1. A bag contains a large number of coins:

75% are 10p coins,

25% are 5p coins.

A random sample of 3 coins is drawn from the bag.
Find the sampling distribution for the median of the values of the 3 selected coins.

(Total 7 marks)

1. Attempt to write down combinations — at least one seen — M1

(5, 5, 5), (5, 5, 10) any order (10, 10, 5) any order, (10, 10, 10) — A1

(5, 10, 5), (10, 5, 5), (10, 5, 10), (5, 10, 10) — all 8 cases considered. May be implied by 3 * (10, 5, 10) and 3 * (5, 5, 10) — A1

median 5 and 10 — B1

Median = 5 P(M = m) = $\left(\frac{1}{4}\right)^3 + 3\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right) = \frac{10}{64} = 0.15625$

add at least 2 prob using ¼ and ¾, identified by having same median of 5 and 10. Allow no 3 for M — M1A1

Median = 10 P(M = m) = $\left(\frac{3}{4}\right)^3 + 3\left(\frac{3}{4}\right)^2\left(\frac{1}{4}\right) = \frac{54}{64} = 0.84375$ — A1 — 7

[7]

1. This question differentiated between candidates. It was disappointing to see the majority of candidates had no idea how to find the probability distribution of the median although quite a few specified the definition of a probability distribution. Several were able to write down the combinations but did not understand how to find the median and construct the probability distribution. There were few completely accurate solutions.