



Maitland Grossmann High School
General Mathematics
Preliminary
Half Yearly Examination
2008

Time Allowed: 1 ½ hours (plus 5 minutes reading time)

Section 1: 15 Multiple Choice Questions (1 mark each)

Answer on Multiple Choice Answer Sheet
Allow about 20 minutes for this section

Section 2: 5 Short Response Questions (15 marks each)

Answer on the provided writing paper
Start each question on a new page
Allow about 70 minutes for this section

General Instructions:

- Write using a black or blue pen.
- Board-approved calculators may be used.
- Draw diagrams using pencil.
- A Formulae Sheet is provided.

Please Note: Where necessary in this paper 1 year = 52 weeks

This paper must not be removed from the examination room

Section 1: Multiple Choice (1 mark each). Answer on the Sheet Provided.

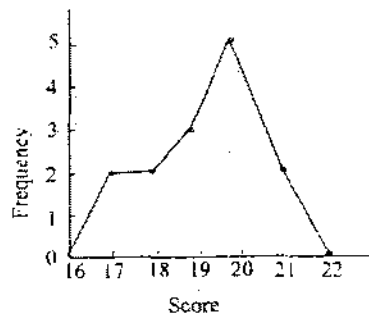
1. What metric unit would you use to measure the width of a pencil?
A millimetres B centimetres C metres D kilometres

2. Alex is paid a casual rate of \$14.20 per hour from 10:00 am until 3:00 pm each day he works, and overtime at time-and-a-half rate per hour for working after 3:00 pm. Alex works from 10:00 am until 4:00 pm, and then from 6:00 pm until 9:30 pm on Thursdays. What is Alex paid for working on a Thursday?
A \$145.55 B \$159.75 C \$166.85 D \$209.45

3. Express in scientific notation 903 054 286.
A 9.03054286×10^8 B 9.03054286×10^9 C 90.3054286×10^7 D 90.3054286×10^8

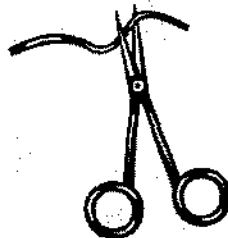
4. A group of students were asked to write down their ages last birthday. Which of the following terms BEST describes this data?
A discrete B continuous C categorical D stratified

5. This frequency polygon shows the class results for a test.



The range of this test would be:

- A 4 B 6 C 5 D 22
6. When the string is cut into two pieces in the ratio 4:5, the length of the longest piece is 20 cm.



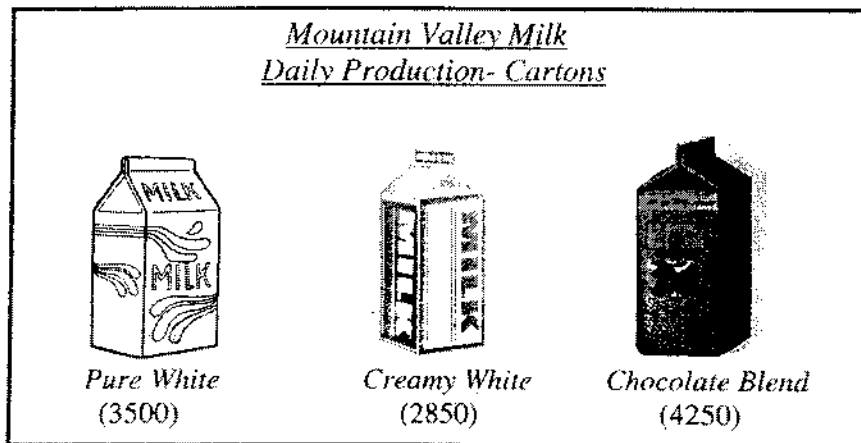
What was the length of the string before it was cut?

- A 16 cm B 19 cm C 25 cm D 36 cm

7. Using the formula $P = 4Q^2$, what is the value of Q if $P = 36$?

- A 1.5 B 3 C 24 D 81

8. In a dairy factory, three flavours of milk are refined and produced in cartons. The number of each produced is shown in brackets.



In a quality control stratified sample, 1000 cartons are selected from the factory on a particular day. The approximate number of "Chocolate Blend" cartons that should be selected is:

- A 400 B 425 C 750 D 1400

9. The 10th term in the sequence -7, -4, -1, 2, ... is:

- A 17 B 20 C 23 D 26

10. A correct line in the solution of $6x - 2 = 5x + 18$ is:

- A $-x = 18 + 2$ B $x = 18 - 2$ C $x = 18 + 2$ D $-x = 18 - 2$

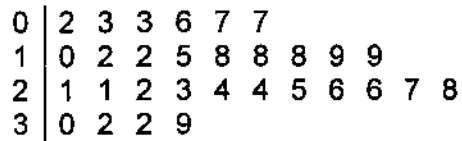
11. To estimate the number of boys and girls in Year 11 in NSW the most suitable sample would be the number of boys and girls in:

- A your class B the mathematics classes at your school C Year 11 at your school D Year 11 in a selection of schools in different regions

12. Katrina receives an annual salary of \$19 370. Her weekly salary is:

- A \$1616-17 B \$403-54 C \$372-50 D \$745

13. The following stem and leaf plot shows the time, in hours, spent studying by a group of Year 11 students during one week.



The lowest and highest scores respectively are:

- A 7 and 9 B 0 and 9 C 2 and 9 D 2 and 39

14. Bernie receives a gross pay of \$35 866, has tax deductions of \$6874, medical deductions of \$425 and superannuation of \$1240. His net pay is:

- A \$28 992 B \$27 327 C \$44 405 D \$390 657

15. 5.06 kg =

- A 0.00506 g B 5060 g C 0.0506 g D 506 g

End of Section 1

Section 2: Short Answer (15 marks each). Start each question on a new page.

Question 16. Begin a New Page. 15 marks.

- a) Lucy earns \$72 493 per annum. Calculate her weekly pay. 1
- b) A sales person's basic weekly wage is \$340. In a particular week the sales person earned \$490 after receiving commission for selling \$1050 of white goods. Calculate:
- i) the amount of the commission. 1
- ii) the rate of commission, as a percentage. 2
- c) Joan and Don are entitled to the age pension. They are a couple with a combined income of \$459 per fortnight. The full pension is \$305.90 each per fortnight.

Income Test for Pensions – Chart C

Family Situation	Income test for pensions	
	For full pension (per fortnight)*	For part pension (per fortnight)
Single	up to \$102	less than \$845.80
Single + 1 child	up to \$126	less than \$869.80
Couple (combined)	up to \$180	less than \$1414.40
Additional children	add \$24 per child	add \$24 per child

* Income over these amounts reduces the rate of pension payable by 50 cents in the dollar (single) or 25 cents in the dollar each (couple).

- i) What family situation do Joan and Don fit into? 1
- ii) Do Joan and Don qualify for a full or part pension? 1
- iii) Calculate how much their pension will be reduced by. 2
- iv) Calculate the pension Joan and Don receive. 1
- d) Ronnie earns \$432 per week. His employer contributes 7%, and Ronnie contributes 3%, to Ronnie's superannuation fund.
- i) Calculate the total amount of superannuation that is placed into Ronnie's fund each week. 2
- ii) Calculate Ronnie's net pay after his superannuation is removed each week. 2
- e) Jodie gets paid on commission. Two weeks ago she earned \$600. Last week she earned 20% more than that. 2
This week she has earned 20% less than last week. How much did she earn this week?

Question 17. Begin a New Page. 15 marks.

- a) Grandpa gives money in the ratio of the ages of his grandchildren. He gives Natalie \$45, Simon \$30 and Kim \$15.
- i) Express the money given to Natalie, Simon and Kim respectively in the simplest ratio. 2
 - ii) What is the ratio of Simon's money to the total given? 1
 - iii) If Simon is 12 years old, how old is Natalie? 2
- b) An Olympic athlete was able to run 100 metres in 9.97 seconds. What would be the average speed in km/h? 2
- c) A truck used 46 litres of diesel on a trip of 250 km. Express the rate of fuel consumption in L/100 km. 2
- d) Calculate $(1.96 \times 10^{-3}) + (1.4 \times 10^7)$, giving your answer in scientific notation. 1
- e) The length of a table was measured to be 154 cm, to the nearest centimetre.
- i) What is the greatest possible error? 1
 - ii) Determine the upper and lower limits of the true length. 1
- f) If 6 dinner plates cost \$29.34, what would be the cost of 8 dinner plates? 2
- g) Simplify the ratio 1.6 : 3 1

Question 18. Begin a New Page. 15 marks.

- a) The length L cm, of a church organ pipe is related to the frequency f vibrations per second, of the note it produces, by the formula:

$$L = \frac{18000}{f}$$

- i) Determine the length (in metres) of an organ pipe producing a sound with a frequency of 150 vibrations per second. 2
- ii) Explain the effect on the frequency of a note if a pipe doubles in length. 1

- b) Simplify:

- i) $2p + 3p$ 1
- ii) $2a + 3b + a - 8b$ 1

- c) Expand and simplify if possible:

- i) $3(x + 9)$ 1
- ii) $8(2x - 5) - 4x$ 2
- iii) $2x^2(3x + 7) + x(4 - 2x)$ 2

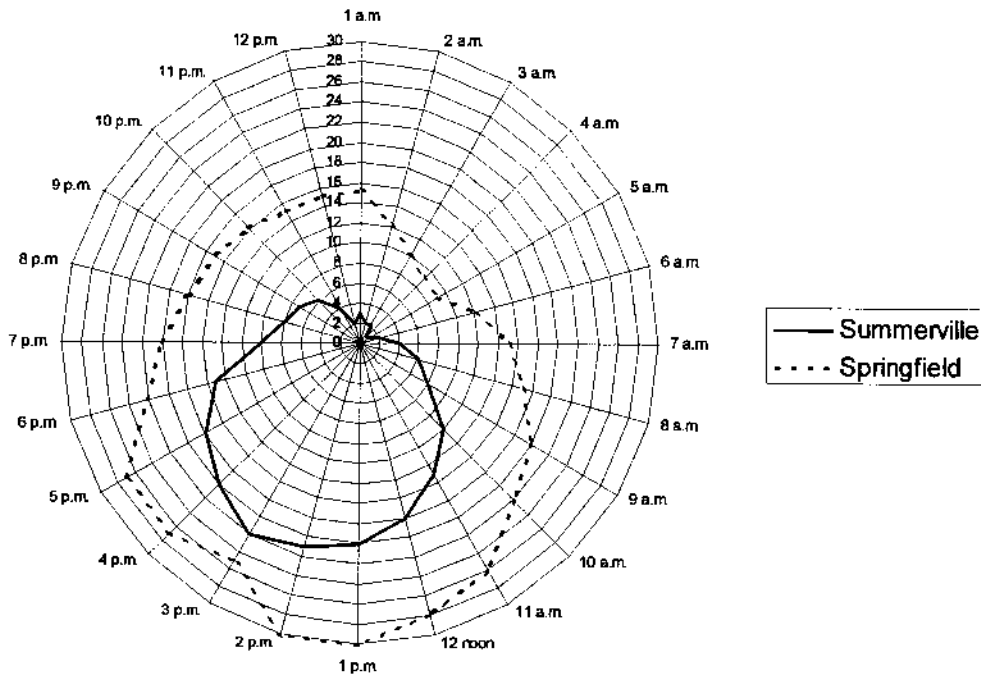
- d) Solve the following equations:

- i) $d - 8 = 36$ 1
- ii) $4x - 7 = 39$ 2
- iii) $2(3 - x) = 3(x + 5)$ 2

Question 19. Begin a New Page. 15 marks.

- a) The temperature on the same day in two towns called Summerville and Springfield are shown on the radar chart below.

Temperature in Two Cities (° C)



What is the difference in temperatures between the two towns at 1p.m.?

1

- b) A sample of 250 car tyres have their life span tested and the results are shown in the table below.

Life of tyre	Number of tyres
0 – 5000 km	6
5000 – 10 000 km	4
10 000 – 15 000 km	4
15 000 – 20 000 km	23
Over 20 000 km	213

To be considered satisfactory, the following conditions must be met.

Condition 1: At least 85% of tyres must have a life span of greater than 20 000 km.

Condition 2: No more than 2.5% can have a life span of less than 5000 km.

- i) Demonstrate whether the tyres meet Condition 1. 2
- ii) Demonstrate whether the tyres meet Condition 2. 2
- iii) Would the tyres be rated satisfactory overall? 1

Continued on the next page.

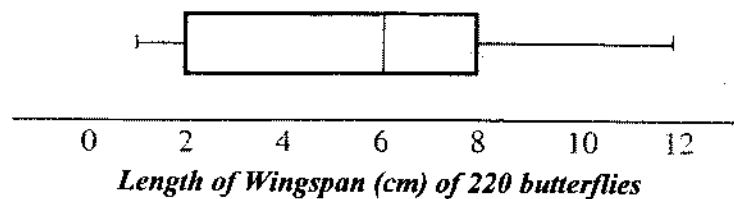
- c) A biologist is examining the ability of a species of butterfly to reproduce. He captures 50 butterflies from an enclosure especially built for the experiment and tags them before releasing them back into the enclosure.

After some days, the biologist recaptures 220 butterflies and notices that of these, 40 had been tagged.

- i) Use the "capture-recapture method" to give an estimate of the number of butterflies in the enclosure. 2
- ii) The biologist repeats this experiment a number of times over a period of 3 months and notices that the number of butterflies increased at 12% per month. 2

Calculate, using your answer in (i), the number of butterflies in the enclosure after the 3 month period.

When the biologist recaptured the 220 butterflies, she measured the wingspan of each butterfly and constructed a box-and-whisker plot shown below.



- iii) What was the median wingspan length of the butterflies? 1
- iv) Determine the interquartile range of the wingspan lengths. 1
- v) How many butterflies had a wingspan length between 2 cm and 6 cm? 1
- vi) Calculate the percentage error in the measurement of a butterfly's wingspan of 10 cm (measured to the nearest cm). 2

Question 20. Begin a New Page. 15 marks.

- a) The table below shows the weekly gross pay (W) for employees of a company. It uses the employee's pay rate (R), the number of normal hours (N) and the number of overtime hours (V) worked for the week. Overtime is paid at time-and-a-half.

Weekly wages				
Name	Pay rate	Normal hours	Overtime hours	Weekly gross pay
	(R)	(N)	(V)	(W)
Bruce	\$14.60	36	6	
Kylie	\$21.35	36	0	\$768.60

- i) Calculate Bruce's weekly gross pay. 2
- ii) Overtime can only be worked in whole hours. Calculate the minimum number of overtime hours that Bruce must work each week, to earn a higher weekly gross pay than Kylie. 2
- iii) Weekly gross pay can be calculated using the formula: 2

$$W = N \times R + 1.5 \times V \times R$$

Calculate the weekly gross pay, W , for Natalie who receives a pay rate of \$17.80 per hour (R), works 35 normal hours (N) and 8 overtime hours (V).

- b) Young's rule is used to calculate the child dosage of a medicine based on the age of the child (A) and the adult dosage (d mL). The formula for Young's rule is: 2

$$\text{Dosage} = \frac{Ad}{A+12}$$

Sandra is 4 years old and is prescribed a medicine for which the adult dosage is 30 mL. Calculate the dose of the medicine that should be given to Sandra.

- c) On 'Auto Alley' there are 20 car yards. A survey is conducted to see the number of cars sold in a week by each of the car yards. The results are shown below.

12 18 26 27 24 10 19 25 12 4
 19 17 29 8 24 28 13 15 27 21

- i) Use the data to complete the frequency distribution table **on the answer sheet provided**. 2
- ii) **On the grid provided**, draw a cumulative frequency histogram and polygon for the data. 2
- iii) Use your graph to estimate the median of the distribution. 1
- iv) Use the graph to estimate the interquartile range of the distribution. 2