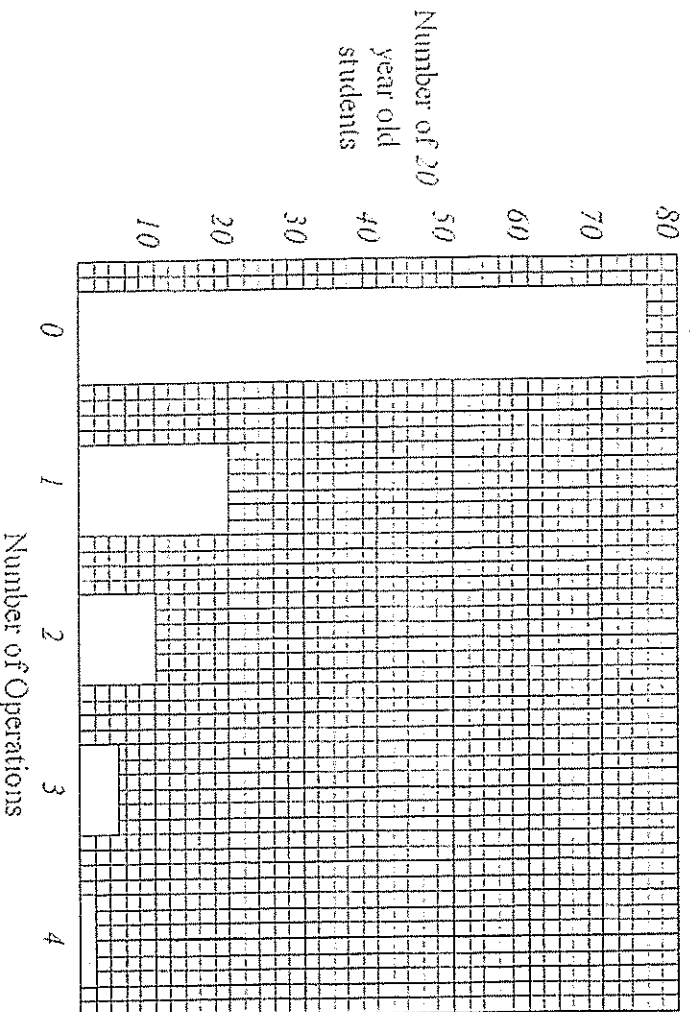


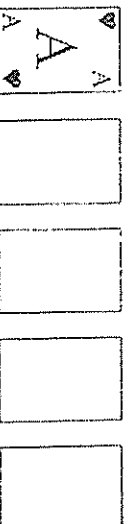
Foundation Questions

- 10) In a small packet there were 7 yellow, 3 red, 4 pink, 8 brown, and 2 blue smarties. One is chosen at random, find the probability that it is:
- red or yellow;
 - green.†
- 11) There are 200 “Lego” bricks in a bucket. Of these 63 are blue, 37 are green, 59 are yellow and the remainder are red. One brick is chosen at random, find the probability of it being:
- white; -
 - blue or red.†
- 12) A bag of 7 blue, 5 white and 3 red balls has one blue ball withdrawn. If the first ball is not replaced, what is the probability that the second ball withdrawn is also blue?
- (A) $\frac{3}{7}$ (B) $\frac{1}{5}$ (C) $\frac{7}{14}$ (D) $\frac{7}{15}$ †
- 13) A coin is tossed three times. What is the probability that on the second toss it is a head?
- (A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$ †
- 14) A twelve sided die, marked with the numbers 1 to 12, is rolled. The probability that the face uppermost is either divisible by 5 or 2 is:
- (A) $\frac{1}{6}$ (B) $\frac{5}{12}$ (C) $\frac{7}{12}$ (D) $\frac{2}{3}$ †
- 15) A group of 20 year old students were surveyed. The graph shows the number of operations each had had up to their twentieth birthday.



- How many students were surveyed?
- Find the probability that a person would reach the age of 20 years without having had at least one operation.†

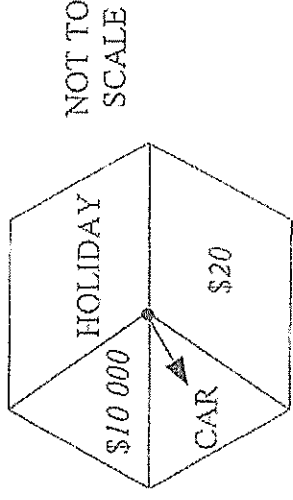
16)



Three picture cards and two aces, (A), are face down. The first card turned over at random is shown. What is the probability that the next card chosen is a picture card?

- (A) $\frac{1}{4}$ (B) $\frac{3}{5}$ (C) $\frac{3}{4}$ (D) $\frac{4}{5}$ †

- 17) A spinner in the shape of a regular hexagon is spun about its centre. Where the arrow stops indicates the prize won. What is the probability of winning a car?



- (A) $\frac{1}{3}$ (B) $\frac{1}{4}$ (C) $\frac{1}{5}$ (D) $\frac{1}{6}$ †
- 18) A letter is chosen at random from the letters of the word “PROBABILITY”. Find the probability that the letter chosen is the letter I.
- (A) $\frac{1}{11}$ (B) $\frac{1}{9}$ (C) $\frac{2}{11}$ (D) $\frac{2}{9}$ †
- 19) Cards numbered 1 to 20 are placed face down on a table. One card is selected at random. What is the probability that the card chosen shows an even number or a number less than 5?
- (A) $\frac{3}{4}$ (B) $\frac{3}{5}$ (C) $\frac{7}{10}$ (D) $\frac{13}{20}$ †

Multi-Stage Events

- 1) a. Calculate the number of different 3 member social committees which can be selected from a class of 12 pupils.
 b. Having chosen 3 pupils for a social committee, in how many different orders may they be seated in a straight line.†
- 2) There are 16 Rugby League teams participating in a local football competition. The coach tells the “Bears” that the probability of the “Bears” winning the competition is $\frac{1}{16}$. Comment on this statement. †
- 3) In Lotto, a standard entry is a game where 6 numbers are chosen from 44, without replacement. How many different standard entries are possible?†
- 4) Sally and Tom are watching a person tossing a coin. The person has tossed 9 heads in a row. Sally says that the next toss of the coin will be heads because heads has occurred 9 times. Tom says that the next toss of the coin will be tails because it must be time for tails to come up after all the heads in a row. What do you think will occur? Give reasons.†
- 5) In a normal pack of 52 cards there are four suits - diamonds, hearts, spades and clubs. Each suit has thirteen cards: *Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King*. Hands of 4 cards are dealt from a normal pack of 52 cards.
- How many different hands are possible?
 - In how many of these hands are there exactly 3 hearts and 1 diamond?†
- 6) A poker machine has three wheels with ten symbols on each wheel as shown:

SYMBOL	WHEEL 1	WHEEL 2	WHEEL 3
Ace	3	2	1
Car	2	1	1
Lemon	4	5	6
Bell	1	2	2

- How many outcomes are possible?
 - In how many ways can three cars appear?†
- 7) Peter’s water polo team plays in a competition against 9 other teams. Comment on the statement:
 ©EDUDATA SOFTWARE PTY LTD: DATA VER 4.0 1995-2000†©SSA NSW 1984-2003 †©BOARD OF STUDIES NSW 1984-2003

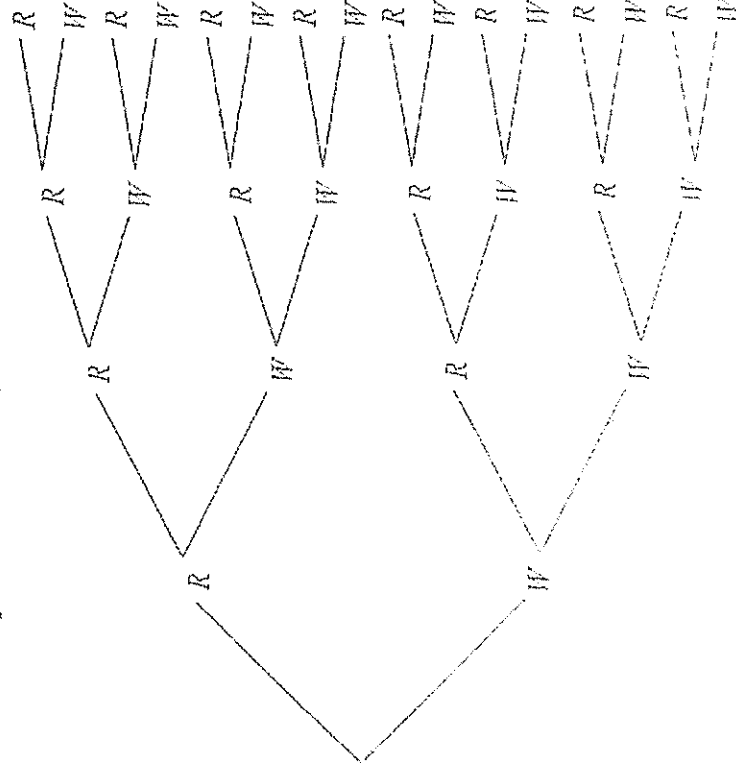
- “As there are 10 teams in the competition, the probability of Peter’s team winning is $\frac{1}{10}$.”
- 8) Three cards are labelled with the digits 4, 6 and 9. A two-digit number is formed. The probability of forming an even number can best be described as:
 (A) unlikely (B) even chance (C) very likely (D) almost certain
- 9) Fifteen teams are taking part in a football competition. Comment on the following statement: “The probability of a particular team winning the competition is $\frac{1}{15}$ ”
- 10) Totto is a game in which six numbers must be correctly selected from thirty numbers (1 to 30). What is the probability of winning Totto by making one selection of six numbers?
- 11) How many different debating teams of 4 students could be selected from 13 students?
- 12) Five people A, B, C, D and E turn up to play squash. List all possible ways two people can be chosen to play first.
- 13) A game similar to Lotto uses cards with numbers one to twenty. This game is played by selecting four of these twenty numbers. What is the probability of marking the four winning numbers?
- 14) How many different 5 card hands can be dealt from a 52 card pack?
- 15) Five girls and five boys are attending a camp.
 i. A group of four girls is needed to cut firewood. How many different groups can be chosen?
 ii. A group of eight, consisting of four boys and four girls, is going canoeing. How many different groups can be chosen?
- 16) i. Cathy, Melinda, and Raelene are the only runners in a race. In how many different ways can they finish if there are no dead-heats?
 ii. Six runners are in a race. In how many different ways can the first three finishing positions be filled?
- 17) A committee of three people is to be chosen at random from a group of eight people. How many different committees can be formed?
- 18) A teacher is arranging 7 children for a group photo. The children will sit in a row. In how many different ways can the teacher arrange the seven children in the row?
- 19) Peter has an 80% chance of winning each game of chess he plays in a particular competition. He is to play three games. He must win at least two of these games to make a final play-off. By using a tree diagram, or otherwise, find the probability that he makes the final play-off.
- 20) Fifty tickets are sold in a raffle. There are two prizes. Michelle buys 5 tickets. The probability that Michelle wins both prizes is given by the expression
 (A) $\frac{5}{50} + \frac{4}{50}$ (B) $\frac{5}{50} + \frac{4}{49}$
 (C) $\frac{5}{50} \times \frac{4}{50}$ (D) $\frac{5}{50} \times \frac{4}{49}$

Tree Diagrams

- 21) In a test, there are four questions to be answered true or false. Each correct answer is worth one mark. The chance that a student will guess the correct answer to any one of the questions is $\frac{1}{2}$.

In the following diagram, *R* indicates a right answer and *W* a wrong answer.

1st question 2nd question 3rd question 4th question



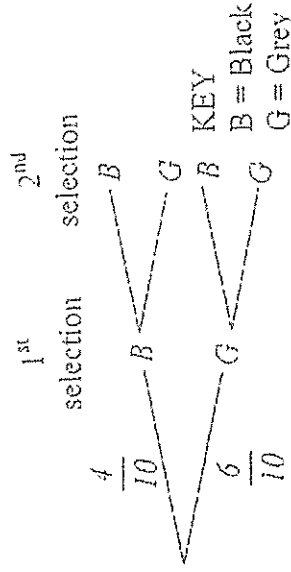
Use the tree diagram to answer the following questions.

- Tzi-keng guesses the answers to all four questions. What is the probability that he will get four right?
 - What is the most likely mark for Tzi-keng on this test? Explain your answer.
 - Amantaria answers the first two questions correctly, and guesses the answers to the last two. What is the probability that she will get four right?
- 22) In a primary school class there are 13 boys and 14 girls. In order to choose two class representatives, the teacher places the names of all the students in a box. Two names are selected at random. What is the probability that two girls' names will be selected?

- (A) $\frac{182}{729}$ (B) $\frac{196}{729}$ (C) $\frac{7}{27}$ (D) $\frac{14}{27}$

23) Sebastian has 4 black socks and 6 grey socks in a drawer. He selects 2 socks at random.

- Copy the tree diagram shown below into your Writing Booklet, and write the probability on each branch.

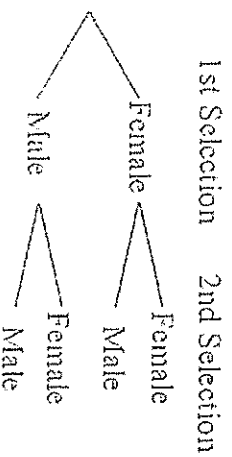


- What is the probability that Sebastian selects a pair of socks matching in colour?
- 24) A box of chocolates contains 12 with hard centres, and 12 with soft centres. Two chocolates are chosen at random. What is the probability that either both have a hard centre, or both have a soft centre?

- (A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{11}{46}$ (D) $\frac{11}{23}$

- 25) At Sunshine Resort, the probability that it will rain on any particular day in January is 0.1 . Gloria will spend 3 days at the Sunshine Resort in January 2001. What is the probability that it will rain on at least one of those 3 days?
 (A) 0.001 (B) 0.271 (C) 0.3 (D) 0.729
- 26) Fifty tickets are sold in a raffle. There are two prizes. Michael buys 5 tickets. Which expression gives the probability that Michael wins both prizes?
 (A) $\frac{5}{50} + \frac{4}{50}$ (B) $\frac{5}{50} + \frac{4}{49}$ (C) $\frac{5}{50} \times \frac{4}{50}$ (D) $\frac{5}{50} \times \frac{4}{49}$

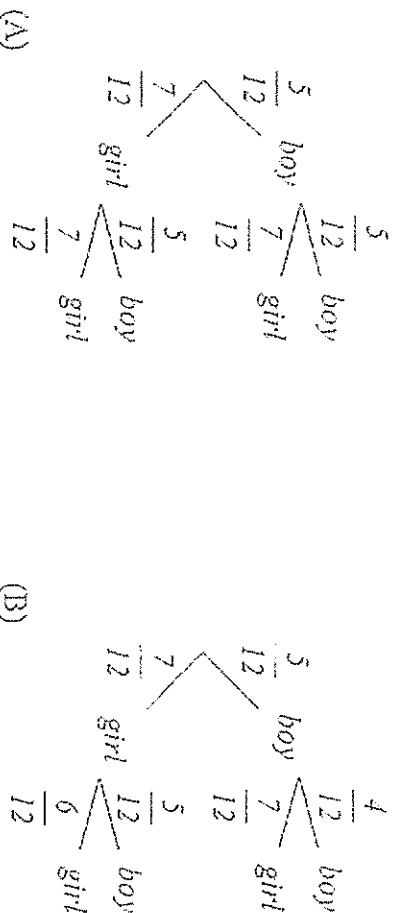
- 27) Five men and three women are living on an island, but not all will be able to stay.
- If one person is selected at random, what is the probability that this person is female?
 - Two people are to be randomly selected to leave the island.
 - Copy the tree diagram into your writing booklet, and complete the diagram by writing the probabilities on all the branches.

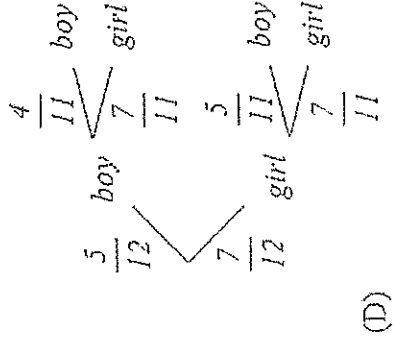
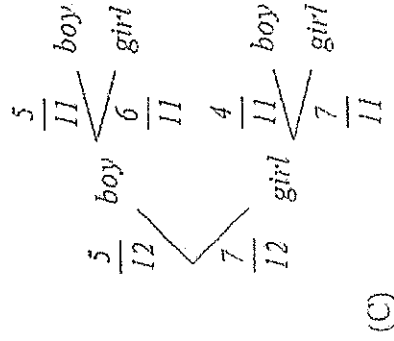


- iii. Antoinette is one of the women on the island. Before the two people are randomly selected to leave, Antoinette calculates her chance of remaining on the island. She concludes that she has a good chance of remaining. Do you agree? Justify your answer.

- 28) Sarah has two packets of jelly beans. Each packet contains one black and five yellow jelly beans. Sarah takes one jelly bean from each packet without looking. What is the probability that both of the jelly beans are black?
 (A) $\frac{1}{36}$ (B) $\frac{1}{12}$ (C) $\frac{1}{6}$ (D) $\frac{1}{3}$

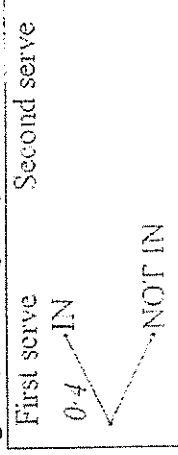
- 29) From 5 boys and 7 girls, two children will be chosen at random to work together on a project. Which of the following probability trees could be used to determine the probability of choosing a boy and a girl?





- 30) A tennis player gets a second serve only if the first serve does not go in. Pat's first serve has a probability of 0.4 of going in, and his second serve has a probability of 0.9 of going in.

- i. Copy the tree diagram shown below.
Complete the tree diagram, showing the probability on each branch.

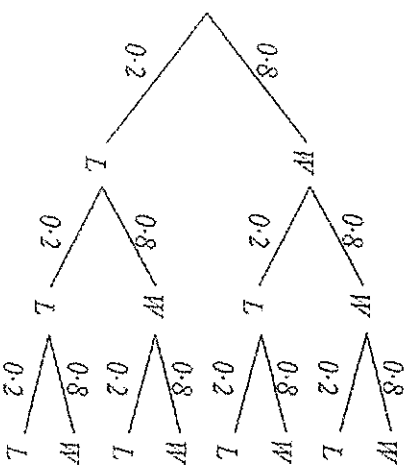


- ii. Find the probability that Pat serves a double fault. (A double fault occurs when both the first and the second serve do NOT go in.)
 - iii. What is the probability that ONE of Pat's serves goes in?
- 31) A basketball player has a 0.8 probability of shooting a goal. If she has two throws, find the probability that she:
- i. shoots two goals;
 - ii. misses both shots.
- 32) A bag contains eighteen white golf balls and two fluorescent golf balls. A golfer randomly selects one ball from the bag and hits it. She then selects another ball from the bag and hits it. What is the probability that:
- i. the first ball hit is fluorescent?
 - ii. both balls are fluorescent?
 - iii. only one of the balls is fluorescent

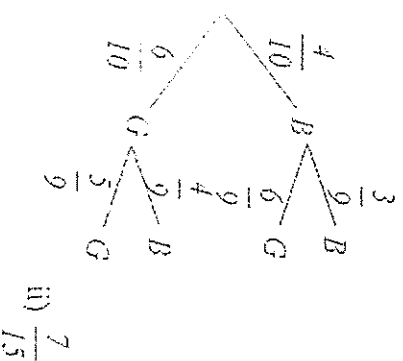
[Answers]

- 1) a) $\frac{5}{12}$ b) 0
- 2) i) 0 ii) $\frac{13}{25}$
- 3) A
- 4) D
- 5) C
- 6) i) $\frac{113}{76}$ ii) $\frac{76}{113}$
- 7) C
- 8) D
- 9) C
- 10) B
- 11) a) 220 b) 6
- 12) This statement assumes that each team in the competition is equally likely to win the premiership. In reality of course this is not the case as there are many factors to be considered (e.g. quality of players, injuries to key players, etc.). The statement is incorrect.
- 13) 7 059 052
- 14) Each loss of the coin is an independent event ∴ both events (H or T) are equally likely to occur.
- 15) i) 270 725 ii) 3718
- 16) i) 1000 possible outcomes ii) 2
- 17) The statement is not true as all teams do not have an equal chance of winning.
- 18) C
- 19) The statement is false. It is not equally likely that each team will win the competition. Some teams will have more skilful players, some will have injuries to key players etc.
- 20) $\frac{1}{593775}$
- 21) 715
- 22) AB, AC, AD, AE, BC, BD, BE, CD, CE, DE
- 23) $\frac{1}{4845}$
- 24) 2 598 960
- 25) i) 5 ii) 25
- 26) i) 6 ii) 120
- 27) 56
- 28) 5040

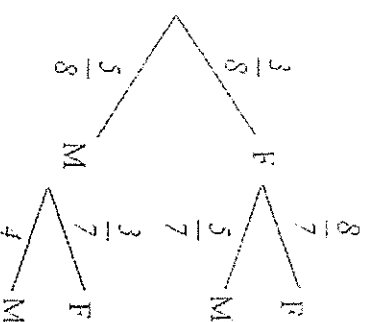
29) P (makes the play-off) = 0.896



- 30) D
- 31) i) $\frac{1}{16}$ ii) 2. It has the highest probability. iii) $\frac{1}{4}$
- 32) C

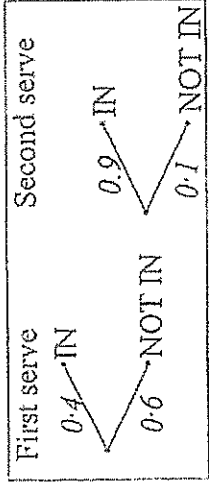


- 33) i)
- 34) D
- 35) B
- 36) D



- 37) i) $\frac{3}{8}$ ii) 1)
- 38) A
- 39) D

ii) Antoinette has a 75% chance of not being chosen, which is a good chance.



40) i) ii) 0.06

- iii) 0.94
- 41) i) 0.64 ii) 0.04
- 42) i) $\frac{1}{10}$ ii) $\frac{1}{190}$ iii) $\frac{18}{95}$