Mixed Exercise 7

1.

(a)	$5 \times 2^2 - 8 \times 2 + 4^2 - 2 \times 4$	M1	oe Allow one error
	12	A1	
(b)	$5x^2 - 8x + (3)^2 - 2(3)$ (= 0)	M1	Allow one error
	$5x^2 - 8x + 3$ (= 0)	A1	
	$(5x + a)(x + b)$ (= 0)	M1	$ab = 3$ or $a + 5b = -8$ or $x = \frac{8 \pm \sqrt{(8^2 - 4 \times 5 \times 3)}}{2 \times 5}$ Allow one error
	$\frac{3}{5}$ and 1	A1 ft	oe ft their quadratic

2.

(a)	$2n + 1$ or $1 + 2n$	B1	
(b)	$(2n - 1)(2n + 1)$	M1	oe eg $(2n + 1)(2n + 3)$ or $(2n - 3)(2n - 1)$
	$4n^2 - 2n + 2n - 1$ or $4n^2 - 1$	A1	oe eg $4n^2 + 2n + 6n + 3$ or $4n^2 - 6n - 2n + 3$
	$4n^2$ is a multiple of 4 so $4n^2 - 1$ is one less	A1	oe clear explanation from their (correct) expression

3.

a	$2x + 5$ or $5 + 2x$	B1	
b	$\frac{7x - 5}{2x + 5} = \frac{8}{3}$ or $3(7x - 5) = 8(2x + 5)$	M1	oe eg $(5x - 10) \equiv 5$ parts and $\frac{2x + 5}{5x - 10} = \frac{3}{5}$
	$21x - 15 = 16x + 40$	M1	oe eg $10x + 25 = 15x - 30$ Allow one error
	$x = 11$	M1	
	99	A1	oe eg 77 in A and 22 in B SC1 for correct answer with no algebra

4.

$x - 1 = 3(y - 2)$ or $x + 6 = 4(y - 1)$	M1	oe Rearranging one of the two equations $x - 1 = 3y - 6$ or $x + 6 = 4y - 4$
$x - 3y = -5$ oe	M1	ft from their equations (no further errors) oe eg attempts substitution and rearranges to a suitable form (earns M2)
$x - 4y = -10$ oe	M1	
$x = 10$ or $y = 5$	A1 ft	Correct elimination from their equations if at least M1 earned
$x = 10$ and $y = 5$	A1	SC1 for $x = 10$ and $y = 5$ from no (or incorrect) working

5.

$(ax + b)(cx + d)$	M1	Where ac = 4 and bd $= \pm 5$ or ad + bc $= \pm 19$
$(4x - 1)(x + 5)$	A1	
$(3x - 4)(3x + 4)$	B1	
their $\frac{(4x-1)(x+5)}{(3x-4)(3x+4)} \times \frac{(3x-4)}{(x+5)}$	M1	Inverting the 2nd fraction and multiplying Must have attempted to factorise both expressions (allow max one error in each)
$\frac{4x-1}{3x+4}$	A1	

6.

(a)	$x^2 + mx + nx + mn$	B1	oe
(b)	$(q =)\ m + n$	B1 ft	oe ft their (a)
	$(r =)\ m\ (\times)\ n$	B1 ft	oe ft their (a)
(c)	Any complete explanation eg m and n are both odd (integers) **and** odd (integer) + odd (integer) = even (integer) (so q is even)	B2	B1 Any partial explanation eg1 m and n are odd (integers) eg2 odd × odd = odd **and** odd + odd = even

7.

$A = (4, 0)$	B1	
$B = (0, 8)$	B1	
$C = (–2, 12)$	B1	
$D = (0, 36)$ or $E = (–3, 0)$	B1	
Correct area for one of their triangles	M1	Using their coordinates of ΔAEC or ΔBCD
3 : 2	A1	Accept 2 : 3
Alternative method		
$AB = 2$, $BC = 1$, $EC = 1$, $CD = 2$	B1	oe
$\frac{1}{2} \times EC \times AC \times \sin ECA$ or $\frac{1}{2} \times BC \times DC \times \sin BCD$	M1	$\frac{1}{2}ab\sin C$ statement for either triangle
$\frac{1}{2} \times 1 \times 3 \times \sin ECA$	A1	
$\frac{1}{2} \times 1 \times 2 \times \sin BCD$	A1	
$\sin ECA = \sin BCD$ since these angles are supplementary	B1	oe must be clearly explained
3 : 2	A1	Accept 2 : 3

8.

(a)	Line from (–4, 4) to (–2, 4)	B1	
	Curve through (–2, 4) (–1, 1) (0, 0) (1, 1) and (2, 4)	B1	$\pm \frac{1}{2}$ square
	Line from (2, 4) to (4, –4)	B1	
(b)	3	B1 ft	ft their graph
(c)	$12 – 4x = –10$	M1	oe
	5.5	A1	oe

9.

$\angle ACB = x$ **and** (Triangle *ABC* is) isosceles	M1	oe
$\angle ABC = 180 - 2x$ **and** Angle sum of triangle (is 180°)	M1	oe $\angle CAD + \angle ACD = 180 - 2x$ **and** Angle sum of triangle (is 180°)
$180 - 2x + 2x = 180$ **and** Opposite angles of cyclic quadrilateral (add up to 180°)	A1	Must have seen working for both M marks oe eg $\angle ABC + \angle ADC = 180$ **and** Opposite angles of cyclic quadrilateral SC2 'Correct' solution with one reason missing SC1 'Correct' solution with >1 reason missing

10.

(a)	–0.5	B1	oe
(b)	$-1 \leq f(x) \leq 0$	B2	B1 $-1 \leq f(x) \leq c \quad c \neq 0 \quad c > -1$ **or** $d \leq f(x) \leq 0 \quad d \neq -1 \quad d < 0$ SC1 Correct sketch of $y = \sin x$ with 180, 360 and –1 labelled on axes
(c)	90	B1	