

PROBABILITY SAMPLING DISTRIBUTIONS

Question 1 (*)**

A bag contains a **large** number of coins. Half of the coins are 10 pence pieces, one third are 20 pence pieces and the rest are 5 pence pieces.

A sample of two coins is selected at random.

Determine the sampling distribution of the mean of the two coins.

mean	5	7.5	10	12.5	15	20
P(mean)	$\frac{1}{36}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{9}$	$\frac{1}{3}$	$\frac{1}{9}$

Question 2 (*)**

A bag contains a **large** number of coins. Two thirds of the coins are 20 pence pieces and the rest are 50 pence pieces.

A sample of three coins is selected at random.

Find the sampling distribution of the median of the three coins.

median	20	50
P(median)	$\frac{20}{27}$	$\frac{7}{27}$

Question 3 (*)**

A bag contains a **large** number of coins, some 5 pence pieces and some 10 pence pieces.

The ratio of 5 pence pieces to the 10 pence pieces is 1:4.

A sample of three coins is selected at random.

Find the sampling distribution of the mean of the three coins.

mean	5	$\frac{20}{3}$	$\frac{25}{3}$	10
P(mean)	$\frac{1}{125}$	$\frac{12}{125}$	$\frac{48}{125}$	$\frac{64}{125}$

Handwritten solution for Question 3:

Sp | 10p
 $\frac{1}{5}$ | $\frac{4}{5}$

OUTCOMES MEAN PROBABILITY

5-5-5 5 $\frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} = \frac{1}{125}$

5-5-10 $\frac{20}{3}$ $\frac{1}{5} \times \frac{1}{5} \times \frac{4}{5} = \frac{4}{125}$

5-10-5 $\frac{20}{3}$ $\frac{1}{5} \times \frac{4}{5} \times \frac{1}{5} = \frac{4}{125}$

10-5-5 $\frac{20}{3}$ $\frac{4}{5} \times \frac{1}{5} \times \frac{1}{5} = \frac{4}{125}$

5-10-10 $\frac{25}{3}$ $\frac{1}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{16}{125}$

10-5-10 $\frac{25}{3}$ $\frac{4}{5} \times \frac{1}{5} \times \frac{4}{5} = \frac{16}{125}$

10-10-5 $\frac{25}{3}$ $\frac{4}{5} \times \frac{4}{5} \times \frac{1}{5} = \frac{16}{125}$

10-10-10 10 $\frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{64}{125}$

MEAN 5 $\frac{20}{3}$ $\frac{25}{3}$ 10

P(MEAN) $\frac{1}{125}$ $\frac{12}{125}$ $\frac{48}{125}$ $\frac{64}{125}$

Question 4 (*)**

A **large** number of light bulbs are stored in the stock-room of an electrical shop.

The ratio of 60 watt bulbs to 100 watt bulbs is 1:3.

A sample of three light bulbs is selected at random.

Find the sampling distribution of the mode of the three bulbs.

mode	60	100
P(mode)	$\frac{5}{32}$	$\frac{27}{32}$

Handwritten solution for Question 4:

60 | 100
 $\frac{1}{4}$ | $\frac{3}{4}$

OUTCOMES MODE PROBABILITY

60-60-60 60 $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{64}$

60-60-100 60 $\frac{1}{4} \times \frac{1}{4} \times \frac{3}{4} = \frac{3}{64}$

60-100-60 60 $\frac{1}{4} \times \frac{3}{4} \times \frac{1}{4} = \frac{3}{64}$

100-60-60 60 $\frac{3}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{3}{64}$

60-100-100 100 $\frac{1}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{9}{64}$

100-60-100 100 $\frac{3}{4} \times \frac{1}{4} \times \frac{3}{4} = \frac{9}{64}$

100-100-60 100 $\frac{3}{4} \times \frac{3}{4} \times \frac{1}{4} = \frac{9}{64}$

100-100-100 100 $\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64}$

MODE 60 100

P(MODE) $\frac{5}{32}$ $\frac{27}{32}$