

Precalculus · Expected Value and Decisions · Test

Common Core S-MD.A.3, S-MD.A.4, S-MD.B.5 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This test has 8 questions worth 20 points in total and takes about 45 minutes. Write every product in your expected value calculations and state each decision in a full sentence. A calculator is allowed. Show your work for full credit.

Test information

- **Grade:** Precalculus
- **Chapter:** Expected Value and Decisions
- **Common Core:** S-MD.A.3, S-MD.A.4, S-MD.B.5
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 3 pts; Question 4: 3 pts; Question 5: 3 pts; Question 6: 3 pts; Question 7: 2 pts; Question 8: 2 pts)

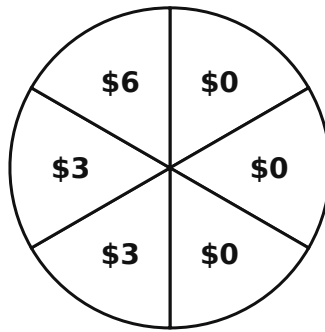
Question 1: Distribution check (2 points)

A random variable X takes the values 0,1,2,3 with $P(0)=0.15$, $P(1)=k$, $P(2)=0.35$, $P(3)=0.20$.

- Find k . (1 point)
- Find $P(X \geq 2)$. (1 point)

Question 2: Carnival spinner (2 points)

A spinner has 6 equal sections with the prizes shown. Let X be the prize in dollars.

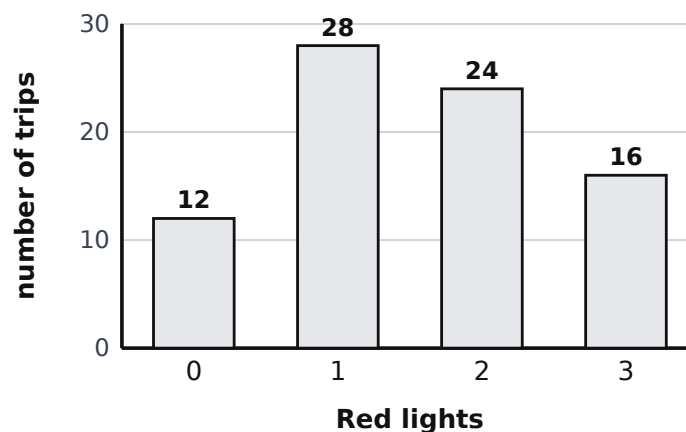


Spinner with six equal sections.

- Write the probability distribution of X . (1 point)
- Find $E(X)$. (1 point)

Question 3: Red lights on the way to school (3 points)

Over 80 trips, Priya counted the red lights on her route to school.



Number of trips with each count of red lights.

- Write the empirical distribution of the number of red lights. (1 point)
- Find the expected number of red lights per trip. (1 point)
- Predict the total number of red lights in 200 trips. (1 point)

Question 4: Card game at the fair (3 points)

A game uses 10 cards. One card pays \$12, three cards pay \$3 each, and six cards pay nothing. A player pays \$2 to draw one card.

- Find the expected payout. (1 point)
- Find the expected net result per game. (1 point)
- Is the game fair? If not, state who it favors and the fair price. (1 point)

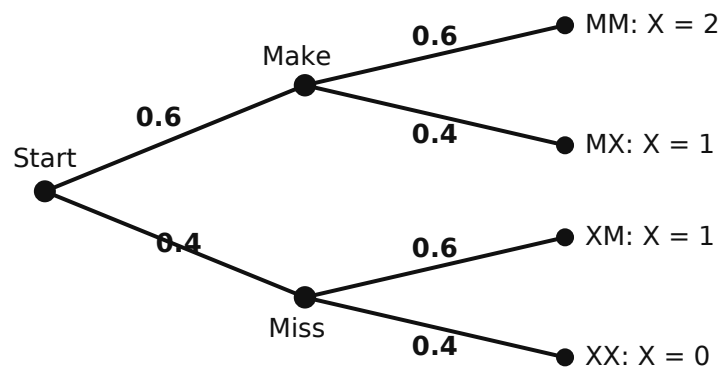
Question 5: Phone insurance (3 points)

Aisha's phone is worth \$450. There is a 6% chance it must be replaced this year. Insurance that pays for a replacement costs \$35 per year.

- Find the expected loss without insurance. (1 point)
- Based only on expected value, should she buy the insurance? Explain. (1 point)
- Find the replacement probability, to the nearest tenth of a percent, at which the two options have equal expected cost. (1 point)

Question 6: Two penalty kicks (3 points)

Noah scores on each penalty kick with probability 0.6, independent of the other kick. He takes two kicks. Let X be the number of goals.



Branch probabilities for two kicks (M means goal, X means miss).

- Write the probability distribution of X . (2 points)
- Find $E(X)$. (1 point)

Question 7: TV warranty (2 points)

A \$500 TV has a warranty that costs \$80. Each year, the chance of a \$350 repair is 10%.

- Find the expected repair cost. (1 point)
- Decide whether the warranty is worth buying by expected value. (1 point)

Question 8: Entry fee for a game (2 points)

A game pays \$8 with probability 0.25, \$3 with probability 0.5, and nothing otherwise.

- Find the expected payout. (1 point)
- Maya pays \$4 to play 100 times. Predict her total net result. (1 point)