

## (23) Binomial Expansions Using Partial Fractions

### WORKING AT D/E

(1) (a) Express  $\frac{5+7x}{(1+x)(1+2x)}$  in partial fractions.

(b) Hence, using the formula book, show that the first 3 terms in ascending powers of  $x$  in expansion of  $\frac{5+7x}{(1+x)(1+2x)}$  are

$$5 - 8x + 14x^2 \dots$$

(c) Explain why  $|x| < \frac{1}{2}$  instead of  $|x| < 1$  for the series expansion to be valid.

### WORKING AT B/C

(1) (a) Express  $\frac{13+7x}{(1-x)(3+x)}$  in the form  $\frac{A}{(1-x)} + \frac{B}{(3+x)}$ .

(b) Hence, using the formula book, find the first 4 terms in the expansion of  $\frac{13+7x}{(1-x)(3+x)}$  in ascending powers of  $x$ , simplifying each term.

(c) State the set of values of  $x$  for which the expansion is valid.

### WORKING AT A\*/A

(1)  $h(x) = \frac{-x(x+8)}{(1-x)(2+x)^2}$ ,  $|x| < 1$

(a) Express  $h(x)$  in partial fractions.

(b) Hence, find the first 3 non-zero terms in the binomial expansion of  $h(x)$  simplifying each term.