

Cambridge International AS & A Level

## MATHEMATICS (9709) P3

TOPIC WISE QUESTIONS + ANSWERS | COMPLETE SYLLABUS







Chapter 1

Algebra







1. 9709\_s20\_qp\_31 Q: 2

	coefficients.
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	State the set of values of x for which the expansion is valid.





$^{2}$ .	9709	s20	αp	32	Q:	1

Find the quotient and remainder when $6x^4 + x^3 - x^2 + 5x - 6$ is divided by $2x^2 - x + 1$ . [3]
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$3.\ 9709\_s20\_qp\_33\ Q:\ 1$	
Solve the inequality $ 2x - 1  > 3 x + 2 $ .	[4]
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4. 97	$^{'}09\_{ m w}20\_{ m qp}\_31~~{ m Q:}~1$
S	Solve the inequality $2 - 5x > 2 x - 3 $ . [4]
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5. 9709\_w20\_qp\_31 Q: 9

**(a)** 

Let $f(x) =$	$8 + 5x + 12x^2$
Let $I(x) =$	$\frac{1}{(1-x)(2+3x)^2}$ .

Express $f(x)$ in partial fractions.	[5]
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)	Hence obtain the expansion of $f(x)$ in ascending powers of $x$ , up to and including the term in $x^2$ [5]
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 $6.\ 9709\_w20\_qp\_32\ Q:\ 2$ 

(a)	Expand $\sqrt[3]{1+6x}$ in ascending powers of x, up to and including the term in $x^3$ , simplifying the coefficients.
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(b)	State the set of values of v for which the expension is valid
(U)	State the set of values of $x$ for which the expansion is valid. [1]



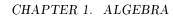


7	9709	m19	an	39	$\bigcirc$	Q
1.	9709	$m_{19}$	qρ	ე∠	Q:	0

Let $f(x) =$	$12 + 12x - 4x^2$
Let $I(x) =$	$\overline{(2+x)(3-2x)}.$

(i)	Express $f(x)$ in partial fractions.	[5]
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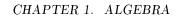




8.	9709_s19_c	qp_31 Q: 8
	Let $f(x) =$	$\frac{16 - 17x}{(2 + x)(3 - x)^2}$

Express $f(x)$ in partial fractions.	[5]
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9. 9709\_s19\_qp\_32 Q: 1

Find the coefficient of $x^3$ in the expansion of $(3-x)(1+3x)^{\frac{1}{3}}$ in ascending powers of $x$ . [4]
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10. 9709\_s19\_qp\_33 Q: 9

Let $f(x) =$	2x(5-x)
Let $I(x) =$	$(3+x)(1-x)^2$

(i)	Express $f(x)$ in partial fractions.	[5]
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Solve the inequality $ 2x $	-3  > 4 x+1 .			
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The polynomial $x^4 + 3x^3 + ax + b$ , where $a$ and $b$ are constants, is denoted by $p(x)$ . When $p(x)$ is divided by $x^2 + x - 1$ the remainder is $2x + 3$ . Find the values of $a$ and $b$ . [5]
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13. 9709_w19_qp_33 Q: 1	
Solve the inequality $2 x+2  >  3x-1 $ .	[4]
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	Or -





14. 9709\_w19\_qp\_33 Q: 2

The polynomial $6x^3 + ax^2 + bx - 2$ , where a and b are constants, is denoted by $p(x)$ . It is given that $(2x + 1)$ is a factor of $p(x)$ and that when $p(x)$ is divided by $(x + 2)$ the remainder is $-24$ . Find the values of a and b.
29





15. 9709\_m18\_qp\_32 Q: 2 Expand  $\sqrt[4]{(1-4x)}$  in ascending powers of x, up to and including the term in  $x^3$ , simplifying the coefficients.





16. 9709\_s18\_qp\_31 Q: 4

The polynomial $x^4 + 2x^3 + ax + b$ , where $a$ and $b$ are constants, is divisible by $x^2 - x + 1$ . Find the values of $a$ and $b$ . [5]
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17. 9709\_s18\_qp\_31 Q: 9

I -4 6()	$12x^2 + 4x - 1$
Let $f(x) =$	$\overline{(x-1)(3x+2)}$

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(ii)	Hence obtain the expansion of $f(x)$ in ascending powers of $x$ , up to and including the term in $x^2$ . [5]
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 $18.\ 9709\_s18\_qp\_32\ Q:\ 9$ 

Let 
$$f(x) = \frac{x - 4x^2}{(3 - x)(2 + x^2)}$$
.

Express $f(x)$ in the	3-x	$2 + x^2$ .			
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Hence obtain the expansion of $f(x)$ in ascending powers of $x$ , up to and including the term i
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19. 9709\_s18\_qp\_33 Q: 1

Expand $\frac{4}{\sqrt{(4-3x)}}$ in ascending powers of $x$ , up to and including the term in $x^2$ , simplifying the coefficients. [4]
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 $20.\ 9709\_w18\_qp\_31\ Q\!:\, 1$ 

Find the set of values of x satisfying the inequality $2 2x - a  <  x + 3a $ , where a is a positive constant. [4]





. 9709_w18_qp_32 Q: 1	
Solve the inequality $3 2x-1  >  x+4 $ .	[4
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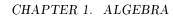


 $22.\ 9709\_w18\_qp\_32\ Q:\ 8$ 

Let $f(x) =$	$7x^2 - 15x + 8$
	$\frac{1}{(1-2x)(2-x)^2}$ .

Express $f(x)$ in partial fractions.	[5
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Solve the inequality $ x-4  < 2 3x + 1 $ .	[4]
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**(i)** 

 $24.\ 9709\_m17\_qp\_32\ Q:\ 9$ 

Let $f(x) =$	x(6-x)
Let $I(x) =$	$\frac{1}{(2+x)(4+x^2)}$ .

Express $f(x)$ in partial fractions.	[5]
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Hence obtain the expansion of $f(x)$ in ascending powers of $x$ , up to and including the term i
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25.	9709_s17_qp_31 Q: 1
	Solve the inequality $ 2x+1  < 3 x-2 $ . [4]
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27.	9709_s17_qp_32 Q: 2
	Solve the inequality $ x-3  < 3x-4$ . [4]
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28.  $9709\_s17\_qp\_32~Q: 8$ 

Let $f(x) =$	$5x^2 - 7x + 4$
Let $I(x)$ –	${(3x+2)(x^2+5)}$ .

Express $f(x)$ in partial fractions.	
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29. 9709\_s17\_qp\_33 Q: 2

Expand $(3 + 2x)^{-3}$ in ascending powers of x up to and including the term in $x^2$ , simplifying the coefficients. [4]
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Find the quotient and remainder when $x^4$ is divided by $x^2 + 2x - 1$ .	[
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 $31.\ 9709\_w17\_qp\_32\ Q:\ 8$ 

Let $f(x) =$	$8x^2 + 9x + 8$
Let $I(x) =$	$\frac{1}{(1-x)(2x+3)^2}$

Express $f(x)$ in partial fractions.	[.
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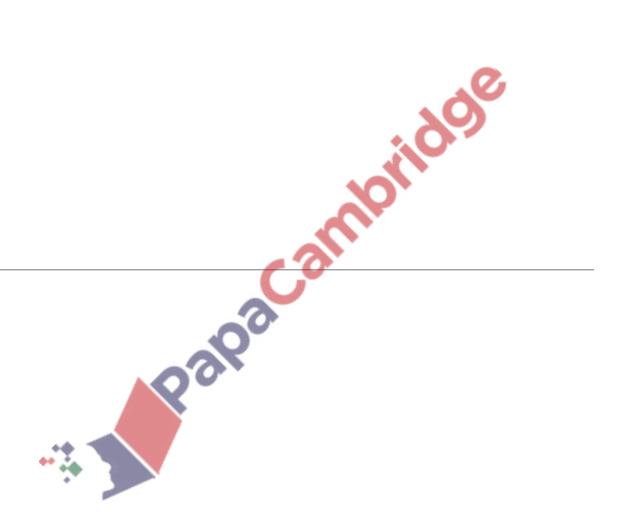




 $32.\ 9709\_m16\_qp\_32\ Q:\ 4$ 

The polynomial  $4x^3 + ax + 2$ , where a is a constant, is denoted by p(x). It is given that (2x + 1) is a factor of p(x).

- (i) Find the value of a. [2]
- (ii) When a has this value,
  - (a) factorise p(x), [2]
  - (b) solve the inequality p(x) > 0, justifying your answer. [3]



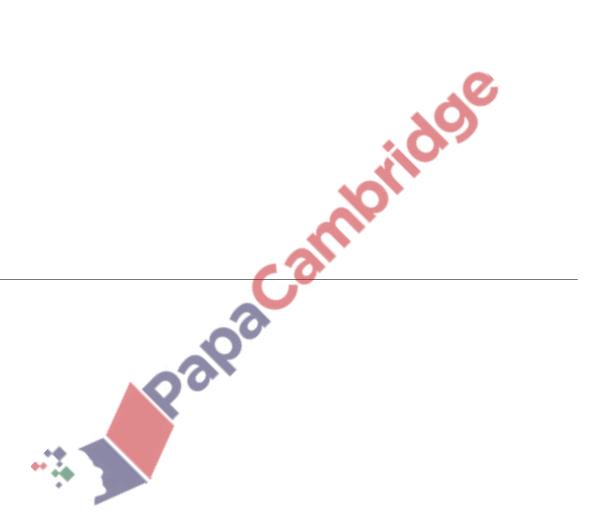




 $33.\ 9709\_s16\_qp\_31\ Q:\ 1$ 

(i) Solve the equation 2|x - 1| = 3|x|. [3]

(ii) Hence solve the equation  $2|5^x - 1| = 3|5^x|$ , giving your answer correct to 3 significant figures. [2]



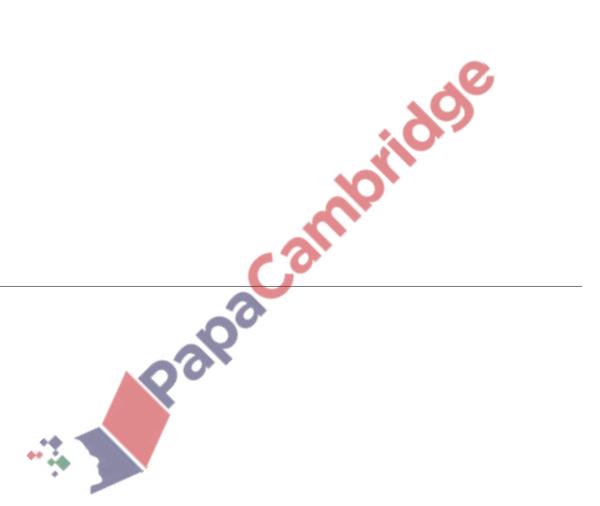




 $34.\ 9709\_s16\_qp\_31\ Q:\ 8$ 

Let 
$$f(x) = \frac{4x^2 + 12}{(x+1)(x-3)^2}$$
.

- (i) Express f(x) in partial fractions.
- (ii) Hence obtain the expansion of f(x) in ascending powers of x, up to and including the term in  $x^2$ .

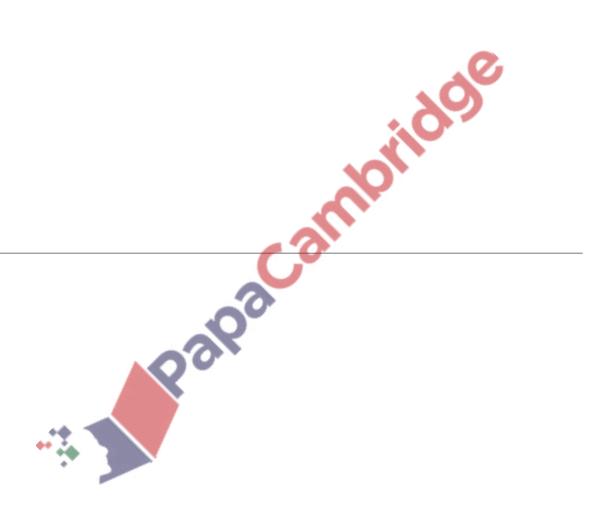






 $35.9709\_s16\_qp\_32$  Q: 2

Expand  $\frac{1}{\sqrt{(1-2x)}}$  in ascending powers of x, up to and including the term in  $x^3$ , simplifying the coefficients.



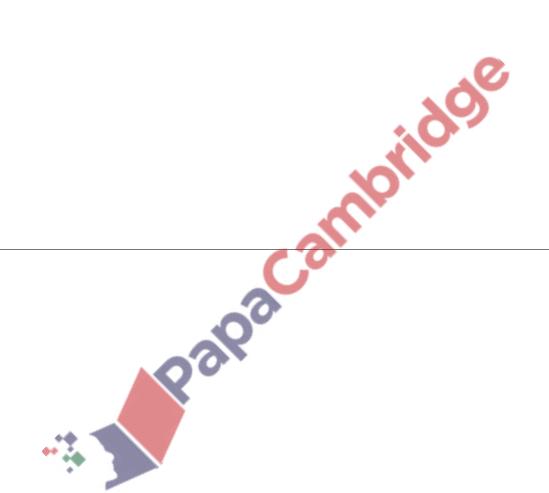




36.  $9709\_s16\_qp\_33~Q:1$ 

Solve the inequality 2|x-2| > |3x+1|.

[4]



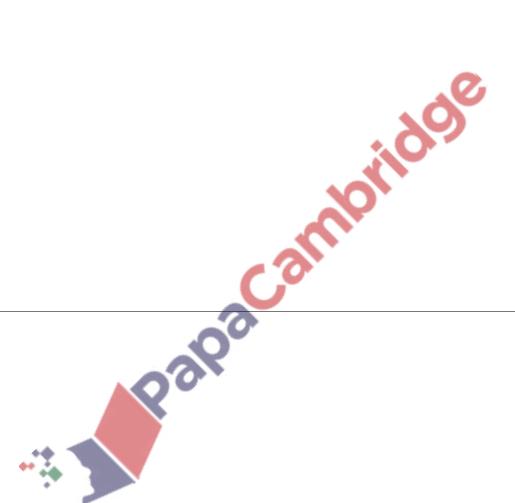




 $37.\ 9709\_s16\_qp\_33\ Q:\ 10$ 

Let 
$$f(x) = \frac{10x - 2x^2}{(x+3)(x-1)^2}$$
.

- (i) Express f(x) in partial fractions.
- (ii) Hence obtain the expansion of f(x) in ascending powers of x, up to and including the term in  $x^2$ .

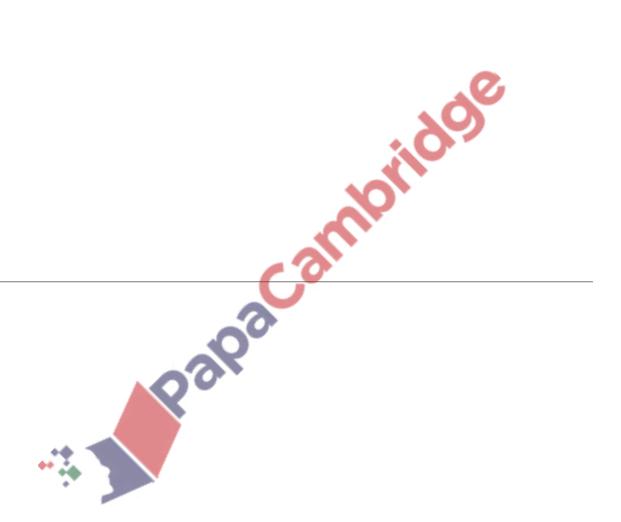






 $38.\ 9709\_w16\_qp\_31\ Q:\ 2$ 

Expand  $(2-x)(1+2x)^{-\frac{3}{2}}$  in ascending powers of x, up to and including the term in  $x^2$ , simplifying the coefficients.





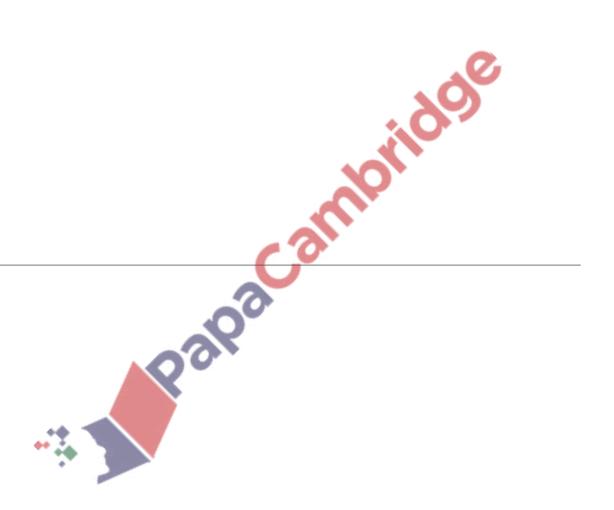


 $39.\ 9709\_w16\_qp\_33\ Q:\ 4$ 

The polynomial  $4x^4 + ax^2 + 11x + b$ , where a and b are constants, is denoted by p(x). It is given that p(x) is divisible by  $x^2 - x + 2$ .

(i) Find the values of a and b. [5]

(ii) When a and b have these values, find the real roots of the equation p(x) = 0. [2]



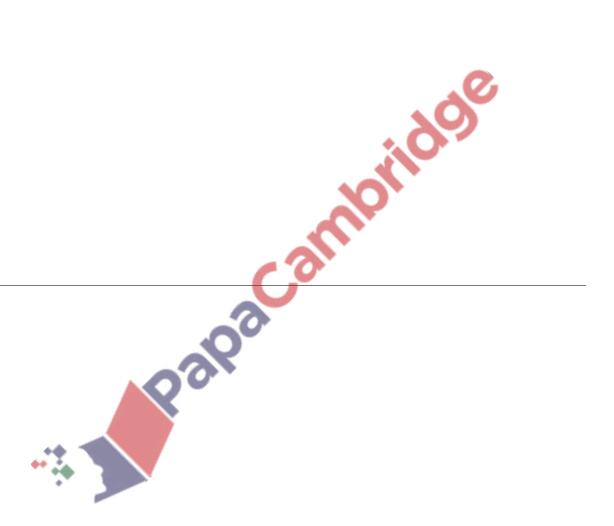




40. 9709\_w16\_qp\_33 Q: 8

Let 
$$f(x) = \frac{3x^2 + x + 6}{(x+2)(x^2+4)}$$
.

- (i) Express f(x) in partial fractions.
- (ii) Hence obtain the expansion of f(x) in ascending powers of x, up to and including the term in  $x^2$ .







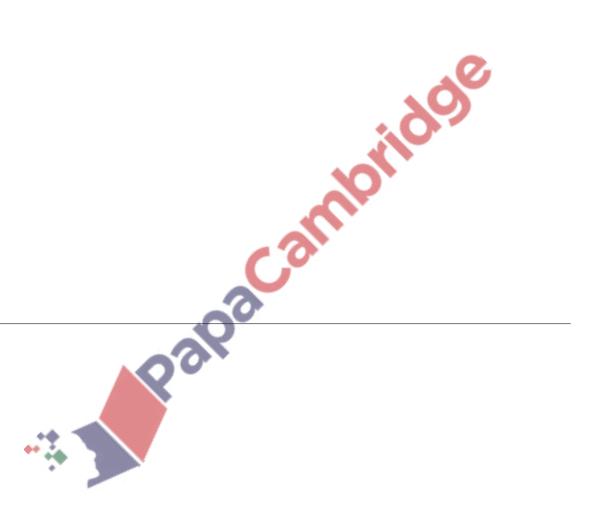
 $41.\ 9709\_s15\_qp\_31\ \ Q:\ 3$ 

Show that, for small values of  $x^2$ ,

$$(1-2x^2)^{-2} - (1+6x^2)^{\frac{2}{3}} \approx kx^4,$$

where the value of the constant k is to be determined.

[6]



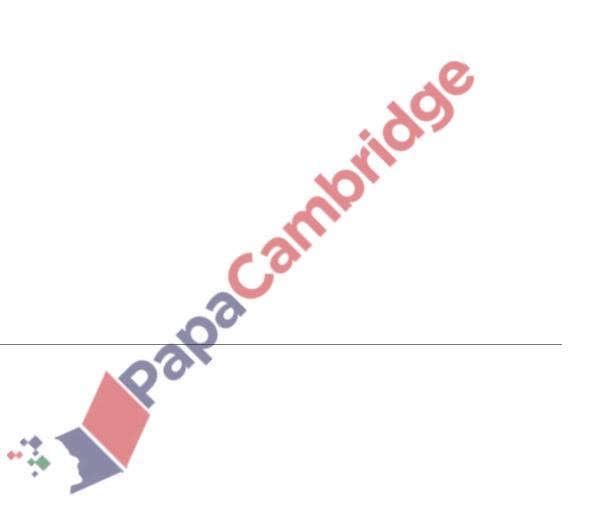




42. 9709\_s15\_qp\_32 Q: 8

Let 
$$f(x) = \frac{5x^2 + x + 6}{(3 - 2x)(x^2 + 4)}$$
.

- (i) Express f(x) in partial fractions.
- (ii) Hence obtain the expansion of f(x) in ascending powers of x, up to and including the term in  $x^2$ .



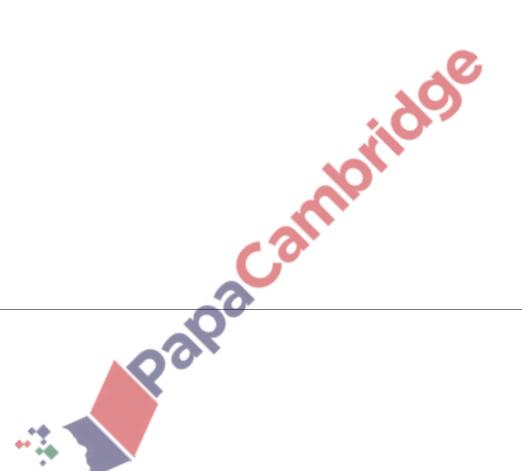




43. 9709\_s15\_qp\_33 Q: 2

Solve the inequality |x-2| > 2x - 3.

[4]



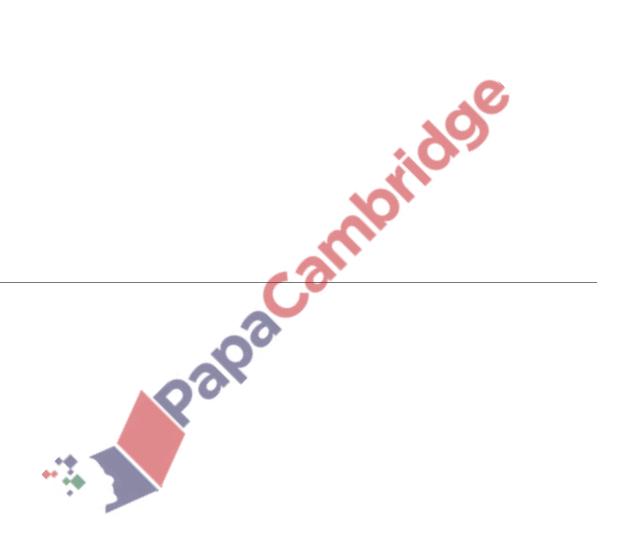




44.  $9709_{\text{w}15}_{\text{qp}}_{31}$  Q: 1

Solve the inequality |2x - 5| > 3|2x + 1|.

[4]





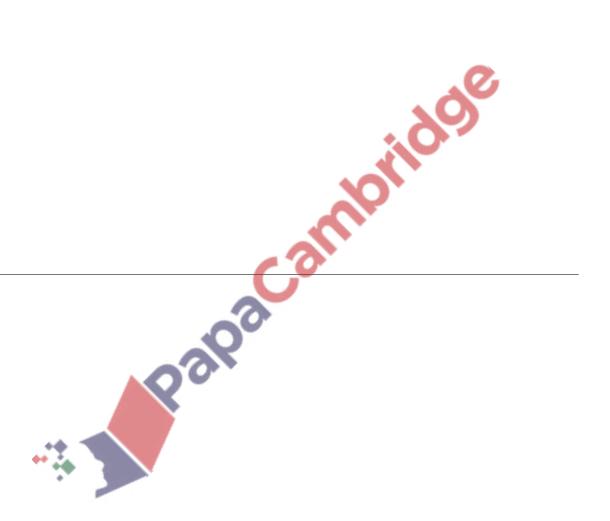


45. 9709\_w15\_qp\_31 Q: 6

The polynomial  $8x^3 + ax^2 + bx - 1$ , where a and b are constants, is denoted by p(x). It is given that (x + 1) is a factor of p(x) and that when p(x) is divided by (2x + 1) the remainder is 1.

(i) Find the values of a and b. [5]

(ii) When a and b have these values, factorise p(x) completely. [3]







 $46.\ 9709\_w15\_qp\_33\ Q:\ 2$ 

Given that  $\sqrt[3]{(1+9x)} \approx 1 + 3x + ax^2 + bx^3$  for small values of x, find the values of the coefficients a and b.

