Notes on Paper 2

1. Even in a simple problem like this, don't rush, there is no shame in jotting down a quick intermediate step.
2. Each coefficient must be divided by 3.
3. Attention to detail is key here. Make sure that you do not lose track of minus signs. Again – it is often tempting not to write anything down, but this is a trap.
4. Each term in the first bracket must be multiplied by each term in the second. The resulting terms are then summed.
5. The most common mistake here will be to multiply the -5 in front of the second bracket by the $-x$, and end up with $-5x$.
6. Two different 'none of the above' options given here – it is important to understand the distinction between the two. Option D implies that there is no answer – no factorisation of $x^2 - 5x - 6$ is possible with whole numbers. Option E says that there is a correct answer, it is just not listed above. The distinction is very important here, however the correct answer is given.
7. A classic example of two standard types of expansion. The first is called a squared binomial, $(x-2)^2$, the second, $(x+2)(x-2)$ is called difference of two squares. It is worthwhile just knowing how these kinds of brackets expand.
8. Since the second equation gives you y in terms of x, this pair of simultaneous equations is perfect for substitution. Solving must be your instinct when you see a pair of equations you know you can solve. Do not be tempted into rearranging the first equation for x and then dividing your two expressions.
9. This tests your ability with algebraic fraction arithmetic, which should work identically to if x was a number rather than a variable.
10. A litany of common cancellation errors here. Try to convince yourself of why D is the only right answer here.
11. Always factorise as much as possible when simplifying algebraic fractions. You can only cancel factors, and not terms.
12. More fraction work. Just as with non algebraic fractions, you must find the lcm of the denominators.
13. Alternatively, you can immediately multiply the entire equation by fuv to obtain $uv = fv + fu$. Factor out f to get $uv = f(v+u)$, then divide both sides by $u+v$ to obtain the answer. This method is quite instructive too.
14. Inequalities can be dangerous. You should treat them like you are disarming a bomb. If in doubt, you can split the double inequality into two, and solve separately. If you solve $3 < -3x$, you end up with $x < -1$. Solving $-3x \leq 6$ gives us $-2 \leq x$. Stitching back together gives us the final answer.
15. The best thing to do here is remove all the brackets and put multiplication signs between everything. The lesson is that the order of multiplication does not matter.
16. The first thing to ask yourself is do you understand why this is a line? The answer is not because it can be rearranged into the form $y = mx + c$, although it helps if you want to find its gradient. You should understand that any equation involving two variables with linear powers only can be represented with a straight line. You should translate "x-intercept" as "y=0" and vice versa.
17. Do you know how to set up an equation? It nicely demarcates your variables from the objects in the question if you always use x, rather than writing "let s=spades" which can be confusing.

18. If in doubt, draw a little diagram – it may be a good investment of 10 seconds to help you visualise.
19. First of all, you should know that areas scale differently to lengths. The area scale factor is always the square of the length scale factor. Here the 'Alternative approach' suggested is completely legal as well as better, as you don't have to mess around with a bunch of zeros.
20. A question where it is vital that you define a variable clearly at the beginning. You have to start with a statement like "let x be the number of people originally on the bus". This is the only way to think about this clearly.
21. How well do you know your formulae? Is it obvious to you that the height of the cylinder in this question is $6r$? It's nice to spot the alternative approach where you realise $1/3$ of the Volume means it will reach $1/3$ of the height, but these things aren't always spottable in time pressure. Be prepared to pay attention to detail in your algebra.
22. "Getting $1/3$ more" is identical to saying multiply the original amount by $4/3$. Then if she originally got $3/8$ of the money, now she will get $\frac{4}{3} * \frac{3}{8} = \frac{1}{2}$ of the money. A useful trick to have in your toolbelt.
23. Do you understand why they first cross the finish line at the lcm of their lap times? Consider this argument. If they start running at 1pm, Jeremie crosses the finish line at 1:12, 1:24, 1:36 – multiples of 12 minutes past 1. The same argument says that Kyumin crosses the finish line at multiples of 18, and Sharon crosses at multiples of 15. For them **all** to cross simultaneously, it must be a multiple of 12, 15 and 18. The rest is details.
24. The ratio approach is the nicest of all. Do try to understand all three.
25. A rather involved similar triangles question which is pretty achievable nonetheless.