



Mathematics Essentials 2019

Task Weighting: 8%

Student Name: _____

TOTAL 57 Marks

Time Allowed: 10 Minutes

Marks: 14

Calculator Free

No calculator or notes permitted for this section.

Question 1 (2 marks: 1, 1)

Consider the word PROBABILITY. A letter is picked from this word at random.

(a) What is the probability of picking a letter I?

$$P(I) = \frac{2}{11} \quad \checkmark$$

(b) What is the probability of picking a vowel?

$$P(\text{vowel}) = \frac{4}{11} \quad \checkmark$$

Question 2 (2 Marks)

Express the probability of the following situation using the appropriate method shown:

Choosing a blue jellybean from a jar containing 7 red, 5 green and 4 blue jellybeans

I. Word unlikely

II. Fraction $\frac{4}{16} = \frac{1}{4}$

\checkmark
②

III. Decimal 0.25

IV. Percentage 25%

Question 3 (2 Marks)

Provide a real life example/situation where probability is used to make a decision or decisions.
Explain your answer

Example

Probability of
car accidents

DECISIONS

- insurance pay outs for claims
- road repairs / improvements by local councils.

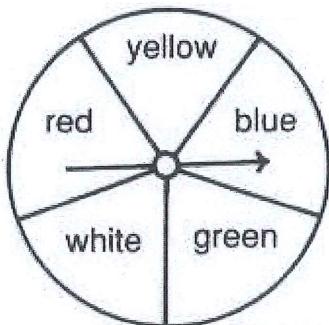
Question 4 (1 Marks)

Mines Rovers Colts have won 3 of their 12 games (as of round 15). What is their relative frequency of winning?

$$f. \frac{3}{12} = 0.25 \quad \checkmark$$

Question 5 (3 Marks)

There are 450 coloured sweets in a bag. Use the spinner below to answer the questions.



(a) Calculate the number of blue sweets.

$$\frac{1}{5} \times 450 = 90 \quad \checkmark$$

(b) How many sweets are NOT blue or yellow.

$$P(\text{not blue / yellow}) = \frac{3}{5} \quad \checkmark$$

$$\frac{3}{5} \times 450 = 270 \quad \checkmark$$

Question 6 (2 Marks)

Tomorrow's weather forecast includes the statements: The probability of strong winds is 70%. The chance of rain is $\frac{4}{5}$. Which event, strong winds or rain is more likely to occur? Justify with calculations.

wind 70% rain $\frac{4}{5} = 80\%$. ✓

rain more likely ✓

Question 7 (2 Marks)

The musical group, Boyz II Men, has three members.



In the picture above, they stood in the order Wanya, Nathan and Shawn. Display a sample space to show the different combinations showing different ways in which they could stand in line before taking a photo.

WNS

NWS

SWN

✓

WSN

NSW

SNW

End of Calculator Free Section

Time Allowed: 45 Minutes

Marks: 40

Calculator Assumed - Calculators and files are allowed in this test.

Show all working to maximise marks.

Question 8 (4 marks – 1, 1, 1, 1)

- (a) Complete the table to show the sample space of the event of throwing two six sided dice and multiply the numbers together.

		1st dice					
		1	2	3	4	5	6
2 nd Dice	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

- (b) Calculate the probability that the answer is less than 12.

$$P(<12) = \frac{19}{36} \quad \checkmark_{FT}$$

- (c) Calculate the probability that the answer is a square number.

$$P(\text{square}) = \frac{6}{36} \quad \checkmark_{FT}$$

- (d) What is the probability that the answer is greater than 36?

$$P(>36) = \frac{0}{36} \quad \checkmark_{FT}$$

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Question 9 (5 Marks)

Brodie **ALWAYS** orders from the following items when he eats at McDonalds; a Big Mac or a Quarter Pounder to start, then either a Chocolate, Caramel or Strawberry Mega Choc Waffle Cone and finally either a Coke or Fanta to wash it down.

If Brodie goes to McDonalds twice a week for 3 weeks how many Chocolate Mega Choc Waffle Cones would you expect Brodie to eat? Justify by demonstrating the sample space.

$$2 \times 3 = 6 \text{ days}$$



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

$$P(BM \text{ & } W)$$

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

$$P(QP \text{ & } W)$$

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

$$P(W, BM \text{ or } QP)$$

waffles

$$\frac{2}{6} \times 6 = 2$$

Question 10 (7 Marks: 2, 1, 1, 3)

In basketball a player can shoot one of 3 shots; a 2 pointer (worth 2 points), a 3 pointer (worth 3 points) or a Free Throw (worth 1 point). A player's shooting percentage is the probability of making that shot.

If Tiani has a 2-Point field goal percentage of 46%, a 3-Point field goal percentage of 30% and a Free Throw percentage of 80%. Calculate:

- a) How many Free Throws would you expect to be successful from 56 shots?

$$80\% \times 56 = 44.8 \approx 45$$

44 ✓

- b) How many 2-Pointers would you expect to be successful from 21 shots?

$$0.46 \times 21 = 9.66 \approx 10$$

so 9 ✓

- c) How many 3-Pointers would you expect to be successful if 15 were shot?

$$0.3 \times 15 = 4.5 \text{ So } 4 \text{ or } 5$$

✓

- d) Zac rates himself as a 3-point shooter (3-Point field goal percentage of 35%) but Tiani thinks differently. Tiani challenges Zac to a shootout and says that with 20 shots she could outscore Zac by shooting only 2 pointers, with Zac only shooting 3 pointers. Is she correct? Justify with calculations

Tiani: $46.70 \times 20 = 9.2 = 9$

$$9 \times 2 = 18 \text{ points}$$

✓

Zac $0.35 \times 20 = 7$

$$7 \times 3 = 21$$

✓

Zac will win



7

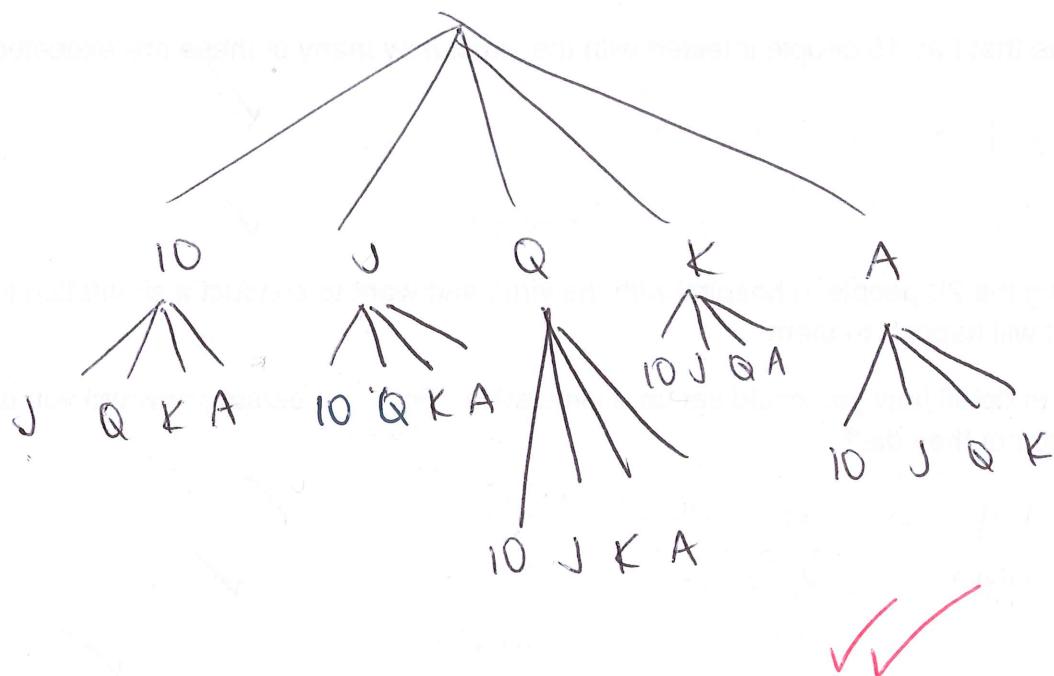
Question 11 (5 marks)

Two cards are drawn at random from a set of five playing cards. They are :

10, Jack, Queen, King and Ace

After the first card is drawn, it is not returned to the pile.

- a) Draw a tree diagram to display all possible combinations of the two cards that could be selected.



- b) Hence calculate the probability that,

- i) An Ace is one of the two cards drawn

$$\frac{8}{20} = \frac{2}{5}$$



- ii) A Jack is drawn first

$$\frac{1}{5}$$



FT

- iii) A Jack and a Queen are drawn

$$\frac{2}{10} = \frac{1}{5}$$



15

Question 12 (10 Marks 1, 2, 3, 2, 2)

Supposing that Ebola has a 70% fatality rate for those infected.

- a) If there are 20 people in a hospital currently being treated for Ebola, how many of those people would you expect to die?

$$0.3 \times 20 = 14$$

- b) In a village that has 15 people infected with the virus, how many of these are expected to survive?

$$0.7 \times 15 = 10.5 \quad \text{so } \underline{10}$$

$$15 - 10 = 5 \quad \text{survive}$$

You are studying the 20 people in hospital with the virus and want to conduct a simulation to determine what will happen to them.

- c) Describe in detail how you could set up a simulation. For each person, how will you determine whether or not they die?

using a 6-sided die

assign 1, 3, 5, 6 = die

2, 4 = survive

Toss die to determine outcome

- d) How many trials of the simulation would you run? Explain your reasons.

30+



reliable

data.



- e) Does this simulation guarantee to give you an accurate picture of what will happen? Explain.

No, gives likelihood.

not certainty that the event will occur.



10

Question 13 (7 Marks: 2, 2, 2, 1)

This game is based on tennis but uses a coin and a six-sided die. There are two players, A and B. A serves by tossing a coin. If the outcome is heads (H) the service is good; if tails (T) there is a fault and that player is allowed to serve again. Only two services are allowed. H or TH gives a good service; TT gives a double fault, and B wins the point.

If the service is good, B rolls the die.

If the outcome is 1, 2, 3, or 4 then it is a good stroke; if 5 or 6 then the point is lost.

If the stroke is good then A rolls the die. This continues until the point is lost.

Pete is playing Mark in a game of Rainy Day Tennis.

- a) Pete is serving. He tosses the coin and gets a head. He then tosses the coin again and gets another head. Mark says that Pete is playing the game incorrectly. Explain why.

(H) serve is good so no
need to toss coin again ✓✓

- b) The following results of tossing the coin and rolling the die were recorded for a game:

T H 3 1 4 2 6

Explain who won, given that Pete served. Explain your answer

Pete✓, as Mark rolled the final

6 which meant the point was lost✓

- c) If neither player had a coin, but they had the die, explain a method that could be used to play the game so that it is basically the same as in the rules.

1,2,3 = good serve. ✓
4,5,6 = fault ✓

or other reasonable answer

- d) State one factor that may cause this simulation to no longer model the real world event.

Fitness, court surface, weather, injury.

Question 14 (4 marks – 1, 1, 1, 1)

- a) What is the difference between a census and a sample?

Sample = portion
census = every one

- b) Give one reason why the Australian census is conducted.

- population growth
- government planning

The 2016 census data estimated Australia's population at 23 401 892.

The median age of people in Australia is 38 years.

Use the data below from the 2016 Census to complete this sentence.

- c) Children aged 0 - 14 years made up 18.65 % of the population and people aged
- d) 65 years and over made up 15.71 % of the population in 2016.

Age	2016	2011
0 - 4 years	1 464 779	1 421 050
5 - 9 years	1 502 646	1 351 921
10 - 14 years	1 397 183	1 371 054
15 - 19 years	1 421 595	1 405 798
20 - 24 years	1 566 793	1 460 674
25 - 29 years	1 664 602	1 513 236
30 - 34 years	1 703 847	1 453 775
35 - 39 years	1 561 679	1 520 138
40 - 44 years	1 583 257	1 542 879
45 - 49 years	1 581 455	1 504 143
50 - 54 years	1 523 551	1 447 404
55 - 59 years	1 454 332	1 297 244
60 - 64 years	1 299 397	1 206 116
65 - 69 years	1 188 999	919 319
70 - 74 years	887 716	708 090
75 - 79 years	652 658	545 263
80 - 84 years	460 549	436 937
85 years and over	486 842	402 681

End of Test

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