Probability: 10 practice questions

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Name: _____ Date: _____

Attempt all questions and show your working. Suggested time: 15 to 20 minutes.

Section A: Consolidating (Questions 1-4)

Question 1

A card is drawn at random from a standard deck of 52 playing cards (four suits of 13 cards: hearts, diamonds, clubs and spades, each with one king).

(a) Given that the card is a heart, what is the probability that it is a king?

(b) Given that the card is a king, what is the probability that it is a heart?

Question 2

A fair six-sided die is rolled.

(a) Given that the number rolled is even, what is the probability that it is greater than 3?

(b) Given that the number rolled is greater than 3, what is the probability that it is even?

Question 3

100 households were asked whether they own a dog and whether they own a cat.

	Has a dog	No dog	Total
Has a cat	10	15	25
No cat	30	45	75
Total	40	60	100

A household is chosen at random. Find:

(a) P(dog)

(b) P(dog mid cat)

(c) P(cat mid dog)

Question 4

Let R be the event "it rains in the afternoon" and C be the event "the morning is cloudy".

(a) Write $P(R \mid C)$ in words.

(b) On a certain day, $P(R \cap C) = 0.24$ and $P(C) = 0.4$. Use $P(R \mid C) = (P(R \cap C))/(P(C))$ to find $P(R \mid C)$.

Section B: Standard (Questions 5-10)

Question 5

In a class of 30 students, 18 play basketball, 12 play soccer and 7 play both.

(a) How many students play neither sport?

(b) A student is chosen at random. Find the probability that they play soccer, given that they play basketball.

(c) Find the probability that they play basketball, given that they play soccer.

Question 6

200 people were given a screening test for a medical condition.

	Test positive	Test negative	Total
Has the condition	18	2	20
Does not have the condition	27	153	180
Total	45	155	200

One person is chosen at random. Find:

(a) the probability that they test positive, given that they have the condition

(b) the probability that they have the condition, given that they test positive.

(c) Explain why the answers to (a) and (b) are different.

Question 7

A bag contains 5 red marbles and 3 blue marbles. Two marbles are taken out one at a time, and the first marble is not put back.

(a) Find the probability that the second marble is red, given that the first marble is red.

(b) Find the probability that both marbles are red.

(c) Find the probability that the second marble is blue, given that the first marble is red.

Question 8

For two events A and B, $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cap B) = 0.15$.

Find:

(a) P(A mid B)

(b) P(B mid A)

(c) $P(A \cup B)$

Question 9

A basketballer makes 70% of her free throws. She takes two free throws, and each shot is not affected by the other.

(a) Explain how the random digits 0 to 9 could be used to simulate one free throw.

(b) Using the rule "0 to 6 means the shot is made, 7 to 9 means it is missed", each pair of digits below simulates two free throws (the first digit is the first shot).

35, 82, 07, 64, 91, 26, 58, 73, 40, 19

Use these 10 trials to estimate:

(i) the probability that both shots are made

(ii) the probability that the second shot is made, given that the first shot is made.

(c) How could the estimates be made more reliable?

Question 10

A card is drawn at random from a standard deck of 52 cards. The face cards are the jacks, queens and kings (12 cards), and half the cards in the deck are red.

(a) Given that the card is a face card, what is the probability that it is red?

(b) Given that the card is red, what is the probability that it is a face card?

Probability: answers

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Question 1

Answer: (a) 1/13 (b) ¼

Question 2

Answer: (a) ⅔ (even: 2, 4, 6; of these, 4 and 6 are greater than 3) (b) ⅔ (4, 5, 6; of these, 4 and 6 are even)

Question 3

Answer: (a) ⅖ (also accept 0.4) (b) ⅖ (10/25, also accept 0.4) (c) ¼ (10/40, also accept 0.25)

Question 4

Answer: (a) the probability that it rains in the afternoon, given that the morning is cloudy (b) 0.6 ((0.24)/(0.4))

Question 5

Answer: (a) 7 (30 - (18 + 12 - 7)) (b) 7/18 (c) 7/12

Question 6

Answer: (a) 9/10 (18/20, also accept 0.9) (b) ⅖ (18/45, also accept 0.4) (c) The 'given' group is different: (a) looks only at the 20 people with the condition, while (b) looks at the 45 people who tested positive, most of whom (27) do not have the condition.

Question 7

Answer: (a) 4/7 (b) 5/14 (⅝ × 4/7) (c) 3/7

Question 8

Answer: (a) 0.375 (also accept ⅜) (b) 0.3 (c) 0.75

Question 9

Answer: (a) Let 7 of the 10 digits (for example 0 to 6) stand for a made shot and the other 3 (7 to 9) stand for a miss; pick a random digit for each shot. (b) (i) 4/10 = ⅖ (35, 64, 26, 40) (ii) 4/7 (first shot made in 7 trials: 35, 07, 64, 26, 58, 40, 19; both made in 4) (c) Run many more trials.

Question 10

Answer: (a) ½ (6/12) (b) 3/13 (6/26)