

Statistics and probability

Topic 8: Basic probability

QUESTION 1 A bag contains 7 red, 10 blue and 3 yellow balls. If a ball is drawn at random, find the probability that it is $7+10+3=20$

- a blue $\frac{10}{20}$ ($\frac{1}{2}$) b red $\frac{7}{20}$ c yellow $\frac{3}{20}$
 d not red $\frac{20-7}{20} = \frac{13}{20}$ e non yellow $\frac{20-3}{20} = \frac{17}{20}$ f white $\frac{0}{20}$

QUESTION 2 A die is thrown once. Find the probability that it is $SS = \{1, 2, 3, 4, 5, 6\}$

- a a six $\frac{1}{6}$ b an odd number $\frac{3}{6}$ ($\frac{1}{2}$)
 c an even number $\frac{3}{6}$ ($\frac{1}{2}$) d one or five $\frac{2}{6}$ ($\frac{1}{3}$)
 e zero $\frac{0}{6}$ (0) f any number from 1 to 6 $\frac{6}{6}$ (1)
inclusive.

QUESTION 3 From the letters of the word 'AUSTRALIA', one letter is selected at random. What is the probability that the letter is *9 letters*

- a a vowel $\frac{5}{9}$ b a consonant $\frac{4}{9}$
 c the letter A $\frac{3}{9}$ d the letter S $\frac{1}{9}$

QUESTION 4 A card is drawn at random from a normal pack of 52 cards. Find the probability that the card is

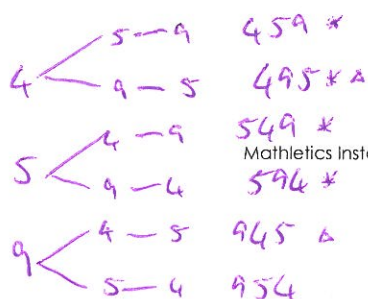
- a a spade $\frac{13}{52}$ ($\frac{1}{4}$) b a black card $\frac{26}{52}$ ($\frac{1}{2}$) c a queen $\frac{4}{52}$ ($\frac{1}{13}$)
 d a red card $\frac{26}{52}$ ($\frac{1}{2}$) e not a club $\frac{37}{52}$ ($\frac{7}{4}$) f an ace or a jack $\frac{8}{52}$ ($\frac{2}{13}$)

QUESTION 5 A three-digit number is to be formed from the digits 4, 5 and 9. What is the probability that:

- a the number formed is odd? $\frac{4}{6}$ ($\frac{2}{3}$) b the number formed is even? $\frac{2}{6}$ ($\frac{1}{3}$)
 c the number is less than 900? $\frac{4}{6}$ ($\frac{2}{3}$) d the number is divisible by 5? $\frac{2}{6}$ ($\frac{1}{3}$)

QUESTION 6 The numbers from 1 to 10 are written on separate cards. One card is chosen at random. What is the probability that the number is: $SS \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

- a odd $\frac{5}{10}$ ($\frac{1}{2}$) b even $\frac{5}{10}$ ($\frac{1}{2}$)
 c seven $\frac{1}{10}$ d more than seven $\frac{3}{10}$
 e less than seven $\frac{6}{10}$ ($\frac{3}{5}$) f zero $\frac{0}{10}$ (0)
 g a prime number $\frac{4}{10}$ ($\frac{2}{5}$) h divisible by 3 $\frac{3}{10}$
 i a factor of 5 $\frac{2}{10}$ ($\frac{1}{5}$) j a multiple of 4 $\frac{2}{10}$ ($\frac{1}{5}$)
(2+2)



Statistics and probability

Topic 9: Probability and tree diagrams

QUESTION 1 A coin is tossed twice. What is the probability of having

	H	T
H	HH	HT
T	TH	TT

- a two heads? $\frac{1}{4}$
- b a head and tail in any order? $\frac{2}{4} (\frac{1}{2})$
- c two tails? $\frac{1}{4}$
- d no heads? $\frac{1}{4}$

QUESTION 2 There are four cards marked with the numbers 2, 3, 4 and 5. They are put in a box. Two cards are selected at random one after the other to form a two-digit number.

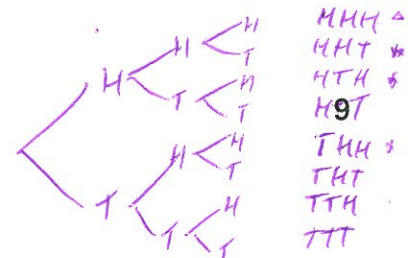
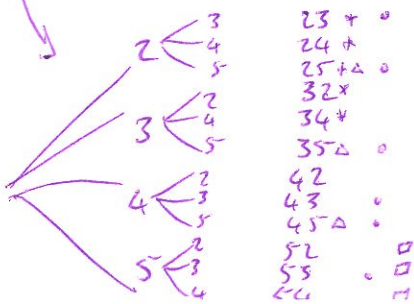
- a How many different two-digit numbers can be formed? 12
- b The probability of a number less than 35 = $\frac{5}{12}$
- c The probability that the number formed is divisible by 5 = $\frac{3}{12} (\frac{1}{4})$
- d The probability of an odd number = $\frac{6}{12} (\frac{1}{2})$
- e The probability of an even number = $\frac{6}{12} (\frac{1}{2})$
- f The probability of a number greater than 50 = $\frac{3}{12} (\frac{1}{4})$

QUESTION 3 Michelle has a box containing one red marble and two green marbles. She selects two marbles at random. Find the probability of

- a two green marbles if she replaces the first marble before she selects the second. $\frac{4}{9}$
- b one red marble if she does not replace the first marble. $\frac{4}{6} (\frac{2}{3})$

QUESTION 4 Three coins are tossed together. What is the probability that

- a two heads and a tail will be thrown? $\frac{3}{8}$
- b three heads will be thrown? $\frac{1}{8}$



Probability – Relative Frequency and Probability

Topic 3 - Simple probability (2)

QUESTION 1 A bag contains 4 white marbles and 1 black marble. If one marble is drawn out at random, what is the probability, as a decimal, that it is:

- a black $\frac{1}{5} = 0.2$ b white $\frac{4}{5} = 0.8$ c yellow $\frac{0}{5} = 0$

QUESTION 2 A raffle ticket is drawn from a box containing 100 tickets numbered from 1 to 100. Find the percentage chance that the number of the ticket is:

- a divisible by 10 $\frac{10}{100} = 10\%$ b less than 10 $\frac{9}{100} = 9\%$
 c greater than 10 $\frac{90}{100} = 90\%$ d a multiple of 5 $\frac{20}{100} = 20\%$
 e greater than 90 $\frac{10}{100} = 10\%$ f a number containing the digit 9 $\frac{19}{100} = 19\%$

QUESTION 3 A spinner used in a game is in the shape of a pentagon, and has an equal chance of landing on any of its sides. The sides are numbered 1, 2, 3, 4 and 5. What is the probability, as a percentage, that the spinner lands on:

- a 2 $\frac{1}{5} = 20\%$ b an odd number $\frac{3}{5} = 60\%$

QUESTION 4 The internal phone numbers at a factory have three digits.

- a How many phone numbers are possible? 1000 $10 \times 10 \times 10$
 b If the numbers are allocated at random, what is the probability, as a decimal, that Lucas has a phone number that ends in 5? $\frac{1}{10} = 0.1$ $0, 1, 2, 3, 4, 5, 6, 7, 8, 9$

QUESTION 5 A bag holds 9 blue, 6 red and 3 yellow golf tees. If a tee is selected at random from the bag at random, what is the probability, (as a fraction in simplest form), that the tee is:

- a blue $\frac{9}{18} = \frac{1}{2}$ b red $\frac{6}{18} = \frac{1}{3}$ c yellow $\frac{3}{18} = \frac{1}{6}$ $9 + 6 + 3 = 18$
 d red or blue $\frac{9+6}{18} = \frac{15}{18} = \frac{5}{6}$ e green $\frac{0}{18} = 0$ f red, yellow or blue $\frac{15}{18} = \frac{5}{6}$

QUESTION 6 Complete:

The probability of any event is always in the range from 0 to 1.

Two Way Tables

Example One:

The following two way table has information regarding sex of students in year 8 and 9. Complete the two way table and answer the questions below.

	Year 8	Year 9	Total
Male	122	108	230
Female	105	105	210
Total	227	213	440

- a) How many year 8 students are there 227
- b) How many female students are in year 9 105
- c) What is the probability of choosing a year 9 student $\frac{213}{440}$
- d) What is the probability of choosing a male year 8 student $\frac{122}{440}$

Example Two:

The following two way table has information regarding possible science subjects year 10 students have chosen for year 11

	Biology	Physics	Chemistry	Total
Male	13	4	15	32
Female	15	24	19	58
Total	28	28	34	90

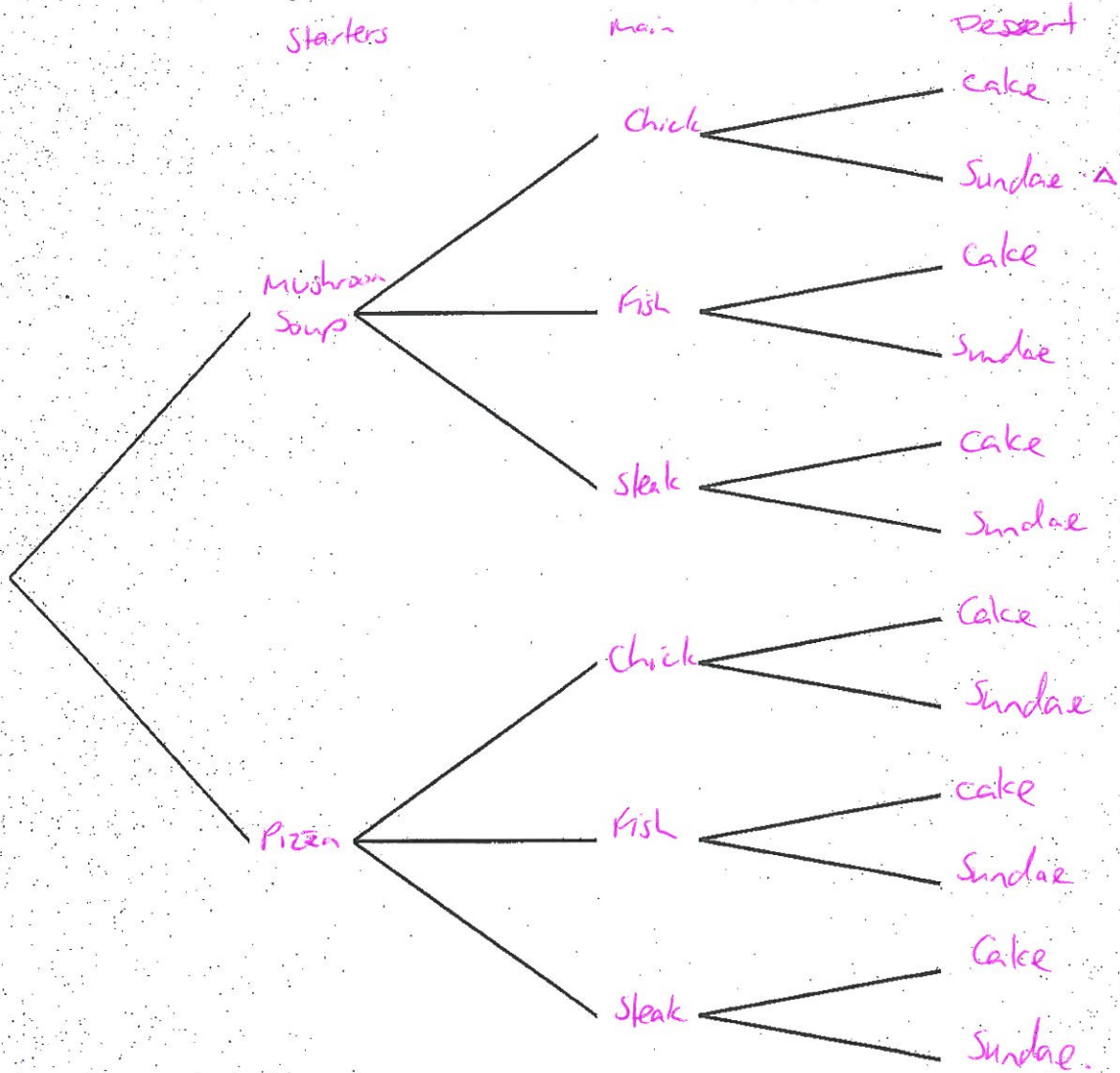
- a) How many students are there in total? 90
- b) How many Students are female? 58
- c) How many students chose biology? 28
- d) What is the probability of choosing a male student? $\frac{32}{90}$
- e) What is the probability of choosing a female student doing physics? $\frac{24}{90}$

Question one:

At a restaurant you get to choose from a set menu. The following includes the menu:

Starters (entrée)	Mushroom soup	or	Mini Pizza		
Main Course	Chicken	or	Fish	or	Steak
Desert	Chocolate Cake	or	Strawberry Sundae		

Complete the Tree diagram below and determine the sample space



Determine the probability of someone choosing

a) Mini pizza as their entree

$\frac{1}{2}$

b) Mushroom soup, chicken and strawberry sundae

$2 \times 3 \times 2 = 12$

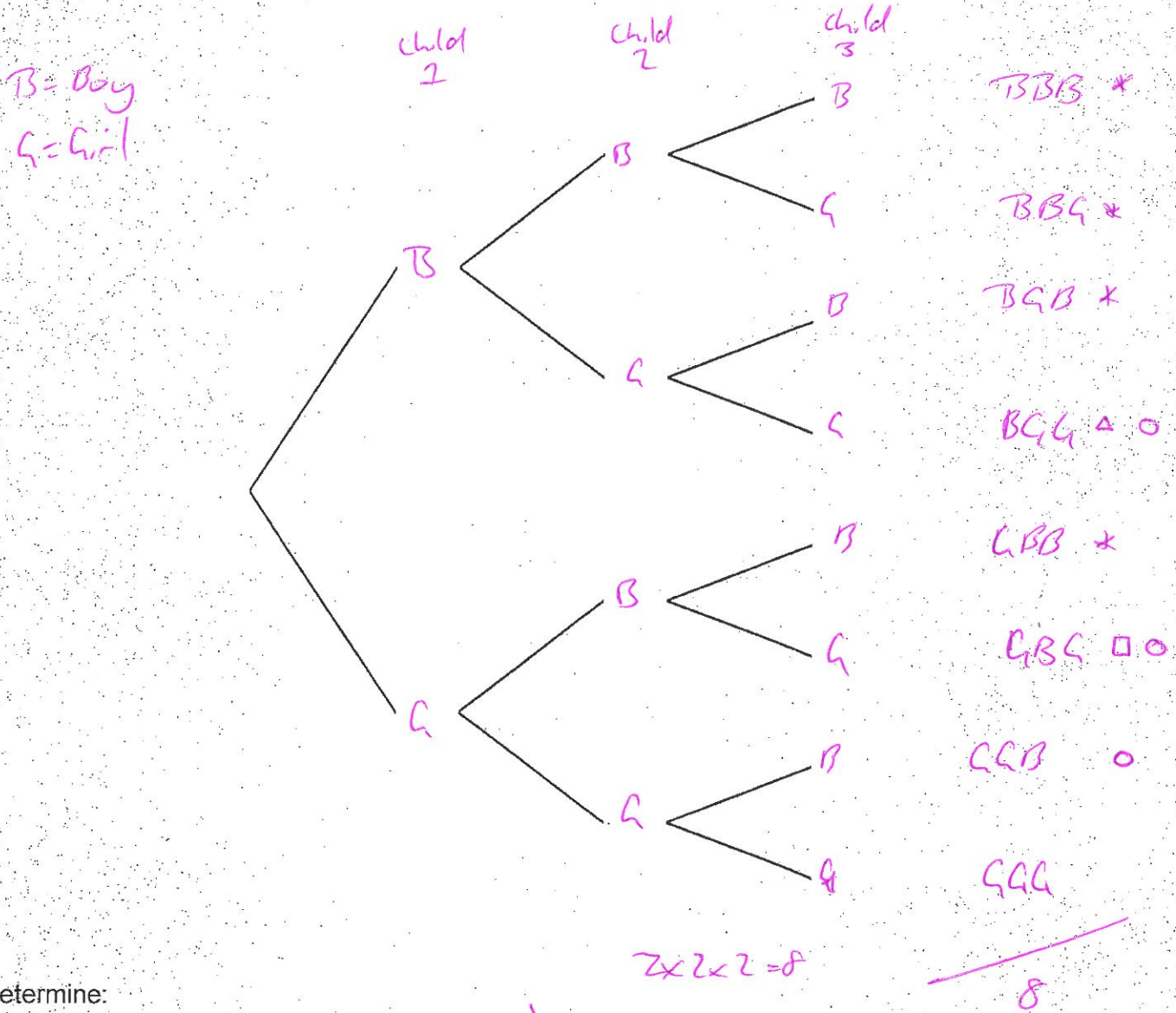
$\frac{1}{12}$

c) Fish or steak as their main meal.

$\frac{2}{3}$ or $\frac{8}{12}$

Question Two:

If a couple were to have three children, complete the tree diagram below to show the possible outcomes of what the sex of the children could be.



Determine:

- a) the probability of getting all boys $\frac{1}{8}$
- b) the probability of getting at least 2 boys * $\frac{4}{8}$ ($\frac{1}{2}$)
- c) the probability of getting a boy first and then two girls. $\frac{1}{8}$
- d) the probability of getting a girl then boy and then girl. $\frac{1}{8}$
- e) The probability of getting 2 girls in any order. $\frac{3}{8}$