Solutions

1. Which of these variables would be expected to result in a discrete distribution?

   a) the masses of the cupcakes for sale in the school cafeteria

   b) the value of a card drawn at random from a deck of 52 cards

   c) the daily barometric pressure measured in your city

a) Mass is measured not counted, so this WILL NOT give a discrete distribution.

b) The value of the card is counted, so this WILL give a discrete distribution.

c) Barometric pressure is measured, so this WILL NOT give a discrete distribution.

2. Which of these variables would be expected to result in a continuous distribution?

a) the number of students with blue eyes in each class in your school

b) the weights of the police officers in the local police force

c) the number of cartons of milk sold in the cafeteria vending machine

d) the number of defective tablet computers in a shipment to an electronics store

a) Number of students with blue eyes is counted, so this WILL NOT give a continuous distribution.

b) Weights of police officers is measured, so this WILL give a continuous distribution.

c) Number of cartons of milk is counted, so this WILL NOT give a continuous distribution.

d) Number of defective tablets is counted, so this WILL NOT give a continuous distribution.

3. A men's clothing store developed a customer waist size probability table from a sample of 300 customers, as shown.

a) Does the distribution appear to be uniform? Explain your answer.

b) What is the frequency associated with a waist size from 34 to 36?

c) If a new customer comes in with a waist size of 38, which interval should the data be placed in?

Literacy Link

Canada officially uses SI units for length, such as centimetres. However, in some industries—including the clothing industry—measurements are still recorded using imperial units, such as inches. 1 inch ≈ 2.54 cm.

Waist Size (in.)	Probability
26–28	0.000
28–30	0.025
30–32	0.175
32–34	0.295
34–36	0.300
36–38	0.160
38–40	0.045
40–42	0.000

a) For this distribution to be uniform the probability of each size would be the same. As the probabilities are different, this is not a uniform distribution.

b) Frequency = Probability x Sample size

= 0.300(300)

= 90

c) If a data value falls on the boundary between two intervals, it is usually placed in the **lower interval**. So, in this case a waist size of 38 should go in the interval 36-38.

4. Donna is monitoring nutrient levels in a local stream. She collects 44 samples of water from various locations. The table shows the volumes of the samples.

a) Can you determine from the table if the distribution is uniform? Explain your answer.

b) Devise a plan to determine whether the distribution is uniform. Carry out your plan and draw a conclusion.

Volume of Sample (mL)			
55	63	56	64
55	62	61	65
57	62	59	63
55	65	60	62
58	62	56	61
63	60	64	57
57	64	60	59
55	61	56	56
58	58	65	64
58	57	60	65
63	61	59	59

a) The raw data is too difficult to analyse in its current form, so it isn't obvious what type of distribution it is.

b) We need to find the frequency of each volume. First find the lowest and highest values... Lowest is 55, Highest is 65. Create a frequency table. As the volumes are measured to the nearest mL we need to recognise this in the table.

As the frequencies are all equal, then the distribution is **UNIFORM**.

Volume of Sample (mL)	Tally	Frequency
54 - 55	IIII	4
55 - 56	IIII	4
56 - 57	IIII	4
57 - 58	IIII	4
58 - 59	IIII	4
59 - 60	IIII	4
60 - 61	IIII	4
61 - 62	IIII	4
62 - 63	IIII	4
63 - 64	IIII	4
64 - 65	IIII	4

5. Thinking Air tanks used by scuba divers are typically filled to a pressure of 3000 psi (pounds per square inch). A sample of 32 tanks at a dive shop was selected, and the table shows the pressures.

a) Determine whether the distribution is uniform. Explain your method.

b) Is this distribution discrete or continuous? Give a reason for your answer.

c) Suggest a reason why are there no values in the table recorded with decimal places, such as 2998.347.

Literacy Link

In scuba diving, pressure is measured using the imperial unit of psi, which means pounds per square inch.

Pressure (psi)			
3003	2999	2995	2999
3004	3001	3001	3000
2998	3000	2999	3000
3001	2997	2998	3003
3005	2995	3005	3002
2997	3004	2995	2997
2996	3001	3002	3002
2999	3003	2996	3003

a) We need to first find the lowest and highest volume... Lowest is 2995, Highest is 3005. Group the data and create a frequency table.

Pressure (psi)	Tally	Frequency
2995 - 2997	IIIII III	8
2997 - 2999	IIIII I	6
2999 - 3001	IIIII II	7
3001 - 3003	IIIII II	7
3003 - 3005	IIII	4

As the frequencies are different, we can state that the distribution isn't uniform.

b) The distribution is continuous. This is because the pressure is measured,not counted.

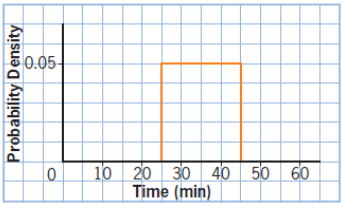
c) A reason why there are no decimal pressures in the table could be due to the measuring equipment only giving integer answers.

7. The Ridgeway High School Paperman Triathlon consists of a 200-m swim, a 5-km bicycle ride, and a 1-km run. The graph shows the probability distribution for the time required to complete the triathlon.

a) What is the probability that a contestant will finish the triathlon in 30 min or less?

b) What is the probability that a contestant will finish the triathlon in 30 to 40 min?

c) Why was this type of distribution used? Explain.



a) Probability of finishing in 30 minutes or less is equal to the area under the graph from 25 minutes (fastest time) to 30 minutes.

$P(25 < x < 30)$ = area under the graph

$= 0.05(30 - 25)$

$= 0.25$

So the probability of finishing in 30 minutes or less is 0.25

b) Probability of finishing in 30 - 40 minutes is equal to the area under the graph from 30 minutes to 40 minutes.

$P(30 < x < 40)$ = area under the graph

$= 0.05(40 - 30)$

$= 0.5$

So the probability of finishing in 30 - 40 minutes is 0.5

c) This type of distribution was used because all times are equally likely.