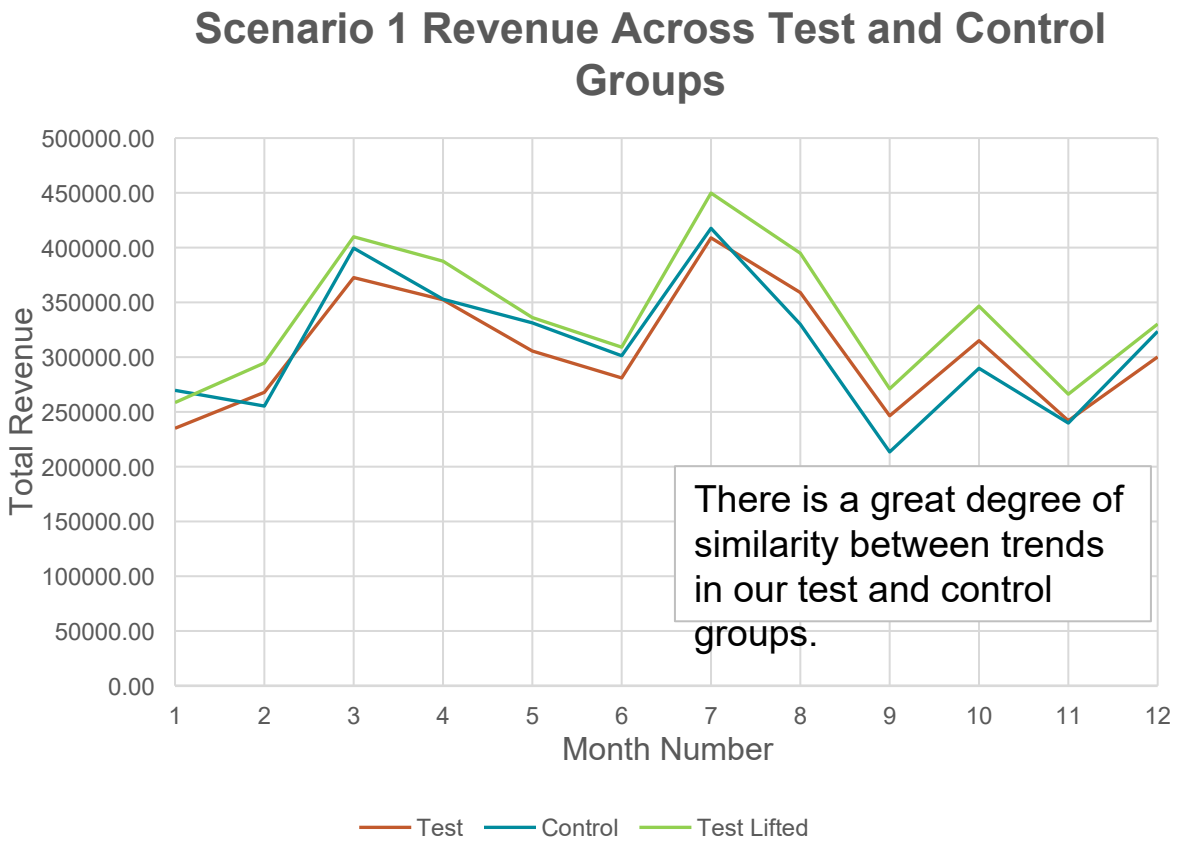
Test Market	Control Market
Grand Mound	Grapevine
Atlanta	Mason Family Resorts
Concord	Williamsburg
Minnesota	Scottsdale

These pairs were chosen because of their correlation values and completion of data

SCENARIO 1

Does increasing the price of hamburgers cause an increase in revenue?

	January	February	March	April	May	June	July	August	September	October	November	December
Test Group Sum	235049.31	267873.31	372604.48	352362.21	305577.39	281009.54	408900.86	358954.43	246473.77	315046.49	241992.18	300198.74
Control Group Sum	269701.16	255343.50	399525.04	352870.27	331275.74	301265.03	417640.18	329987.45	213463.96	289807.76	239825.27	323518.00



Average Paired Differences over 12-month period: → **3543.53**

Standard Deviation: → **14581.21**

Given a sample size of **4** and a lift of **10%**, the power of this test is **0.02**.

SCENARIO 2

What is the optimal burger price to maximize revenue?

Conduct a test within one property. Test:

- 4 burger price points at
- 2 different mealtimes and
- 2 different times of the week

Response Variable:

Revenue

We believe a burger price increase of $0.50 will increase total revenue because it is enough of a price increase to make a difference in revenue but not enough to negatively impact quantities sold.

We believe that an increase in burger prices during dinner time will increase total revenue because dinner is usually a more expensive meal, so customers will be more willing to pay.

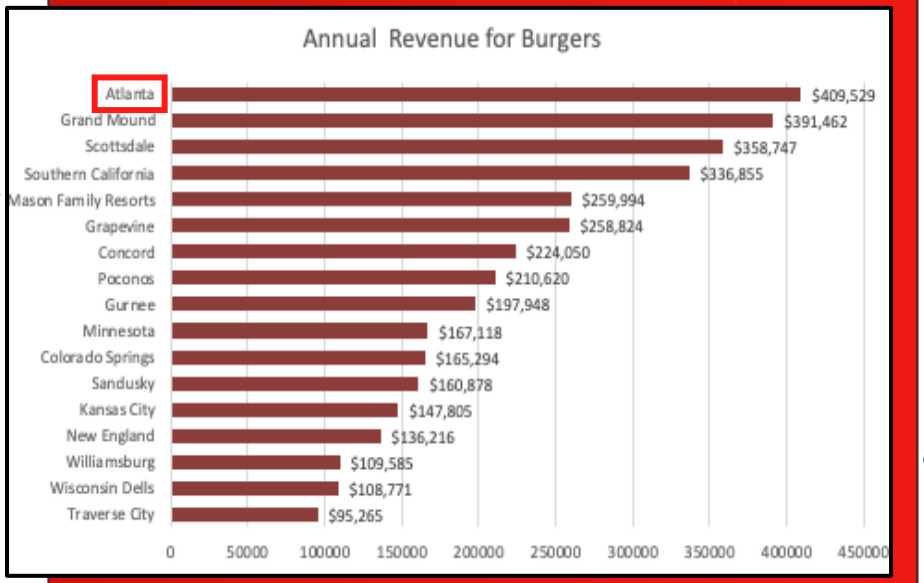
We believe that an increase in burger price during weekends will increase total revenue because more families are likely to visit on weekends and are more inclined to spend money versus the weekdays.

SCENARIO 2

What is the optimal burger price to maximize revenue?

TEST MARKET SELECTION

We chose **Atlanta** as our test market because this location has the highest annual revenue for burger sales. We want to see how these tests would affect our property with the most revenue.



OPERATIONALIZATION

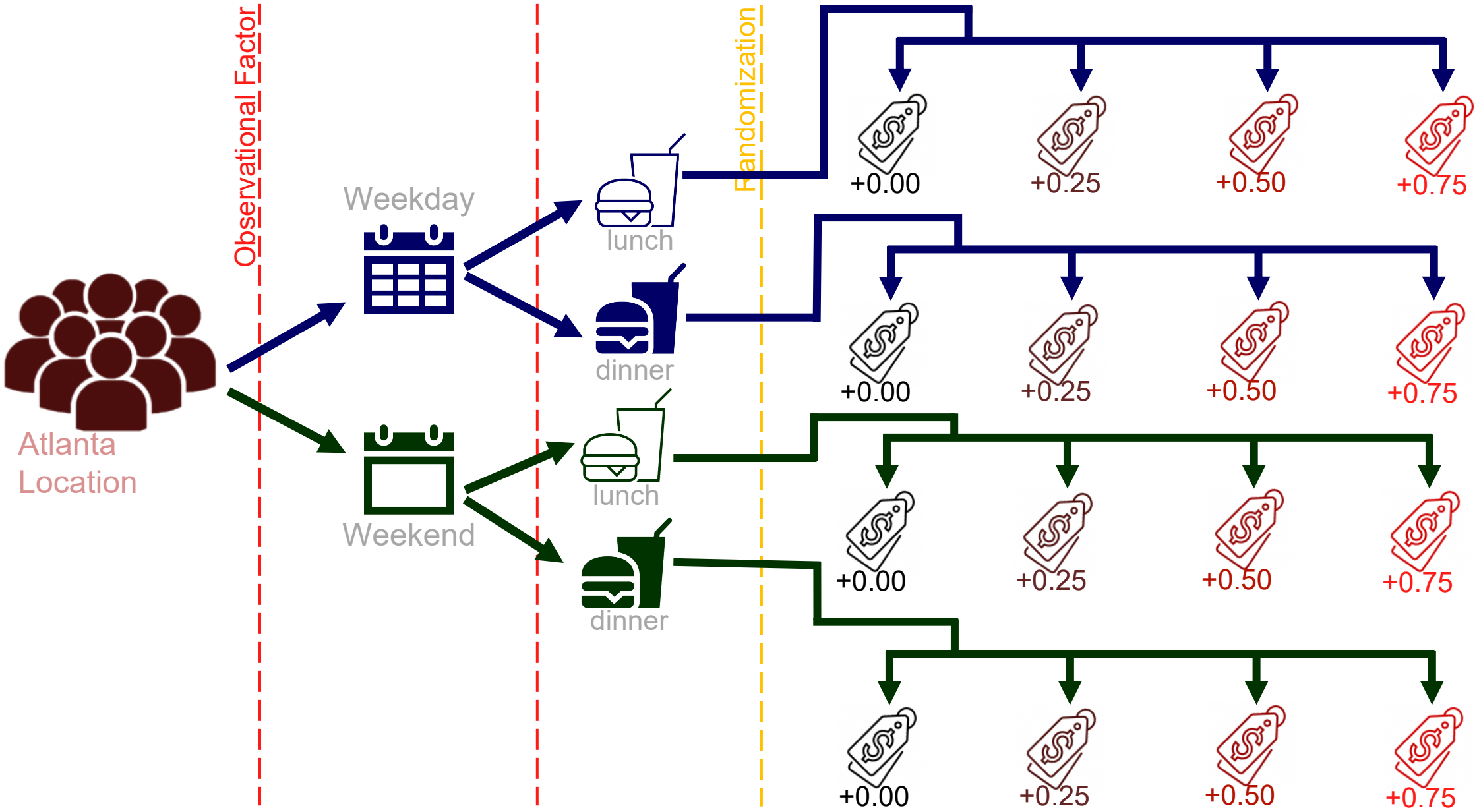
Price is our experimental factor

Time of week and mealtime are observational factors

16 Total Groups

SCENARIO 2

Test Design



SCENARIO 2

What is the optimal burger price to maximize revenue?

SAMPLE & EFFECT SIZE

179

is the required sample size based on our calculations

0.25

is our chosen effect size

REPLICATIONS PER CELL

$$\frac{\text{required sample size}}{\text{number of groups}} = \frac{179}{16} =$$

11 replicates per cell

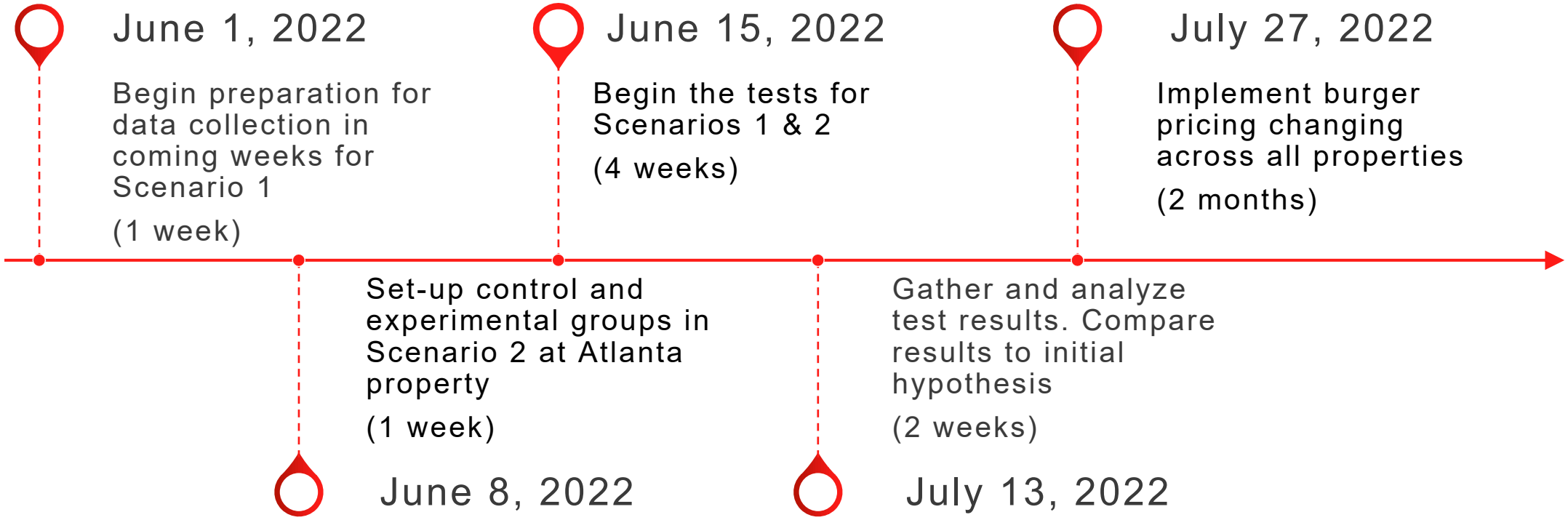
TIME REQUIREMENT

Assuming we can have **3** replicates per treatment per week:

$$\frac{\text{replicates per cell}}{\text{replicates per treatment}} = \frac{11}{3} =$$

4 weeks of testing required

TIMELINE


June 1, 2022
Begin preparation for data collection in coming weeks for Scenario 1
(1 week)
June 8, 2022
Set-up control and experimental groups in Scenario 2 at Atlanta property
(1 week)
June 15, 2022
Begin the tests for Scenarios 1 & 2
(4 weeks)
July 13, 2022
Gather and analyze test results. Compare results to initial hypothesis
(2 weeks)
July 27, 2022
Implement burger pricing changing across all properties
(2 months)

APPENDIX

SCENARIO 1

```
library(MarketMatching)
library(readxl)
library(plyr)
library(tidyverse)
library(dplyr)
library(WebPower)
library(pwr)
library(ggplot2)

#view data
DataSet1 <- read_excel("E:/class/Module C/ITOM 6264 Test and Learn/Great Wolf F&B test planning.xlsx",
                       col_types = c("text","date","text","numeric","numeric","numeric","text","numeric","text
#transfer to date
DataSet1$BUSINESS_DATE <- as.Date(DataSet1$BUSINESS_DATE)

data2 <-
  DataSet1 %>%
  mutate(month=as.Date( strftime(BUSINESS_DATE, "%Y-%m-1") ))

data3 <- ddply(data2,.(PROPERTY, month), summarize,MonthRevenue= sum(REVENUE))

#Generate suggested test/control pairs
mm <- MarketMatching::best_matches(data= data3,
                      id_variable = "PROPERTY",
                      date_variable = "month",
                      matching_variable = "MonthRevenue",
                      parallel=FALSE,
                      warping_limit = 1, # warping limit=1
                      dtw_emphasis = 0, # rely only on dtw for pre-screening
                      suggest_market_splits = TRUE,
                      start_match_period = "2021-01-01",
                      end_match_period = "2021-12-31")

## The file that contains the suggested test/control splits
## The file is sorted from the strongest market pair to the weakest pair.
bm <- head(mm$SuggestedTestControlSplits)
```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SCENARIO 1

```
#1st scenario table
dft <- data.table::as.data.table(bm)
view(dft)
#Power Calculation---power = 0.02
dfpw <- pwr.t.test(d=0.243,
                   n=4,
                   sig.level=0.05,
                   type="paired",
                   alternative="less")
```

```
#line graph
dfc1 <- dplyr::filter(data3,grepl('Grand Mound|Atlanta|Concord|Minnesota',PROPERTY))
testset <- ddply(dfc1,.(month), summarize,MonthRevenue= sum(MonthRevenue))

dfc2 <- dplyr::filter(data3,grepl('Grapevine|Family Resorts|Williamsburg|Scottsdale',PROPERTY))
controlset <- ddply(dfc2,.(month), summarize,MonthRevenue= sum(MonthRevenue))

ggp <- ggplot(NULL, aes(x=month, y=MonthRevenue)) +
  geom_line(data = testset, col = "red") +
  geom_line(data = controlset, col = "blue")+
  ggtitle("Paired Groups")
ggp
```


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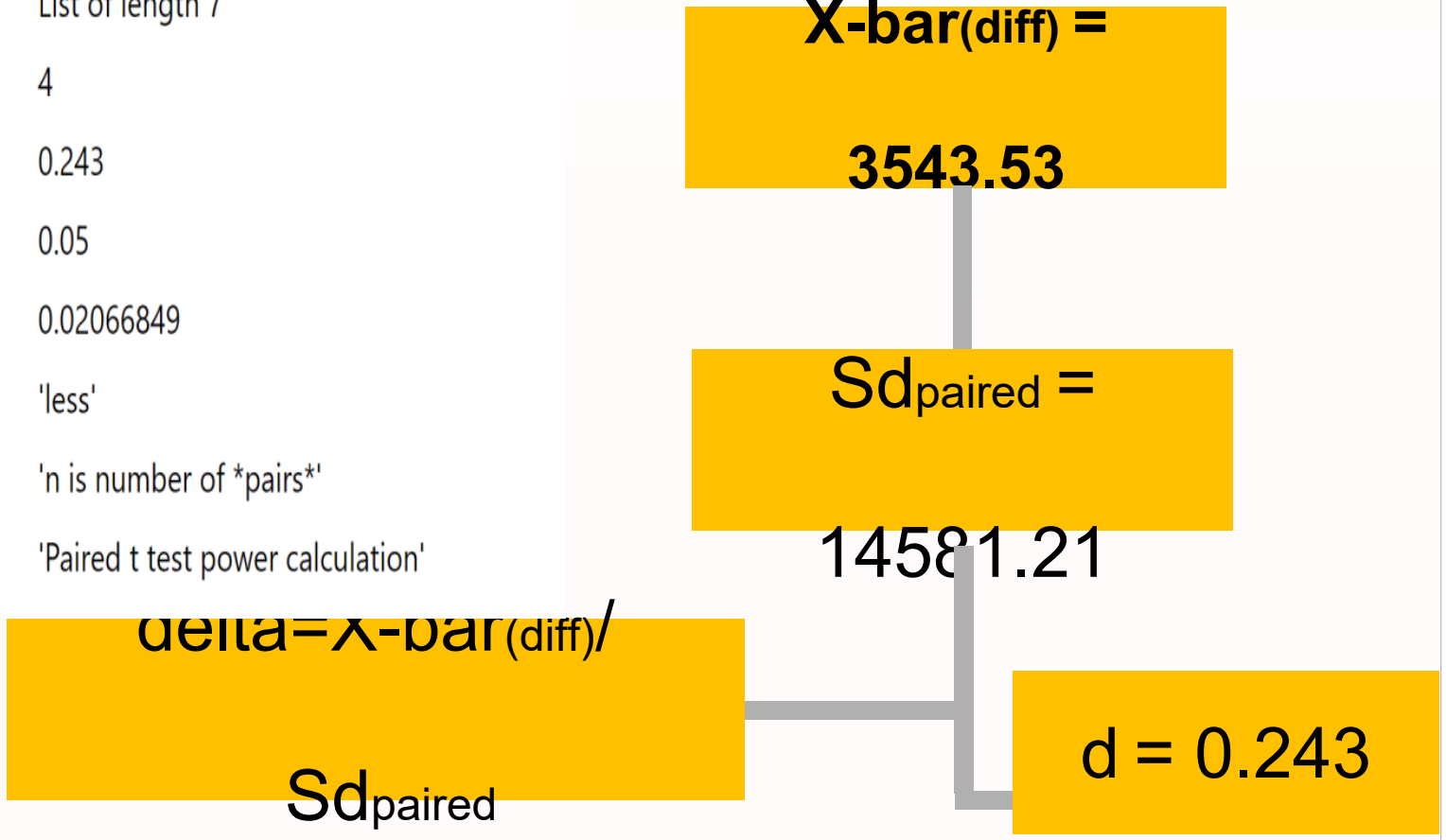
SCENARIO 1

	Type	Value
dfpw	list [7] (S3: power.htest)	List of length 7
n	double [1]	4
d	double [1]	0.243
sig.level	double [1]	0.05
power	double [1]	0.02066849
alternative	character [1]	'less'
note	character [1]	'n is number of *pairs*'
method	character [1]	'Paired t test power calculation'



SCENARIO 2

```r
library(WebPower)
anova <- wp.kanova(ndf=3,f=0.25,ng=16,alpha=0.05, power= 0.8)
Number_of_replicates <- anova$n/16
Number_of_weeks <- Number_of_replicates/3
print(paste("Number of Replicates are ",Number_of_replicates))
print(paste("Number of weeks",Number_of_weeks))
```

```
> anova
Multiple way ANOVA analysis

         n ndf      ddf    f ng alpha power
 178.6856   3 162.6856 0.25 16  0.05   0.8

NOTE: Sample size is the total sample size
URL: http://psychstat.org/kanova
> Number_of_replicates <- anova$n/16
> Number_of_weeks <- Number_of_replicates/3
> print(paste("Number of Replicates are ",Number_of_replicates))
[1] "Number of Replicates are  11.1678506160778"
> print(paste("Number of weeks needed to run the test:",Number_of_weeks))
[1] "Number of weeks needed to run the test: 3.72261687202592"
```

- Sample size: ~ 179
- Effect size: +0.25(Medium)
- Number of replicates per cell: 178/16 = 11
- Numbers of weeks needed to run the test: 11/3 = ~ 4

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