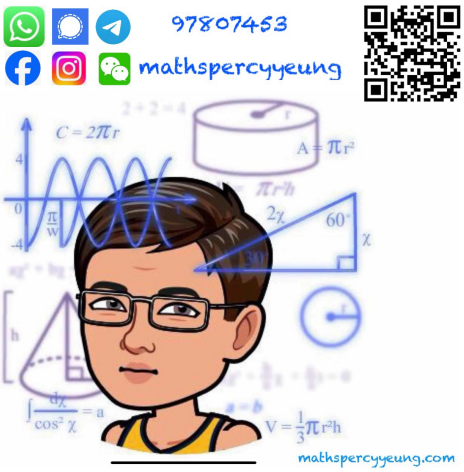
2024-2025 First/Second Term Examination (Revision)

F. 3 Mathematics

Paper 1



Time allowed : 1 hour 30 minutes

Full mark : 80

This question-answer book consists of 17 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.

2024-25 E1

1. (a) Factorize $2x^2 - 7xy + 6y^2$.

   (b) Using the result of (a), factorize $2a^2 - 7a(b+2) + 6(b+2)^2$. (3 marks)

2. Simplify $\dfrac{(4x^3y^{-1})^2}{(-2x^{-2})^3}$ and express your answer with positive indices. (3 marks)

Answers written in the margins will not be marked.

3. (a) Solve the inequality $\frac{4x-3}{3}-\frac{x}{2}<\frac{3-5x}{2}$ and represent the solutions graphically.

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

(4 marks)

Answers written in the margins will not be marked.

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4. Helen has bought x eggs at \$0.9 each for her shop. However, 6 of them are broken. She sells the remaining eggs at \$1.4 each.

   (a) Express the overall profit in terms of x.

   (b) If the percentage profit is greater than 15%, find the least value of x.

(6 marks)

Answers written in the margins will not be marked.

5. The population of a country was 1.2×10^7 last year, and it reaches 1.26×10^7 this year. It is given that the population of the country increases at a constant rate of r% annually.

   (a) Find the value of r.

   (b) Find the increase in the population of the country in the coming 4 years. Express your answer in scientific notation. (Give your answer correct to 3 significant figures.)

(6 marks)

Answers written in the margins will not be marked.

9. If n is a positive integer, simplify the following expressions.

(a) $\dfrac{5^{n+2}+5^{n+1}}{5^{n-1}-5^{n}}$ (3 marks)

(b) $\dfrac{27^{n+2}}{9^{n}}\times\left(3^{n}\right)^{3}\div 81^{n+1}$ (3 marks)

Answers written in the margins will not be marked.

11. (a) Mr. Chan's total annual income is \$546 000 and he has only the basic allowance of \$132 000.

It is given that the salaries tax payable by Mr. Chan is charged at progressive rates as follows:

Net chargeable income	Tax rates
On the first \$50 000	2%
On the next \$50 000	6%
On the next \$50 000	10%
On the next \$50 000	14%
Remainder	17%

Find his salaries tax payable. (3 marks)

(b) In order to pay the salaries tax, Mr. Chan wants to borrow \$$P$ from a bank for a year. The bank provides the following two plans to him:

Plan A charges an interest rate of 8% p.a. compounded quarterly.

Plan B charges a simple interest rate of 10% p.a. for the first 2 months, and then an interest rate of 6% p.a. compounded monthly afterwards.

Which plan should Mr. Chan choose in order to pay less interest? (7 marks)

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2024-25 E2

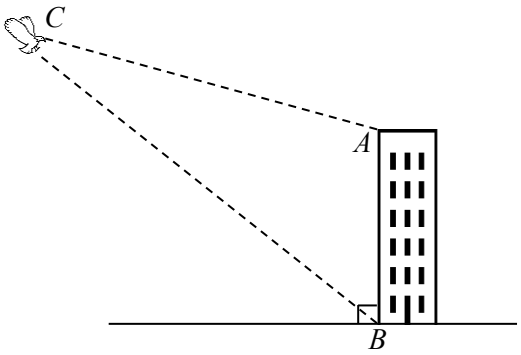
5. (a) Simplify $\dfrac{1-\sin^2(90°-\theta)}{\tan\theta}\left[\tan^2(90°-\theta)+1\right]$.

(b) Hence, solve $\dfrac{1-\sin^2(90°-\theta)}{\tan\theta}\left[\tan^2(90°-\theta)+1\right]=2\cos 30°$ without using a calculator.

(5 marks)

Answers written in the margins will not be marked.

10. A tower AB of 80 m high standing on a horizontal ground. The angles of depression of the top A and the bottom B of the tower from an airship C are 12° and 26° respectively. Find the height of the airship C above the ground correct to 3 significant figures. (6 marks)



Answers written in the margins will not be marked.

13. Car A and car B leave town O at noon. Car A travels in the direction S60°W at a speed of 40 km/h, while car B travels in the direction S40°E at the same speed. At 1:15 pm, car A and car B reach points P and Q respectively.

(a) Find the distance between the two cars. (4 marks)

(b) Find the true bearing of car B from car A at 1:15 pm. (1 mark)

(c) After 1:15 pm, car A travels at the same speed due east from P while car B stops at Q. When will be the car A be the closest to car B? (5 marks)

Answers written in the margins will not be marked.

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End of Paper