1	21	P1	for a relevant probability, eg P(green) $= \frac{x}{2x+3}$ or P(blue) $= \frac{x+3}{2x+3}$	the number of green and blue pens could be $x-3$ and x or equivalent probabilities must be in an algebraic form in a single variable
		P1	for a relevant product, eg. $"\frac{x}{2x+3}" \times "\frac{x-1}{2x+2}"$ or $"\frac{x+3}{2x+3}" \times "\frac{x+2}{2x+2}"$ **OR** $\left("\frac{x}{x+3}"\right)^2 + \left("\frac{x+3}{2x+3}"\right)^2 = \frac{27}{75}$	This is an exception using replacements. No further credit is available
		P1	forms an appropriate equation, eg. $"\frac{x}{2x+3} \times \frac{x-1}{2x+2}" + "\frac{x+3}{2x+3} \times \frac{x+2}{2x+2}" = \frac{27}{55}$	
		P1	(dep P3) process to reduce equation to $ax^2 + bx + c = 0$ eg. $x^2 - 25x + 84 = 0$	
		P1	process to solve quadratic equation eg. $(x-21)(x-4) = 0$	
		A1	cao	

2	12 red, 9 green	P1	for process to find a relationship between r and g eg $\frac{g}{r+g} = \frac{3}{7}$ **or** $\frac{g}{r} = \frac{3}{4}$	
		P1	for process to find a second relationship between r and g eg $\frac{g+3}{r+2+g+3} = \frac{6}{13}$ **or** $\frac{g+3}{r+2} = \frac{6}{7}$	
		P1	(dep P2) for start to process of solving pair of equations, eg eliminates one variable from the equations **or** removes fractions from both equations	
		P1	(dep P3) for complete process to solve equations to find g **or** r	
		A1	cao	
			OR	
		P1	for two of $3x+3$, $4x+2$ and $7x+5$	
		P1	for $\frac{3x+3}{7x+5} = \frac{6}{13}$	
		P1	(dep P2) for removing fractions from the equation, eg $13(3x+3) = 6(7x+5)$ **or** $39x + 39 = 42x + 30$	
		P1	(dep P3) for complete process to solve $13(3x+3) = 6(7x+5)$	
		A1	cao	

3	72	M1	for $\frac{5}{30} = \frac{12}{p}$ oe, eg $\frac{12}{p} \times 30 = 5$ or $12 \div \frac{5}{30}$ **or** $5 : 30 = 12 : p$ **or** 1 in 6 $(30 \div 5)$ counters are yellow, so $12 \times$ "6" **or** using equivalent ratios to 5 : 30, eg. 2 : 12 and 10 : 60 and adding to give 2 + 10 : 12 + 60	
		A1	cao	

4 (a)	Shown	M1 M1 C1	for $\frac{n}{n+8}$ **or** starts to work with ratios, eg 3:7 forms equation and clears fractions, eg $10n = 7n + 56$ or $10n + 3(n + 8) = 10(n + 8)$ **or** equates $\frac{3}{10}=\frac{8}{x}$ or $\frac{3}{10}=\frac{8}{n+8}$ **or** continues to work with ratios, eg 3:7 = 24:56 gives the total sweets eg $\frac{80}{3}$ oe **or** number of red sweets $n = \frac{56}{3}$ oe **or** gives number of red as $\frac{56}{3}$ **OR** award 3 marks for a complete written argument, eg, P(y) = $\frac{3}{10}$ and there are 8 yellows. This cannot work as 3 is not a factor of 8 (and $\frac{3}{10}$ is in its simplest form)	Does not have to restate the $\frac{7}{10}$; giving a different probability will suffice
4 (b)	28	P1 P1 P1 P1 A1	for $\frac{n}{n+8}$ and $\frac{n-1}{n+7}$ oe forms an appropriate equation, eg $\frac{n}{n+8}\times\frac{n-1}{n+7}=\frac{3}{5}$ for correctly forming a quadratic ready for solving, eg $an^2 + bn + c$ (= 0), $2n^2 - 50n - 168$ (= 0), $n^2 - 25n - 84$ (= 0) oe process to solve quadratic equation, ft a 3 term quadratic factorising eg $(n + 3)(n - 28)$ (=0) oe **or** completing the square **or** correct use of formula eg $\frac{--25\pm\sqrt{25^2-4\times-84}}{2}$, $\frac{--50\pm\sqrt{50^2-4\times2\times-168}}{2\times2}$ cao	Note we do not need to see "= 0"; just the LHS is sufficient. Award 0 marks for a correct answer with no supportive working.