



Name: _____

Teacher: _____

Year 10 Stage 5.1 Mathematics Assessment Task 3 – Preparation Task - 2023

Topics:**Indices, Probability & Data****Task number: 3****Weighting: 15%****Due Date: 31/8/23****Nature and description of the task:**

Today you are receiving a “Preparation Booklet” with a series of problems. You are expected to investigate/attempt each of these questions and submit the solutions on the due date. On the 31st August 2023 you will receive a selection of questions similar to those in this preparation activity booklet. You will have 20 minutes to complete an in-class Validation Task.

The final mark for this assessment is broken down as follows:

- Take-home Preparation Booklet = 70%
- In-class Validation Task = 30%

NOTE:

- You will **NOT** have access to the Preparation Booklet during the in-class Validation Task.
- Marks may be deducted for a lack of working out. Please show all working out for all short answer questions.

Outcomes assessed:

- MA5.1-5NA operates with algebraic expressions involving positive-integer and zero indices, and establishes the meaning of negative indices for numerical bases.
- MA5.1-12SP uses statistical displays to compare sets of data, and evaluates statistical claims made in the media.
- MA5.1-13SP calculates relative frequencies to estimate probabilities of simple and compound events
- MA5.1-2WM selects and uses appropriate strategies to solve problems
- MA5.1-3WM provides reasoning to support conclusions that are appropriate to the context

Non-Completion of Task:

If you know you are going to be away on the day of the Validation Task, you must make alternative arrangements with your teacher beforehand. If you are suddenly away on the day of the Task, you must contact your teacher on your return to school. Documentation will be required in both cases.

Plagiarism, the using of the work of others without acknowledgement, will incur serious penalties and may result in a zero award. Any cheating will also incur penalties.

Failure to follow the above procedures may also result in a zero award. The policies and procedures that are outlined on the ROSA booklet will be followed regarding the non-completion of assessment tasks.

As a result of completing this assignment, students should be familiar with:

- the processes used to simplify expressions that incorporate positive and negative indices. This includes the use of scientific notation.
- the notation and terminology associated with calculating of chance of an event. Students should also be able to solve simple probability questions using a variety of diagrams and tables, as well as problems that include multi-stage events.
- the variety of ways data can be organised, displayed and analysed. They should also be able to make comparisons and judgements based on the data given.

Marks:

OUTCOME	MARK
Indices <ul style="list-style-type: none"> • MA5.1-5NA operates with algebraic expressions involving positive-integer and zero indices, and establishes the meaning of negative indices for numerical bases. 	/14
Probability <ul style="list-style-type: none"> • MA5.1-13SP calculates relative frequencies to estimate probabilities of simple and compound events 	/13
Data <ul style="list-style-type: none"> • MA5.1-12SP uses statistical displays to compare sets of data, and evaluates statistical claims made in the media. 	/17
TOTAL	/44

Question 1 – Indices (14 marks)

(a) *Multiple Choice: Circle the Correct Answer*

What is the correct way to write $a \times a \times a \times y \times y \times y$ in index form?

- (A) ay^3 (B) $3ay^3$ (C) $3a3y$ (D) a^3y^3

1

(b) *Multiple Choice: Circle the Correct Answer*

What is the correct way to express $\left(\frac{2a}{b}\right)^3$ in expanded form?

- (A) $\frac{2a}{b} \times \frac{2a}{b} \times \frac{2a}{b}$ (B) $3 \times \frac{2a}{b}$ (C) $\frac{2a}{b} + \frac{2a}{b} + \frac{2a}{b}$ (D) $\frac{6a}{3b}$

1

(c) Fully simplify the following expressions:

i) $v^7 \times v^5 =$

1

ii) $r^9 \div r^3 \times r^4 =$

1

iii) $(c^4)^2 =$

1

iv) $(5x^3)^3 =$

1

v) $3x^0 =$

1

vi) $\frac{(2p^2 \times 3p^4)^2}{20p^3}$

2

- (d) Below is a table of basic numerals that have also been written in scientific notation.

Basic Numeral	Scientific Notation
365 000	3.65×10^5
205 000 000 000	2.05×10^{11}
0.000 001 5	1.5×10^{-6}

- i) It is said that the average human has approximately 110 000 hairs on their head.

What is this number, expressed in scientific notation?

1

- ii) The current world population is estimated to be approximately 8.05×10^9 . How many human hairs are there on the planet? Express your answer in both scientific notation and as a basic numeral.

2

- iii) Each hair grows at a rate of approximately 1.3×10^{-5} metres per hour. How long is this in millimetres? Write your answer as a basic numeral.

(Remember that 1 metre = 1000 millimetres)

1

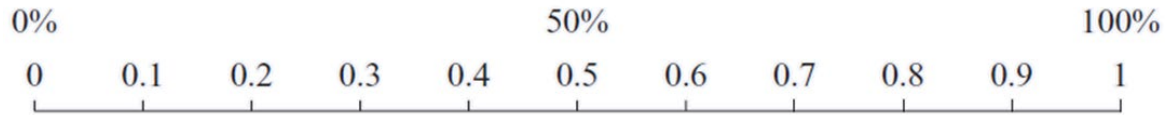
- (e) If $x^y = y^x$, what could the values of x and y be? Note: $x \neq y$

1

END OF QUESTION 1

Question 2 – Probability (13 marks)

- (a) On the number line pictured below, write the words *certain*, *likely*, *impossible*, *even chance* and *highly unlikely* underneath to the correct position.



1

- (b) *Multiple Choice: Circle the Correct Answer*

A coin is tossed three times and the result has been heads all three times. What is the probability of a heads on the next throw?

1

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

- (c) *Multiple Choice: Circle the Correct Answer*

The table below shows the number of cars which exited a large roundabout.

Road	Rhonda Road	Louis Lane	Sven Street	Aden Avenue
Number of cars	43	11	34	33

What is the probability of picking a car that takes Aden Avenue or Louis Lane when it exits the roundabout?

1

- (A) $\frac{1}{11}$ (B) $\frac{4}{11}$ (C) $\frac{6}{11}$ (D) $\frac{10}{11}$

- (d) A survey was conducted of 120 people who stayed at the Prestige Hotel, asking whether they would recommend the hotel or not. Of the 70 females surveyed, 27 said that they would not recommend the hotel to others. There were 55 people who would recommend the hotel to others.

	Male	Female	Total
Recommend			
Not Recommend			
Total			

- i) Using the information above, complete the two-way table. 2

- ii) If we were to randomly select a guest, what is the probability that the person was a male who would not recommended the Prestige Hotel? 1

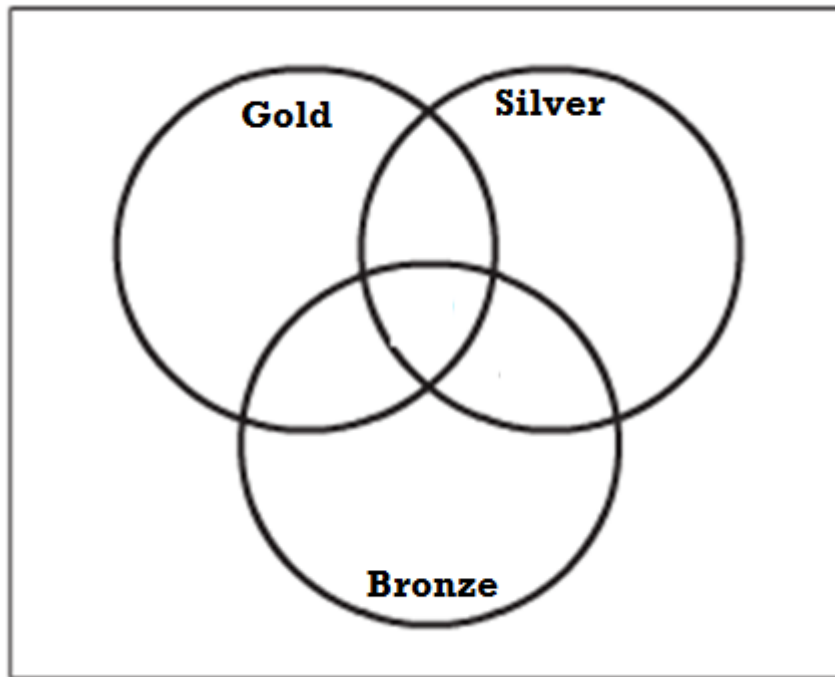
- iii) If we were to randomly select a guest from those that would recommend the hotel, what is the probability that the person was female? 1

- (e) Research over the past 25 years shows that each November there is an average of two wet days on Sunnybank Island. Travelaround Tours offer one-day tours to Sunnybank Island at a cost of \$150 each, with a money back guarantee against rain.

- i) What is the relative frequency of wet November days as a percentage? 1

- ii) If Travelaround Tours take 1200 bookings for tours in November, how much money would they expect to refund? 1

- (f) There has been a total of 71 teams compete at the Commonwealth Games since its existence.



- i) Using the information listed below, complete the triple Venn diagram pictured above. 3
- 43 teams have won gold, silver and bronze
 - 2 teams have won gold only
 - 3 teams have won both silver and gold, but not bronze
 - Ireland is the only nation to win a silver only
 - 4 teams have failed to win gold, but have won silver and bronze
 - 5 teams have won bronze only
- ii) How many teams are yet to win a medal at the Commonwealth Games? 1
-

End of Question 2

Question 3 – Data & Statistics (17 marks)

The data shown below illustrates the amount of tackles each player made during a game where the Dragons played the Sharks. Use this data to answer questions (a) – (e)



St- George Illawarra Dragons

6	14	16	19	21	23	24	25	26	26	28	33	36	39	47
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Cronulla Sharks

6	17	25	33	33	36	39	40	44	48	49	50	51	53	55	60
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(a) *Multiple Choice: Circle the Correct Answer*

What type of data is listed above?

- (A) Categorical Nominal (B) Categorical Ordinal
 (C) Numerical Discrete (D) Numerical Continuous

1

(b) For each team, find the mean (to 1 decimal place), mode, median and range.

4

Dragons



Mean:

Mode:

Median:

Range:

Sharks



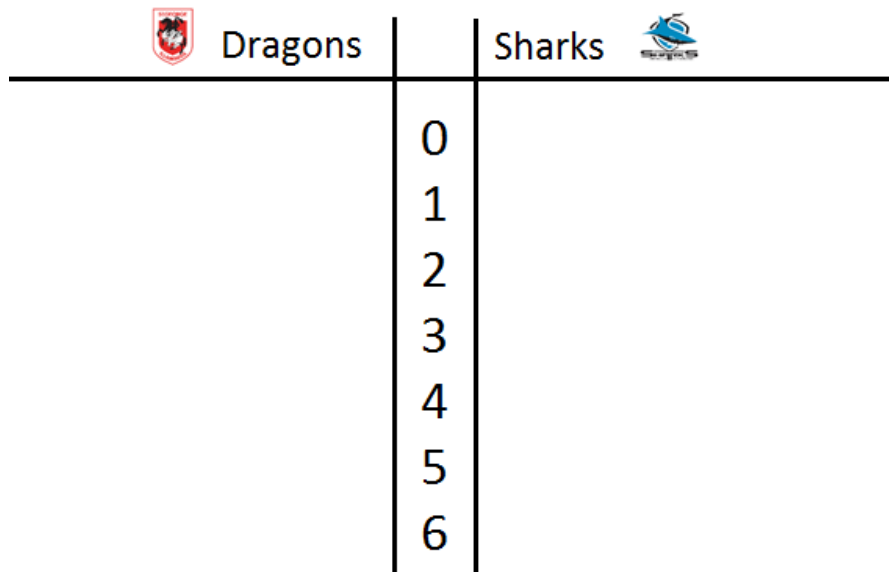
Mean:

Mode:

Median:

Range:

(c) Represent the data in a (back to back) stem and leaf plot



2

(d) Based on your stem and leaf plot, what can you say about the shape of the distribution for each team? Also make comment on any clusters and/or outliers.

Dragons:

1

Sharks:

1

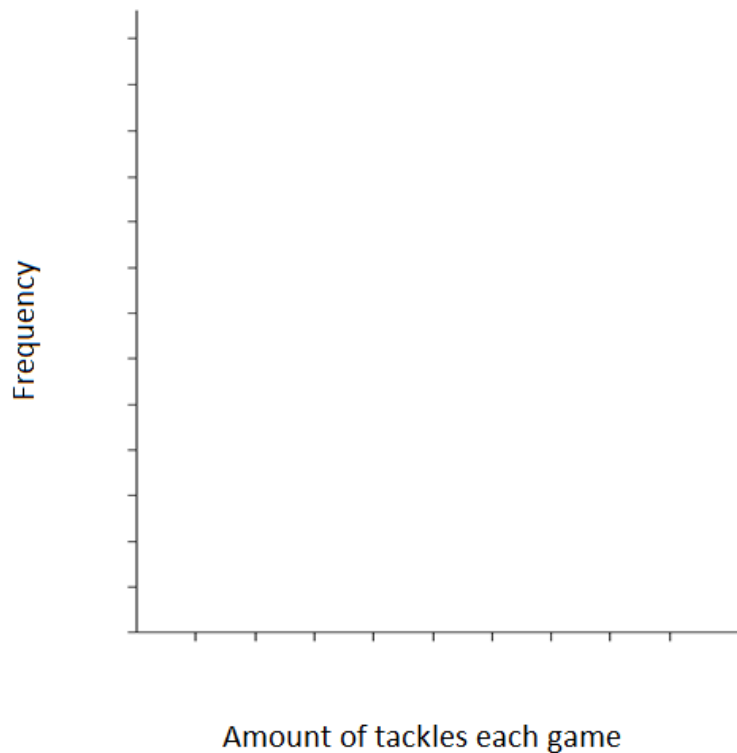
(e) Based on the tackle data only, make a prediction as to who won the game. Justify your answer using statistical terminology.

2

- (f) The data for the amount of tackles each player from the Dragons made during the whole season are recorded in the grouped frequency table below.

Amount of tackles per game	Class Centre (x)	Frequency (f)	f x x
6 – 10	8	5	40
11 – 15	13	6	78
16 – 20		9	
21 – 25		15	
26 – 30		24	
31 – 35		55	
36 – 40		48	
41 – 45		65	
46 – 50		52	
		$\sum f =$	$\sum f \times x =$

- i) Fill in the blanks above to complete the grouped frequency table. 2
- ii) Calculate the mean number of tackles, correct to 1 decimal place. 1
-
- iii) Using the data from the grouped frequency table, construct a Frequency Histogram and Polygon. 3
 (Hint: Use the class centre as your x – axis)



End of Question 3

END OF PREPARATION ACTIVITY