Exam Number			

MID-YEAR EXAMINATION 2015-2016

Form 3 Mathematics
Paper 1

Section A, B

Question – Answer Book

Instructions

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

Page No.	Marks
1	(9)
2	(9)
3	(7)
Section A	**(25)**
Page No.	**Marks**
4	(7)
5	(8)
6	(9)
7	(11)
Section B	**(35)**
Supp. Sheet	

Total mark	**(60)**

Section A Foundation Questions [25 marks]

1. Tom's home is 1.8 km from his school. His average walking speed is 1.2 m/s. If he leaves home at 6:30 a.m., when will he arrive at his school? (3 marks)

2. Make n the subject of the formula $T = \dfrac{m+n}{1-mn}$. (3 marks)

3. Simplify $\left(\dfrac{-7a^{-3}}{b^2}\right)^{-2}$ and express your answer with positive indices. (3 marks)

Answers written in the margins will not be marked

Page Total

4. Solve $\begin{cases} 3x + 4y = 6 \\ 2x + 3y = 5 \end{cases}$. (3 marks)

5. Solve the inequality $\frac{2(x+1)}{3} > \frac{-(4-x)}{4}$ and represent the solution graphically.

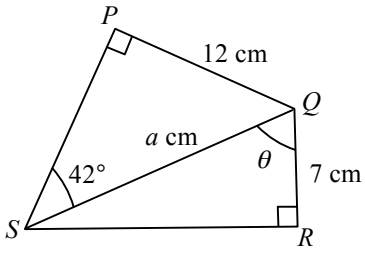
(3 marks)

6. Consider a set of data: 9, 16, 7, 26, 10, 17, 15 and 20
If two data are deleted, the new mean became 15. Find the new median. (3 marks)

Answers written in the margins will not be marked

Page Total

7. In the figure, $\triangle PQS$ and $\triangle QRS$ are two right-angled triangles. Given that PQ = 12 cm, QR = 7 cm and $\angle PSQ = 42°$, find a and θ. (3 marks)



8. The actual weights of 4 students are 48.6 kg, 47.1 kg, 38.9 kg and 42.5 kg. Find the relative error of their mean weight if it is rounded off to the nearest 0.1 kg. (4 marks)

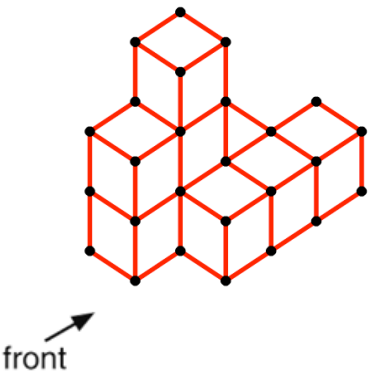
- End of Section A -

Answers written in the margins will not be marked

Page Total

Section B Short Questions [35 marks]

9. Draw the orthographic views of the following solid on grid paper. (3 marks)

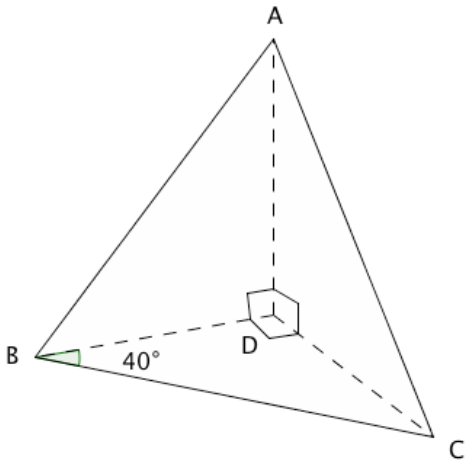


Front View Side View Top View

10. In the figure, $ABCD$ is a triangular pyramid, where

$\angle DBC = 40°$, $BD \perp CD$, $AD \perp BD$ and $AD \perp CD$.

(a) Name the projection of point B on plane ACD.
(b) Name the angle between BC and plane ACD.
(c) Find the angle between BC and plane ACD.
(d) Find the angle between planes BCD and ACD.
(4 marks)

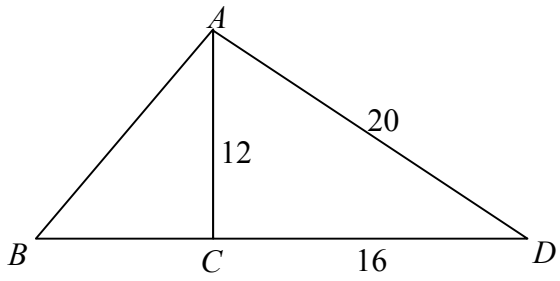


Answers written in the margins will not be marked

Page Total

11. It is given that the length of three line segments are x cm, $4x$ cm and 20 cm, where x is an integer. How many distinct triangles can be formed by the three line segments? (4 marks)

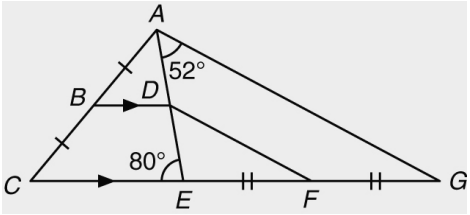
12. Referring to the figure, C is a point on the side BD of $\triangle ABD$, prove that AC is passing through orthocenter of $\triangle ABD$. (4 marks)



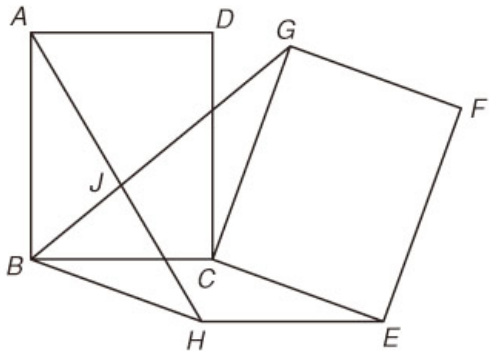
Answers written in the margins will not be marked

Page Total

13. In the figure, *ABC*, *ADE* and *CEFG* are straight lines. Find $\angle DFE$. (4 marks)



14. In the figure, *ABCD* and *GCEF* are two congruent rectangles. *BHEC* is a rhombus. *AH* and *BG* intersect at *J*. Prove that $\triangle ABH \cong \triangle GCB$. (5 marks)



Answers written in the margins will not be marked

Page Total

15. The sum of the squares of three consecutive negative odd integers is 683. Find the three integers. (5 marks)

16. It is given that $M = p^2q^3r^5$. Suppose both p and q are decreased by 25% and then increased by 10%, while r is decreased by 15% and then further decreased by 20%.

    (a) Find the percentage change in the value of M.

    (b) If the original value of M is 0.561^{-6}, express the new value of M in fraction.

(6 marks)

Answers written in the margins will not be marked

Page Total

Answers written in the margins will not be marked

Page Total

Supplementary Answer Sheet

Answers written in the margins will not be marked

- End of Section B -

Page Total

Exam Number			

LA SALLE COLLEGE
MID-YEAR EXAMINATION 2015-2016

Form 3 Mathematics
Paper 1

Section C

Question No.	Marks
1	(8)
2	(10)
3	(12)
4	(10)
Section C	
Total	**(40)**

Question – Answer Book

Instructions

1. Write your examination number in the spaces provided on this cover.
2. The total mark of this section is 40.
3. Attempt ALL questions in this section. Do not write in the margins. Answers written in the margins will not be marked.
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.

Section C [40 marks]

1. Alan has $500,000 to invest. He wants to deposit the sum of money in a bank. The interest rate is r% p.a. and the interest is compounded half-yearly.

(a) Given that the interest he will get after 2 years is $20,300 (in nearest hundred), find the value of r, correct your answer to the nearest integer.

(3 marks)

(b) Alan thinks that the interest rate is very low; he considers buying a flat which costs $3,500,000. In this case, he has to get a personal loan $3,000,000 from a bank at 6% p.a. compounded monthly. Suppose that he will not make any repayment for the loan until he sells the flat 2 years after the purchase. Find the total interest he has to pay at the end of 2 years, correct the amount to the nearest hundred.

(2 marks)

Answers written in the margins will not be marked

Page Total

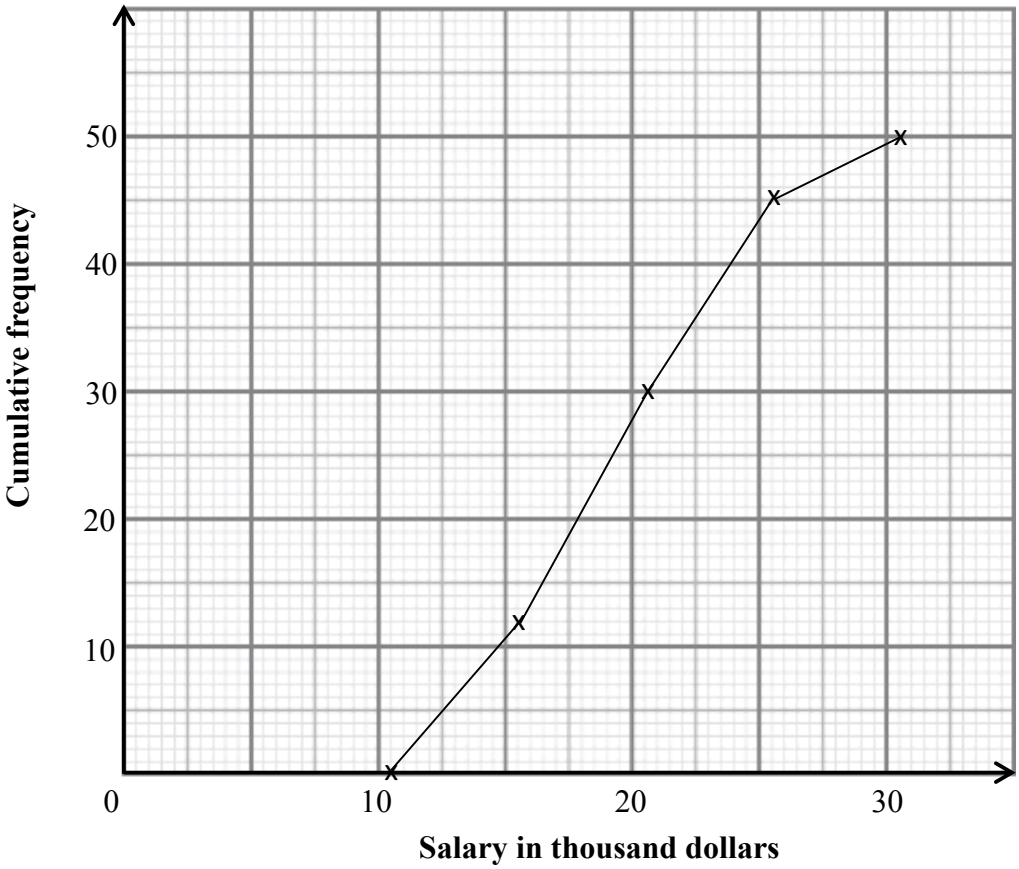
(c) It is expected that the value of the flat will increase by k% after 2 years, where k is an integer. Find the minimum value of k, if Alan wants to gain more by buying the flat than investing the money in the bank in two years time.

(3 marks)

Answers written in the margins will not be marked

Page Total

2. The following is a cumulative frequency polygon showing the salary of 50 employees in a company.



(a) Referring to the above cumulative frequency polygon, complete the following table.

(2 marks)

Staff Rank	A	B	C	D
Monthly Salary (thousand dollars)	11 – 15	16 – 20	21 – 25	26 – 30
Number of employees				

(b) Find the median and mean monthly salaries of these 50 employees. (3 marks)

Answers written in the margins will not be marked

Page Total

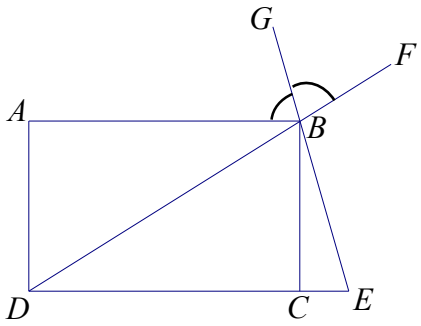
(c) The company decides to promote n employees next month. Some of these employees will be promoted from rank A to rank B and the rest will be promoted from rank B to rank C. As a result, the new mean monthly salary will be increased by at most 5%. Find the greatest value of n.

(3 marks)

(d) After the promotion in (c), where n takes the greatest value, the modal class of these 50 employees remains unchanged. If x is the number of employees promoted from rank B to rank C, find the possible values of x.

(2 marks)

3. In the figure, $ABCD$ is a rectangle. D, C and E lie on the same straight line. The lines DF and EG intersect at the point B. It is given that EG is the angle bisector of $\angle ABF$.



(a) Prove that $DB = DE$. (3 marks)

(b) Given that $BC = 2x + 3$, $DC = 4x$ and $CE = x$.

(i) Find the value of x. (4 marks)

(ii) Given that DH is the altitude of ΔBDE, prove that $\Delta DHE \sim \Delta BCE$. (2 marks)

(iii) Hence or otherwise, find the length of DH. (3 marks)

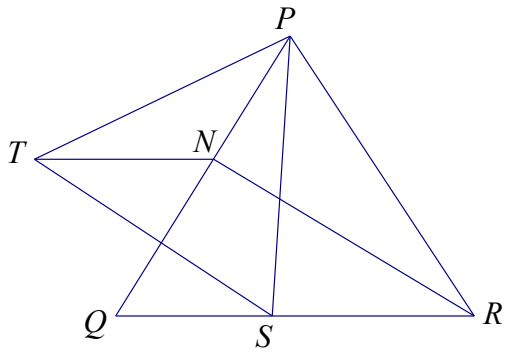
Answers written in the margins will not be marked

Page Total

Answers written in the margins will not be marked

Page Total

4. In the figure, ΔPQR and ΔPTS are equilateral triangles. N and S lie on PQ and QR respectively such that $NQ = SR$.



(a) (i) Prove that $\Delta NQR \cong \Delta SRP$. (3 marks)

(ii) Hence, deduce that $NR = TS$. (2 marks)

Answers written in the margins will not be marked

Page Total

(b) Prove that $\angle TSQ = \angle SPR$. (2 marks)

(c) Using the above results or otherwise, prove that *TNRS* is a parallelogram. (3 marks)

Answers written in the margins will not be marked

Page Total

Supplementary Answer Sheet

- End of Section C -

Answers written in the margins will not be marked

Page Total