ANSWERS

Probability – Past Paper Questions

20. A bag contains 20 beads. There are 3 green, 4 yellow and 13 red beads in the bag.
Two beads are selected at random without replacement from the bag.

(a) Calculate the probability that both selected beads are yellow.

$\frac{4}{20} \times \frac{3}{19} = \frac{12}{380} = \frac{3}{95}$ (1)

(1)

[2]

(b) Calculate the probability that the two beads are different colours.

RY → $\frac{13}{20} \times \frac{4}{19} = \frac{52}{380}$

RG → $\frac{13}{20} \times \frac{3}{19} = \frac{39}{380}$ (3)

GR → $\frac{3}{20} \times \frac{13}{20} = \frac{39}{380}$

GY → $\frac{3}{20} \times \frac{4}{19} = \frac{12}{380}$

YR → $\frac{4}{20} \times \frac{13}{19} = \frac{52}{380}$

YG → $\frac{4}{20} \times \frac{3}{19} = \frac{12}{380}$

Total $= \frac{206}{380} = \frac{103}{190}$ (1)

[4]

5. Two fair £1 coins are thrown.
Jane says that the probability of two heads is equal to the probability of a head and a tail.
Is this true?
Justify your answer by finding the probabilities of these outcomes.

TT $= \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

TH $= \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

HT $= \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (1)

HH $= \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

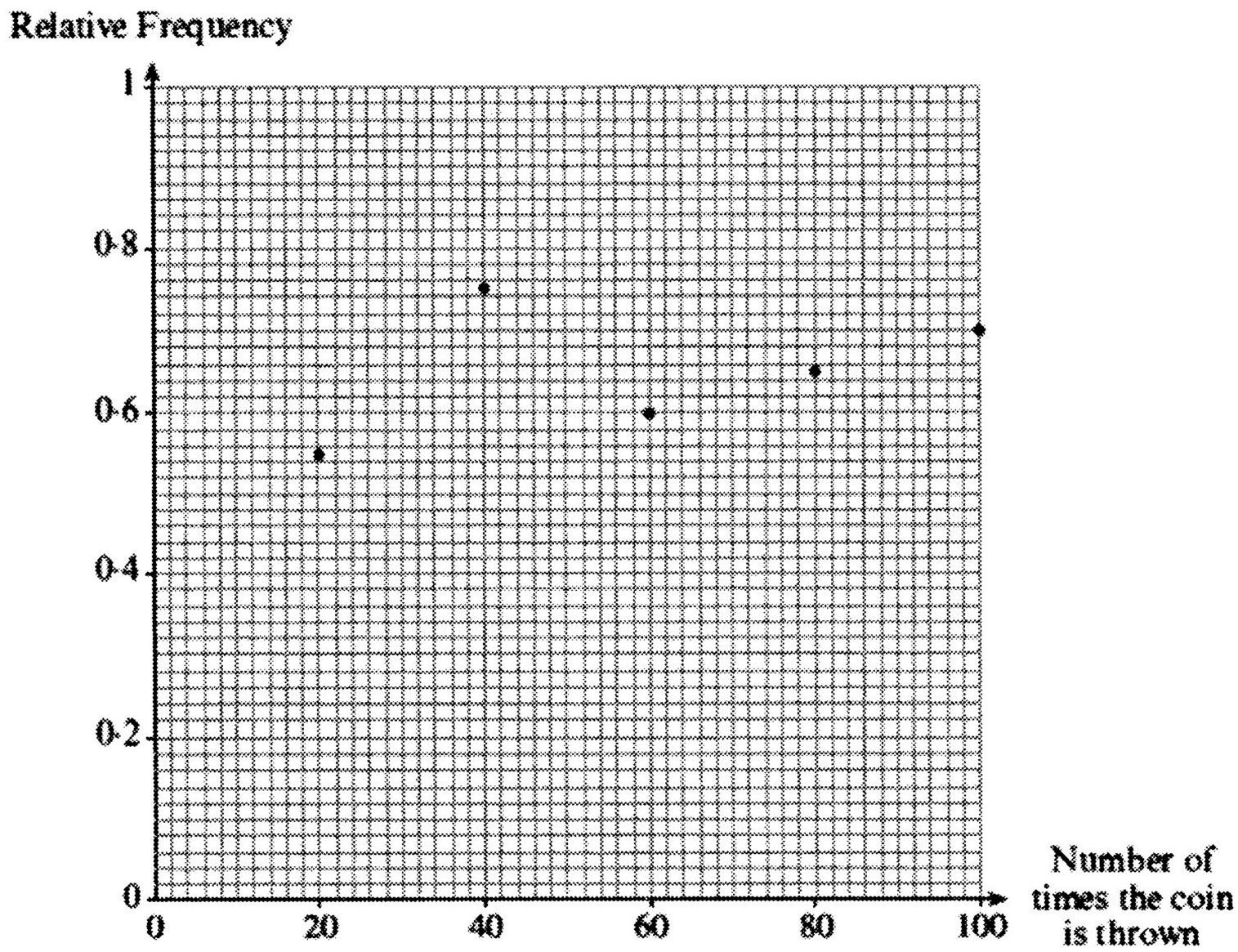
(1)

So Prob of HH is $\frac{1}{4}$ but one H and a T is HT and TH $= \frac{1}{2}$ so not equal.

(1)

[3]

10. An experiment was carried out to investigate the probability of obtaining a tail when a biased coin is thrown.
The relative frequency of a tail was calculated after throwing the coin a total of 20 times, 40 times, 60 times, 80 times and 100 times.
The results are plotted on the graph below.



(a) Which reading do you think gives the best estimate for the probability of obtaining a tail? You must give a reason for your answer.

(1)
0·7 as it comes from the most throws, so should be closer to the actual probability. (1)

[2]

(b) Using the graph, find how many

(i) tails were obtained in the first 60 throws,

P(Tail) = 0·6
So 0·6 × 60 (1)
= 36 tails. (1)

(ii) heads were obtained in the 100 throws.

P(Tail) = 0·7 ∴ P(Head) = 0·3 (1)

0·3 × 100
= 30 heads (1).

[4]

14. A bag contains 11 marbles.
There are 3 yellow, 3 blue and 5 red marbles in the bag.
Two marbles are selected at random from the bag.

(a) Calculate the probability that both the selected marbles are blue.

$\frac{3}{11} \times \frac{2}{10} = \frac{6}{110} = \frac{3}{55}$

1 1

[2]

(b) Calculate the probability that exactly one of the selected marbles is red.

$YR = \frac{3}{11} \times \frac{5}{10} = \frac{15}{110}$

$RY = \frac{5}{10} \times \frac{3}{11} = \frac{15}{110}$ 2

$RB = \frac{5}{10} \times \frac{3}{11} = \frac{15}{110}$

$BR = \frac{3}{11} \times \frac{5}{10} = \frac{15}{110}$

Total $= \frac{60}{110} = \frac{6}{11}$. 1

[3]

13. A bag contains 10 marbles of which 2 are yellow, 3 are blue and 5 are red.
Two marbles are selected at random from the bag. Calculate the probability that exactly one of the selected marbles is blue.

$YB = \frac{2}{10} \times \frac{3}{9} = \frac{6}{90}$

$BY = \frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$ 2

$RB = \frac{5}{10} \times \frac{3}{9} = \frac{15}{90}$

$BR = \frac{3}{10} \times \frac{5}{9} = \frac{15}{90}$

Total $= \frac{42}{90} = \frac{21}{45}$ 1

[3]