F3 MID YEAR
MATH
PAPER I

MID-YEAR EXAMINATION
2014 – 2015

FORM 3 MATHEMATICS PAPER I
Section A, B
Question-Answer Book

Form 3
Paper I

Examination Number		

INSTRUCTIONS

1. Write your examination number in the spaces provided on this cover.
2. In this paper, Section A carries 25 marks and Section B carries 35 marks.
3. Attempt ALL questions in the two sections.
4. Supplementary answer sheets will be supplied on request. Write your Examination Number on each sheet and put them INSIDE this book.
5. Unless otherwise specified, all working steps must be clearly shown.
6. Unless otherwise specified, numerical answers should either be exact or correct to 3 significant figures.
7. The diagrams in this paper are not necessarily drawn to scale.

	Marker's Use Only
Page No.	Marks
2	(10)
3	(7)
4	(8)
Section A Total	
5	(7)
6	(7)
7	(8)
8	(6)
9	(7)
Supplementary Answer Sheet	
Section B Total	
Total:	

Section A – Foundation Questions (25%)

1. Without using a calculator, find the value of the following expressions, express your answers in scientific notation.

   a) $7\,800\,000\,000 + 300\,000\,000$

   b) $\dfrac{2\,340\,000\,000}{(3\times10^{2})(0.002)}$ (3 marks)

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

3. Solve the inequality of $\dfrac{1+x}{3}-\dfrac{9-x}{5}<\dfrac{x-1}{2}$ and represent the solution graphically.

   Hence, find the largest integer satisfies the inequality. (4 marks)

4. Consider the formula $2(3m + n) = m - 7$.

a) Make n the subject of the above formula.

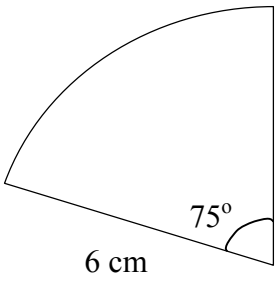
b) If $n : m = 3 : 2$, find n and m. (4 marks)

5. Solve the following pair of simultaneous equations.

$$\begin{cases} 2x - 3y = 5 \\ 4x + 2y = 2 \end{cases}.$$ (3 marks)

6. Find the area and perimeter of the sector in the figure.

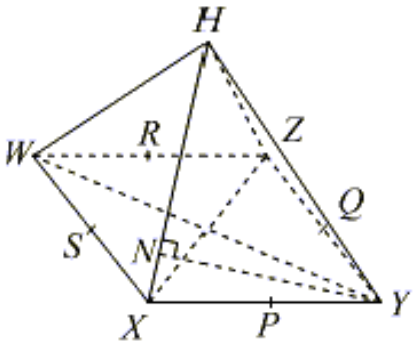
(Leave your answers in terms of π) (4 marks)



7. In the figure, the object has 5 faces in total. The base *WXYZ* is a rectangle and the other 4 faces are all isosceles triangles. *P*, *Q*, *R* and *S* are the mid-points of *XY*, *YZ*, *WZ* and *WX* respectively, and $NY \perp HX$. The intersection of *WY* and *XZ* is the projection of *H* on the plane *WXYZ*.

a) Name the angles between the *HY* and the base *WXYZ*.
b) Name the angle between planes *HWX* and *WXYZ*
c) Name the angle between planes *HWX* and *HXY*.
d) Name the angle between planes *HWX* and *HYZ*.

(4 marks)



Section B – Short Questions (35%)

8. The results of the five tests (Full mark: 100) of a student are listed below.

85, 76, 52, 80, 98

a) i) Find the mean score of the five tests.

ii) Find the median score of the five tests. (2 marks)

b) i) What marks should the student get in the 6th test in order to attain a mean score of 80?

ii) Find the median score if mean score of the six tests is 80. (3 marks)

c) Is it possible for the student to get a mean score of 82 after the 6th test? (2 marks)

Go on to the next page

9. The following table shows the examination scores of students A, B and C in three subjects.

Subject	Weight	Score		
		A	B	C
X	5	72	58	66
Y	3	52	76	63
Z	2	61	65	59

Find the weighted mean score of each student. Which student has a better result? (3 marks)

10. The table shows the salaries tax rate for the year 2014/15. If Mr X has to pay \$9760 as the salaries tax, find Mr X net chargeable income. (4 marks)

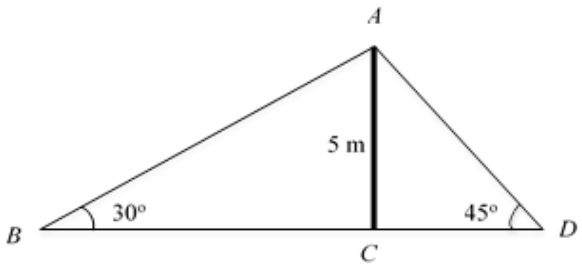
Net chargeable income	Tax rate
On the first \$40 000	2%
On the next \$40 000	7%
On the next \$40 000	12%
Remainder	17%

11. A wire of length 60π cm is cut into two parts, each of which is bent into a circle. The total area of the two circles is 468π cm^2. Let r cm be the radius of smaller circle.

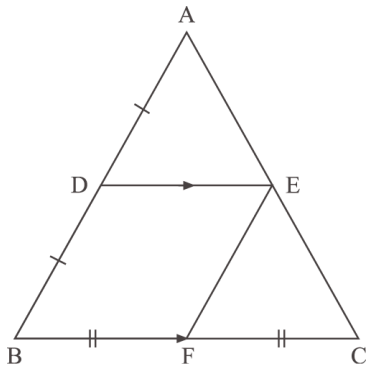
a) By consider the circumferences of the circle, express the radius of the larger circle in terms of r. (2 marks)

b) Find the radii of the circles. (3 marks)

12. As shown in the figure, a bamboo rod erect vertically is fixed by two ropes. The angles between each rope and the ground are 30° and 45° respectively. If the height of the bamboo rod is 5 m, find BD. (Correct your answer to the nearest 0.1 m.) (3 marks)



13. In the figure, D and F are the mid-point of AB and BC , respectively. Given that DE // BC.



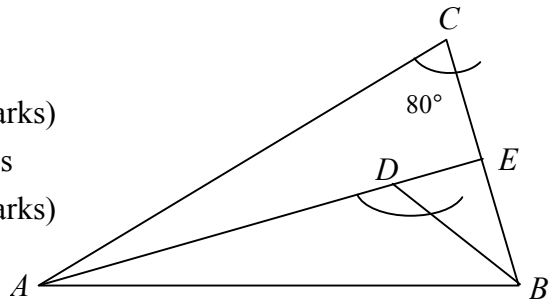
a) Prove that $\Delta ADE \cong \Delta EFC$. (3 marks)

b) Show that $\Delta ADE \cong \Delta FED$. (3 marks)

14. In the figure, $\angle ACB = 80°$ and D is incentre of $\triangle ABC$.

a) Find $\angle ADB$. (3 marks)

b) If D is also orthocentre of $\triangle ABC$, show that $\triangle ABC$ is an isosceles triangle. (4 marks)



Supplementary Sheet

End of Section A and Section B

LA SALLE COLLEGE
MID-YEAR EXAMINATION 2014-2015

Exam Number			

Form 3 Mathematics
Paper 1

Section C

Time allowed: 105 minutes

Question – Answer Book

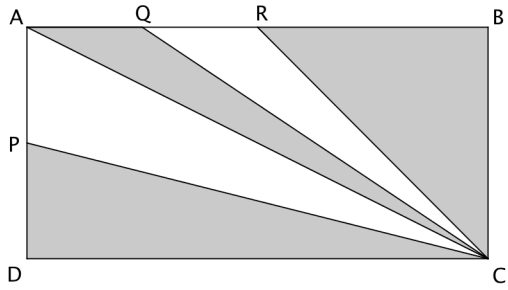
Instructions

1. Write your examination number in the spaces provided on the top right corner of this cover page.
2. The total mark of this section is 40.
3. Attempt ALL questions in this section.
   Write your answers in the spaces provided in this Question-Answer Book. Page 9 is a supplementary answer sheet.
4. 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.
7. Use of HKEAA approved calculator is allowed.

Question No.	Marks
1	(10)
2	(10)
3	(10)
4	(10)
Supp. Sheet	
Section C Total	**(40)**

Section C [40 marks]

1. The figure shows a rectangle $ABCD$ whereas $AB > BC$. It is given that the length and the width of the rectangle are 2 cm and 25 cm less than its diagonal respectively.



(a) Find the length and the width of the rectangle $ABCD$. (6 marks)

Answers written in the margins will not be marked

Page Total

(b) Given that PC, QC and RC are the medians of ΔADC, ΔARC and ΔQBC respectively. Find the total area of all the shaded regions in the figure. (4 marks)

Answers written in the margins will not be marked

Page Total

2. The daily maximum temperatures of cities *A* and *B* in the past 10 days are listed below.

Day	1	2	3	4	5	6	7	8	9	10
City *A*	29°C	28°C	21°C	22°C	18°C	23°C	22°C	20°C	22°C	17°C
City *B*	35°C	27°C	20°C	22°C	17°C	22°C	22°C	19°C	22°C	16°C

(a) (i) Find the mean, the median and the mode of the daily maximum temperatures of each city in the past 10 days. (3 marks)

(ii) According to the results in (a) (i), what do you observe when comparing the averages of the maximum temperatures of the two cities in the past 10 days? (1 mark)

(b) The daily maximum temperatures of the two cities are divided into four groups. Complete the following cumulative frequency table. (2 marks)

Daily Maximum Temperature (°C)	Daily Maximum Temperature of City *A* and *B* (less than °C)	*Cf* (City *A*)	*Cf* (City *B*)
	15.5	***0***	***0***
16 – 20			
21 – 25			
26 – 30			
31 – 35			

(c) Using the result in part **(b)**, plot the two cumulative frequency polygons on the **graph paper provided on page 10**. (2 marks)

(d) Using the result in part **(c),** find the medians of the two cities. (2 marks)

Answers written in the margins will not be marked

Page Total

3. The monthly salary of Mr. Ho is obtained by the sum of basic salary, commission and bonus. In September, the basic salary, commission and bonus are \$5000, \$$a$ and \$600 respectively. In October, the basic salary and the commission were increase by 10% and 8% respectively, that of bonus decreases by 5%.

(a) If the total salary of October is \$24 268, find the value of a. (2 marks)

(b) What is the percentage change of monthly salary from September to October? (2 marks)

(c) The market price of Mr. Ho's flat is \$4 136 400. The rateable value of his flat is 8% of its market price. Mr. Ho wants to rent out his flat such that the rates is at most equal to 20% of the rent charged. If the rates are charged at 5% p.a., what is the minimum monthly rent that Mr. Ho should charge? (3 marks)

Answers written in the margins will not be marked

Page Total

(d) Mr. Ho wants to deposit a sum of money in a bank for preparing retirement. His goal is to have at least \$400 000 in 35 years. Bank *A* offers an interest rate of 2.5% p.a. compounded quarterly while Bank *B* offers an interest rate of 2.25% p.a. compounded monthly. By choosing a lower principal, which bank should he deposit his money?

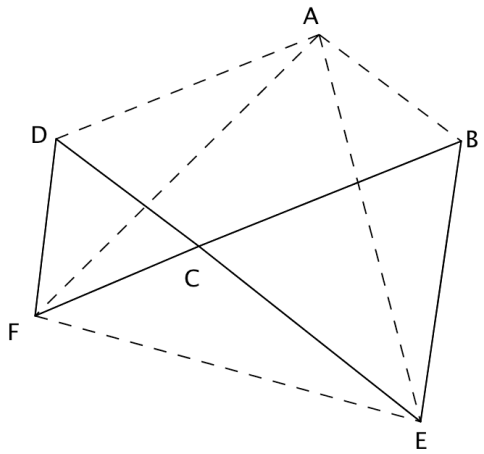
(3 marks)

Answers written in the margins will not be marked

Page Total

4. In the figure, *BCE* and *CDF* are equilateral triangles.

(a) If ΔAEF is an equilateral triangle, prove that *ABCD* is a parallelogram. (6 marks)



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Page Total

(b) It is given that $AB = 15$ cm, $AD = 30$ cm, DCE and FCB are straight lines intersecting at C. By using the result in part **(a)**, find $\angle CEF$. (4 marks)

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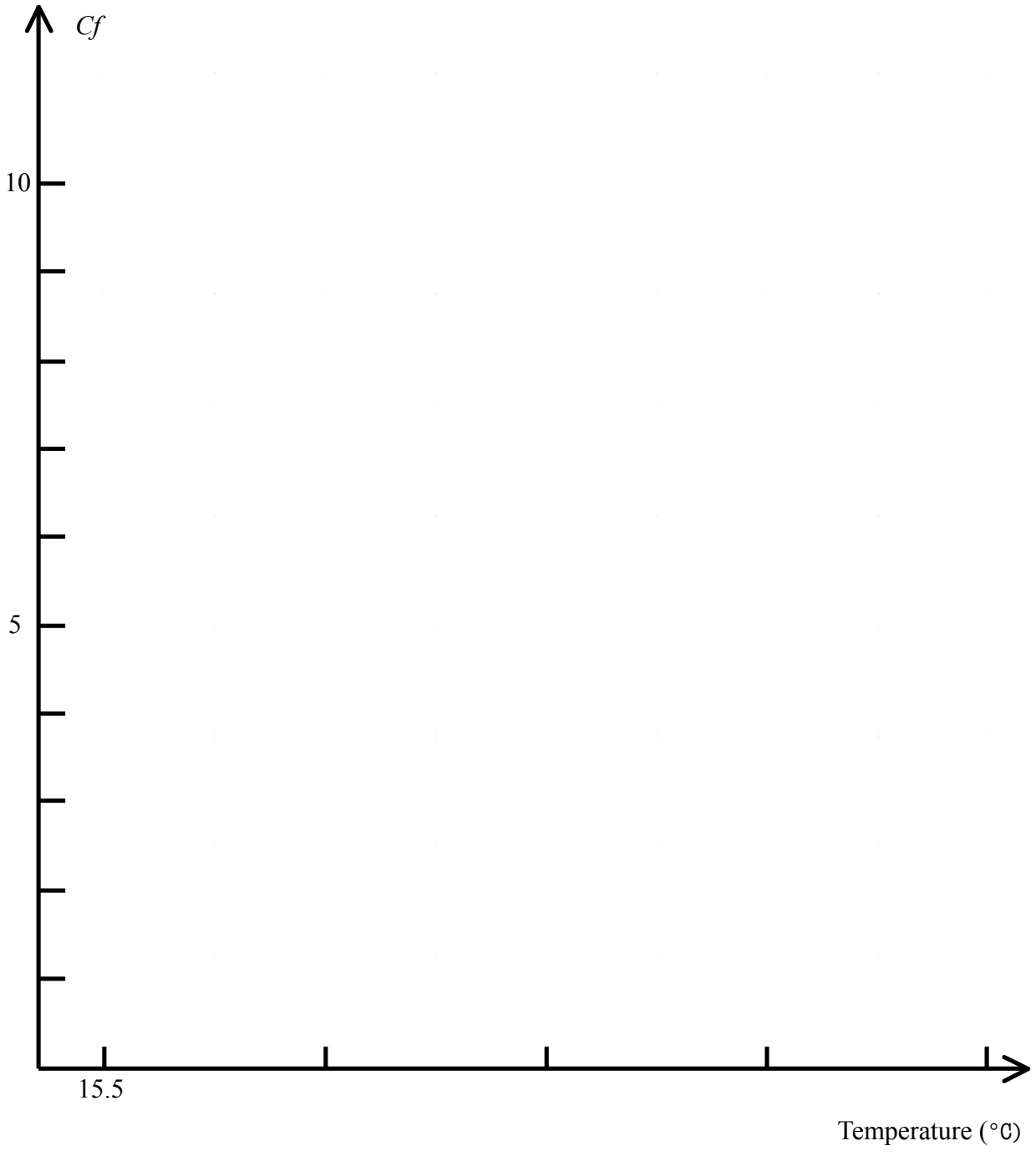
Page Total

Supplementary Answer Sheet

Answers written in the margins will not be marked

Page Total

Graph paper for question **2(c)**



Answers written in the margins will not be marked

- End of Section C -