

CCK F2 2024-25 Final math I

FINAL EXAMINATION 2024 – 2025 QUESTION-ANSWER BOOK

Subject: **Secondary 2 Mathematics**

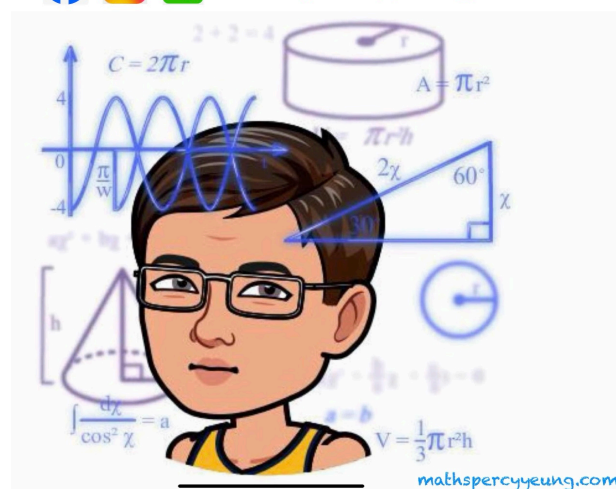
Paper: **I**

Time Allowed: **1 hour**

Total Marks: **100**

INSTRUCTIONS

- (1) Write your name, class and examination number in the spaces provided.
- (2) This paper consists of Three Sections, A1, A2 and B.
- (3) Attempt ALL questions in Sections A1, A2 and B. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.
- (4) Unless otherwise specified, the use of HKEAA approved electronic calculators is allowed.
- (5) Unless otherwise specified, all working must be clearly shown.
- (6) Unless otherwise specified, numerical answers should be exact or correct to 3 significant figures.



No. of pages: **14**

Page	Marks	
2		
3		
4		
5		
6		
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8		
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10		
11		
12		
13		
14		
Total		

Section A(1) (40 marks)

1. Expand the following expressions by using identities.

(a) $(1 - a)(1 + a)$

(1 mark)

(b) $(3x - y)^2$

(2 marks)

(c) $(1 + 2x)^2$

(2 marks)

2. Factorize the following expressions.

(a) $ab - 2bc + abc$

(2 marks)

(b) $2ab - 4a - 3b + 6$

(2 marks)

3. Simplify the following expressions.

(a) $\frac{16y^5}{4y^3}$

(1 mark)

(b) $\frac{7(3k+1)}{14k} \times \frac{k^3}{k(3k+1)}$

(2 marks)

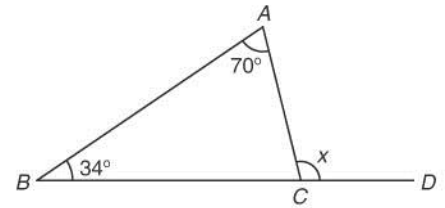
(c) $\frac{4h^2(2-5h)}{14h^5(5h-2)}$

(3 marks)

Answers written in the margins will not be marked.

4. In the figure, BCD is a straight line. Find the value of x .

(2 marks)



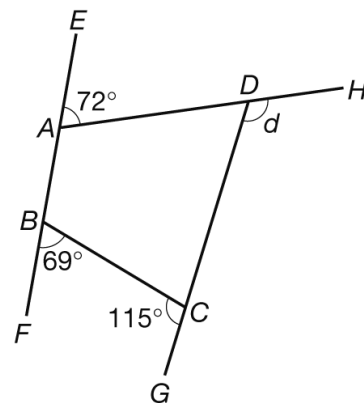
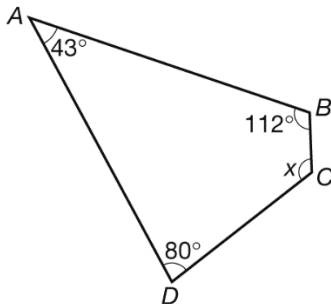
5. Find the value of the unknowns in the following figures.

(a)

(2 marks)

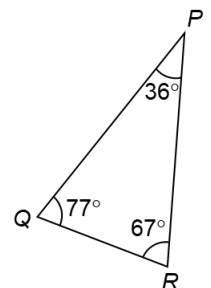
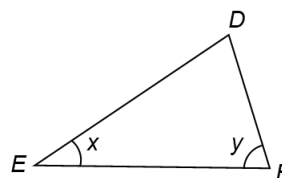
(b)

(2 marks)

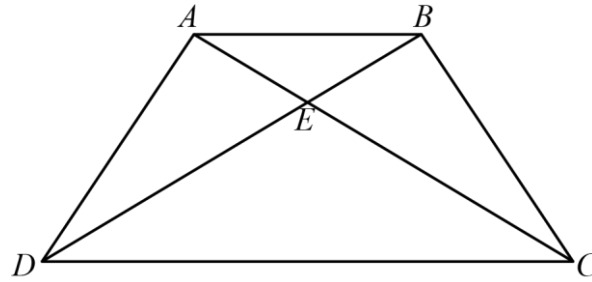


6. In the figure, $\triangle DEF \cong \triangle QPR$. Find the values of x and y .

(3 marks)



7. In the figure, $ABCD$ is a quadrilateral. The diagonals AC and BD intersect at E . It is given that $DE = CE$ and $\angle DAC = \angle CBD$.



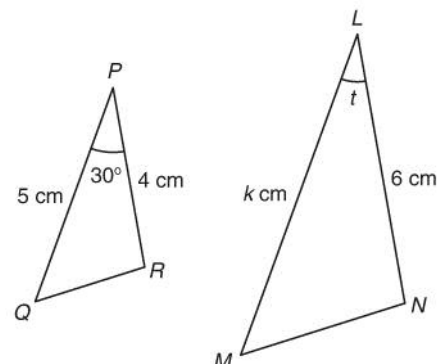
- (a) Prove that $\triangle ADC \cong \triangle BCD$. (3 marks)

- (b) Consider the triangles in the above figure.

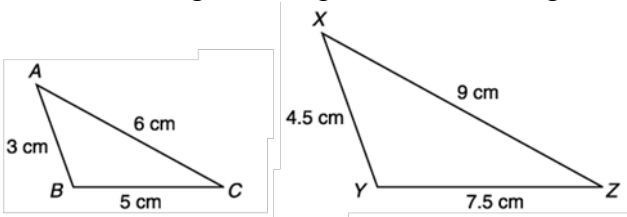
- (i) How many pairs of congruent triangles are there? (1 mark)

- (ii) How many pairs of similar triangles are there? (1 mark)

8. In the figure, $\triangle PQR \sim \triangle LMN$. Find the values of t and k . (3 marks)



9. The figure shows a pair of similar triangles. Complete the following table. (2 marks)



Similar Triangles	Reason
$\triangle ABC \sim \triangle$ _____	(_____)

10. The table below shows the heights (in cm) of some plants.

Height (cm)	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35
Frequency	9	8	3	11	15

(a) What are the lower and upper class limits of the second class interval? (2 marks)

Lower class limit: _____ Upper class limit: _____

(b) What is the class mark of the fourth class interval? (1 mark)

(c) What are the lower and upper class boundaries of the fifth class interval? (2 marks)

Lower class boundary: _____ Upper class boundary: _____

(d) What is the class width of the third class interval? (1 mark)

Answers written in the margins will not be marked.

Section A(2) (30 marks)

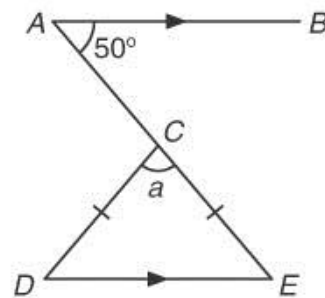
11. Prove that $3(x + 1) - (x + 2) = 2x + 1$ is an identity. (3 marks)

12. If $(3x - 4)(x + 2) \equiv 3x^2 + Ax - B$, where A and B are constants, find the values of A and B . (3 marks)

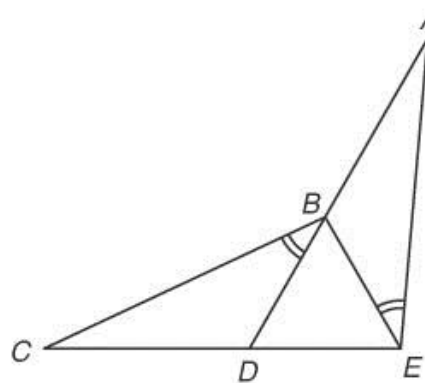
13. Simplify the following algebraic fractions.

(a) $\frac{2x - 2y}{x^2 - xy}$ (3 marks) (b) $\frac{a^3(ab - 1)}{8(a + 4b)} \div \frac{a(ab - 1)}{2(a + 4b)}$ (2 marks)

14. In the figure, ACE is a straight line, $CD = CE$ and $AB \parallel DE$. Find the value of a . (4 marks)

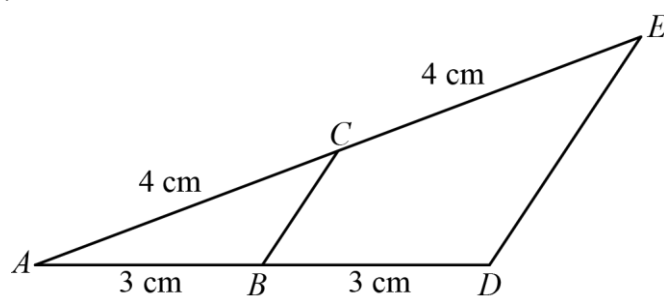


15. In the figure, $\triangle BDE$ is an isosceles triangle with $DE = BE$. It is given that $\angle CBD = \angle AEB$, ABD and CDE are straight lines. Prove that $\triangle BCD \sim \triangle EAB$. (5 marks)



Answers written in the margins will not be marked.

16. In the figure, B and C are the mid-points of AD and AE respectively. It is given that $AC = CE = 4$ cm and $AB = BD = 3$ cm.



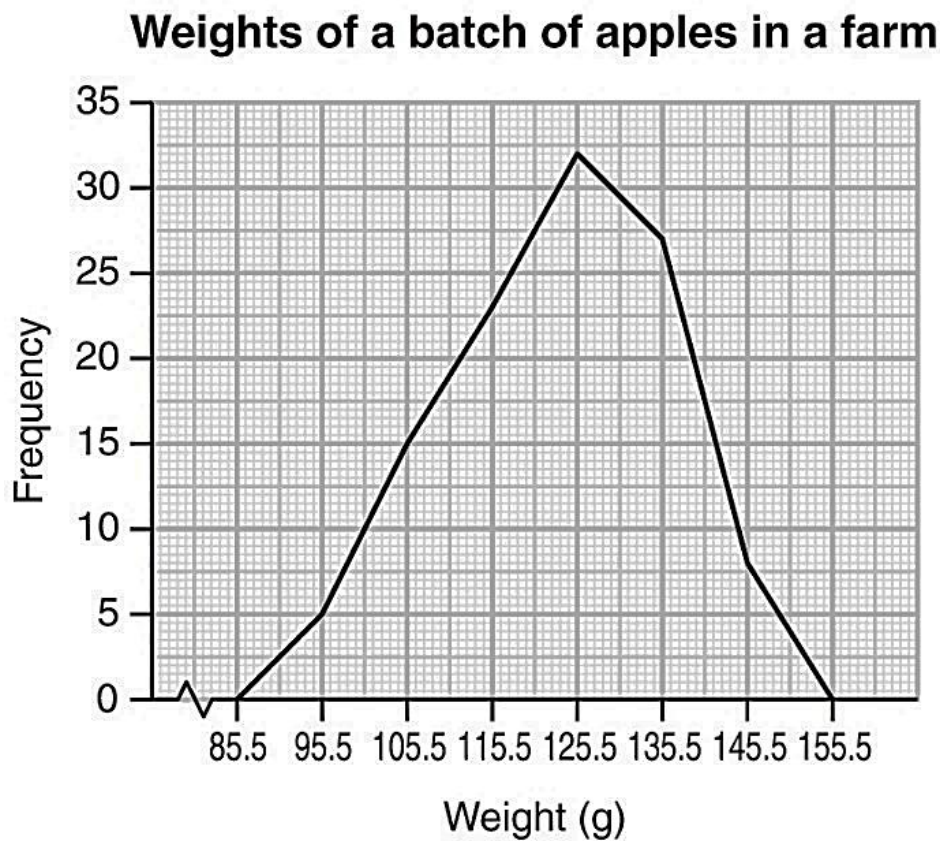
- (a) Prove that $\triangle ABC \sim \triangle ADE$.

(3 marks)

- (b) Hence, show that $DE = 2BC$.

(2 marks)

17. The frequency polygon below shows the distribution of the weights (in g) of a batch of apples in a farm.



(a) How many apples are there in this batch of apples? (1 mark)

(b) The farmer sells the batch of apples according to apples' size. The selling price of the apples are shown in the following table.

Size	Weight	Price
Small	Below 120.5 g	\$2
Medium	120.5 g or above but below 140.5 g	\$3
Large	140.5 g or above	\$5

The farmer suggested that he can get more than \$300 if all the apples are sold. Do you agree? Explain your answer. (4 marks)

Answers written in the margins will not be marked.

Section B (30 marks)

18. (a) Expand $(a - 5)^2$. (2 marks)

(b) Hence, expand $(x + y - 5)^2$. (3 marks)

19. If the size of an interior angle of a regular n -sided polygon is 10 times that of an exterior angle, find
(a) the value of n , (4 mark)

(b) the size of each interior angle. (Leave your answer in fraction.) (1 mark)

Answers written in the margins will not be marked.

20. Given that $x^4 + Ax^2 + B \equiv (x^2 + C)^2$, where A , B and C are constants.

(a) Express B and C in terms of A .

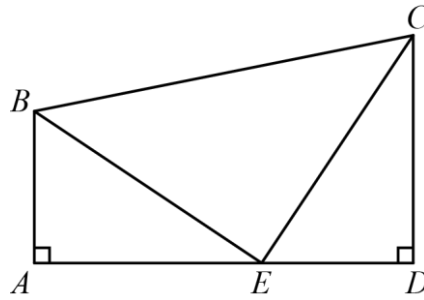
(3 marks)

(b) Using the results of (a), factorize $x^4 + 4$.

(2 marks)

Answers written in the margins will not be marked.

21. The figure below shows a trapezium $ABCD$ with $\angle BAD = \angle CDA = 90^\circ$. E is a point on AD such that $BE = CE$ and $AB = ED$.



- (a) Prove that $\triangle ABE \cong \triangle DEC$ (3 marks)

- (b) Show that $\angle BEC = 90^\circ$. (2 marks)

- (c) Denote $DE = a$, $CD = b$ and $CE = c$.

- (i) By considering the area of trapezium $ABCD$, show that $ab + \frac{1}{2}c^2 = \frac{1}{2}(a+b)^2$. (3 marks)

- (ii) Using the result of (c)(i), show that $a^2 + b^2 = c^2$. (2 marks)

22. The frequency distribution table and the cumulative frequency table below show the lengths (in km) of 250 tunnels in a city, where a , b , c , h and k are integers.

Length (km)	Frequency
0 – 0.9	14
1.0 – 1.9	27
2.0 – 2.9	a
3.0 – 3.9	b
4.0 – 4.9	c
5.0 – 5.9	75

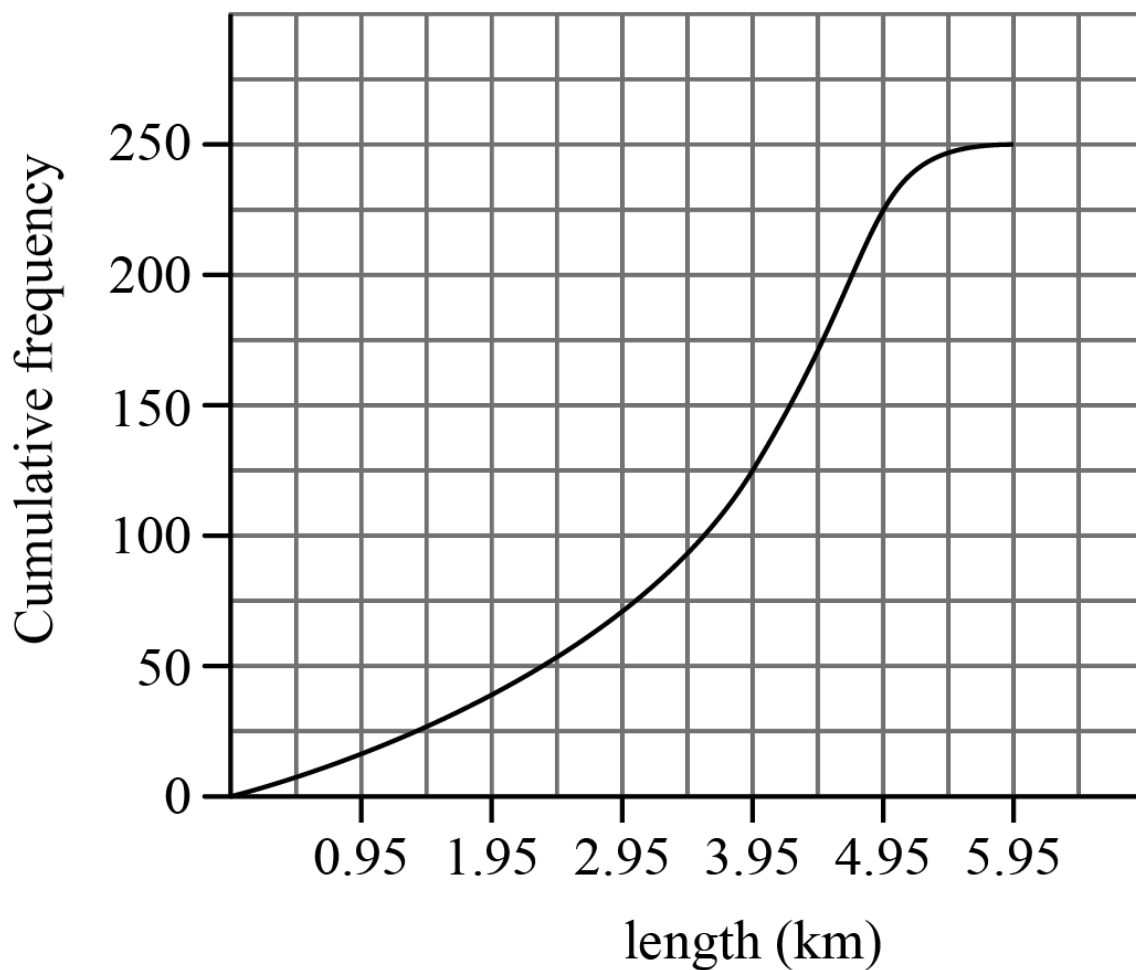
Length less than (km)	Cumulative frequency
0.95	14
1.95	h
2.95	64
3.95	125
4.95	k
5.95	250

- (a) Write down the values of h and k . (2 marks)

- (b) Mr. Lee suggested that over 70% tunnels in the city are longer than 4.95 km. Do you agree? Explain your answer. (2 marks)

- (c) The graph below shows a cumulative frequency curve that is drawn from the cumulative frequency table.

The lengths of 250 tunnels in a city



From the graph, find the median.

(1 mark)

~ End of Paper ~