

ANSWERS

FOR TEST

Name: _____

Multiple Choice

1 The probability that the sun will rise today can be described as:

- A impossible
- B highly unlikely
- C certain
- D no chance
- E very unlikely

2 The estimated probability for not getting a head when a coin is tossed is:

- A 0
- B $\frac{1}{2}$
- C $\frac{1}{3}$
- D $\frac{1}{4}$
- E 1

3 Questions 3 and 4 refer to the following information:

A die was rolled 50 times and the number two came up 10 times. The relative frequency of obtaining a two is:

- A $\frac{1}{5}$
- B $\frac{4}{5}$
- C $\frac{1}{2}$
- D 1
- E 0

$$\frac{10}{50} = \frac{1}{5}$$

4 The relative frequency of a number that is not a two is

- A $\frac{1}{5}$
- B $\frac{4}{5}$
- C $\frac{1}{2}$
- D 1
- E 0

$$1 - \frac{1}{5} = \frac{4}{5}$$

5 Out of 12 soccer balls tested, 4 were found to be deflated. The relative frequency of deflated soccer balls is:

- A 1
- B 0
- C $\frac{1}{2}$
- D $\frac{2}{3}$
- E $\frac{1}{3}$

$$\frac{4}{12} = \frac{1}{3}$$

6 The probability of getting an odd number when you roll a die is:

- A $\frac{1}{2}$
- B $\frac{1}{3}$
- C $\frac{1}{6}$
- D 0
- E 1

$$\frac{3}{6} = \frac{1}{2}$$

7 The sample space when tossing a 5 sided die is:

- A {5}
- B {1}
- C {1, 3, 5}
- D {1, 2, 3, 4, 5}
- E {2, 4, 6}

8 If the probability that it will rain tomorrow is $\frac{2}{3}$, the probability that it will not rain is

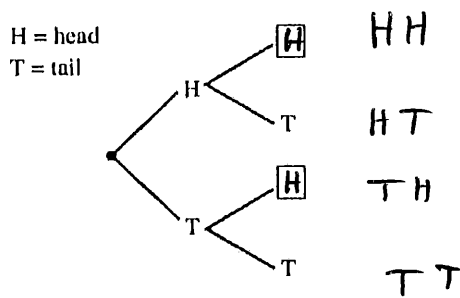
- A 1
- B 0
- C $\frac{4}{3}$
- D $\frac{2}{3}$
- E $\frac{1}{3}$

$$1 - \frac{2}{3} = \frac{1}{3}$$

9 Tossing a coin will simulate the outcomes of

- A 6 videos to watch
- B 5 multiple choice answers on a test
- C electing a school captain from 3 students
- D childbirth
- E 4 different courses on a menu

10 Questions 10, 11 and 12 refer to the following information:
The figure below is a tree diagram that shows the event of tossing two coins.



What will go in the blank squares?

- A T
- B H
- C HH
- D TT
- E HT

11 The outcomes are

- A HH, TT
- B HHT, THT
- C H, T
- D HTHT
- E HH, HT, TH, TT

12 The probability of a getting a tail and a head is

- A $\frac{1}{4}$
- B $\frac{3}{4}$
- C $\frac{1}{3}$
- D $\frac{1}{2}$
- E 1

Favourable outcomes: {HT, TH}

13 Consider the following table of students who play sport.

	Boys	Girls
Cricket	12	10
Football	16	0
Tennis	8	8
Golf	4	12
TOTAL	40	30

The relative frequency of tennis players is:

- A $\frac{8}{70}$
- B $\frac{8}{16}$
- C $\frac{16}{70}$
- D $\frac{8}{40}$
- E $\frac{1}{4}$

$$\frac{8+8}{70} = \frac{16}{70}$$

Probability Test A

Name: _____

Section B Short/Extended answer

1 Describe these events as either:
impossible,
likely,
or not likely.

- (a) You roll a die and the number 2 comes up. *not likely*
 (b) You will not eat any chocolate over the next 3 days. *likely (for me)*
 (c) You spin a 4 sector spinner labelled 1 to 4 and it lands on number 5. *impossible*

2 A die is rolled 80 times with the number 2 coming up 12 times. Find the relative frequency of:

- (a) obtaining a 2 $\frac{12}{80} = \frac{3}{20}$
 (b) not obtaining a 2. $\frac{17}{20}$

3 Joanna tested 20 pairs of pantyhose and found 5 to have rips in them.

- (a) What was the relative frequency of the ripped pantyhose? $\frac{5}{20} = \frac{1}{4}$
 (b) What fraction of pantyhose were wearable (not ripped)? $\frac{15}{20} = \frac{3}{4}$

4 A die was rolled 120 times and the results recorded are shown below.

Score	1	2	3	4	5	6
Frequency	28	15	32	5	24	16

- (a) List the outcomes for each event.
 (i) Obtaining an even number. *(i) {2, 4, 6}*
 (ii) Obtaining a number less than 4. *(ii) {1, 2, 3}*
 (iii) Obtaining a number greater than 2. *(iii) {3, 4, 5, 6}*

(b) Express the relative frequency of each of the face numbers.

(b) For 1: $\frac{28}{120} = \frac{7}{30}$ For 4: $\frac{5}{120} = \frac{1}{24}$

For 2: $\frac{15}{120} = \frac{1}{8}$ For 5: $\frac{24}{120} = \frac{1}{5}$

For 3: $\frac{32}{120} = \frac{4}{15}$ For 6: $\frac{16}{120} = \frac{2}{15}$

- 5 A 4-sector spinner was spun 10 times and the results noted as shown below.
 1, 4, 2, 3, 2,
 1, 3, 1, 4, 4.

(a)

Result	1	2	3	4
Frequency	3	2	2	3

- (a) Organise the data into a frequency table.
 (b) Find the relative frequency of each outcome.
 (c) What is the total of all the relative frequencies?

(b) $1: \frac{3}{10}$ $2: \frac{2}{10}$ $3: \frac{2}{10}$
 $4: \frac{3}{10}$

(c) $\frac{3}{10} + \frac{2}{10} + \frac{2}{10} + \frac{3}{10} = \frac{10}{10} = 1$

- 6 A standard packet of 52 playing cards has 4 suites of 13 cards each. The 4 suites are hearts, clubs, diamonds and spades. The cards in each suite are labelled 2 to 10 then jack, queen, king and ace. A card is drawn at random (and is replaced each time).

What is the probability of getting:

- (a) a 4 Favourable outcomes {4H, 4D, 4S, 4C} $\Pr(\text{getting a 4}) = \frac{4}{52} = \frac{1}{13}$
 (b) an ace Favourable outcomes: {AH, AD, AS, AC} $\Pr(\text{an ace}) = \frac{4}{52} = \frac{1}{13}$
 (c) an even number Favourable outcomes: $\left\{ \begin{array}{l} 2H, 4H, 6H, 8H, 10H \\ 2D, 4D, 6D, 8D, 10D \\ 2S, 4S, 6S, 8S, 10S \\ 2C, 4C, 6C, 8C, 10C \end{array} \right\}$
 (d) a king of spades? $\Pr(\text{king of spades}) = \frac{1}{52}$

- 7 What is the sample space of

- (a) a coin toss $\mathcal{E} = \{H, T\}$
 (b) a die being rolled $\mathcal{E} = \{1, 2, 3, 4, 5, 6\}$
 (c) a drawing pin being dropped? ?
 (d) spinning a 5 sector spinner? $\mathcal{E} = \{1, 2, 3, 4, 5\}$

$\Pr(\text{even no.}) = \frac{20}{52} = \frac{5}{13}$

- 8 A 7 sided die tossed, find the probability of getting

- (a) An even number $\Pr(\text{even}) = \frac{3}{7}$
 (b) a 3 $\Pr(\text{a 3}) = \frac{1}{7}$

9 A standard die is rolled, find the probability of getting:

(a) a 5 $\Pr(a\ 5) = \frac{1}{6}$

(b) 3 or 4 $\Pr(3\ \text{or}\ 4) = \frac{2}{6} = \frac{1}{3}$

(c) an odd number $\Pr(\text{odd number}) = \frac{3}{6} = \frac{1}{2}$

(d) a prime number $\Pr(a\ \text{prime}) = \frac{3}{6} = \frac{1}{2}$ (Favourable outcomes: $\{2, 3, 5\}$)

(e) a multiple of 2 $\Pr(\text{multiple of 2}) = \frac{3}{6} = \frac{1}{2}$ (Favourable outcomes: $\{2, 4, 6\}$)

10 A card is randomly drawn from a well shuffled pack. Find the chance that it is:

(a) a heart $\Pr(\text{Heart}) = \frac{1}{4}$

(b) a 9 $\Pr(a\ 9) = \frac{4}{52} = \frac{1}{13}$

(c) not a 7 $\Pr(\text{not 7}) = \frac{12}{13}$

(d) a spade or club $\Pr(\text{spade or club}) = \frac{1}{2}$

11 Debbie randomly selects a marble from a bag that has 9 red, 4 orange, 3 yellow and 2 blue marbles. What is the probability that she picks

(a) a yellow marble $\Pr(\text{Yellow}) = \frac{3}{9+4+3+2} = \frac{3}{18} = \frac{1}{6}$

(b) an orange or blue marble $\Pr(\text{orange or blue}) = \frac{4+2}{18} = \frac{6}{18} = \frac{1}{3}$

(c) a marble that is not red? $\Pr(\text{not red}) = \frac{18-9}{18} = \frac{9}{18} = \frac{1}{2}$

12 Questions 21 to 25 refer to the following information.

Use a tree diagram to show the sample space of tossing two coins.

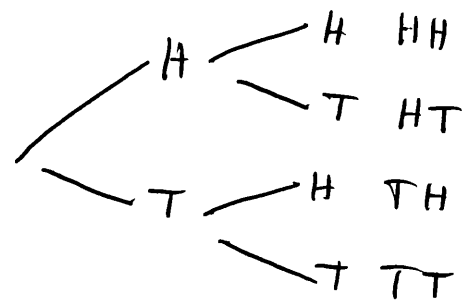
Find the probability of obtaining

(a) 2 heads $\Pr(HH) = \frac{1}{4}$

(b) a head and a tail $\Pr(a\ \text{head and a tail}) = \frac{2}{4} = \frac{1}{2}$

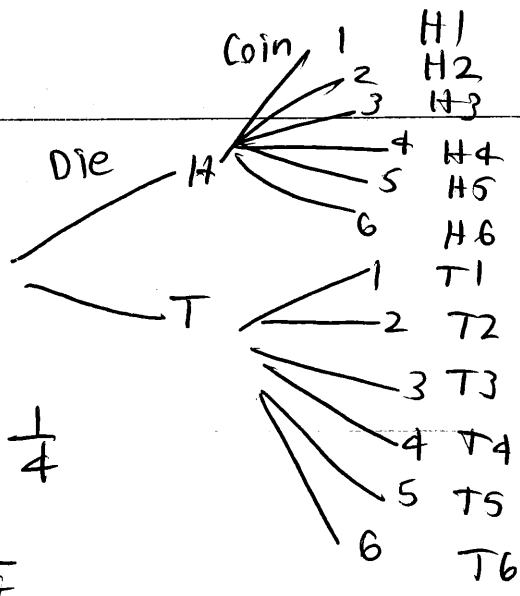
(c) the same result with both coins.

$\Pr(\text{same result}) = \frac{2}{4} = \frac{1}{2}$



↳ Favourable outcomes: $\{HH, TT\}$

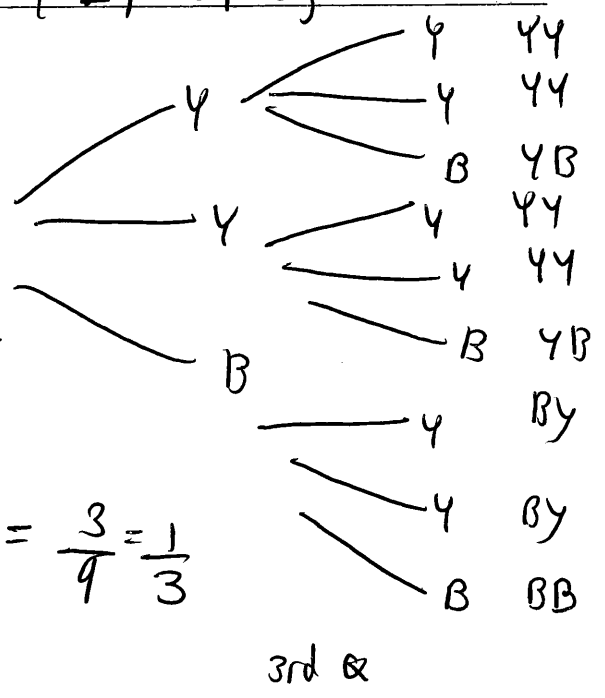
13 If a die is rolled and a coin is tossed, find the probability of obtaining. Draw a Tree Diagram or a Two Way Table.



- (a) a tail $Pr(\text{tail}) = \frac{6}{12} = \frac{1}{2}$
- (b) 1, head $Pr(1, \text{tail}) = \frac{1}{12}$
- (c) even, head $Pr(\text{even, head}) = \frac{3}{12} = \frac{1}{4}$
- (d) tail, prime number $Pr(\text{tail, prime}) = \frac{3}{12} = \frac{1}{4}$

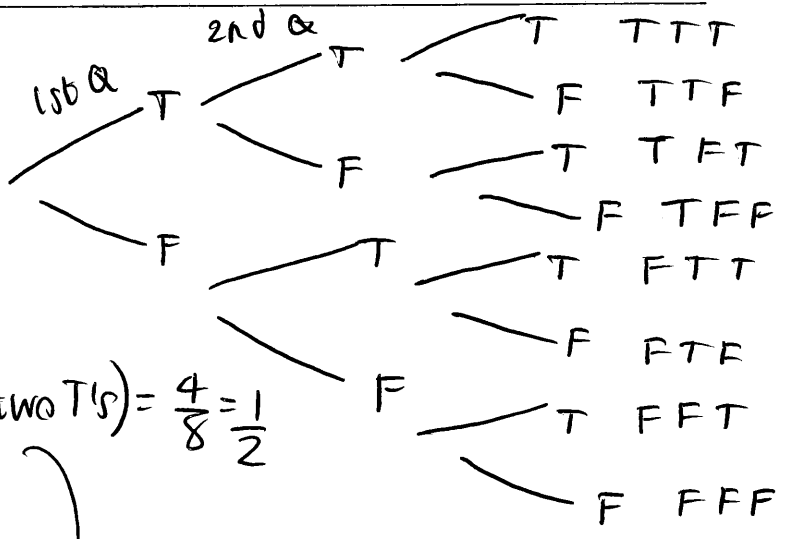
Favourable outcomes: $\{T2, T3, T5\}$

14 Susan chooses a marble from a bag containing 2 yellow marbles and 1 black marble. The colour is noted and it is replaced and a 2nd marble is selected. Find the probability of drawing. Use a Tree Diagram to illustrate the outcomes.



- (a) yellow then yellow $Pr(YY) = \frac{4}{9}$
- (b) black then yellow $Pr(\text{black then yellow}) = \frac{2}{9}$
- (c) no yellows $Pr(BB) = \frac{1}{9}$
- (d) at least one black first. $Pr(\text{at least one black first}) = \frac{3}{9} = \frac{1}{3}$

15 For a 3 question test the possible answers are True (T) or False (F). What is the probability of the correct answers being:



- (Use a Tree Diagram!!)
- (a) TTT $Pr(TTT) = \frac{1}{8}$
 - (b) FFF $Pr(FFF) = \frac{1}{8}$
 - (c) at least two Ts $Pr(\text{at least two T's}) = \frac{4}{8} = \frac{1}{2}$
 - (d) F then both T? $Pr(FTT) = \frac{1}{8}$

Favourable outcomes: $\{TTT, TTF, FTT, TFT\}$

16 In the game Powerball, the powerball is chosen from balls numbered from 1 to 45. Find the probability that the powerball number is:

(a) 38 $\Pr(\text{getting } 38) = \frac{1}{45}$

(b) even $\Pr(\text{even}) = \frac{22}{45}$

(c) less than 20 $\Pr(\text{less than } 20) = \frac{19}{45}$

(d) a multiple of 4

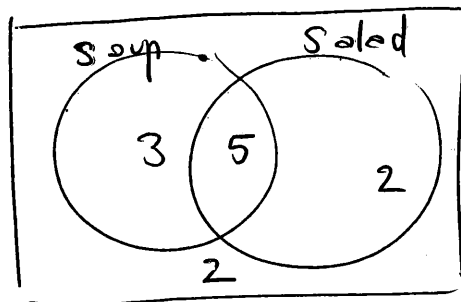
$$\mathcal{E} = \{ \underline{1}, \underline{2}, \underline{3}, \underline{4}, \underline{5}, \underline{6}, \underline{7}, \underline{8}, \underline{9}, \underline{10}, \underline{11}, \underline{12}, \underline{13}, \underline{14}, \underline{15}, \underline{16}, \underline{17}, \underline{18}, \underline{19}, \underline{20}, \underline{21}, \underline{22}, \underline{23}, \underline{24}, \underline{25}, \underline{26}, \underline{27}, \underline{28}, \underline{29}, \underline{30}, \underline{31}, \underline{32}, \underline{33}, \underline{34}, \underline{35}, \underline{36}, \underline{37}, \underline{38}, \underline{39}, \underline{40}, \underline{41}, \underline{42}, \underline{43}, \underline{44}, \underline{45} \}$$

Favourable outcomes = $\{ 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44 \}$

$$\Pr(\text{multiple of } 4) = \frac{11}{45}$$

- 17 A group of 12 diners sat at a table. Five of them ordered both soup and salad, 2 ordered neither while 3 ordered soup only.

a. Complete a Venn diagram of this situation.



- b. If a diner is selected at random, calculate the probability that he/she had soup.

$$\Pr(\text{Soup}) = \frac{8}{12} = \frac{2}{3}$$

- c. If a diner is selected at random, calculate the probability that he or she had only salad.

$$\Pr(\text{salad only}) = \frac{2}{12} = \frac{1}{6}$$

- d. What does $n(\text{Soup} \cap \text{Salad})$ equal?

$$n(\text{Soup} \cap \text{salad}) = 5$$

- e. What does $n(\text{Soup} \cup \text{Salad})$ equal?

$$n(\text{Soup} \cup \text{salad}) = 10$$

- f. What does $\Pr(\text{Salad}')$ equal?

$$\Pr(\text{salad}') = \frac{5}{12}$$

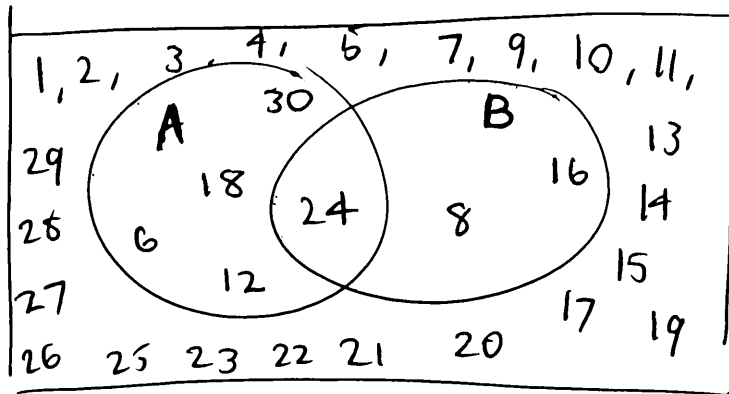
- 18 Let $\xi = \{ \text{all counting numbers from 1 to 30 inclusive} \}$
 Let $A = \{ \text{all multiples of 6} \}$
 Let $B = \{ \text{all multiples of 8} \}$

a. List the sets A and B.

$$A = \{ 6, 12, 18, 24, 30 \}$$

$$B = \{ 8, 16, 24 \}$$

b. Draw a Venn Diagram to illustrate these sets.



c. i. Find: $n(A \cap B)$

$$n(A \cap B) = 1$$

ii. Find $n(A \cup B)$

$$n(A \cup B) = 7$$

d. Find, as fractions in simplest form:

i. $\Pr(A \cap B)$

$$\Pr(A \cap B) = \frac{1}{30}$$

ii. $\Pr(A \cup B)$

$$\Pr(A \cup B) = \frac{7}{30}$$

iii. $\Pr(A')$

$$\Pr(A') = \frac{25}{30} = \frac{5}{6}$$

iv. $\Pr(B)$

$$\Pr(B) = \frac{3}{30} = \frac{1}{10}$$

