



11

MAITLAND GROSSMANN HIGH SCHOOL

2007

HALF-YEARLY EXAMINATION
PRELIMINARY COURSE

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – $1\frac{1}{2}$ hours
- Write using blue or black pen
- Board approved calculators may be used
- Marks will be deducted for careless or badly arranged work

Total marks - 90

SECTION 1

- Attempt Questions 1 – 15
- Multiple choice
- Answer on the sheet provided.
- Use blue or black pen.

SECTION 2

- Attempt Questions 16 – 20
- Use blue or black pen.
- Use pencil for diagrams only
- Show all necessary working
- Use only one side of the page
- Do not work in columns
- Start each question on a new page

SECTION 1

Multiple Choice

Answer on the sheet provided

- 1 To calculate the approximate answer to 4.783×0.791 , we round each number to one significant figure to give:
- (A) 5×0.7 (B) 4.8×0.8 (C) 5×1 (D) 5×0.8

2

Score	Frequency	???
1	10	10
2	13	
3	22	
4	14	
5	8	

In the table above, what should be the heading of the column marked ???

- (A) Tally (B) Class centre
(C) Class (D) Cumulative frequency

- 3 The answer to $\frac{12q^9}{14q^2}$ is:

- (A) $\frac{6}{7qh^7}$ (B) $\frac{6}{7q^{11}}$ (C) $\frac{6q^7}{7}$ (D) $\frac{6q^{11}}{7}$

- 4 When simplified $5a - 6b + a - b$ becomes:

- (A) $6a - 6b$ (B) $6a - 5b$ (C) $5a - 6b$ (D) $6a - 7b$

- 5 If $h = 1\frac{1}{2}$ and $i = \frac{3}{4}$, then $\frac{2h^2}{5i}$ equals:

- (A) $2\frac{2}{5}$ (B) $1\frac{13}{23}$ (C) $\frac{18}{23}$ (D) $1\frac{1}{5}$

- 6 When expanded and then simplified, $7(11 - 2m) - (3m + 12)$ becomes:
- (A) $89 - 17m$ (B) $65 - 17m$ (C) $89 - 5m$ (D) $89 - 12m$

7 If $9u + 6 = -30$, u equals:

- (A) 4 (B) 3 (C) -3 (D) -4

8 What is the median for the data in the stem-and-leaf plot shown below?

stem	leaf	(A)	(B)
53	0 1 4 6 7	6	6.5
54	3 3 3 3 4 5	(C) 566	(D) 567
55	8 9		
56	1 3 4 6 6 6 7 8		
57	0 6 7 7 9		
58	1 2 2 2 5 6		
59	2 2 2 5 7		

9 The ratio of 2 hours to 100 minutes in its simplest form is:

- (A) 1 : 50 (B) 3 : 5 (C) 120 : 100 (D) 6 : 5

10 The absolute error in the measurement 3.6 litres is:

- (A) 0.1 L (B) 0.05 L (C) 0.5 L (D) 3.55 L

11 The solution to $\frac{x}{4} + \frac{2x}{3} = 11$ is:

- (A) $x = 11$ (B) $x = 12$ (C) $x = 13$ (D) $x = 14$

12 The percentage decrease from 80 kg to 74 kg is:

- (A) 92.5% (B) 7.5% (C) 94% (D) 6%

13 What is the modal class for the grouped data given in the table below?

Class	Class centre	Frequency
1 - 10	5.5	5
11 - 20	15.5	6
21 - 30	25.5	14
31 - 40	35.5	17
41 - 50	45.5	6

- (A) 25.5 (B) 35.5 (C) 21 - 30 (D) 31 - 40

14 Consider the following set of x and y values.

x	0	1	2	3
y	1	2	5	10

The algebraic rule which best describes the relationship between the x and y values is:

- (A) $y = 2x$ (B) $y = x + 5$ (C) $y = x^2 + 1$ (D) $y = 2x + 10$

15 The speed of light is 3.0×10^8 m/s.

Using the formula Distance = Speed \times Time, the distance that light travels in 1 minute is:

- (A) 1.8×10^{-10} m (B) 1.8×10^{10} m
 (C) 2.0×10^9 m (D) 2.0×10^{-9} m

SECTION 2

Attempt questions 16 – 20.

All questions are of equal value

All necessary working should be shown in every question.

Question 16 (15 marks)

- | | Marks |
|---|-------|
| (a) Which pay option offers the highest weekly wage, and by how much?
Option 1: \$1 638 a month
Option 2: \$23 512 a year | 3 |
| (b) Convert an annual salary of \$47 424 to an hourly salary based on 38 hours per week. | 2 |
| (c) A real estate agent sold a house valued at \$276 000. If he received $2\frac{1}{2}\%$ commission on the first \$150 000 and $\frac{1}{2}\%$ on the remainder, find his total commission. | 3 |
| (d) Calculate the annual net pay for an employee whose gross pay is \$23 926 p.a. He has annual union fees of \$276, tax of \$4 156.84, an employee superannuation contribution of 4% of gross income and medical insurance of \$112.50 per month. | 3 |
| (e) Kasey has just left school and has a job that clears \$190 a week. She pays \$30 a week on fares and lunches, \$50 per week on entertainment, \$35 per week on clothes and \$20 for other expenses, and \$70 a fortnight for board to her parents. Prepare Kasey's weekly budget. | 4 |

Start a new page. Extra writing paper is available.

Question 17 (15 marks)

- | | Marks |
|--|-------|
| (a) Simplify $10m^4 + 50m^6 \div 5m^2$ | 2 |
| (b) Simplify $\frac{4}{9}(3a^2b^4)^3$ | 2 |
| (c) Solve the following equations: | |
| (i) $10 - 2t = 1 - (3 - 3t)$ | 3 |
| (ii) $\frac{a+1}{2} = \frac{3-2a}{3}$ | 3 |
| (f) The time T seconds, for a pendulum of length L metres, to swing back and forth once is given by the formula: | |
| $T = 2\pi\sqrt{\frac{L}{g}}, \text{ where } g = 10.$ | |
| (i) Find the time, correct to 1 decimal place, for a pendulum length of 3 metres to swing back and forth once. | 2 |
| (ii) Find the length of a pendulum with $T = 5$, correct to 1 significant figure. | 3 |

Start a new page. Extra writing paper is available.

Question 18 (15 marks)

Marks

(a) Convert 72 litres/hour to millilitres/second.

2

(b) An anti-sunburn lotion contains 72 g/L of Titanium dioxide.
How much Titanium dioxide is there in a 125 mL bottle of lotion?

3

(c)



- (i) Write the length and width of the rectangle above, to the nearest millimetre. 2
- (ii) What is the area of the rectangle, in square centimetres? 2
- (iii) What are the lower and upper limits of the length and width? 2
- (iv) Hence find the lower and upper limits of the area of the rectangle, in square centimeters. 2
- (v) Find the maximum error in calculating the area of the rectangle. 2

Question 19 (15 marks)

Marks

- (a) In no more than two sentences, comment on the possible bias of a phone survey conducted during the week from Monday to Friday. 2
- (b) Classify the following data as categorical, discrete or continuous: 3
- (i) the number of rainy days in a month
 - (ii) shoe sizes in a department store
 - (iii) daily temperature
- (c) A manufacturing company produces the following number of light globes each week.

Globe	40 watts	60 watts	80 watts	100 watts
Number	2 500	4 800	3 400	6 300

If a stratified random sample based on these light globes is taken each week for a quality check,

- (i) what proportion of each type of globe should be selected for the sample? 3
 - (ii) what number of each type of globe should be checked for a sample of 50 globes? 2
- (d) In a survey, 50 salesmen were asked the country of manufacture of their car. The results were given in the table below. 2

Country	frequency
Australia	17
Japan	19
Korea	5
Germany	3
Other	6

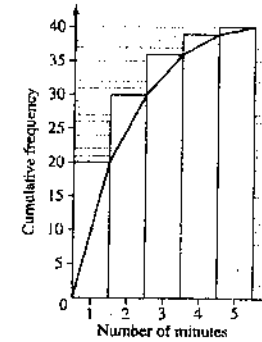
If a sector graph was to be drawn to display this information, what would be the size of the sector angle for Korea?

Question 20 (15 marks)

Marks

(a)

The number of minutes after the bell that students arrived for roll call.



- (i) How many students arrived at roll call in less than 3 minutes after the bell? 1
- (ii) How many students took 3 minutes to arrive for roll call? 1
- (iii) What is the mode? 1
- (iv) Estimate the median. 1
- (v) Estimate the lower and upper quartiles and hence estimate the interquartile range. 3
- (vi) Estimate the 90th percentile. 1

(b) 20 speeds were recorded from cars traveling along the F3 freeway from Newcastle to Sydney.

120, 112, 117, 119, 115, 124, 116, 119, 120, 116
124, 118, 121, 126, 131, 118, 90, 122, 118, 121

- (i) Draw a stem-and-leaf plot 3
- (ii) Draw a box-and-whisker plot 4



General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – 1½ hours
- Write using blue or black pen
- Board approved calculators may be used
- Marks will be deducted for careless or badly arranged work

Total marks - 90

SECTION 1

- Attempt Questions 1 – 15
- Multiple choice
- Answer on the sheet provided.
- Use blue or black pen.

SECTION 2

- Attempt Questions 16 – 20
- Use blue or black pen.
- Use pencil for diagrams only
- Show all necessary working
- Use only one side of the page
- Do not work in columns
- Start each question on a new page

SECTION 1 Multiple Choice Answer on the sheet provided

1 To calculate the approximate answer to 4.783×0.791 , we round each number to one significant figure to give:

- (A) 5×0.7 (B) 4.8×0.8 (C) 5×1 (D) 5×0.8

2

Score	Frequency	???
1	10	10
2	13	
3	22	
4	14	
5	8	

In the table above, what should be the heading of the column marked ???

- (A) Tally (B) Class centre
(C) Class (D) Cumulative frequency

3 The answer to $\frac{12q^9}{14q^2}$ is:

- (A) $\frac{6}{7q^7}$ (B) $\frac{6}{7q^7}$ (C) $\frac{6q^7}{7}$ (D) $\frac{6q^{11}}{7}$

4 When simplified $5a - 6b + a - b$ becomes:

- (A) $6a - 6b$ (B) $6a - 5b$ (C) $5a - 6b$ (D) $6a - 7b$

5 If $h = \frac{1}{2}$ and $l = \frac{3}{4}$, then $\frac{2h^2}{5l}$ equals:

- (A) $2\frac{2}{5}$ (B) $1\frac{13}{23}$ (C) $\frac{18}{23}$ (D) $1\frac{1}{5}$

6 When expanded and then simplified, $7(11 - 2m) - (3m + 12)$ becomes:

- (A) $89 - 17m$ (B) $65 - 17m$ (C) $89 - 5m$ (D) $89 - 12m$

7 If $9u + 6 = -30$, u equals:

- (A) 4 (B) 3 (C) -3 (D) -4

8 What is the median for the data in the stem-and-leaf plot shown below?

stem	leaf
53	0 1 4 6 7
54	3 3 3 3 4 5
55	8 9
56	1 3 4 6 6 6 7 8
57	0 6 7 7 9
58	1 2 2 2 5 6
59	2 2 2 5 7

- (A) 6 (B) 6.5
(C) 566 (D) 567

9 The ratio of 2 hours to 100 minutes in its simplest form is:

- (A) 1 : 50 (B) 3 : 5 (C) 120 : 100 (D) 6 : 5

10 The absolute error in the measurement 3.6 litres is:

- (A) 0.1 L (B) 0.05 L (C) 0.5 L (D) 3.55 L

11 The solution to $\frac{x}{4} + \frac{2x}{3} = 11$ is:

- (A) $x = 11$ (B) $x = 12$ (C) $x = 13$ (D) $x = 14$

12 The percentage decrease from 80 kg to 74 kg is:

- (A) 92.5% (B) 7.5% (C) 94% (D) 6%

13 What is the modal class for the grouped data given in the table below?

Class	Class centre	Frequency
1 - 10	5.5	5
11 - 20	15.5	6
21 - 30	25.5	14
31 - 40	35.5	17
41 - 50	45.5	6

- (A) 25.5 (B) 35.5 (C) 21 - 30 (D) 31 - 40

14 Consider the following set of x and y values.

x	0	1	2	3
y	1	2	5	10

The algebraic rule which best describes the relationship between the x and y values is:

- (A) $y = 2x$ (B) $y = x + 5$ (C) $y = x^2 + 1$ (D) $y = 2x + 10$

15 The speed of light is 3.0×10^8 m/s. Using the formula Distance = Speed \times Time, the distance that light travels in 1 minute is:

- (A) 1.8×10^{-10} m (B) 1.8×10^{10} m
(C) 2.0×10^9 m (D) 2.0×10^{-9} m

SECTION 2

Attempt questions 16 – 20.

All questions are of equal value

All necessary working should be shown in every question.

Question 16 (15 marks)

Marks

- (a) Which pay option offers the highest weekly wage, and by how much? 3

Option 1: \$1 638 a month
 Option 2: \$23 512 a year
 $\$452.15 - \$378 = \$74.15$
 • Option 2 gives highest wage by \$74.15 per week.

① weekly wage = $\$1638 \times 12 \div 52 = \378
 ② weekly wage = $\$23512 \div 52 = \$452.1535 \dots = \$452.15$ (2dp)

- (b) Convert an annual salary of \$47 424 to an hourly salary based on 38 hours per week. 2

$\$47424 \div 52 \div 38 = \24
 ∴ \$24/hour is the hourly salary.

- (c) A real estate agent sold a house valued at \$276 000. If he received $2\frac{1}{2}\%$ commission on the first \$150 000 and $\frac{1}{2}\%$ on the remainder, find his total commission. 3

Total commission = $2\frac{1}{2}\%$ of \$150 000 + $\frac{1}{2}\%$ of $(\$276000 - \$150000)$
 $= 0.025 \times \$150000 + 0.005 \times \126000
 $= \$3750 + \630
 $= \$4380$

- (d) Calculate the annual net pay for an employee whose gross pay is \$23 926 p.a. He has annual union fees of \$276, tax of \$4 156.84, an employee superannuation contribution of 4% of gross income and medical insurance of \$112.50 per month. 3

Annual net pay = $\$23926 - \$276 - \$4156.84 - 0.04 \times \$23926 - 12 \times \$112.50$
 $= \$17186.12$

- (e) Kasey has just left school and has a job that clears \$190 a week. She pays \$30 a week on fares and lunches, \$50 per week on entertainment, \$35 per week on clothes and \$20 for other expenses, and \$70 a fortnight for board to her parents. Prepare Kasey's weekly budget. 4

Kasey's weekly budget

Income		Expenses	
Job	\$190	fares & lunches	\$30-
		entertainment	50-
		clothes	35-
		other expenses	20-
		board	35-
		savings	20-
	\$190		\$190

(\$70 fortnightly is \$35/week)

Start a new page. Extra writing paper is available.

Question 17 (15 marks)

Marks

- (a) Simplify $10m^4 + 50m^5 + 5m^2$ 2

$= 10m^4 + 10m^4$
 $= 20m^4$

- (b) Simplify $\frac{4}{9}(3a^2b^4)^3$ 2

$= \frac{4}{9} \times 3^3 a^6 b^{12}$
 $= 12 a^6 b^{12}$

- (c) Solve the following equations:

(i) $10 - 2t = 1 - (3 - 3t)$

(i) $10 - 2t = 1 - (3 - 3t)$
 $= 1 - 3 + 3t$

(ii) $\frac{a+1}{2} = \frac{3-2a}{3}$

$12 = 5t$
 $t = \frac{12}{5}$
 $= 2\frac{2}{5}$

$3(a+1) = 2(3-2a)$
 $3a+3 = 6-4a$
 $7a = 3$
 $a = \frac{3}{7}$

- (f) The time T seconds, for a pendulum of length L metres, to swing back and forth once is given by the formula:

$T = 2\pi\sqrt{\frac{L}{g}}$, where $g = 10$.

- (i) Find the time, correct to 1 decimal place, for a pendulum length of 3 metres to swing back and forth once. 2

- (ii) Find the length of a pendulum with $T = 5$, correct to 1 significant figure. 3

(i) $T = 2\pi\sqrt{\frac{L}{g}}$
 $= 2\pi\sqrt{\frac{3}{10}}$
 $= 3.4414 \dots$
 $= 3.4$ (1dp)
 ∴ Time approx. 3.4 seconds

(ii) $T = 2\pi\sqrt{\frac{L}{g}}$
 $5 = 2\pi\sqrt{\frac{L}{10}}$
 $\frac{5}{2\pi} = \sqrt{\frac{L}{10}}$
 $(\frac{5}{2\pi})^2 = \frac{L}{10}$
 $L = 10 \times (\frac{5}{2\pi})^2$
 $= 6.3325 \dots$
 $= 6$ (1 sig. fig.)
 ∴ Length of pendulum approx. 6 metres