

Good Hope School
Mock Examination 2020 – 2021

S.6 MATHEMATICS
COMPULSORY PART
PAPER 1

Question-Answer Book

2 hours and 15 minutes

This paper must be answered in English

INSTRUCTIONS

- (1) After the announcement of the start of the examination, you should first write your Name, Class and Class Number in the spaces provided on Page 1.
- (2) This paper consists of **THREE** sections, A(1), A(2) and B.
- (3) Attempt **ALL** questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.
- (4) Graph paper and supplementary answer sheets will be supplied on request. Write your Name, Class, Class Number and the Question Number in the spaces provided on each sheet and fasten them **INSIDE** this book.
- (5) Unless otherwise specified, all working must be clearly shown.
- (6) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
- (7) The diagrams in this paper are not necessarily drawn to scale.
- (8) No extra time will be given to candidates for filling in their Name, Class, Class Number and the Question Number after the 'Time is up' announcement.

Name	
Class	
Class Number	

	Marker's Use Only
Section A(1) Question No.	Marks
1 – 2	
3 – 4	
5 – 6	
7 – 8	
9	
Section A(1) Total	/ 35

	Marks
Section A(2) Question No.	
10	
11	
12	
13	
14	
Section A(2) Total	/ 35

	Marks
Section B Question No.	
15	
16	
17	
18	
19	
Section B Total	/ 35

Deduction	Marks
– PP	/ 2
– U	/ 1

	Marks
Paper 1	/ 105
Paper 2	/ 45
Total	/ 100

SECTION A(1) (35 marks)

1. Simplify $\frac{(2a^{-3}b)^4}{4a^2b^{-5}}$ and express your answer with positive indices. **(3 marks)**

2. Factorize
(a) $2a^2 + 5ab + 2b^2$,
(b) $2a^2 + 5ab + 2b^2 - 6a - 12b$. **(3 marks)**

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3. Consider the formula $p = \frac{1}{4}(3q - 1)$.

(a) Make q the subject of the above formula.


(b) If the value of p is increased by 1, write down the change in the value of q . (3 marks)

4. (a) Find the range of values of x which satisfy both $\frac{-5-5x}{6} < 3(x+1)$ and $2x-7 < 0$.

(b) Write down the least integer which satisfies both inequalities in (a). (4 marks)

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5. In a box, the ratio of the number of red balls to the number of yellow balls is 5 : 9. If 500 red balls and 200 yellow balls are added into the box, the ratio of the number of red balls to the number of yellow balls becomes 3 : 4. Find the original number of red balls in the box. **(4 marks)**

6. The height of Peter is 20% more than that of John. It is given that Peter is 150 cm tall.
- (a) Find the height of John.
- (b) The height of Alice is 20% less than that of Peter. Are Alice and John of the same height? Explain your answer. **(4 marks)**

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7. A tablet is termed *air* if its weight is measured as 460 g correct to the nearest 10 g.

(a) Find the least possible weight of an *air* tablet.

(b) Someone claims that the total weight of 90 *air* tablets can be measured as 40.8 kg correct to the nearest 0.1 kg. Do you agree? Explain your answer.


(4 marks)

8. The coordinates of the points A and B are $(1, -5)$ and $(3, 4)$ respectively. A is rotated anti-clockwise about the origin through 90° to A' . B is reflected about $x = -1$ to B' .

(a) Write down the coordinates of A' and B' .

(b) Is $A'B$ parallel to AB' ? Explain your answer.

(5 marks)

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9. The bar chart in **Figure 1** shows the distribution of the numbers of pencils owned by a group of children, where $5 < a < 8$ and $1 < b < 8$. The median and the mean of the distribution are both 3.5.

Distribution of the numbers of pencils owned by the group of children

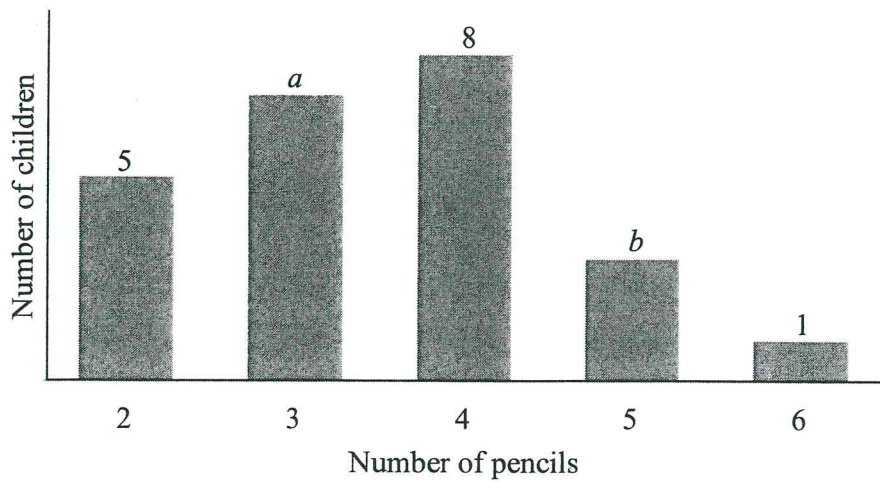


Figure 1

- (a) Find a and b . **(3 marks)**
- (b) If a child is randomly selected from the group, find the probability that the number of pencils owned by the selected child exceeds the mode of the distribution. **(2 marks)**

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11. Let $f(x)$ be a cubic polynomial. When $f(x)$ is divided by $x + 2$, the remainder is -45 . When $f(x)$ is divided by $x - 1$, the remainder is 21. It is given that $x^2 - x + 3$ is a factor of $f(x)$.

(a) Find the quotient when $f(x)$ is divided by $x^2 - x + 3$. (3 marks)

(b) Let $g(x) = 4x^2 + 7x + 3$. How many rational roots does the equation $f(x) = g(x)$ have? Explain your answer. (3 marks)

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13. The stem-and-leaf diagram in **Figure 2** shows the distribution of the test scores (in marks) of a group of 25 students.

Stem (tens)	Leaf (units)					
0	<i>a</i>	9				
1	2	5	7	8	8	
2	3	3	5	6	7	9
3	2	3	5	6	<i>c</i>	<i>c</i> <i>c</i>
4	1	2	2	4	<i>b</i>	

Figure 2

It is given that the inter-quartile range of the distribution is 21 marks.

- (a) Find *c*. **(2 marks)**
- (b) It is given that the range of the distribution is less than 40 marks and the mean of the distribution is 28.6 marks. Find *a* and *b*. **(3 marks)**
- (c) Two students join the group and their test scores are included. If the mode of the new distribution is increased, find all the possible means of the new distribution. **(3 marks)**

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14. In **Figure 3**, BD is a diameter of the circle. $ABCD$ is a cyclic quadrilateral with $AB = DC$. E is a point on \widehat{AD} . BE and AD meet at F .

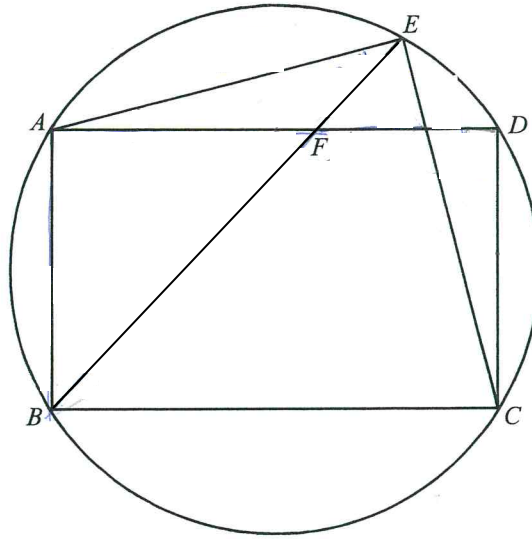


Figure 3

- (a) Prove that $\triangle BDF \sim \triangle AEF$. **(2 marks)**
- (b) Write down the names of two triangles which are similar to $\triangle ABF$. **(2 marks)**
- (c) If $BD = 10$, $AE = 5\sqrt{2}$ and $FE = \sqrt{2}$, find the length of AB . **(4 marks)**

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SECTION B (35 marks)

15. There are 48 male and 32 female customers in a café.

(a) If 4 customers are selected to form a survey group consisting of at least 1 female customer, how many different survey groups can be formed? **(2 marks)**

(b) The following table shows the statistics of the sizes of drinks ordered by these 80 customers. Two customers are selected at random. Find the probability that the two selected customers have ordered drinks of the same size.

Customer \ Size	Large	Medium	Small
Male	14	28	6
Female	2	12	18

(2 marks)

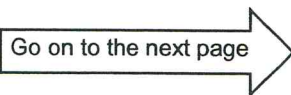
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19. **Figure 4(a)** shows a triangular metal sheet ABC with $\angle BAC = 32^\circ$ and $\angle ABC = 42^\circ$. D is a point on AB such that $\angle ACD = 68^\circ$ and $CD = 24$ cm.

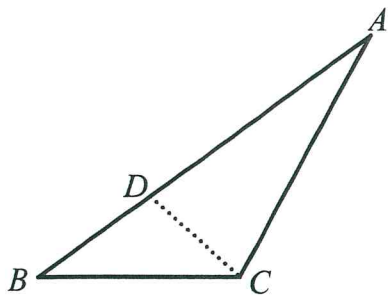


Figure 4(a)

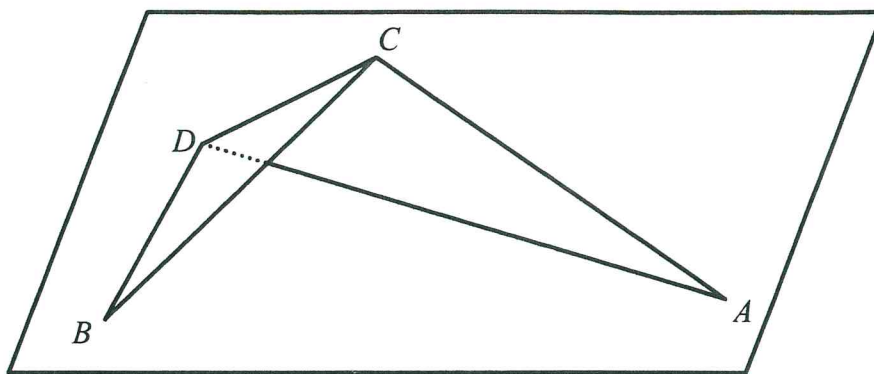



Figure 4(b)

- (a) Find the length of AC and BC . (3 marks)
- (b) In **Figure 4(b)**, the metal sheet is bent along CD and placed on a horizontal ground such that the plane ABD lies on the ground and the distance between A and B is 30 cm.
- (i) Find $\angle ACB$.
- (ii) Find the angle between the plane ACD and the plane BCD . (6 marks)

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