

Topic Y7: Binomial and partial fractions (Post-TT) [34]

1.

(i) Expand $(1 + 2x)^{\frac{1}{2}}$ as a series in ascending powers of x , up to and including the term in x^3 . [3]

(ii) Hence find the expansion of $\frac{(1 + 2x)^{\frac{1}{2}}}{(1 + x)^3}$ as a series in ascending powers of x , up to and including the term in x^3 . [5]

(iii) State the set of values of x for which the expansion in part (ii) is valid. [1]

(Total 9 marks)

2.

(i) Expand $(a + x)^{-2}$ in ascending powers of x up to and including the term in x^2 . [4]

(ii) When $(1 - x)(a + x)^{-2}$ is expanded, the coefficient of x^2 is 0. Find the value of a . [3]

(Total 7 marks)

3.

(a) Show that the binomial expansion of

$$(4 + 5x)^{\frac{1}{2}}$$

in ascending powers of x , up to and including the term in x^2 is

$$2 + \frac{5}{4}x + kx^2$$

giving the value of the constant k as a simplified fraction.

(4)

(b) (i) Use the expansion from part (a), with $x = \frac{1}{10}$, to find an approximate value for $\sqrt{2}$

Give your answer in the form $\frac{p}{q}$ where p and q are integers.

(ii) Explain why substituting $x = \frac{1}{10}$ into this binomial expansion leads to a valid approximation.

(4)

(Total 8 marks)

4.

The expression $\frac{11 + 8x}{(2 - x)(1 + x)^2}$ is denoted by $f(x)$.

(i) Express $f(x)$ in the form $\frac{A}{2 - x} + \frac{B}{1 + x} + \frac{C}{(1 + x)^2}$, where A , B and C are constants. [5]

(ii) Given that $|x| < 1$, find the first 3 terms in the expansion of $f(x)$ in ascending powers of x . [5]

(Total 10 marks)