Please stick the barcode label here.

TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

MATHEMATICS Extended Part Module M1
PAPER

Question-Answer Book

Candidate Number

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: Binomial Expansion

INSTRUCTIONS

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

(2) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Unless otherwise specified, all working must be clearly shown.

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

(5) The diagrams in this paper are not necessarily drawn to scale.

(6) Calculators and mathematical drawing instruments may be used.

(7) The marks for each question are shown in brackets.

(8) No extra time will be given after the 'Time is up' announcement.

TUTGATHER

SECTION A(1) (16 marks)

1. Expand $(2 + 3x)^4$ in ascending powers of x, simplifying each coefficient. **(3 marks)**

2. Find the coefficient of x^5 in the expansion of $(3 - 2x)^8$. **(3 marks)**

3. Using the binomial theorem, expand $(x - \frac{2}{x})^5$ in descending powers of x, simplifying each term. **(4 marks)**

Answers written in the margins will not be marked.
Answers written in the margins will not be marked.
TUTGATHER

4. In the expansion of $(2x + \frac{3}{x^2})^9$ in descending powers of x, **(6 marks)**

(a) write down the general term;

(b) find the constant term;

(c) find the coefficient of x^3.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

SECTION A(2) (24 marks)

5. (a) Expand $(1 + 2x)^{10}$ in ascending powers of x up to and including the term in x^3. **(7 marks)**

(b) Hence find an approximation of $(1.02)^{10}$, giving your answer correct to 4 decimal places.

(c) By considering the next term in the expansion, determine whether your approximation in (b) is an over-estimate or an under-estimate.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

6. It is given that the coefficient of x^2 in the expansion of $(1 + kx)^7$ is equal to the coefficient of x^3 in the expansion of $(1 - kx)^8$, where $k \neq 0$. **(8 marks)**

(a) Find the possible values of k.

(b) For the positive value of k found in (a), find the coefficient of x^4 in the expansion of $(1 + kx)^7$.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

7. (a) Expand $(1 - x)^6$ and $(1 + x)^6$ in ascending powers of x. **(9 marks)**

(b) Hence, or otherwise, expand $(1 + x)^6 + (1 - x)^6$ and $(1 + x)^6 - (1 - x)^6$ in ascending powers of x.

(c) Using the result of (b), evaluate $1.2^6 + 0.8^6$ exactly.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

SECTION B (10 marks)

8. Let n be a positive integer. In the expansion of $(x^2 + \frac{2}{x})^n$, the coefficients of x^3 and x^0 are equal. **(10 marks)**

(a) Show that $\frac{\binom{n}{r_1}2^{r_1}}{\binom{n}{r_2}2^{r_2}} = 1$, where r_1 and r_2 are the values of r giving the terms in x^3 and x^0 respectively, and find r_1 and r_2 in terms of n.

(b) Hence find n.

(c) For this value of n, find the term independent of x in the expansion of $(x^2 + \frac{2}{x})^n (1 - \frac{1}{x})^2$.

END OF PAPER

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER