



BAULKHAM HILLS HIGH SCHOOL

Half -Yearly 2015
YEAR 11 TASK 1

Mathematics Extension 1

General Instructions

- Reading time – 5 minutes
- Working time – 1 hour
- Write using black or blue pen
- Board-approved calculators may be used
- Show all necessary working in Questions 6-9
- Marks may be deducted for careless or badly arranged work

Total marks – 44

Exam consists of 5 pages.

This paper consists of TWO sections.

Section 1 – Page 2 (5 marks)

- Attempt Question 1-5

Section II – Pages 3-5 (39 marks)

- Attempt questions 6-9

Answer all questions in the appropriate space in the Answer booklet provided.

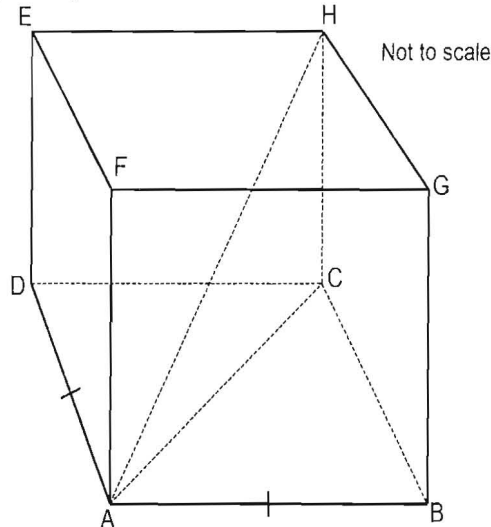
Section I – Multiple Choice - 5 marks

1. Solve for x ,

$$\frac{2x + 1}{1 - x} \geq 1$$

- (A) $0 \leq x < 1$ (B) $x \leq 0$ or $x > 1$
(C) $x > 0$ or $x > 1$ (D) $0 < x \leq 1$

2. A rectangular prism with a square base ABCD, is shown below. The diagonal of the prism, $AH = 8\text{cm}$, the height of the prism, $HC = 4\text{cm}$.



The volume of this rectangular prism is

- (A) 64 cm^3 (B) 96 cm^3
(C) 128 cm^3 (D) 192 cm^3
3. The domain of the function $f(x) = (4 - x^2)^{-\frac{1}{2}}$
- (A) $x \leq -2$ or $x \geq 2$ (B) $x < -2$ or $x > 2$ (C) $-2 \leq x \leq 2$ (D) $-2 < x < 2$
4. If the equation $f(2x) - 2f(x) = 0$ is true for all real values of x , then $f(x)$ could be
- (A) $\frac{x^2}{2}$ (B) $2x$
(C) $\sqrt{2x}$ (D) $x - 2$
5. Ten people are to be seated around a circular table. How many possible seating arrangements are there if two particular friends want to sit directly opposite each other?
- (A) $2 \times 8!$ (B) $2 \times 9!$ (C) $4! \times 4!$ (D) $8!$

End of Section 1

Section II – Extended Response

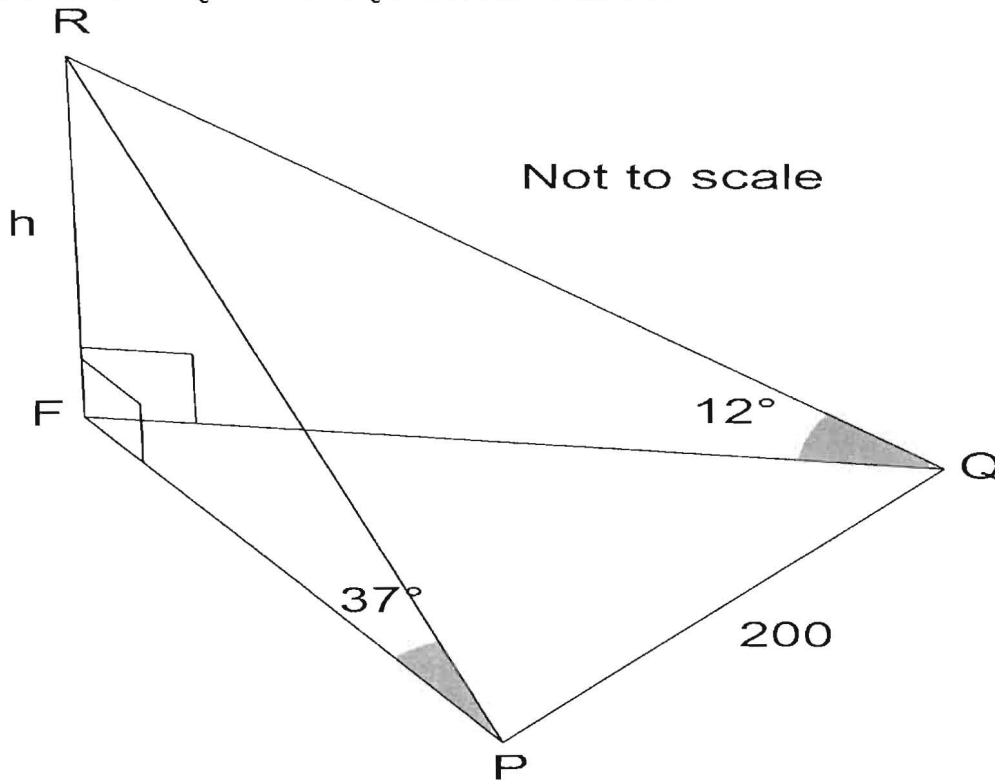
Attempt questions 6-9.

All necessary working should be shown in every question.

Question 6 (10 marks)	Marks
a) Prove the identity $\frac{2 \sin^3 x + 2 \cos^3 x}{\sin^2 x + \sin x \cdot \cos x} = 2 \operatorname{cosec} x - 2 \cos x$	2
b) Determine if the function $f(x) = x^2 + \cos x$ is odd, even or neither. Show all working.	2
c) Solve $\frac{x^2 + 2}{x} \geq 2x - 1$	3
d) . A committee of 5 is to be chosen from 6 men and 8 women. Find how many committees are possible, if	
i) the committee will consist of 3 men and 2 women.	1
ii) there is at least one woman on the committee.	2
Question 7 (10marks)	
a) (i) Sketch on the same number plane the graph of $y = \sqrt{3 - x}$ and $y = x - 1 $.	2
(ii) Hence or otherwise solve $\sqrt{3 - x} \leq x - 1 $	2
b) Solve the equation $3 \cot \theta = \tan \theta + 2$ for $0^\circ \leq \theta \leq 360^\circ$, giving your answer correct to the nearest minute.	3
c) Factorise completely $x^5 + x^2 y^2 (y - x) - y^5$	3

Question 8 (8 marks)

- a) A bushwalker walking on a horizontal straight road PQ observes that from his position P the bearing of a hill FR is 337° and he notices the peak R of the hill at an angle of elevation of 37° . After walking 200 metres, he arrives at Q. The angle of elevation of R from Q is 12° and Q is due east of the hill.



- i) Show that $FP = h \tan 53^\circ$ 1
- ii) By finding a similar expression for FQ, show that 2
 $200^2 = h^2 \tan^2 53^\circ + h^2 \tan^2 78^\circ - 2h^2 \tan 53^\circ \tan 78^\circ \cos 67^\circ$ 1
- iii) Hence find the height of the tower. 1
- b) , At a dinner party, the host, hostess and their six guests sit at a round table. In how many ways can they be arranged, if the host and hostess are not sitting together? 2
- c) How many different numbers greater than 6000 can be formed with the digits 4, 5, 6, 7, 8 if no digit is used more than once? 2

Question 9 (11 marks)

Marks

- a) (i) How many different arrangements of the letters of the word ISOSCELES are possible? **2**
- (ii) How many of these arrangements have all S's together? **2**
- (iii) How many of them have the letter S as the first and last letter? **2**
- b) Given a function
- $$y = \frac{x}{9 - x^2}$$
- (i) Find all the asymptotes of the function. **2**
- (ii) Determine whether the function is even, odd or neither. Justify your answer. **1**
- (iii) Sketch the curve. **2**

End of Exam

