

**Instructions:** Find the expected value for each scenario and then interpret the result in the context of the problem.

- In a Pick 4 game you can win \$100 if you pick all 4 numbers correctly, and \$5 if you get three of the numbers correct. You earn nothing otherwise, but have to pay \$1 to play. What is the expected value of each ticket that you purchase?

	All 4 match	Three of 4 match	Not Enough Match
Value of Event (Winnings - \$1 to play)	99	4	-1
Probability of Event	$\frac{1}{10,000}$	$\frac{36}{10,000}$	$\frac{9963}{10,000}$

-0.972

for each ticket purchased one can expect to lose 97 cents on average

- In a raffle, 350 tickets are sold. The top prize is \$1200. The second prize is \$500. The third prize is \$100. There are 4 fourth prizes worth \$20 each. It costs \$10 to purchase a ticket. Complete the table below and use it to calculate the expected value of purchasing a raffle ticket.

	1 <sup>st</sup> prize	2 <sup>nd</sup> prize	3 <sup>rd</sup> prize	4 <sup>th</sup> prize	Win nothing
Value of Event (Winnings - \$10 to play)	1190	490	90	10	-10
Probability of Event	$\frac{1}{350}$	$\frac{1}{350}$	$\frac{1}{350}$	$\frac{4}{350}$	$\frac{343}{350}$

-4.63

for every ticket purchased, one can expect to lose \$4.63 each

- An insurance company charges \$248 for a home-owner's policy. It expects to pay out \$150,000 to replace the house with probability 0.0001, it expects to pay out \$25,000 with probability 0.005, and it expects to pay out \$500 with probability 0.03. Find the expected value of the policy.

	Replace Home	Major Damage	Minor Damage	No Damage
Value of Event (Payout - \$250 for policy)	149,752	24,752	252	-248
Probability of Event	.0001	.005	.03	.9649

-93

for every month of coverage \$93 goes to insurance profits

- In a raffle, 500 tickets are sold. The top prize is \$2000. The second prize is \$750. The third prize is \$250. There are 4 fourth prizes worth \$10 each. It costs \$10 to purchase a ticket. Complete the table below and use it to calculate the expected value of purchasing a raffle ticket.
- Your friend Joe offers you a chance to play a dice game with him for money. If you roll a 4 or a 6, he will pay you \$4. If you roll an odd number, you may him \$3. If you roll a 2, no money is exchanged. Should you play your friend's game?

# Expected values Key

(2)

4.

$x$	1990	740	240	0	-10
$p(x)$	$\frac{1}{500}$	$\frac{1}{500}$	$\frac{1}{500}$	$\frac{4}{500}$	$\frac{493}{500}$

$$-3.92$$

for every ticket purchased, one can expect to lose an average of \$3.92

5.

$x$	4	-3	0
$p(x)$	$\frac{1}{6}$	$\frac{3}{6}$	$\frac{1}{6}$
	4 or 6	odd	

$$-.1\bar{6}$$

on average, you expect to lose  $\frac{1}{6}$  of a dollar for each play (the game is not fair; no, don't play him)