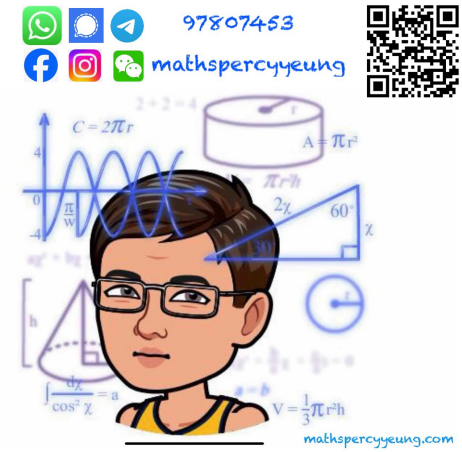
2022-2023 First/Second Term Examination (Revision)

F. 3 Mathematics

Paper 1



Time allowed : 1 hour 30 minutes

Full mark : 80

This question-answer book consists of 15 printed pages.

Instructions to candidates:

1. This paper must be answered in English with a blue / black ball pen, unless otherwise specified.
2. Write your name, class and class number in the space provided on this cover.
3. This paper consists of TWO sections, A and B.
   Section A carries 40 marks and Section B carries 40 marks.
4. Answer 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.
5. All diagrams / graphs / charts as part of the answers must be clearly drawn with an HB pencil.
6. Graph paper and supplementary answer sheets will be supplied on request. Write your name, class and class number on each sheet, and fasten them INSIDE this book.
7. Unless otherwise specified, all working must be clearly shown.
8. The diagrams in this paper are not necessarily drawn to scale.
9. Unless otherwise specified, numerical answers must be exact or correct to 3 significant figures.
10. Calculator pad printed with the “HKEA Approved” / “HKEAA Approved” label is allowed.
    Remove the calculator cover / jacket.

Section A (40 marks)

1. Factorize the following expressions.

   (a) $a^2 - 2a - 3$

   (b) $ab^2 + b^2 + a^2 - 2a - 3$

   (c) $(m+1)^2 - 2(m+1) - 3$

(5 marks)

2. (a) Solve the inequality $\frac{5x-3}{4} - \frac{7x-25}{3} \leq 0$.

   (b) Write down the smallest integer satisfying the inequality in (a).

(4 marks)

Answers written in the margins will not be marked.

3. Over the past 4 years, the volume of water in a reservoir decreased by 22% each year. If the volume of water 4 years ago was 6 250 000 m^3,

   (a) find the volume of water this year,

   (b) find the percentage change in the volume over these 4 years.

(4 marks)

4. Tommy has deposited $22 500 in a bank for half a year and a simple interest of $450 is received.

   (a) Find the interest rate per annum.

   (b) If Tommy withdraws the amount at the end of this half year and deposits it to another bank for one year with the same interest rate per annum in (a), compounded quarterly. Find the total amount after a year. (Give your answer to the nearest integer.)

(4 marks)

Answers written in the margins will not be marked.

10. The cost of a cup of yogurt is $8.5. The manager of a supermarket has found that 100 cups of this yogurt among the stock will expire in three days, and thus he decides to sell these 100 cups at $5 each whilst the rest of the stock at the original price of $15 each. If the percentage profit for selling all of the yogurt is not less than 50%, at least how many cups of yogurt are there in the supermarket? (6 marks)

Answers written in the margins will not be marked.

12. A bank provides a loan scheme as follows:

Loan Scheme
(1) The interest is calculated based on the outstanding balance at the end of each month at an interest rate of 4.8% p.a., compounded monthly.
(2) A monthly instalment is paid to the bank after the calculation of interest at the end of each month until the loan is fully repaid.

Eric borrows $43 200 from the bank under the above scheme. He decides to pay a monthly instalment of $14 300. (The last instalment may be less than $14 300.)

(a) How much does Eric owe the bank at the end of the first month after paying the monthly instalment? (3 marks)

(b) Find the number of monthly instalments that Eric has to make for the loan. (5 marks)

(c) Find the total interest Eric has to pay. (3 marks)

(Give the answers correct to the nearest integer if necessary.)

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2022-23 E2

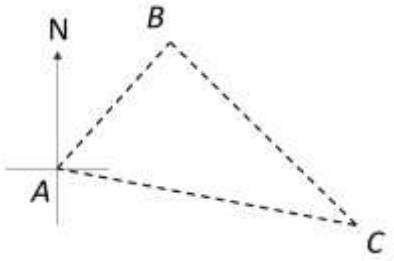
5. (a) Simplify $\left(\dfrac{1}{\cos(90°-\theta)}+\dfrac{1}{\sin(90°-\theta)}\right)\times\dfrac{\sin(90°-\theta)}{1+\tan\theta}$.

(b) Hence, solve $\left(\dfrac{1}{\cos(90°-\theta)}+\dfrac{1}{\sin(90°-\theta)}\right)\times\dfrac{\sin(90°-\theta)}{1+\tan\theta}=\tan 20°$.

(6 marks)

Answers written in the margins will not be marked.

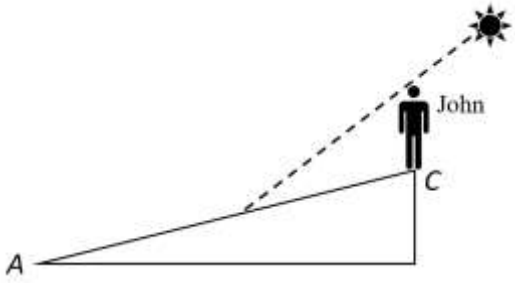
9. John goes hiking. He starts from A and walks a 200 m horizontal distance to B and then walks a 300 m horizontal distance to C. It is given that the compass bearing of B from A is N 40° E and the compass bearing of B from C is N 50° W.



(a) Find the distance between A and C. (3 marks)

(b) Find the compass bearing of A from C. (2 marks)

(c) It is given that the gradient of the path AC is $1:8$. The sun shines in the direction from C to A and forms the shadow of John on the path AC. The height of John is 1.8 m and the length of the shadow formed is 3 m. Find the angle of elevation that the sun shines with. (4 marks)



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End of Paper