Venn diagrams and two-way tables: 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 drawing pin was tossed 80 times. It landed point up 52 times.

(a) Find the relative frequency of the pin landing point up, as a decimal.

(b) Estimate the probability that the pin lands point down.

Question 2

A Venn diagram shows the sports played by a class of 30 students. It has a circle for soccer and a circle for basketball. The numbers in the regions are: soccer only 12, basketball only 8, both soccer and basketball 5, and outside both circles (neither sport) 5.

A student is chosen at random from the class.

(a) How many students play soccer?

(b) Find the probability that the student plays soccer and basketball.

(c) Find the probability that the student plays soccer or basketball (or both).

(d) Find the probability that the student plays soccer or basketball, but not both.

Question 3

A number is chosen at random from the whole numbers 1 to 12. Let A be the event "the number is even" and B be the event "the number is a multiple of 3".

(a) List the numbers in "A and B".

(b) List the numbers in "A or B" (inclusive or: in A, in B, or in both).

(c) List the numbers in "A or B but not both" (exclusive or).

(d) Find the probability of "A or B" (inclusive).

Question 4

A café recorded what 50 customers ordered.

	Food	No food	Total
Hot drink	18	12	30
Cold drink	8	12	20
Total	26	24	50

Use the data to estimate the probability that a customer orders:

(a) a hot drink and food

(b) a cold drink and no food

Section B: Standard (Questions 5-10)

Question 5

In a survey of 200 Year 9 students, each student was asked whether they own a mobile phone and whether they play a musical instrument. Some values are missing.

	Instrument	No instrument	Total
Phone	48		170
No phone		18	
Total	60		200

(a) Complete the table.

Use the data to estimate the probability that a Year 9 student:

(b) owns a phone and plays an instrument

(c) owns a phone or plays an instrument (or both)

(d) owns a phone or plays an instrument, but not both

Question 6

In a survey of 50 families, 28 had been on a beach holiday in the past year, 20 had been on a snow holiday, and 9 had been on both.

(a) Draw a Venn diagram and write the number of families in each of the four regions.

Use the data to estimate the probability that a family:

(b) had a beach holiday or a snow holiday (or both)

(c) had exactly one of these two types of holiday

(d) had neither type of holiday

Question 7

For two events A and B, P(A) = 0.6, P(B) = 0.35 and P(A and B) = 0.2.

(a) Find P(A or B) (inclusive or).

(b) Find the probability that exactly one of A and B happens.

(c) Find the probability that neither A nor B happens.

Question 8

A card is chosen at random from 20 cards numbered 1 to 20. Find the probability that the number is:

(a) even and a multiple of 5

(b) even or a multiple of 5 (or both)

(c) even or a multiple of 5, but not both

Question 9

A random sample of 200 adults in a town was surveyed. Of these, 70 own a dog, 50 own a cat and 20 own both a dog and a cat.

(a) Estimate the probability that an adult in the town owns a dog or a cat (or both).

(b) There are 12,000 adults in the town. Estimate how many own a dog but not a cat.

(c) Estimate how many adults in the town own both a dog and a cat.

Question 10

Two events are mutually exclusive if they cannot both happen at the same time. State whether each pair of events is mutually exclusive, and explain.

(a) A die is rolled: "rolling a 2" and "rolling an odd number"

(b) A die is rolled: "rolling an even number" and "rolling a number greater than 4"

(c) A student is chosen from a school: "the student is in Year 9" and "the student is in Year 10"

(d) A student is chosen from a school: "the student plays netball" and "the student plays soccer"

(e) For two mutually exclusive events, what is P(A and B)? What does this mean for inclusive or and exclusive or?

Venn diagrams and two-way tables: answers

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Question 1

Answer: (a) 0.65 (52/80) (b) 0.35

Question 2

Answer: (a) 17 (b) 5/30 = ⅙ (c) 25/30 = ⅚ (d) 20/30 = ⅔

Question 3

Answer: (a) 6, 12 (b) 2, 3, 4, 6, 8, 9, 10, 12 (c) 2, 3, 4, 8, 9, 10 (d) 8/12 = ⅔

Question 4

Answer: (a) 18/50 = 0.36 (b) 12/50 = 0.24

Question 5

Answer: (a) Phone, no instrument 122; no phone, instrument 12; no phone total 30; no instrument total 140 (b) 48/200 = 0.24 (c) 182/200 = 0.91 (48 + 122 + 12) (d) 134/200 = 0.67 (122 + 12)

Question 6

Answer: (a) Beach only 19, snow only 11, both 9, neither 11 (b) 39/50 = 0.78 (c) 30/50 = 0.6 (d) 11/50 = 0.22

Question 7

Answer: (a) 0.75 (0.6 + 0.35 - 0.2) (b) 0.55 (0.75 - 0.2) (c) 0.25 (1 - 0.75)

Question 8

Answer: (a) 2/20 = 1/10 (10 and 20) (b) 12/20 = ⅗ (10 + 4 - 2 = 12 numbers) (c) 10/20 = ½

Question 9

Answer: (a) 0.5 ((70 + 50 - 20)/(200)) (b) 3000 (50/200 × 12,000) (c) 1200 (20/200 × 12,000)

Question 10

Answer: (a) Mutually exclusive: 2 is not odd. (b) Not mutually exclusive: rolling a 6 is in both. (c) Mutually exclusive: a student cannot be in two year levels at once. (d) Not mutually exclusive: a student can play both sports. (e) P(A and B) = 0, so the inclusive or and the exclusive or are the same event and P(A or B) = P(A) + P(B).