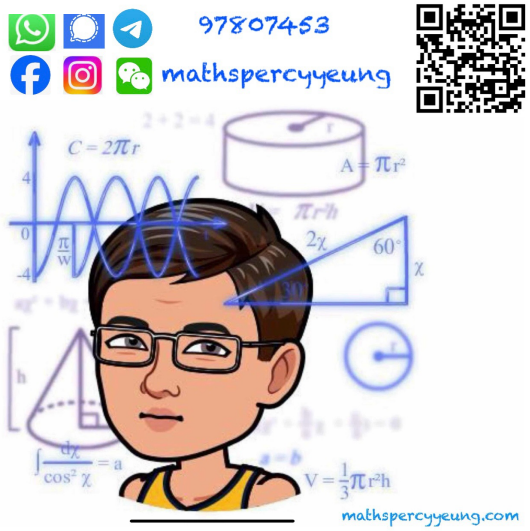
17-18 F.6
1st TERM UT
MATH CP
PAPER 1



2017 – 2018
Form 6 First Term Uniform Test

MATHEMATICS Compulsory Part

PAPER 1

Question–Answer Book

30th October, 2017
8:15 am – 9:45 am (1 hour 30 minutes)
This paper must be answered in English

INSTRUCTIONS

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

2. This paper consists of THREE sections, A(1), A(2) and B.

3. Attempt 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.

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

5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

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

Sections	Marks
A (1 – 4)	
A (5 – 9)	
A Total	**/43**
B Total	**/27**
TOTAL	**/70**

Section A(1) (24 marks)

1. Simplify $\dfrac{\left(x^{-4}y^{3}\right)^{5}}{\left(x^{-3}\right)^{4}}$ and express your answer with positive indices. (3 marks)

2. Factorize

(a) $2a^2+5ab-7b^2$,

(b) $2a^2+5ab-7b^2-3a+3b$.

(3 marks)

3. Make h the subject of the formula $h(2k+3)=h-k$. (3 marks)

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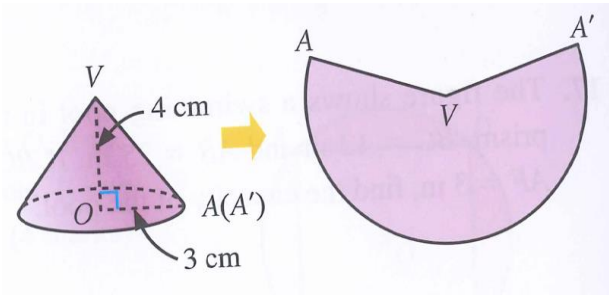
4. In the figure, a paper cone is cut along VA and then unfolded to become a sector VAA'. If the base radius and the height of the cone are 3 cm and 4 cm respectively, find reflex $\angle AVA'$.

(4 marks)



5. **(a)** Solve the following compound inequality

$$3x-2\le\frac{10-x}{3} \quad \text{and} \quad -x+3<7 \quad \cdots\cdots(*)$$

and represent the solutions graphically.

(b) Write down the greatest integer satisfying (*).

(5 marks)

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6. The stem-and-leaf diagram below shows the weights(in g) of the apples in a box.

Stem (tens)	Leaf (units)
23	4 7
24	1 3 4 6 9
25	0 2 2
26	3 5

(a) Find the mean weight and the median weight of the apples. (2 marks)

(b) Amy puts four more apples into the box where the mean weight of these four apples is 250 g. It is found that the weights of two of the four apples are 249 g and 251 g.

(i) Write down the mean weight of the 16 apples.

(ii) Is it possible that the median of the weights of the 16 apples is the same as the median found in **(a)**? Explain your answer.

(4 marks)

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Section A(2) (19 marks)

7. In a bag, there are altogether 24 red, yellow and white balls. The numbers of red, yellow and white balls form an arithmetic sequence and the product of the numbers is 384. It is given that the number of white balls is the greatest.

(a) Find the number of red balls. (4 marks)

(b) A ball is drawn at random from the bag. Ivy claims that the probability of getting a white ball is greater than 0.6. Do you agree? Explain your answer. (2 marks)

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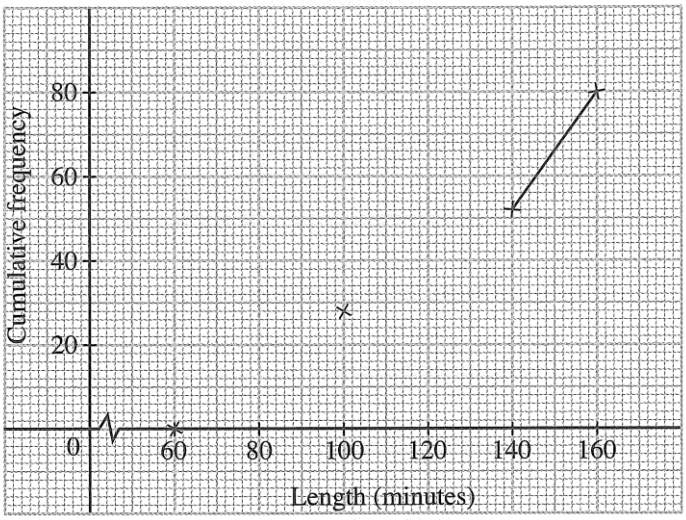
8. A student records the lengths of 80 movies. The data are organized in a frequency table and plotted in a cumulative frequency polygon. However, some ink was spilled on the frequency table (as shown below) and the cumulative frequency polygon is incomplete. It is given that the mean and the median of the distribution are 117.5 minutes and 120 minutes respectively.

Length (t minutes)	Class mark (minutes)	Frequency
$60 \le t < 80$	70	
$80 \le t < 100$	90	
$100 \le t < 120$	110	
$120 \le t < 140$	130	
$140 \le t < 160$	150	



Reconstruct the frequency table and find the frequency of each class. (6 marks)

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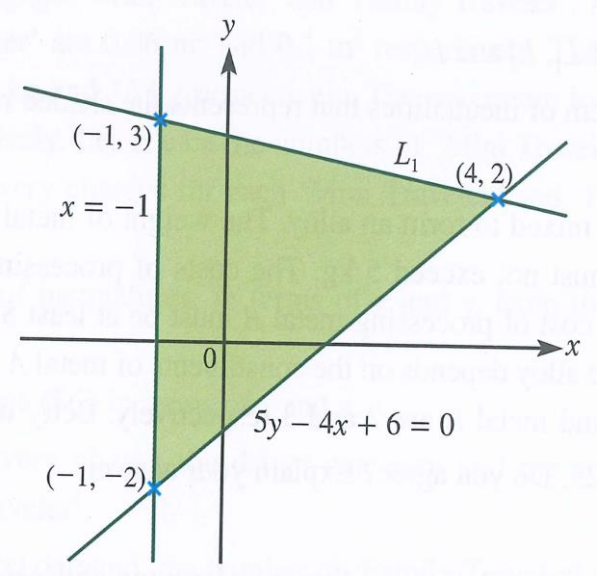
9. The figure shows the region bounded by 3 straight lines.



(a) Find the equation of L_1. (2 marks)

(b) Write down the system of inequalities represented by the shaded region. (3 marks)

(c) Boyle claims that $P = y - 3x$ attains its maximum value subject to the constraints in **(b)** at (–1, 3). Do you agree? Explain your answer. (2 marks)

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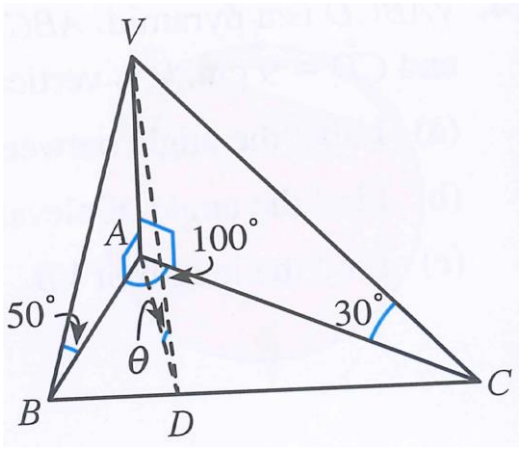
Section B (27 marks)

10. In the figure, ABC is the horizontal ground. V is 50 m vertically above the point A. The angles of elevation of V from B and C are 50° and 30° respectively and $\angle BAC = 100°$.



(a) Find AB and AC. (2 marks)

(b) Find BC and $\angle ABC$. (4 marks)

(c) D is a moving point on BC and θ is the angle of elevation of V from D.

(i) If $BD = DC$, find the value of θ.

(ii) Find the greatest value of θ.

(4 marks)

(d) Describe the change of values of θ when D is moving from B to C. (2 marks)

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11. Jason buys a flat and borrows a loan of $\$P$ from a bank at an interest rate of 3% p.a., compounded monthly. For each successive month after the day when the loan is taken, loan interest is calculated and then a monthly instalment of $\$x$ is immediately paid to the bank until the loan is fully repaid (the last instalment may be less than $\$x$), where $x < P$.

(a) (i) Express, in terms of x and P, the amount that Jason still owes the bank after paying the 2^{nd} instalment.

(ii) If Jason has not yet fully repaid the loan after paying the n^{th} instalment, express, in terms of x and P, the amount that he still owes the bank.

(5 marks)

(b) It is given that the price of the flat is \$3 000 000 and Jason borrows a loan of 70% of the price. Suppose that Jason's monthly instalment is \$10 000 (the last instalment may be less than \$10 000).

(i) Find the number of instalments for Jason to fully repay the loan.

(ii) Jason wants to fully repay the loan with a smaller monthly instalment. He requests to pay a monthly instalment of \$5 000. If you are the manager of the bank, will you approve his request? Explain your answer.

(6 marks)

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12. 7 cards numbered 1, 2, 3, 4, 5, 6 and 7 respectively are arranged in a row. Find the number of possible arrangements in the following cases.

(a) The sum of the numbers of any two adjacent cards are odd. (2 marks)

(b) The sum of the numbers of any three consecutive cards is not 17. (2 marks)

End of Paper

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