

## Warm-up

1) Jon wants to play a game;  $1/25$  you get \$100,  $1/5$  you get \$15 and the rest of the time he gets \$10. Is it a good idea to play?

$$\begin{array}{r} 100 \\ \times 0.04 \\ \hline 4 \end{array} + \begin{array}{r} 15 \\ \times 0.2 \\ \hline 3 \end{array} + \begin{array}{r} -10 \\ \times 0.76 \\ \hline -7.6 \end{array} = \boxed{\$-0.60}$$

$1 - 0.24 = 0.76$

No

## Warm-up

2) Sean's company wants to invest: Tasty Treats projects a 60% chance of \$80k, a 25% chance of \$30k and a 15% chance of breaking even. Simple Snacks projects a 45% chance of \$65k, a 55% chance of \$40k. Which is the better investment?

$$\begin{array}{r} \text{TT} \\ 80 \quad 30 \quad 0 \\ \times 0.6 \quad \times 0.25 \quad \times 0.15 \\ \hline 48 \quad + \quad 7.5 \quad + \quad 0 \end{array}$$

$$\begin{array}{l} \$55.5 \text{ k} \\ \$55,500 \end{array}$$

$$\begin{array}{r} 65 \quad 40 \\ \times 0.45 \quad \times 0.55 \\ \hline 29.25 \quad + \quad 22 = \end{array}$$

$$\begin{array}{l} \$51.25 \text{ k} \\ \$51,250 \end{array}$$

1) The world famous gambler from Philadelphia, Señor Rick, proposes the following game of chance. You roll a fair die. If you roll a 1, then Señor Rick pays you \$30. If you roll a 2, Señor Rick pays you \$6. If you roll a 3, you win nothing. If you roll a 4 or a 5, you must pay Señor Rick \$12, and if you roll a 6, you must pay Señor Rick \$15. Is Señor Rick loco for proposing such a game? Explain.

$$\frac{30}{\frac{1}{6}} + \frac{6}{\frac{1}{6}} + \frac{0}{\frac{1}{6}} + \frac{-12}{\frac{1}{3}} + \frac{-15}{\frac{1}{6}} = -\$0.5$$

2) You pay \$10 to play the following game of chance. There is a bag containing 12 balls, five are red, three are green and the rest are yellow. You are to draw one ball from the bag. You will win \$14 if you draw a red ball and you will win \$12 if you draw a yellow ball. How much do you expect to win or loss if you play this game 100 times?

$$9.83 - 10 = -\$0.17 \times 100 = \boxed{-\$17}$$

$$\frac{14}{\frac{5}{12}} + \frac{12}{\frac{4}{12}} + \frac{0}{\frac{3}{12}} = 9.83$$

3) In a game you roll a die. If you roll a 1, 2 or 3 you win 6 points, a 4 gets 24 points and a 5 or 6 loses 12 points. What is the expected value for the number of points you'll win per turn? What is the expected value for 200 turns?

$$\frac{6}{\frac{1}{2}} + \frac{24}{\frac{1}{6}} + \frac{-12}{\frac{1}{3}} = 3$$

$\boxed{600 \text{ pts}}$

4) Your company plans to invest in a particular project.

Potential Return	\$30,000	\$0	\$55,000
Probability	0.35	0.4	0.25

$10,500$ 
 $0$ 
 $13,750$

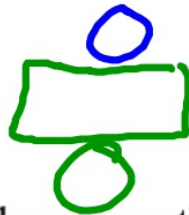
Based solely on this information, what should you do?

Invest

\$24,250

5) A manufacturer is considering the manufacture of a new and better mousetrap. She estimates the probability that the new mousetrap is successful is  $\frac{3}{4}$ . If it is successful it would generate profits of \$120,000. The development costs for the mousetrap are \$98,000. Should the manufacturer proceed with plans for the new mousetrap? Why or why not?

$$\begin{array}{r} 120,000 \\ \times 0.75 \\ \hline 90,000 \end{array}$$



No, too expensive

6) A grab bag contains 12 packages worth \$80, 15 packages worth \$40 and 25 packages worth \$30. Is it worthwhile to pay \$50 to pick one of the packages at random?

$$\frac{80 \times 12}{52} + \frac{40 \times 15}{52} + \frac{30 \times 25}{52} = 18.46 + 11.54 + 14.42 = 44.42 \quad \text{No}$$

7) Use the table below to find the expected number of wins for the first 6 games:

Wins	0	1	2	3	4	5	6
Probability	0.05	0.08	0.12	0.22	0.28	0.14	0.11

$$0 \quad 0.08 \quad 0.24 \quad 0.66 \quad 1.12 \quad 0.7 \quad 0.66$$

$$\boxed{3.46 \text{ wins}}$$

8) A \$20 bill, two \$10 bills, two \$5 bills and five \$1 bills are placed in a bag. If one bill is chosen at random, what is the expected value for the amount chosen?

$$\frac{20}{2} \times \frac{1}{10} + \frac{10}{2} \times \frac{2}{10} + \frac{5}{1} \times \frac{2}{10} + \frac{1}{0.5} \times \frac{5}{10} = \$5.5$$

9) At Tucson Raceway Park, your horse, Soon-to-be-Glue, has a probability of  $\frac{1}{20}$  of coming in first place, a probability of  $\frac{1}{10}$  of coming in second place, and a probability of  $\frac{1}{4}$  of coming in third place. First place pays \$4,500 to the winner, second place \$3,500 and third place \$1,500. Is it worthwhile to enter the race if it costs \$1,000?

# WB Between 204 and 205

1. There is a  $\frac{3}{5}$  chance of snow on each of the next 3 days. There is a  $\frac{1}{4}$  chance of sleet on the same days. The probability of snow and sleet is  $\frac{1}{10}$  over the same time. Determine the probability for each of the following:

a) Probability of snow or sleet on the first day

$$\frac{3}{5} + \frac{1}{4} - \frac{1}{10} = \frac{3}{4}$$

b) Probability of snow if it is sleeting

Cond.

Both  
Known

Known

$$\frac{\frac{1}{10}}{\frac{1}{4}} = \frac{2}{5}$$

c) Probability of sleet if it is snowing

$$\frac{\frac{1}{10}}{\frac{3}{5}} = \frac{1}{6}$$

d) Probability of snow on all three days

$$\frac{3}{5} \cdot \frac{3}{5} \cdot \frac{3}{5} = \frac{27}{125}$$

e) Probability of only snow on all three days

$$\frac{3}{5} - \frac{1}{10} = \frac{1}{2}$$

Snow Both Only  
Snow

$$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$$

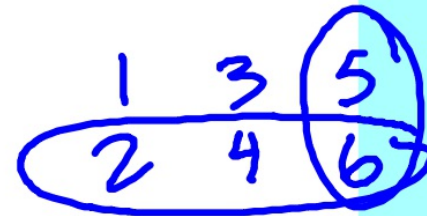
2. When rolling a six sided die. Find...

a) P(even then at least 5)

$$\frac{3}{6} \cdot \frac{2}{6} = \frac{1}{6}$$

b) P(even or at least 5)

$$\frac{3}{6} + \frac{2}{6} - \frac{1}{6} = \frac{2}{3}$$



~~c) P(even and at least 5)~~

d) P(even | at least 5)

$$\frac{\frac{1}{6}}{\frac{2}{6}} = \frac{1}{2}$$

Cond.

e) P(at least 5 | even)

$$\frac{\frac{1}{6}}{\frac{3}{6}} = \frac{1}{3}$$

## Unit 2 So Far...

**OR** → Always Addition  
Check for Subtraction

**THEN** → Multiply

**EXPECTED** →

- ① Outcomes
- ② Mult. by Prob.
- ③ Add

**None of the Above**

① Given/Known Info? → Cond. Both Known

② Multiple Events? → (then)

③ Selecting from Mult. Groups? → Combo.



## Mixed Review

Everyday for the next 5 days has the same weather forecast. There is  $\frac{2}{5}$  chance of rain, a  $\frac{2}{3}$  chance of reaching  $80^\circ$  and a  $\frac{1}{4}$  chance of both.

1) What is the probability of rain one day then reaching  $80^\circ$  the next?

$$\frac{2}{5} \cdot \frac{2}{3} = \frac{4}{15}$$

2) What is the probability of rain or reaching  $80^\circ$ ?

$$\frac{2}{5} + \frac{2}{3} - \frac{1}{4} = \frac{49}{60}$$

3) What is the probability of rain if the temperature has already passed  $80^\circ$ ?

Known  $\frac{1}{4}$  Both Known  $\frac{\frac{1}{4}}{\frac{2}{3}} = \frac{3}{8}$

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4) What is the probability of rain 3 days in a row?

$$\frac{2}{5} \cdot \frac{2}{5} \cdot \frac{2}{5} = \frac{8}{125}$$

5) What is the probability of only rain?

$$\frac{2}{5} - \frac{1}{4} = \frac{3}{20}$$

6) What is the probability of reaching  $80^\circ$  if you can hear rain on the window?

$$\frac{\frac{1}{4}}{\frac{2}{5}} = \frac{5}{8}$$