

Expected Value and Smart Decisions

Grade 12 – Precalculus math · Test · Standards: S-MD.A.3, S-MD.A.4, S-MD.B.5

Name: _____ Date: _____ Class: _____

This 45-minute test has 8 questions worth 20 points. Show the distribution table or the sum for each expected value, and say in words what the result means. Give dollar amounts to the nearest cent.

Standards: S-MD.A.3, S-MD.A.4, S-MD.B.5 · **Level:** Grade 12 Precalculus

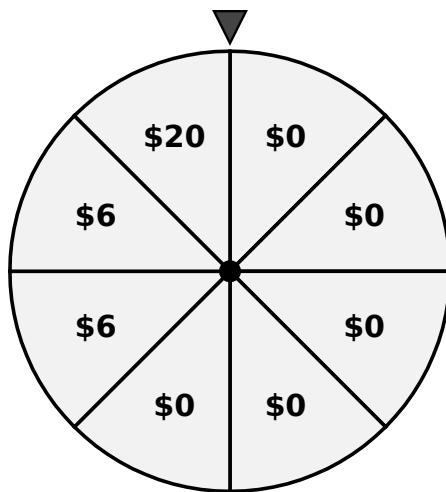
Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Missing Probability (2 points)

A random variable X has $P(-1) = 0.25$, $P(2) = 0.30$ and $P(5) = 0.15$, and $P(0)$ is unknown.

- Find $P(0)$. (1 point)
- Find $E(X)$. (1 point)

Question 2 Reading a Spinner (3 points)

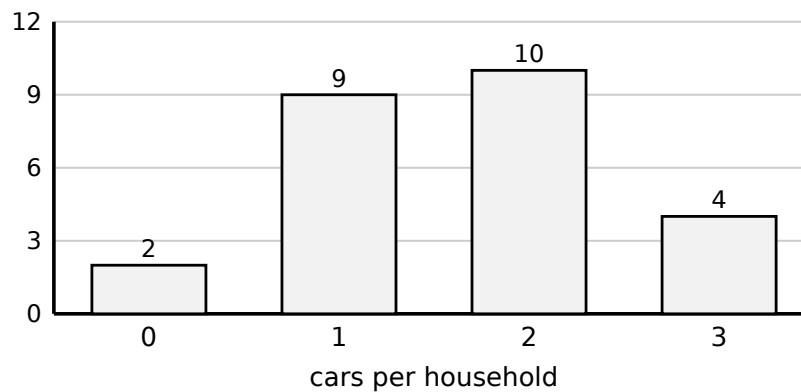


An 8-sector spinner.

A player pays \$5 to spin and receives the amount shown. Let X be the payout.

- Write the probability distribution of X . (1 point)
- Find $E(X)$. (1 point)
- Is the game fair? State the expected net gain. (1 point)

Question 3 Cars per Household (2 points)



Bar chart.

The chart shows how many cars were owned by each of 25 surveyed households. Write the empirical distribution and find the expected number of cars.

Question 4 Headphone Warranty (3 points)

A \$48 warranty on a pair of headphones covers a \$150 repair, which has a 10% chance of being needed.

- Find the expected repair cost. (1 point)
- Compare it with the warranty price. (1 point)
- Give a recommendation and name one reason a buyer might still choose the warranty. (1 point)

Question 5 Insurer's Expected Profit (3 points)

An insurance company charges \$200 per policy. Each policy has a 4% chance of a \$3,500 claim.

- Find the expected claim cost per policy. (1 point)
- Find the expected profit per policy. (1 point)
- Find the expected profit on 1,500 policies. (1 point)

Question 6 A Fair Prize (2 points)

A player pays \$6 to roll a fair die and wins \$18 if the roll is a 6, and nothing otherwise.

- Find the expected winnings. (1 point)
- What prize for rolling a 6 would make the game fair? (1 point)

Question 7 Comparing Job Offers (3 points)

Job A pays a fixed \$2,000 per month. Job B pays commission: \$4,000 with probability 0.3, \$2,000 with probability 0.5 and \$500 with probability 0.2.

- a. Find the expected monthly pay at Job B. *(1 point)*
- b. Compare the two jobs by expected value. *(1 point)*
- c. Name one factor besides expected value that could affect the choice. *(1 point)*

Question 8 Larger of Two Dice (2 points)

Two fair four-sided dice are rolled. Let X be the larger of the two numbers. Write the distribution of X and find $E(X)$.