

Extra Credit Worksheet

Name _____

This is *not* a group activity. You may consult others for help, but please do your own work.

A typical slot machine has 3 dials, each with 20 symbols (cherries, lemons, plums, oranges, bells, and bars). A typical set of dials is set up as follows:

	Dial 1	Dial 2	Dial 3
Cherries	7	7	0
Oranges	3	7	6
Lemons	3	0	2
Plums	4	1	6
Bells	2	2	5
Bars	1	3	1
Total	20	20	20

According to this table, of the 20 slots on dial 1, 7 are cherries, 3 are oranges, and so on. A typical payoff on a 1 unit bet is as shown in the following table:

Dial 1	Dial 2	Dial 3	Payoff
Bar	Bar	Bar	100
Bell	Bell	Bar	50
Plum	Plum	Bar	40
Orange	Orange	Bar	30
Bell	Bell	Bell	20
Plum	Plum	Plum	14
Orange	Orange	Orange	8
Cherry	Cherry	Anything	2
Cherry	No cherry	Anything	1
	Anything else		0

Now, remember, it costs 1 unit to play. Figure out the net gains for each of possible outcomes. This is the Payoff - 1 for each.

Dial 1	Dial 2	Dial 3	Net Gain
Bar	Bar	Bar	
Bell	Bell	Bar	
Plum	Plum	Bar	
Orange	Orange	Bar	
Bell	Bell	Bell	
Plum	Plum	Plum	
Orange	Orange	Orange	
Cherry	Cherry	Anything	
Cherry	No cherry	Anything	
	Anything else		

Calculate the probabilities for each outcome (Most can be done using the multiplication rule)
 Assume each dial acts independently:

	Dial 1 probability	Dial 2 probability	Dial 3 probability	Probability of Outcome
Bar-Bar-Bar				
Bell-Bell-Bar				
Plum-Plum-Bar				
Orange-Orange-Bar				
Bell-Bell-Bell				
Plum-Plum-Plum				
Orange-Orange-Orange				
Cherry-Cherry-Anything				
Cherry-No Cherry-Anything				
Anything Else	Probability of Anything Else = 1-(sum of all the other outcome probabilities) ==>			

Compute the player's expected winnings on the slot machine.

Outcome	Net Gain	Probability of Outcome	Expected Winnings
Bar-Bar-Bar			
Bell-Bell-Bar			
Plum-Plum-Bar			
Orange-Orange-Bar			
Bell-Bell-Bell			
Plum-Plum-Plum			
Orange-Orange-Orange			
Cherry-Cherry-Anything			
Cherry-No Cherry-Any			
Anything else			
Total Expected Winnings =>			

What is the total expected winnings over the long run?

What should be the advertised % payback?

Would you be willing to play this slot machine for an extended period of time? Why or why not?