Probability

TOPIC TEST

Time allowed: 1 hour

Total marks = 100

SECTION I Multiple-choice questions

10 marks

Instructions • This section consists of 10 multiple-choice questions
• Each question is worth 1 mark
• Fill in only ONE CIRCLE
• Calculators may be used

1 The probability of a particular event is 0.1. That event is:

(A) impossible   (B) unlikely   (C) probable   (D) certain

2 A ball is picked at random from a bag holding 1 black and 2 white balls. The sample space contains how many elements?

(A) $\frac{1}{2}$ (B) 1   (C) 2   (D) 3

3 A coin is tossed twice. What is the probability that both show heads?

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) none of these

4 Which could not be the probability of a particular event?

(A) $\frac{2}{3}$ (B) 60%   (C) 0.2378   (D) $\frac{7}{5}$

5 In a certain group of people the probability of red hair is $\frac{7}{30}$, the probability of brown eyes is $\frac{6}{25}$ and the probability of both red hair and brown eyes is $\frac{2}{15}$. If a person is chosen at random from this group, what is the probability that she or he has red hair or brown eyes?

(A) $\frac{71}{150}$ (B) $\frac{17}{50}$ (C) $\frac{71}{1125}$ (D) $\frac{91}{150}$

6 Which two events are mutually exclusive?

(A) choosing a multiple of 6 or a multiple of 8 when choosing a number from between 1 and 40

(B) getting an even number or a number less than 3 when tossing a die

(C) getting a diamond or a queen when choosing a card from a standard pack of cards

(D) getting 2 heads or 2 tails when tossing two coins

7 A die is tossed twice. What is the probability that the same number appears both times?

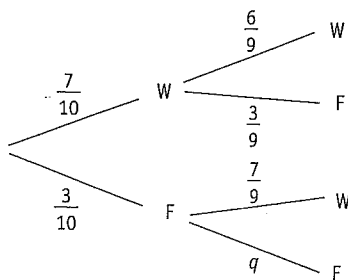(A) $\frac{1}{6}$ (B) $\frac{1}{2}$ (C) $\frac{1}{36}$ (D) $\frac{1}{18}$

8 The probability represented by q on the tree diagram must be:

(A) $\dfrac{2}{9}$

(B) $\dfrac{3}{9}$

(C) $\dfrac{3}{10}$

(D) $\dfrac{6}{9}$

9 A card is drawn at random from a standard pack of 52 playing cards. The card is the six of diamonds. It is not replaced. A second card is then drawn at random. What is the probability that the second card is a diamond?

(A) $\dfrac{1}{4}$ (B) $\dfrac{4}{17}$ (C) $\dfrac{3}{13}$ (D) $\dfrac{6}{13}$

10 Scientists testing a new strain of grass seed have found that 120 seeds germinated and 80 failed to germinate. Based on this information the probability that a particular seed of this strain will fail to germinate is:

(A) $\dfrac{2}{3}$ (B) $\dfrac{2}{5}$ (C) $\dfrac{3}{5}$ D $\dfrac{1}{3}$

SECTION II

Show all necessary working

90 marks

11 A box holds 23 blue, 15 red and 32 white balls. If one ball is selected at random, what is the probability that it is:

2 marks each

a blue

b red

c white

d black

12 An ordinary die is thrown. What is the probability that the uppermost face shows: **2 marks each**

a 3

b an odd number

c a prime number

d a number less than 3

13 25 people entered the photographic competition at the local show. 'The probability of any one of those people winning the competition is therefore $\frac{1}{25}$'. Briefly comment on the truth of this statement.

4 marks

_____

_____

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_____

_____

14 Two different dice are tossed. One die has four faces numbered 1, 2, 3 and 4, while the other die has eight faces numbered from 1 to 8. The numbers on the uppermost faces are added to form the score.

2 marks

a Complete the table.

+	1	2	3	4	5	6	7	8
1								
2								
3								
4								

What is the probability of a score: **2 marks each**

b of 9   **c** less than 5   **d** 8 or higher

_____   _____   _____

_____   _____   _____

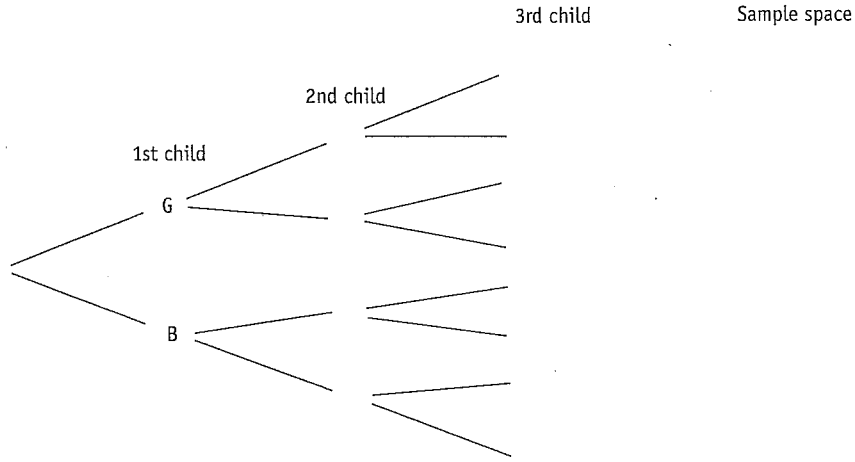**15** The two hundred members of a club were surveyed and it was found that 125 of them owned a car. What is the probability that if a member is chosen at random, he or she will not own a car?   **3 marks**

_____

_____

_____

_____

16 A family includes three children.

   a   Complete the tree diagram.   **4 marks**

   b   What is the probability that the three children are: **2 marks each**

   i   all girls   **ii**   2 girls and a boy   **iii**   at least one boy

   _____   _____   _____

   _____   _____   _____

   _____   _____   _____

17 There is a 6% chance that any person will suffer from a particular disease in a calendar year. Two people are selected at random. What is the probability that:

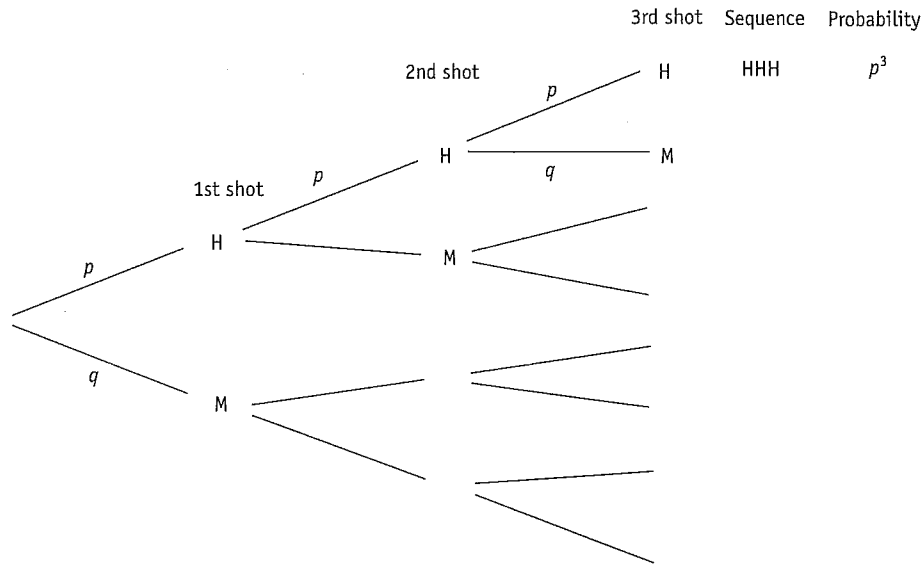   **a**   both catch the disease   **3 marks**

   _____

   _____

   _____

   b   at least one catches the disease   **4 marks**

   _____

   _____

   _____

   _____

18 Three shots are fired at a target. p is the probability that the shot hits the target and q the probability that the shot missed.

a Complete the tree diagram.   **5 marks**

	2nd shot	3rd shot	Sequence	Probability

1st shot ... H ... HHH ... p^3

b If the probability that a shot hits the target is 28%, what is the probability, as a percentage correct to one decimal place, that: **3 marks each**

i every shot is a hit

ii one shot hits only

iii at least one shot misses

19 A president and vice-president are to be randomly chosen from the members of a committee. If the committee consists of 5 women and 7 men, what is the probability that: **3 marks each**

a the president is a woman

b the vice-president is a woman

c both the president and vice-president are women

20 A bag contains 20 blue and 15 white marbles. A marble is drawn at random, its colour noted and then replaced. A second and third marble are drawn and replaced. What is the probability that:

a all three marbles are blue

3 marks

_____

_____

_____

b all three marbles are the same colour

4 marks

_____

_____

_____

_____

21 Chantal buys 6 tickets in a raffle in which 200 tickets are sold. One ticket is drawn for first prize, discarded and a second ticket drawn for second prize. What is the probability that Chantal will win a prize?

5 marks

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22 Teams A and B play two games of one-day cricket. The probability that team A will win is $\frac{3}{5}$, the probability of team B winning is $\frac{7}{20}$, and the probability of a tie or a washed out game is $\frac{1}{20}$. What is the probability that:

a team A wins both games

2 marks

_____

_____

b team B wins at least one game

5 marks

_____

_____

_____

_____

1 B 2 C 3 C 4 D 5 B 6 D 7 A 8 A 9 B 10 B 11 a $\frac{23}{70}$ b $\frac{3}{14}$ c $\frac{16}{35}$ d 0 12 a $\frac{1}{6}$ b $\frac{1}{2}$ c $\frac{1}{2}$ d $\frac{1}{3}$
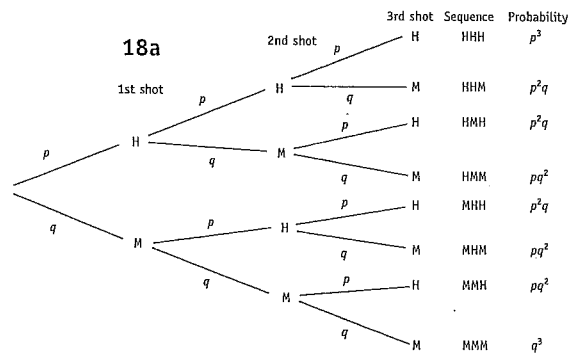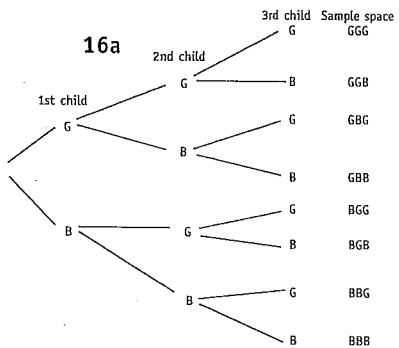
13 The statement is false because the outcomes are not equally likely. The 25 people would have different talents and the most talented would be more likely to win.

14 a

+	1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8	9
2	3	4	5	6	7	8	9	10
3	4	5	6	7	8	9	10	11
4	5	6	7	8	9	10	11	12

b $\frac{1}{8}$ c $\frac{3}{16}$ d $\frac{7}{16}$ **15** $\frac{3}{8}$

16 a (below) b i $\frac{1}{8}$ ii $\frac{3}{8}$ iii $\frac{7}{8}$ **17** a 0.36% b 11.64%

16a

18a

18 a (above right) b i 2.2% ii 43.5% iii 97.8% **19** a $\frac{5}{12}$ b $\frac{5}{12}$ c $\frac{5}{33}$

20 a $\frac{64}{343}$ b $\frac{13}{49}$ **21** $\frac{1179}{19900}$ **22** a $\frac{9}{25}$ b $\frac{231}{400}$