



STAGE 5.1-5.3 MATHEMATICS

General instructions

- Working time – 2 periods.
- Write on one side of lined A4 paper supplied by yourself.
- **Commence each new question on a new sheet.**
- Write using blue or black pen. Where diagrams are to be sketched, these may be done in pencil.
- Board approved calculators may be used.
- All necessary working should be shown in every question.
- Attempt **all** questions.
- At the conclusion of the examination, bundle the sheets used in the correct order within this paper and hand to examination supervisors.

Class teacher (please ✓)

- Mr Lowe
- Mr Fletcher
- Mr Lam
- Miss Wei
- Mr Weiss

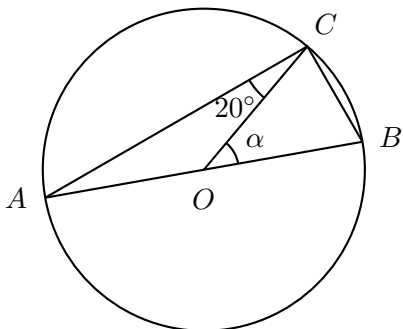
NAME: PAGES USED:

Marker's use only.

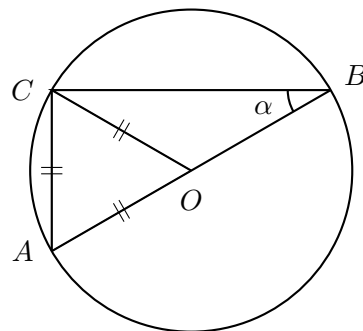
QUESTION	1	2	3	4	5	6	7	Total	Total (%)
MARKS	$\overline{15}$	$\overline{10}$	$\overline{10}$	$\overline{11}$	$\overline{21}$	$\overline{18}$	$\overline{21}$	$\overline{106}$	$\overline{100}$

- Question 1** (15 Marks) Commence on a NEW sheet. **Marks**
- (a) Write 0.000 738 in scientific notation, correct to 2 significant figures. **1**
- (b) Evaluate $\frac{1}{\sqrt{45.8 - 5.8}}$ correct to 2 decimal places. **1**
- (c) Find 8.5% of \$300. **1**
- (d) Simplify $\frac{7x - 21}{7}$. **1**
- (e) Factorise $9 - 4x^2$. **1**
- (f) Solve $x^2 = 5x$. **1**
- (g) If $\sqrt{a} = 3\sqrt{7}$, find the value of a . **1**
- (h) Calculate the area of a rhombus with diagonals of length 7 cm and 10 cm. **1**
- (i) If the dimensions of a cube are doubled, by what factor is the volume increased? **1**
- (j) Light travels at a speed of 3×10^8 metres per second. Find the number of kilometres that light travels in 1 hour. **1**
- (k) The point $(k, 2)$ lies on the line $2x + 3y - 8 = 0$. Find the value of k . **1**
- (l) What is the maximum value of $25 - (3x - 7)^2$? **1**
- (m) If a marathon runner completes a course of 42.2 km in 2 hours and 30 minutes, calculate her average speed in kilometres per hour. **1**
- (n) Find the value of α . No reasons are necessary.

i.



ii.



Question 2 (10 Marks)	Commence on a NEW sheet.	Marks
(a)	What is the equation of a circle with centre $(5, -1)$ and radius 16?	2
(b)	Draw the following graphs:	
i.	$y = 5^x$.	2
ii.	$y = \frac{-5}{x}$.	2
iii.	$y = \sqrt{x - 4}$.	2
(c)	If \$7 420 is invested in a building society for 10 years with an interest of 8% p.a. compounding every six months, how much money is in the account after 10 years?	2

Question 3 (10 Marks)	Commence on a NEW sheet.	Marks
(a)	What is the probability of throwing a total of 8 with one throw of a pair of dice?	2
(b)	From a bag containing 5 red and 3 blue balls, a ball is taken at random from the bag. A second ball is then withdrawn and placed beside it. Draw a tree diagram to show this and use it to find the probability that one ball is blue and one is red.	2
(c)	If the probability of an event is $\frac{1}{4}$, how many times would you expect the event to occur in 80 trials?	1
(d)	A four digit number is to be formed from the digits 1, 3, 5 and 8. What is the probability that the number will	
i.	Start with the digit '3'?	1
ii.	Be odd?	1
iii.	Be greater than 5 000?	1
(e)	A family has 3 children. What is the probability of	
i.	3 boys?	1
ii.	At least 1 boy?	1
iii.	2 boys and a girl?	1

Question 4 (11 Marks)

Commence on a NEW sheet.

Marks

- (a) At a school swimming carnival, 40 students entered the diving competition. Each dive was awarded points on a scale of 1 to 10. The table below shows the distribution of the scores.

Score	1	2	3	4	5	6	7	8	9	10
Students	1	1	2	3	4	4	5	9	8	3

- i. Find the mode of the scores. **1**
- ii. Find the median score. **1**
- iii. Find the mean score, correct to 2 decimal places. **2**
- iv. Find the standard deviation, correct to 2 decimal places. **2**
- (b) If the mean of a set of scores is 24 and standard deviation is P and a further score of 24 is added to the set,
- i. What is the new mean? **1**
- ii. Will the standard deviation be more than P , less than P or remain the same? **1**
- (c) After completing 4 tests, Harry has an average mark of 60%. If there are 2 more tests and Harry scores $\frac{37}{45}$ and $\frac{78}{80}$, what will be his new average? **2**
- (d) What is the relative frequency of the letter “i” in the word **artificial**? **1**

Question 5 (21 Marks)

Commence on a NEW sheet.

Marks

- (a) In each of the following, state whether the set of ordered pairs represents a function or not, then write down the domain and range.

i. $(1, 8), (2, 7), (3, 6), (4, 5)$.

2

ii. $(1, 1), (1, 2), (0, 4), (2, 3)$.

2

- (b) If $f(x) = x^2 - 5$, find:

i. $f(0)$.

1

ii. $f(-2)$.

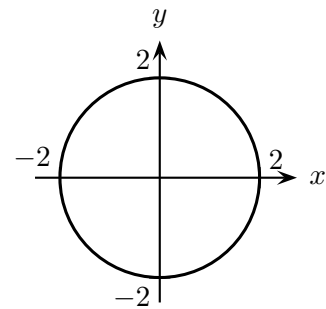
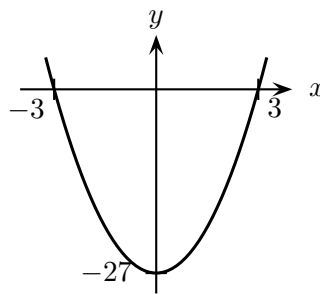
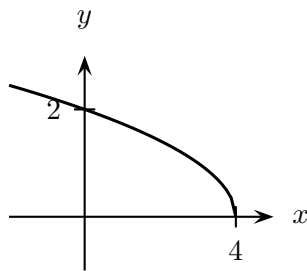
1

- (c) In each of the following, state whether the curve sketched represents a function or not, then write down the domain and range.

i.

ii.

iii.



- (d) Find the inverse function $f^{-1}(x)$ for each of these linear functions.

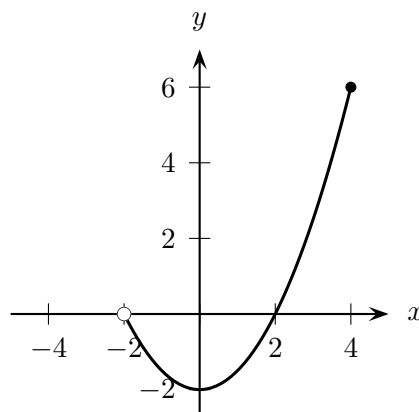
i. $y = 2x - 7$.

1

ii. $y = \frac{2x - 1}{x - 3}$.

2

- (e) Use the graph of $y = f(x)$ to sketch the following functions:



i. $y = f(x) + 1$.

1

ii. $y = f(x - 1)$.

1

iii. $y = -f(x)$.

1

Question 6 (18 Marks)	Commence on a NEW sheet.	Marks
(a) Simplify $\frac{18x^3}{9x^4}$.		2
(b) Solve for x :		4
i. $2^x = \frac{1}{16}$.		
ii. $4^{x+1} \geq 8$.		
(c) Write $a^{\frac{3}{4}}$ without any indices.		2
(d) Find the exact value of $9^{-\frac{1}{2}} + 3^0$.		2
(e) Evaluate:		3
i. $\log_3 27$.		
ii. $\log_2 \left(\frac{1}{2\sqrt{2}} \right)$.		
(f) Solve for x :		
i. $\log_2 x = 4$.		1
ii. $\log_x 81 = 4$.		1
iii. $\log_5 125 = x$.		1
(g) Simplify $\frac{2^{n+1}}{2^n - 2^{n-1}}$.		2

Question 7 (21 Marks)	Commence on a NEW sheet.	Marks
(a) For the equation $y = x^2 + 4x - 4$,		
i. Find the y intercept.		1
ii. Find the x intercepts.		1
iii. Find the axis of symmetry.		1
iv. Find the vertex.		1
v. Sketch the curve.		1
(b) What is the reciprocal of $x + \frac{1}{x}$?		2
(c) If θ is reflex and $\cos \theta = \frac{\sqrt{3}}{2}$, what is the size of θ ?		2
(d) Draw a triangle where $\tan \theta = \frac{8}{15}$. Hence write down the value of $\sin \theta$.		3
(e) A ship sails from O for 60 nautical miles on a bearing of N25°E to a point A . It then changes course and sails for 40 nautical miles on a bearing of S75°E to a point B .		
Draw a diagram to represent the above information, and find		
i. The distance from B to O , to the nearest nautical mile.		2
ii. The bearing of B from O .		3
(f) For the function $y = 3 \sin 2x$,		
i. Find the amplitude.		1
ii. Find the period.		1
iii. Sketch the graph for $0^\circ \leq x \leq 360^\circ$.		2

End of paper.