



EP.M94 Probability Depth

GL ASSESSMENT EP.M94 · Calculators not allowed · about 55 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A fair coin is flipped once. What is the probability that it lands on tails? Give your answer as a fraction.

(Total for Question 1 is 1 mark)

- 2** A fair six-sided dice is rolled once. What is the probability that the score is an even number?

- ☐ A) $\frac{1}{6}$
☐ B) $\frac{1}{3}$
☐ C) $\frac{1}{2}$
☐ D) $\frac{2}{3}$

(Total for Question 2 is 1 mark)

- 3** A bag contains 4 red counters and 6 blue counters, and no others. A counter is picked at random. What is the probability that it is red? Give your answer as a fraction in its simplest form.

(Total for Question 3 is 1 mark)

- 4** The probability that a train arrives on time is 0.72. Find the probability that the train does not arrive on time.

(Total for Question 4 is 2 marks)

- 5 A spinner is divided into 10 equal sections numbered 1 to 10. It is spun once. What is the probability that the spinner lands on a multiple of 3? Give your answer as a fraction in its simplest form.

(Total for Question 5 is 2 marks)

- 6 A box of raffle tickets contains only yellow, pink and white tickets. The probability of picking a yellow ticket is 0.3 and the probability of picking a pink ticket is 0.45. Find the probability of picking a white ticket.

(Total for Question 6 is 2 marks)

- 7 The probability that a spinner lands on the colour green is $\frac{1}{6}$. The spinner is spun 240 times. How many times would you expect it to land on green?

(Total for Question 7 is 2 marks)

- 8 A card is picked at random from a set of 20 cards numbered 1 to 20. What is the probability that the number is a factor of 20?

- ☐ A) $\frac{1}{5}$
- ☐ B) $\frac{1}{4}$
- ☐ C) $\frac{3}{10}$
- ☐ D) $\frac{2}{5}$

(Total for Question 8 is 2 marks)

- 9 Two fair coins are flipped at the same time. List all the possible outcomes, then find the probability that both coins land on heads.

(Total for Question 9 is 3 marks)

- 10** A fair six-sided dice is rolled and a fair coin is flipped at the same time. Find the probability of getting a 6 on the dice and heads on the coin.

(Total for Question 10 is 3 marks)

- 11** A bag contains only red counters and blue counters. There are 3 times as many blue counters as red counters. A counter is picked at random. Find the probability that it is red. Give your answer as a fraction in its simplest form.

(Total for Question 11 is 3 marks)

- 12** A spinner was spun 50 times. It landed on red 14 times, blue 21 times and green the rest of the time. Estimate the probability that the spinner lands on green.

(Total for Question 12 is 3 marks)

- 13** Two fair six-sided dice are rolled and their scores are added together. Find the probability that the total is 7.

(Total for Question 13 is 3 marks)

- 14** A bag contains 5 red counters and 3 blue counters, and no others. Two counters are picked at random, one after the other, without the first counter being replaced. Find the probability that both counters picked are red.

(Total for Question 14 is 3 marks)

- 15** A number is picked at random from the whole numbers 1 to 25 inclusive. What is the probability that the number is NOT a multiple of 4?

(Total for Question 15 is 2 marks)

- 16** A bag contains only red, blue and green counters. The probability of picking a red counter is $\frac{1}{3}$ and the probability of picking a blue counter is $\frac{1}{4}$. There are 10 green counters in the bag. How many counters are there in the bag altogether?

(Total for Question 16 is 4 marks)

- 17** A four-sided spinner has sections labelled A, B, C and D. The probability of landing on A is twice the probability of landing on B. The probability of landing on C is 0.1 and the probability of landing on D is 0.3. Find the probability of landing on B.

(Total for Question 17 is 3 marks)

- 18** The probability that a certain seed germinates is $\frac{3}{8}$. If 96 seeds are planted, how many would be expected to germinate?

(Total for Question 18 is 2 marks)

- 19** A letter is picked at random from the word MATHEMATICS. What is the probability that the letter is M? Give your answer as a fraction in its simplest form.

(Total for Question 19 is 2 marks)

- 20** A fair spinner has 5 equal sections coloured red, blue, green, yellow and purple. What is the probability that it lands on a colour that is not red? Give your answer as a fraction.

(Total for Question 20 is 1 mark)

- 21** In a class of 30 pupils, 18 walk to school. A pupil is picked at random from the class. Find the probability, as a decimal, that the pupil does not walk to school.

(Total for Question 21 is 2 marks)

- 22** A jar contains only orange sweets and purple sweets, in the ratio 5 : 7. A sweet is picked at random from the jar. Find the probability that it is purple. Give your answer as a fraction in its simplest form.

(Total for Question 22 is 3 marks)

- 23** A spinner has three equal sections numbered 1, 2 and 3. A fair coin is flipped at the same time as the spinner is spun. List all the possible outcomes, then find the probability of getting an odd number on the spinner and heads on the coin.

(Total for Question 23 is 3 marks)

- 24** A bag of counters is used for a probability experiment.

- (a) A bag contains counters that are either black or white only. The probability of picking a black counter is 0.6. There are 18 black counters in the bag. How many counters are there in the bag altogether? (2)

- (b) 5 more white counters are added to the bag, and no counters are removed or added of any other colour. Find the new probability of picking a black counter, giving your answer as a fraction in its simplest form. (3)

(Total for Question 24 is 5 marks)

Mark scheme · EP.M94 Probability Depth

Question 1

- **B1** $\frac{1}{2}$ cao
- **Answer:** $\frac{1}{2}$

Question 2

- **B1** C ($\frac{1}{2}$) cao
- **Answer:** C) $\frac{1}{2}$

Question 3

- **B1** $\frac{2}{5}$ cao
- **Answer:** $\frac{2}{5}$

Question 4

- **M1** recognises the two outcomes have probabilities that sum to 1 (oe)
- **A1** 0.28 cao
- **Answer:** 0.28

Question 5

- **M1** identifies the multiples of 3 from 1 to 10 as 3, 6 and 9 (oe)
- **A1** $\frac{3}{10}$ cao
- **Answer:** $\frac{3}{10}$

Question 6

- **M1** $0.3 + 0.45 = 0.75$ (oe)
- **A1** 0.25 cao
- **Answer:** 0.25

Question 7

- **M1** expected frequency = probability x number of trials (oe)
- **A1** 40 cao
- **Answer:** 40

Question 8

- **M1** lists the factors of 20 as 1, 2, 4, 5, 10 and 20 (oe)
- **A1** C ($\frac{3}{10}$) cao
- **Answer:** C) $\frac{3}{10}$

Question 9

- **M1** lists all 4 outcomes: HH, HT, TH, TT (oe)
- **M1** identifies 1 outcome (HH) as both heads (oe)
- **A1** $\frac{1}{4}$ cao
- **Answer:** $\frac{1}{4}$

Question 10

- **M1** total number of equally likely outcomes = $6 \times 2 = 12$ (oe)
- **M1** identifies exactly 1 outcome matches (6, heads) (oe)
- **A1** $\frac{1}{12}$ cao
- **Answer:** $\frac{1}{12}$

Question 11

- **M1** expresses the counters as a ratio red : blue = 1 : 3 (oe)
- **M1** finds the total number of parts as $1 + 3 = 4$ (oe)
- **A1** $\frac{1}{4}$ cao
- **Answer: $\frac{1}{4}$**

Question 12

- **M1** $14 + 21 = 35$ (times the spinner landed on red or blue)
- **M1** $50 - 35 = 15$ (times the spinner landed on green)
- **A1** $\frac{3}{10}$ cao
- **Answer: $\frac{3}{10}$**

Question 13

- **M1** recognises there are $6 \times 6 = 36$ equally likely outcomes in total (oe)
- **M1** lists the 6 combinations that give a total of 7: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1) (oe)
- **A1** $\frac{1}{6}$ cao
- **Answer: $\frac{1}{6}$**

Question 14

- **M1** $P(\text{first red}) = \frac{5}{8}$ (oe)
- **M1** $P(\text{second red, given first was red}) = \frac{4}{7}$, since one red counter and one counter overall have been removed (oe)
- **A1** $\frac{5}{14}$ cao
- **Answer: $\frac{5}{14}$**

Question 15

- **M1** identifies 6 multiples of 4 from 1 to 25: 4, 8, 12, 16, 20, 24 (oe)
- **A1** $\frac{19}{25}$ cao
- **Answer: $\frac{19}{25}$**

Question 16

- **M1** $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$ (probability of red or blue)
- **M1** $1 - \frac{7}{12} = \frac{5}{12}$ (probability of green)
- **M1** sets up $\frac{5}{12}$ of the total = 10 (oe)
- **A1** 24 cao
- **Answer: 24**

Question 17

- **M1** forms $2x + x + 0.1 + 0.3 = 1$, where x is $P(B)$ (oe)
- **M1** simplifies to $3x = 0.6$ (oe)
- **A1** 0.2 cao
- **Answer: 0.2**

Question 18

- **M1** $96 / 8 = 12$ (oe)
- **A1** 36 cao
- **Answer: 36**

Question 19

- **M1** the word MATHEMATICS has 11 letters, of which 2 are M (oe)
- **A1** $\frac{2}{11}$ cao
- **Answer: $\frac{2}{11}$**

Question 20

- **B1** $\frac{4}{5}$ cao
- **Answer:** $\frac{4}{5}$

Question 21

- **M1** $30 - 18 = 12$ (pupils who do not walk)
- **A1** 0.4 cao
- **Answer:** 0.4

Question 22

- **M1** $5 + 7 = 12$ parts in total (oe)
- **M1** purple sweets make up 7 of the 12 parts (oe)
- **A1** $\frac{7}{12}$ cao
- **Answer:** $\frac{7}{12}$

Question 23

- **M1** lists all 6 outcomes: (1,H), (1,T), (2,H), (2,T), (3,H), (3,T) (oe)
- **M1** identifies the 2 favourable outcomes: (1,H) and (3,H) (oe)
- **A1** $\frac{1}{3}$ cao
- **Answer:** $\frac{1}{3}$

Question 24

- (a) **M1** $18 \div 0.6$ (oe)
- (a) **A1** 30 cao
- **(a) Answer:** 30
- (b) **M1** $30 - 18 = 12$ white counters originally (ft from a)
- (b) **M1** $12 + 5 = 17$ white counters, so $18 + 17 = 35$ counters in total (oe)
- (b) **A1** $\frac{18}{35}$ cao
- **(b) Answer:** $\frac{18}{35}$