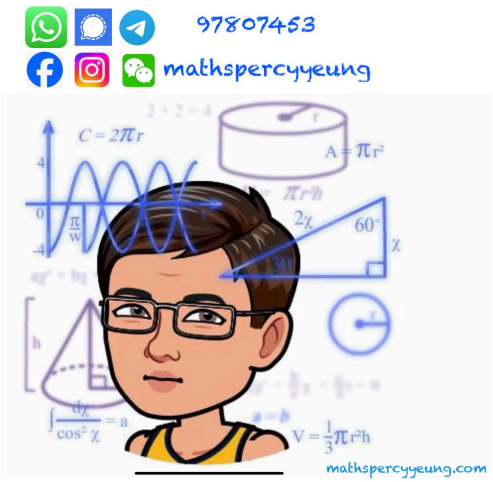
MSC F3 2024-25 Math FT1

Marking Scheme

2024-2025 First Term Form Test

F. 3 Mathematics



Time allowed : 45 minutes

Full mark : 45

This question-answer book consists of 8 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 20 marks and Section B carries 25 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. Mark the answers for Section A on page 4 with an HB pencil as follows:

CORRECT:	INCORRECT:
23. ▭ ▬ ▭ ▭	23. ▭ ▭ ▭ ▭
	23. ▭ ▭ ▭ ▬

   Wrong marks should be completely erased with a clean rubber.
   Choose the best answer for each question. All questions carry equal marks in Section A.

6. All diagrams / graphs / charts as part of the answers must be clearly drawn with an HB pencil.

7. 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.

8. Unless otherwise specified, all working must be clearly shown in Section B.

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

10. Unless otherwise specified, numerical answers must be exact.

11. Calculator pad printed with the "HKEA Approved" / "HKEAA Approved" label is allowed.
    Remove the calculator cover / jacket.

Section A (20 marks)

1. Factorize $6x^2y+5xy^2-6y^3$.

   A. $(2x-3y)(3x+2y)$
   B. $(2x+3y)(3x-2y)$
   C. $y(2x-3y)(3x+2y)$
   D. $y(2x+3y)(3x-2y)$

2. Which of the following must have $m+2n$ as a factor?

   A. m^2+4n^2
   B. $m^2+2mn+4n^2$
   C. $2m^2+2mn-4n^2$
   D. $m(m+n)-2n(m+n)$

3. If $4x^2+kx+20=(x+a)(ax+b)$, where a, b and k are integers, then b =

   A. 2.
   B. 4.
   C. 5.
   D. 10.

4. It is given that a, b and m are integers. Which of the following must be true?

   I. $\left(\frac{a}{b}\right)^{-m}=\frac{b^m}{a^m}$
   II. $(m^{-a})^b=m^{-a+b}$
   III. $(-a^m)^2=-a^{2m}$

   A. I only
   B. II only
   C. I and III only
   D. II and III only

5. It is given that n is a non-zero number. $9^{4n}\cdot 16^{2n}$ =

   A. 6^{6n}.
   B. 6^{8n}.
   C. 144^{6n}.
   D. 144^{8n}.

Answers written in the margins will not be marked.

6. Which of the following are scientific notations?

I. 12×10^{99}

II. 4.5×10^{99}

III. 7.8×10^{-99}

A. I only

B. II only

C. I and III only

D. II and III only

7. Convert the denary number $2^{11}+2\times2^{8}+3\times2^{5}+1$ to a binary number.

A. 101001100001_2

B. 100100100001_2

C. 100200300001_2

D. 10100110001_2

8. $10001000111_2 =$

A. $2^{10}+2^{6}+6$.

B. $2^{10}+2^{6}+7$.

C. $2^{11}+2^{7}+13$.

D. $2^{11}+2^{7}+14$.

9. How many negative integers satisfy the inequality $\frac{4-x}{2}\geq\frac{2(3+x)}{-3}$.

A. 0

B. 23

C. 24

D. 25

10. If $a<b$ and $k>0$, which of the following must be true?

I. $a^2<b^2$

II. $k^2a<k^2b$

III. $\frac{a}{k}>\frac{b}{k}$

A. I only

B. II only

C. I and III only

D. II and III only

Answers written in the margins will not be marked.

Use a pencil to mark your answer as follows: A B C D

	A	B	C	D
1.	▭	▭	▭	▬
2.	▭	▭	▬	▭
3.	▭	▭	▬	▭
4.	▬	▭	▭	▭
5.	▭	▬	▭	▭

	A	B	C	D
6.	▭	▭	▭	▬
7.	▬	▭	▭	▭
8.	▭	▬	▭	▭
9.	▭	▭	▬	▭
10.	▭	▬	▭	▭

Section B (25 marks)

1. (a) Factorize $8x^2 + 5xy - 3y^2$.

   (b) Hence, or otherwise, factorize $16x^2 + 10xy - 6y^2 - 2x - 2y$.

(4 marks)

Answers written in the margins will not be marked.

2. Simplify $\dfrac{(-a^3b^0)^2(2ab^2)^{-2}}{a^3b^{-3}}$ and express your answer with positive indices. (3 marks)

3. If $\left(4^{x-3}\right)\left(8^{2-x}\right)\left(16^{-x}\right)=\dfrac{1}{y}$, express y in terms of x in the simplest index form. (3 marks)

Answers written in the margins will not be marked.

4. (a) (i) Solve the inequality $\frac{3x+8}{-2} > x-6$.

(ii) Represent the solutions in (a)(i) graphically.

(3 marks)

(b) Write down the greatest integer satisfying the inequality in (a). (1 mark)

Answers written in the margins will not be marked.

5. Let $A = n \times 10^7$ and $B = 5n \times 10^5$, where n is a positive integer.

(a) If $A + B = C \times 10^5$, express C in terms of n. (2 marks)

(b) If $\frac{A \times B}{A + B} < (n + 9) \times 10^5$, find all possible value(s) of n. (3 marks)

Answers written in the margins will not be marked.

6. Suppose at the beginning the number of stickers owned by Betty is k. The number of stickers owned by Ben is double that owned by Betty. After playing a game, each of them gets 20 more stickers and the total number of stickers owned by them is at least 50.

(a) Find the least possible number of stickers owned by Betty before playing the game. (4 marks)

(b) Ben claims that he has 27 stickers after playing the game. Do you agree? Explain your answer. (2 marks)

End of Paper

Answers written in the margins will not be marked.