

## Core 4 Binomial Questions

- 5 (a) (i) Obtain the binomial expansion of  $(1 - x)^{-1}$  up to and including the term in  $x^2$ .  
(2 marks)

(ii) Hence, or otherwise, show that

$$\frac{1}{3 - 2x} \approx \frac{1}{3} + \frac{2}{9}x + \frac{4}{27}x^2$$

for small values of  $x$ .

(3 marks)

- (b) Obtain the binomial expansion of  $\frac{1}{(1 - x)^2}$  up to and including the term in  $x^2$ .  
(2 marks)

- (c) Given that  $\frac{2x^2 - 3}{(3 - 2x)(1 - x)^2}$  can be written in the form  $\frac{A}{(3 - 2x)} + \frac{B}{(1 - x)} + \frac{C}{(1 - x)^2}$ ,  
find the values of  $A$ ,  $B$  and  $C$ .  
(5 marks)

- (d) Hence find the binomial expansion of  $\frac{2x^2 - 3}{(3 - 2x)(1 - x)^2}$  up to and including the term  
in  $x^2$ .  
(3 marks)
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- 2 (a) Obtain the binomial expansion of  $(1 - x)^{-3}$  up to and including the term in  $x^2$ .  
(2 marks)

- (b) Hence obtain the binomial expansion of  $\left(1 - \frac{5}{2}x\right)^{-3}$  up to and including the term  
in  $x^2$ .  
(2 marks)

- (c) Find the range of values of  $x$  for which the binomial expansion of  $\left(1 - \frac{5}{2}x\right)^{-3}$  would  
be valid.  
(2 marks)

- (d) Given that  $x$  is small, show that  $\left(\frac{4}{2 - 5x}\right)^3 \approx a + bx + cx^2$ , where  $a$ ,  $b$  and  $c$  are  
integers.  
(2 marks)
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5 (a) Find the binomial expansion of  $(1+x)^{\frac{1}{3}}$  up to the term in  $x^2$ . (2 marks)

(b) (i) Show that  $(8+3x)^{\frac{1}{3}} \approx 2 + \frac{1}{4}x - \frac{1}{32}x^2$  for small values of  $x$ . (3 marks)

(ii) Hence show that  $\sqrt[3]{9} \approx \frac{599}{288}$ . (2 marks)

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2 (a) (i) Find the binomial expansion of  $(1+x)^{-1}$  up to the term in  $x^3$ . (2 marks)

(ii) Hence, or otherwise, obtain the binomial expansion of  $\frac{1}{1+3x}$  up to the term in  $x^3$ . (2 marks)

(b) Express  $\frac{1+4x}{(1+x)(1+3x)}$  in partial fractions. (3 marks)

(c) (i) Find the binomial expansion of  $\frac{1+4x}{(1+x)(1+3x)}$  up to the term in  $x^3$ . (3 marks)

(ii) Find the range of values of  $x$  for which the binomial expansion of  $\frac{1+4x}{(1+x)(1+3x)}$  is valid. (2 marks)

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