

GK-12 Lesson Plan

Teacher: Steven MacDonald

```
#Number of Trials
```

```
n <- 10000
```

```
#Sample draws from 1:6 with replacement under a uniform distribution.
```

```
die1 <- sample(1:6, n, replace = TRUE)
```

```
die2 <- sample(1:6, n, replace = TRUE)
```

```
#Takes the sum of two dice
```

```
sum <- die1 + die2
```

```
#Creates histogram of the sum
```

```
hist(sum, main="Dice Distribution", xlab = "Sum of the Two Dice", right=FALSE, breaks=seq(2,13,1),
```

```
col=heat.colors(11), freq=TRUE, xaxt='n')
```

```
axis(side=1, at = seq(2,12,1))
```

```
#The following Code Segment may be uncommented to overlay the histogram with the theoretical values
```

```
#expected <- c(0,0,1/36,2/36,3/36,4/36,5/36,6/36,5/36,4/36,3/36,2/36,1/36)
```

```
#barplot(expected*n, xlim = c(2,13), ylim=c(0,25), col="#33333345", beside=FALSE, add=TRUE, space=0)
```

```
#Creates a line plot of the probability density
```

```
plot(density(sum, adjust=3), col="Green",type="l", xaxt='n', xlim=(c(2,12)), xlab = "Sum of the Two Dice",
```

```
main = "Probability Density")
```

```
axis(side=1, at = seq(2,12,1))
```

```
#Plots vertical lines at the mean, first, and second standard deviations.
```

```
abline(v=mean(sum), col = "Red")
```

```
abline(v=(mean(sum)+sd(sum)), col = "Purple")
```

```
abline(v=(mean(sum)-sd(sum)), col = "Purple")
```

```
if(mean(sum)-2*sd(sum) >= 2 ) {
```

```
abline(v=(mean(sum)-2*sd(sum)),col = "Blue")
```

```
}
```

```
if (mean(sum)+2*sd(sum) <= 12 )
```

```
{
```

```
abline(v=(mean(sum)+2*sd(sum)),col = "Blue")
```

```
}
```

```
#Stores the mean and standard deviation into variables, then prints those values
```

```
dicemean<- mean(sum)
```

```
dicesd<-sd(sum)
```

```
#Contributes Z-scores for each roll value.
```

```
for (i in 2:12) {
```

```
zscore[i] <- ((i) - dicemean)/dicesd
```

```
}
```

```
#Prints z-scores, mean, and SD
```

```
zscore[2:12]
```

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dicemean

dicesd

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