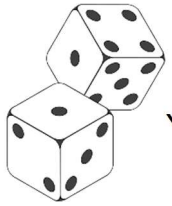
Situational Problem—Casino Profits

You are continuing your investigation as interim president of the Régie des alcools, des courses et des jeux for the province of Quebec regarding a proposal to increase the number of casinos in the province of Quebec.

You have already created a game that better reflects the objective of reducing the rates of gambling addiction in the province.

Your next job is to calculate the average profit per day if a casino were to incorporate the games described below. Give your opinion, based on the average profit per day, on whether these games in combination would reduce gambling addiction. Support your opinion with calculations and explanations of what these results mean.

Dice



Roll two dice in succession. If the sum is greater than or equal to 9 you win $10 and keep your bet. If the sum is less than 9, you lose your bet. The bet is $3.

You expect that Dice will be played 600 times per day.

Target Practice

The bet is $4 and is not returned. You must throw a dart and hit the smiley face. If your dart hits and sticks in either eye, you win $50. If your dart hits and sticks anywhere else inside the smiley face, you win $5. If your dart hits and sticks anywhere outside the smiley face but inside the square, you lose your bet.

The diameter of each eye is 5 cm. The diameter of the smiley face is 40 cm. The length of the square is 60 cm.

You expect that Target Practice will be played 200 times per day.

Cards

Given a deck of 52 cards, you must pick a card. If you pick a red 2, you win $2. If you pick a black face card, you win $10. If you pick a 7, you win $1. If you pick any other card you win $0.50. The bet is $2 and is not returned.

You expect Cards to be played 500 times per day.

Dice Calculations:

Dice Diagrams (if necessary):

Target Practice Calculations:

Target Practice Diagrams (if necessary):

Cards Calculations:

Cards Diagrams (if necessary):

Average Profit per Day Calculations:

Average Profit per Day Diagrams (if necessary):

a. Give your opinion, based on the average profit per day, on whether these games in combination would reduce gambling addiction. Discuss both the value and the – or + sign.

b. Support your opinion by referring to your calculations and explanations of what these results mean.

Criterion D: Applying mathematics in real-life contexts

Maximum: 8

At the end of year 5, students should be able to:

i. identify relevant elements of authentic real-life situations

ii. select appropriate mathematical strategies when solving authentic real-life situations

iii. apply the selected mathematical strategies successfully to reach a solution

iv. justify the degree of accuracy of a solution

v. justify whether a solution makes sense in the context of the authentic real-life situation.

Achievement level	Level descriptor
0	The student **does not** reach a standard described by any of the descriptors below.
1–2	The student is able to: i. identify **some** of the elements of the authentic real-life situation by setting up tables to organize outcomes, true values, and probabilities for all games. ii. apply mathematical strategies to **find a solution** to the authentic real-life situation, **with limited success** by using the information from the tables.
3–4	The student is able to: i. identify the **relevant** elements of the authentic real-life situation by setting up tables to organize outcomes, true values, and probabilities for all games. ii. select, **with some success**, **adequate** mathematical strategies to model the authentic real-life situation by applying the information from the tables to the appropriate formula. iii. apply mathematical strategies to **reach a solution** to the authentic real-life situation by applying the results from strands i and ii to determine the average profit per day for the casino. iv. **discuss** whether the solution makes sense in the context of the authentic real-life situation by vaguely answering question a.
5–6	The student is able to: i. identify the **relevant** elements of the authentic real-life situation by setting up tables to organize outcomes, true values, and probabilities for all games. ii. select **adequate** mathematical strategies to model the authentic real-life situation by correctly applying the information from the tables to the appropriate formula. iii. apply the selected mathematical strategies to **reach a valid solution** to the authentic real-life situation by applying the results from strands i and ii to determine the average profit per day for the casino. iv. **explain** the degree of accuracy of the solution by answering question a. v. **explain** whether the solution makes sense in the context of the authentic real-life situation by answering question b.
7–8	The student is able to: i. identify the **relevant** elements of the authentic real-life situation by setting up tables to organize outcomes, true values, and probabilities for all games. ii. select **appropriate** mathematical strategies to model the authentic real-life situation by correctly applying the information from the tables to the appropriate formula. iii. apply the selected mathematical strategies to **reach a correct solution** to the authentic real-life situation by correctly applying the results from strands i and ii to determine the average profit per day for the casino. iv. **justify** the degree of accuracy of the solution by thoroughly answering question a. v. **justify** whether the solution makes sense in the context of the authentic real-life situation by thoroughly answering question b.