

## Mark schemes

### Q1.

$$3x^2 - 6x + x - 2$$

$$\text{or } 3x^2 - 5x - 2$$

*4 terms with at least 3 correct*

M1

$$3x^2 + (a - \text{their } 5)x - \text{their } 2 + b$$

$$\text{or } a - \text{their } 5 = 8$$

$$\text{or } b - \text{their } 2 = -5$$

M1

$$a = 13$$

A1

$$b = -3$$

A1

#### Additional Guidance

$$a - \text{their } 5 = 8, a = 13$$

M1A1

$$a - \text{their } 5 = 8, a = 13 \text{ and } b - 2 = -5, b = -3$$

M1A1M1A1

$$13x - 3$$

M1A1M1A1

[4]

### Q2.

$$(x =) 2(x + 1) \text{ or } 2x + 1$$

$$\text{or } \frac{1}{2}x (= x + 1)$$

*oe May be seen as an index is  $(3^2)^{x+1}$*

*or  $9^{1/2x}$*

M1

$$-2$$

*Correct answer is 2 marks even if working nonsense or wrong.*

A1

[2]

### Q3.

$$(a) \quad 12x^2 + 18x - 2x - 3$$

*Must have four terms, one in  $x^2$ , 2 in  $x$  and a constant term. 3 terms correct*

Terms may be in box method but must have correct signs

M1

$$12x^2 + 16x - 3$$

A1

**Additional Guidance**

$$8x^2 + 18x - 2x - 3$$

M1

$$12x^2 + 18x + 2x - 3$$

M1

$$8x^2 + 18x + 2x - 3$$

M0

$$12x + 18x - 2x - 3$$

M0

	6x	-1
2x	12x <sup>2</sup>	-2x
3	18x	-3

M1

	6x	-1
2x	12x <sup>2</sup>	2x
3	18x	3

M1

(but can be recovered)

(b) **Alternative method 1**

$$(ax \pm c)(bx \pm d)$$

$$ab = 4 \text{ and } cd = \pm 3$$

M1

$$(4x - 3)(x + 1)$$

A1

$$\frac{3}{4} \text{ and } -1$$

ft their brackets if M1 awarded

A1ft

**Alternative method 2**

$$\frac{-1 \pm \sqrt{1^2 - 4 \times 4 \times -3}}{2 \times 4}$$

Allow one error from wrong sign for  $-b$ , wrong signs for  $-4ac$ ,  $b^2$  as  $-1$

Do not accept wrong formula, ie  $+$  not  $\pm$ , 2 not  $2a$  or only

dividing root by 2a

M1

$$\frac{-1 \pm \sqrt{49}}{8}$$

A1

$$\frac{3}{4} \text{ and } -1$$

oe ft on wrong sign for  $-b$  only eg  $-\frac{3}{4}$  and  $-1$

A1

### Alternative method 3

$$\left(x + \frac{1}{8}\right)^2 = \frac{49}{64}$$

M1

$$x = \pm \sqrt{\frac{49}{64}} - \frac{1}{8}$$

A1

$$\frac{3}{4} \text{ and } -1$$

oe

A1ft

### Alternative method 4

Writes  $x^2 + x - 12$  and writes

$$\left(x \pm \frac{a}{4}\right) \left(x \pm \frac{b}{4}\right) \text{ where } ab = -12$$
$$(4x \pm 4)(4x \pm 3)$$

M1

$$\left(x + \frac{4}{4}\right) \left(x - \frac{3}{4}\right)$$

oe eg  $(4x + 4)(4x - 3)$

A1

$$\frac{3}{4} \text{ and } -1$$

oe ft their brackets if M1 awarded

A1ft

### Additional Guidance

$$(2x - 1)(2x + 3), \frac{1}{2} \text{ and } -1\frac{1}{2}$$

M1, A0, A1 ft

$$\frac{1 \pm \sqrt{1^2 - 4 \times 4 \times -3}}{2 \times 4}, -\frac{3}{4} \text{ and } 1$$

M1, A0, A1 ft

$$(4x + 3)(x - 1), -\frac{3}{4} \text{ and } -1$$

M1, A0, A1 ft

$$x^2 + x - 12$$

M1

$$\left(x + \frac{2}{4}\right) \left(x - \frac{6}{4}\right)$$

A0

$$1\frac{1}{2} \text{ and } -\frac{1}{2}$$

A1ft

[5]

#### Q4.

(a)  $a(a - 3)$

*Do not accept fw*

*oe*

*eg  $-a(-a + 3)$*

B1

(b)  $3y + 18$

$$\frac{7y}{3} + \frac{4}{3} \text{ (Must be separate terms)}$$

B1

$$7y - 3y = 18 - 4$$

$$\text{or } 7y - \text{their } 3y = \text{their } 18 - 4$$

$$\text{or } 4y = 14$$

$$\frac{7y}{3} - y = 6 - \frac{4}{3}$$

$$\text{or their } \frac{7y}{3} - y = 6 - \text{their } \frac{4}{3}$$

M1

$$3.5 \text{ or } 3\frac{1}{2} \text{ or } \frac{7}{2}$$

*ft collecting their four terms*

A1ft

[4]

**Q5.**

(a)  $5x - 15 - 3x + 3$   
or  $5x - 15 - 3x - - 3$

*3 correct terms for M1 (can be seen separately)*  
*NB  $5x - 15 = \pm 3x \pm 3$  or allow M1 only, even if correct answer or ft answer subsequently seen*

M1

$5x - 15 - 3x + 3$

*Completely correct for A1*

A1

$2x - 12$  or  $2(x - 6)$

*ft if M1 awarded and no further errors*  
*Deduct a mark if incorrect further work*

A1ft

(b)  $8(x + 2) + 2(2x + 1)$  (with one denominator of 16 or no denominator)  
If expanded straightaway 3 terms must be correct

*$4(x + 2) + 2x + 1$  (with one denominator of 8 or no denominator)*  
*If expanded straightaway 3 terms must be correct.*

M1

$12x + 18$

*$6x + 9$  or any multiple eg  $24x + 36$*   
***NB**  $12x + 18, 6x + 9$  etc. is M1, A1 as they often eliminate the denominators in two operations and leave incompatible denominators in their calculations*

A1

Their  $12x + 18 = 0$  (must be a linear equation)

*Their  $6x + 9 = 0$  (must be a linear equation)*

M1Dep

$-1.5$

*ft on both Ms and one error*

A1ft

**Alternative**

$$\frac{x}{2} + 1 + \frac{2x}{8} + \frac{1}{8}$$

*oe 3 correct fractions for M1*

M1

$$\frac{3x}{4} + 1\frac{1}{8}$$

*oe  $\frac{3x}{4} + \frac{9}{8}$  or  $0.75x + 1.125$*

A1

Their  $\frac{3x}{4} + 1\frac{1}{8} = 0$

M1

-1.5

*ft on both Ms and one error*

A1ft

[7]

**Q6.**

- (a) -3 and 0

*B1 for each*

B2

- (b) their 6 points plotted within tolerance

$\frac{1}{2}$  square tolerance

B1ft

Smooth curve through their points

*Must be U shape through 6 points*

B1ft

- (c) -1.5 and 2

*ft their graph*

$\frac{1}{2}$  square tolerance

*B1 for each*

*[-1.55, -1.45] and [1.95, 2.05]*

B2ft

[6]

**Q7.**

- (a) -4 and 5

*B1 for each*

B2

- (b) 5 correctly plotted coordinates

*ft their -4 and their 5*

*tolerance  $\pm\frac{1}{2}$  square*

M1

Smooth curve passing through their 5 points

*ft their plotted points*

*tolerance  $\pm\frac{1}{2}$  square*

A1

- (c) -1 and 2.5

*B1 for each*

B2

**Additional Guidance**

Do not accept coordinates

[6]