6.4 Practice Problems

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

1) Suppose you buy 1 ticket for $1 out of a lottery of 1,000 tickets where the prize for the one winning ticket is to be $500. What are your expected winnings? 1) _____
A) $0.00 B) –$0.40 C) –$1.00 D) –$0.50

2) Suppose a charitable organization decides to raise money by raffling a trip worth $500. If 3,000 tickets are sold at $1.00 each, find the expected value of winning for a person who buys 1 ticket. 2) _____
A) –$0.81 B) –$1.00 C) –$0.83 D) –$0.85

3) In a game, you have a 1/48 probability of winning $143 and a 47/48 probability of losing $10. What is your expected winning? 3) _____
A) $2.98 B) –$6.81 C) –$9.79 D) $12.77

4) Suppose you pay $2.00 to roll a fair die with the understanding that you will get back $4.00 for rolling a 4 or a 3, nothing otherwise. What is your expected net winnings? 4) _____
A) $4.00 B) –$0.67 C) $2.00 D) –$2.00

5) Numbers is a game where you bet $1.00 on any three–digit number from 000 to 999. If your number comes up, you get $600.00. Find the expected winnings. 5) _____
A) –$1.00 B) –$0.40 C) –$0.42 D) –$0.50

6) Suppose you pay $1.00 to roll a fair die with the understanding that you will get back $3 for rolling a 2 or a 3, nothing otherwise. What are your expected winnings? 6) _____
A) $1.00 B) $3 C) –$1.00 D) $0

7) Bob and Fred play the following game. Bob rolls a single die. If an even number results, Bob must pay Fred the number of dollars indicated by the number rolled. On the other hand, if an odd number is rolled, Fred must pay Bob the number of dollars indicated by the number rolled. Find Bob's expectation. 7) _____
A) $0.40 B) $0 C) –$0.25 D) –$0.50

8) A certain game involves tossing 3 fair coins. It pays 23 cents for 3 heads, 14 cents for 2 heads, and 5 cents for 1 head. What is a fair price to pay to play this game? 8) _____
A) 8 cents B) 9 cents C) 10 cents D) 14 cents

9) Bob and Fred play the following game. Bob rolls a single die. If an even number results, Bob must pay Fred the number of dollars indicated by the number rolled. On the other hand, if an odd number is rolled, Fred must pay Bob the number of dollars indicated by the number rolled. Find Fred's expectation. 9) _____
A) $0 B) –$0.10 C) $0.50 D) $0.25

10) Bob and Fred play the following game. Bob rolls a single die. If the result is the number 1, 2, 3, 4, or 5, Bob must pay Fred the number of dollars indicated by the number rolled. If a 6 is rolled, Fred must pay Bob $21. Find Fred's expectation. 10) _____

A) –$1 B) $4 C) –$6 D) $0

11) If 5 apples in a barrel of 25 apples are rotten, what is the expected number of rotten apples in a sample of 2 apples? 11) _____

A) 1 B) 0.4 C) 0.63 D) 0.33

12) From a group of 3 men and 4 women, a delegation of 2 is selected. What is the expected number of men in the delegation? 12) _____

A) 0.57 B) 0.86 C) 1 D) 0.48

13) If 3 balls are drawn from a bag containing 3 red and 4 blue balls, what is the expected number of red balls in the sample? 13) _____

A) 1.54 B) 1.39 C) 0.89 D) 1.29

14) A contractor is considering a sale that promises a profit of $34,000 with a probability of .7 or a loss (due to bad weather, strikes, and such) of $5000 with a probability of .3. What is the expected profit? 14) _____

A) $22,300 B) $23,800 C) $27,300 D) $29,000

15) Experience shows that a ski lodge will be full (181 guests) if there is a heavy snow fall in December, while only partially full (88 guests) with a light snow fall. What is the expected number of guests if the probability for a heavy snow fall is .40? 15) _____

A) 143.8 B) 108.6 C) 125.2 D) 72.4

16) An insurance company has written 59 policies of $50,000, 457 of $25,000, and 943 of $10,000 on people of age 20. If the probability that a person will die at age 20 is .001, how much can the company expect to pay during the year the policies were written? 16) _____

A) $23,805 B) $0 C) $238,050 D) $2381

17) An insurance company says that at age 50 one must choose to take $10,000 at age 60, $30,000 at 70, or $50,000 at 80 ($0 death benefit). The probability of living from 50 to 60 is 0.84, from 50 to 70, 0.63, and from 50 to 80, 0.49. Find the expected value at each age. 17) _____

A) 60: $8400
70: $18,900
80: $24,500

B) 60: $6300
70: $18,900
80: $24,500

C) 60: $8400
70: $25,200
80: $42,000

D) 60: $8400
70: $14,700
80: $24,500

18) At age 50, Ann must choose between taking $19,000 at age 60 if she is alive then, or $29,000 at age 70 if she is alive then. The probability for a person aged 50 living to be 60 and 70 is 0.82 and 0.59, respectively. Using expected value, what is Ann's best option? 18) _____

A) $29,000 at age 70 B) $19,000 at age 60

19) Find the expected number of girls in a family of 5 children. 19) _____

A) 2 B) 2.5 C) 3 D) 2.25

20) If 2 cards are drawn from a deck of 52 cards, what is the expected number of spades? 20) _____

A) 0.75 B) 0.50 C) 0.25 D) 0.47

21) Find the expected number of boys in a family of 4 children. 21) _____

A) 3 B) 2.75 C) 2.5 D) 2

22) Find the expected number of girls in a family of 5 children. 22) _____

A) 3.5 B) 3.25 C) 2.5 D) 3

23) In a certain animal species, the probability that a female will have 0, 1, 2, 3, or 4 offspring in a given year is 0.31, 0.21, 0.19, 0.17, and 0.12 respectively. Find the expected number of offspring. 23) _____

A) 1.38 B) 2 C) 1.75 D) 1.58

24) An insurance company will insure a $260,000 home for its total value for an annual premium of $590. If the company spends $30 per year to service such a policy, the probability of total loss for such a home in a given year is 0.001 and you assume either total loss or no loss will occur, what is the company's expected annual gain (or profit) on each such policy? 24) _____

A) –$260 B) $300 C) $330 D) $250

25) Assume that you have a car worth $7300 and you wish to insure it for its full replacement value if it is stolen. If there is a 2% chance that the car will be stolen, what would a fair premium price be? 25) _____

A) $152.98 B) $161.30 C) $133.94 D) $148.98

26) A company estimates that it has a 40% chance of being successful in bidding on a $50,000 contract. If it costs $8000 in consultant fees to prepare the bid, what is the expected gain or loss for the company if it decides to bid on this contract? 26) _____

A) $12,000.00 B) $33,390.90 C) $33,208.39 D) $33,571.05

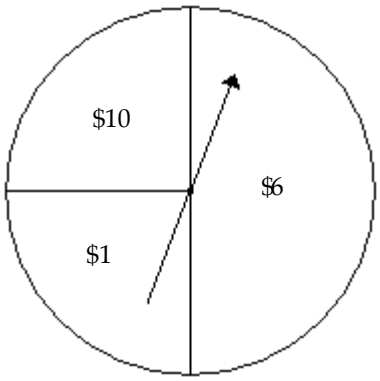
27) A student is taking a standardized test consisting of multiple choice questions for which there are five options for each question. Five points are awarded for each correct answer, but the student loses 2 points for an incorrect answer. Questions left blank neither receive nor lose points. Is it in the student's best interest to guess? 27) _____

A) Yes B) No

28) A student is taking a standardized test consisting of multiple choice questions for which there are five options for each question. Nine points are awarded for each correct answer, but the student loses 2 points for an incorrect answer. Questions left blank neither receive nor lose points. What is the minimum number of options that the student should be able to rule out before making a guess on any particular question? 28) _____

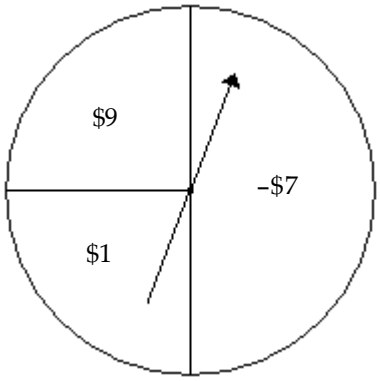
A) Two B) Three C) None D) One

29) Assume that a person spins the pointer and is awarded the amount indicated by the pointer. Determine the person's expectation. 29) _____



A) $6 B) $5.75 C) $4.25 D) $8.50

30) Assume that a person spins the pointer and is awarded the amount indicated if the pointer points to a positive number but must pay the amount indicated if the pointer points to a negative number. Determine the person's expectation. 30) _____



A) –$0.75 B) $0.75 C) –$1 D) $6

31) You are playing a game in which a single die is rolled. If a 2 or a 5 comes up, you win $12, otherwise you lose $3. What is the price that you should pay to play the game that would make the game fair? 31) _____

A) $2 B) $3 C) $7.50 D) $1

32) In a raffle, one thousand tickets are sold. There is a grand prize of $4000, a second prize of $500, and a third prize of $100. What ticket price would make this game fair? 32) _____

A) $4.74 B) $4.33 C) $4.69 D) $4.60