HARRISON COLLEGE INTERNAL EXAMINATION 2021 CARIBBEAN ADVANCED PROFICIENCY EXAMINATION SCHOOL BASED ASSESSMENT

PURE MATHEMATICS

UNIT 2 – TEST 2

Time: 1 hour and 20 minutes

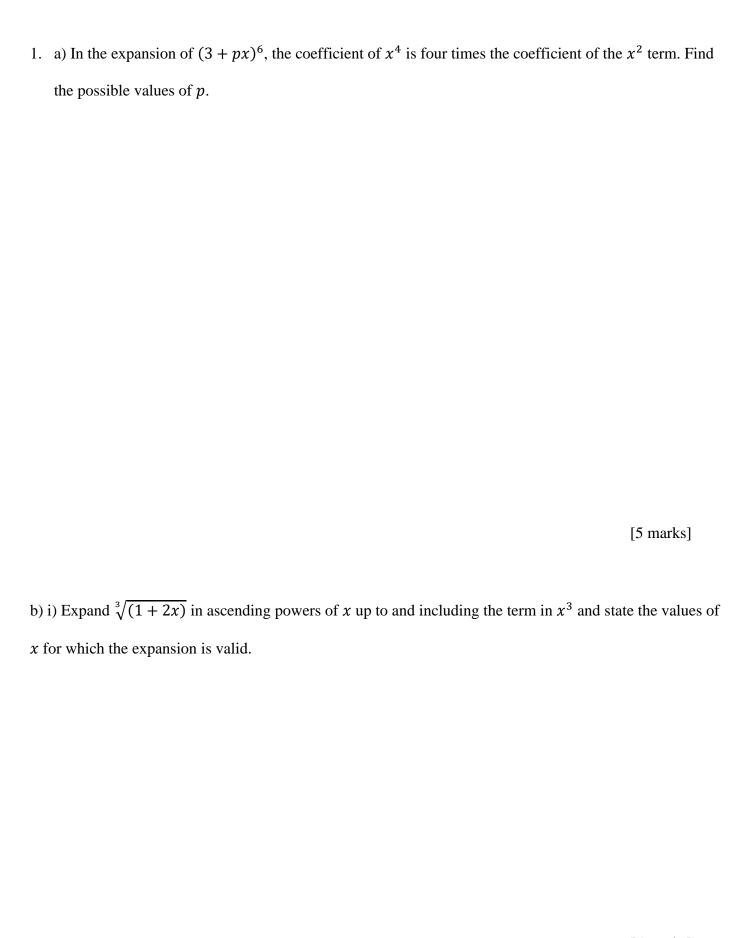
NAME OF STUDENT:	
SCHOOL CODE: 030014	
DATE:	
This examination paper consists of 10 printed pages, including 1 blank page.	
The paper consists of 5 questions.	
The maximum mark for this examination is 60.	

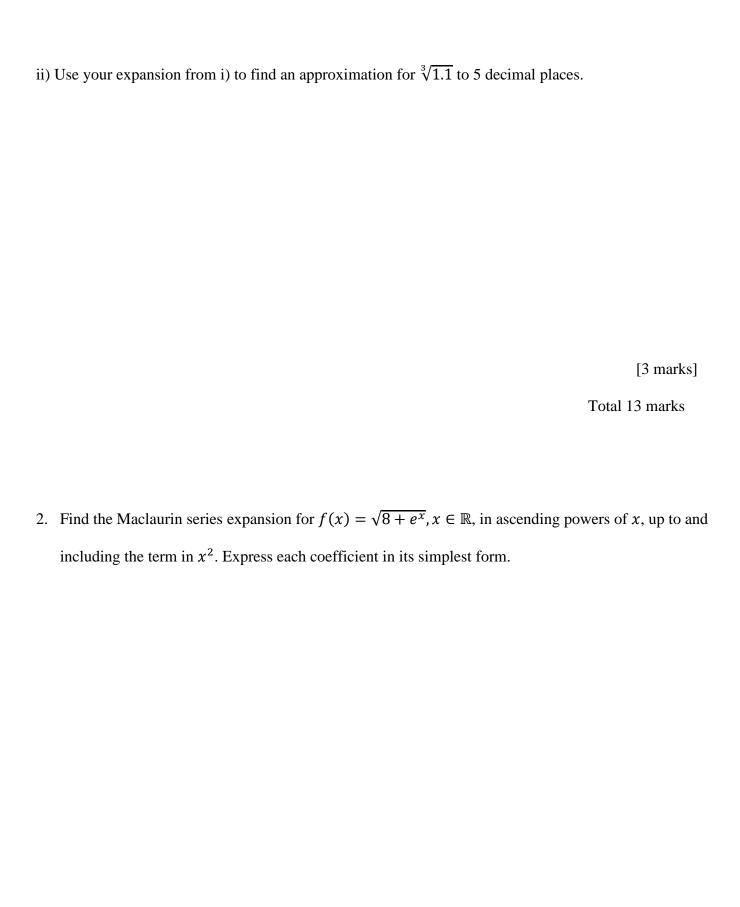
<u>INSTRUCTIONS TO CANDIDA</u>TES

- 1. Write your name clearly in the space above.
- 2. Answer **ALL** questions in the **SPACES PROVIDED**.
- 3. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra page(s) provided. You must also write your name and candidate number clearly on any additional paper used.
- 4. Number your questions carefully and identically to those on the question paper.
- 5. Unless otherwise stated in the question, any numerical answer that is not exact, **MUST** be written correct to three (3) significant figures.

EXAMINATION MATERIALS ALLOWED

- 1. Mathematical formulae
- 2. Electronic calculator (non-programmable, non-graphical).





3. A sequence is defined by

$$u_1 = 2$$
 and $u_{n+1} = \frac{u_n}{1 + u_n}$

i) Calculate u_3 .

[2 marks]

ii) Prove by mathematical induction that, for $n \ge 1$,

$$u_n = \frac{2}{2n-1}$$

[8 marks]

Total 10 marks

4. i) Show that

$$\frac{1}{r} - \frac{1}{r+2} \equiv \frac{2}{r(r+2)}$$

[2 marks]

ii) Hence find an expression, in terms of n, for

$$\sum_{r=1}^{n} \frac{2}{r(r+2)}$$

iii) Find the value of N, given that

$$\sum_{r=N+1}^{\infty} \frac{2}{r(r+2)} = \frac{11}{30}$$

5. a) i) Show that the equation

$$x^3 + x - 7 = 0$$

has a root between 1.6 and 1.8.

[3 marks]

ii) Use linear interpolation once, starting with the interval in a) i), to give this root two decimal places.

[2 marks]

b) It is known that the function

$$f(x) = 3\sqrt{x} + \frac{18}{\sqrt{x}} - 20$$

has a root α in the interval [1.1, 1.2].

i) Find f'(x).

		[3 marks]
ii)	Using $x_0 = 1.1$ as a first approximation to α , apply the Newton-Raphson procedu	re twice to $f(x)$ to
	find a third approximation to α , giving your answer to 3 significant figures.	
		[7 marks]
	Tot	al 15 marks

END OF TEST

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