QUEEN’S COLLEGE
Yearly Examination, 2009-2010

MATHEMATICS PAPER 1
Question-Answer Book

Secondary 1 Date: 15 – 6 – 2010
Time: 8:30 am – 9:45 am

1. Write your class, class number in the spaces provided on this cover.

2. This paper consists of TWO sections, A and B. Section A carries 78 marks and Section B carries 42 marks.

3. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book.

4. Unless otherwise specified, all working must be clearly shown.

5. The diagrams in this paper are not necessarily drawn to scale.

6. Use of calculator is not allowed for this paper.
1. The following back-to-back stem-and-leaf diagram shows the weights of students in S1A and S1B. Study it carefully and answer the following questions, write your answers in the spaces provided below.

<table>
<thead>
<tr>
<th>S1A Leaf (1 kg)</th>
<th>Stem (10 kg)</th>
<th>S1B Leaf (1 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8  8  6  3  2  2  2</td>
<td>3</td>
<td>0  1</td>
</tr>
<tr>
<td>9  8  7  6  4  4  2  2  0</td>
<td>4</td>
<td>1  1  2  2  4  6  6</td>
</tr>
<tr>
<td>9  9  7  6  5  3  3  2</td>
<td>5</td>
<td>3  3  5  5  7  8  9  9  9</td>
</tr>
<tr>
<td>9  6  3  2  2  1</td>
<td>6</td>
<td>2  2  2  4  6  8  8  9  9</td>
</tr>
<tr>
<td>7  6  4  3  2</td>
<td>7</td>
<td>1  2  3  3  5  7  9</td>
</tr>
<tr>
<td>6  5  5  4</td>
<td>8</td>
<td>0  2  4  6  8  9</td>
</tr>
</tbody>
</table>

(a) Find the total number of students in S1A and the total number of students in S1B (2 marks)

(b) Find the number of students in S1A with weights equal 62 kg. (1 mark)

(c) Find the weight of the heaviest student(s) in S1A. (1 mark)

(d) Find the weight of the thinnest student(s) in S1B (1 mark)

(e) From the diagram above, students of which class are generally thinner? (1 mark)

(f) If students heavier than 80 kg are recommended to join a weight controlling camp, how many students in S1B will be recommended to join the camp? (1 mark)

7 marks

(a) the total number of students in S1A is

the total number of students in S1B is

(b) the number of students in S1A with weights equal 62 kg is

(c) the weight of the heaviest student(s) in S1A is

(d) the weight of the thinnest student(s) in S1B is

(e) students of class are generally thinner

(f) No. of students in S1B recommended to join the camp is
2. Three students, Peter, John and Henry have $16.8, $24.3 and $32.5 respectively.

(a) By rounding down the amount owned by each student to the nearest dollar, estimate the total amount they have.  

(b) If the three students want to buy a football of price $70, will they have enough money to buy the football? Use the result of (a) to explain your answer.

3. Study the polar coordinate plane below, and answer the following questions.

(a) Find the polar coordinates of P and the polar coordinates of Q.  
(b) Find the size of $\angle POQ$.  
(c) Find the area of $\Delta POQ$.  

- 3 -
4. The bar chart and the pie chart below show the distribution of the numbers of keys owned by the students in class A. The numbers of students having 2 keys, 3 keys and 4 keys are 12, 17 and $k$ respectively.

(a) Find the total numbers of students in class A. (2 marks)

(b) Find the value of $k$. (2 marks)

(c) Find the number of students in class A with only 1 key. (2 marks)

(d) It is given that the numbers of students in class A and class B are the same. The distributions of the numbers of keys owned by the students in class A and class B are also the same. The two classes are now combined to form a group. Do we need to re-draw

(i) the bar chart shown above? If your answer is ‘yes’, write down the modification/change needed. (3 marks)

(ii) the pie chart shown above? If your answer is ‘yes’, write down the modification/change needed. (9 marks)
5. The figure below shows a prism $ABCDEFGH$.

(a) Find the total number of faces of the prism \((1\ \text{mark})\)

(b) Which face is the base of the prism? \((1\ \text{mark})\)

(c) Find the area of the base of the prism. \((2\ \text{marks})\)

(d) Find the volume of the prism. \((2\ \text{marks})\)

(e) Find the total surface area of the prism. \((3\ \text{marks})\)

\[(a)\ \text{the total number of faces of the prism} = 6\]

\[(b)\ \text{BCGF is the base of the prism}\]

\[(c)\ \text{area of the base} = (1\ \text{A_u}) = 54\ \text{m}^2\]

\[(d)\ \text{the volume of the prism} = 54 \times 5\ \text{m}^3 = 270\ \text{m}^3\]

\[(e)\ \text{the total surface area} = 54 \times 2 + (2 + 13 + 7 + 12) \times 5\ \text{m}^2 = 108 + 32 \times 5\ \text{m}^2 = 278\ \text{m}^2\]
6. In the rectangular coordinate plane below, \( l \) is a line parallel to the \( x \)-axis and it passes through a point \( \text{B} \ (1, 2) \) on the plane. If the coordinates of the point \( \text{A} \) are \((-4, 5)\), find the coordinates of its images after the following transformations. (Steps are not required for this question.)

![Diagram](image)

(a) \( \text{A} \) is translated 6 units to the right and then 5 units downward to a point \( \text{P} \). (1 mark)

(b) \( \text{A} \) is reflected in the \( y \)-axis to a point \( \text{Q} \). (1 mark)

(c) \( \text{A} \) is reflected in line \( l \) to a point \( \text{R} \). (1 mark)

(d) \( \text{A} \) is rotated clockwise about the origin \( \text{O} \) through \( 90^\circ \) to a point \( \text{S} \). (1 mark)

(e) \( \text{A} \) is rotated anticlockwise about the origin \( \text{O} \) through \( 180^\circ \) to a point \( \text{T} \). (1 mark)

(f) Which of the above 5 images \((\text{P, Q, R, S, T})\) lie/lie on the \( x \)-axis? Explain your answer. (2 marks)

(g) Which two of the above 5 images \((\text{P, Q, R, S, T})\) can be joined together to form a line parallel to the \( y \)-axis? Explain your answer. (2 marks)
7. The consultation fees charges to a child patient and adult patient by a doctor are $120 and $160 respectively. On a certain day, there were 60 patients consulted the doctor and the total consultation fee charged was $8160. Find

(a) the number of child patients consulted the doctor on that day (8 marks)
(b) the number of adult patients consulted the doctor on that day (2 marks)

(a) Let the no. of child patients consulted the doctor on that day be $x$.

Then, the no. of adult patients consulted the doctor on that day is $(60 - x)$.

For 120$x$ + 160 $(60 - x)$ = 8160

120$x$ + 9600 - 160$x$ = 8160

1440 = 40$x$

$x$ = 36

the no. of child patients is 36.

(b) $60 - x$ = 60 - 36 = 24

the no. of adult patients is 24.
8. In the rectangular coordinate plane below, $AQ$, $CP$ are parallel to the $y$-axis and $BP$, $CQ$ are parallel to the $x$-axis.

(a) Find the coordinates of $P$ and the coordinates of $Q$.  

(b) Find the area of $ABPCQ$.  

(a) The coordinates of the point $P$ are $(-3, -4)$.  

(b) The coordinates of the point $Q$ are $(-5, 2)$.  

Area of $ABPCQ = 60$ square units.
9. There are 600 boys in a school and the number of girls is 20% less than that of boys.

(a) Find the number of girls in the school. 

(b) There are 756 local students in the school.

(i) Find the percentage of local students in the school. 

(ii) It is given that 66% of the boys are local students. If $x\%$ of the girls are also local student, write down the value of $x$. 

(3 marks) 

(4 marks) 

(5 marks) 

(12 marks)
In the figure below, $TSR$ and $KHM$ are straight lines while $RP$/$KM$ and $PH$/$NM$.

<table>
<thead>
<tr>
<th></th>
<th>Long Questions. (40 marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Answer ALL questions in this section and write your answers in the spaces provided.</td>
</tr>
</tbody>
</table>

a. Find $\angle SRQ$. (9 marks)

b. Find $\angle PHK$ and $\angle RPH$. (9 marks)

c. Is $PH$ // $TR$? Explain your answer. (2 marks)

(20 marks)
11. In the diagram below, $JKHN$ is a straight line and $NM \parallel FJ$.

a. Prove that the 2 triangles in the diagram above are similar; hence (8 marks)

b. i. find the area of $\triangle HNM$ if $\angle FKJ = 90^\circ$, explain your steps clearly. (5 marks)

ii. find the length of $KF$ and $JF$ if $KJ = 6$. (7 marks)