Notes on Sample Paper 1

01. It's very easy to get carried away by the excitement of starting an exam and make silly mistakes, especially in the first question. In a question like this it is a good idea to take extra care laying out a clear written solution that will help you confirm that you've carried out each step correctly.
02. In contrast, a more informal approach is quite reasonable here, and could save you time: We know that a sixth of a quantity can be found by multiplying by the fraction $\frac{1}{6}$; this is of course equivalent to dividing by 6. Since this is distributive across the sum, you can obtain the answer correctly by dividing each term in turn by 6. It should be easy to see that this results in $\frac{1}{2}+\frac{2}{3}x$.
03. As in 02 you are expected to be familiar with the concept that 'dividing by a quantity is the same as multiplying by its reciprocal'.
04. A useful word formula to learn for squared binomials: to expand $(a+b)^2$ you 'square the first, double the product (i.e. two lots of ab) and square the last'. As none of the options have an $8x$ term, you can quickly see that the correct answer is not given.
05. It's important to pay close attention to what the question is asking rather than just 'do something mathematically sensible'. Options A and C both give correct identities for the given expression, but a *factorisation* is asked for and in this case that means you should check if a two-bracket factorisation is possible.
06. In a question like this, it's a good idea to be alert for potential pitfalls before you plunge into the algebra. In this case you need to be aware of the minus sign before the $(x+1)(x-4)$ term. You may need to bracket carefully to avoid sign errors.
07. More minus signs before brackets to watch out for. Careful layout of each line of working should help avoid careless errors.
08. You could do this one without working if you were confident enough to deduce the following: firstly, the 2s cancel; then after subtracting powers according to laws of indices you are left with a single a on the bottom and a b^2 on the top.
09. Another question testing your understanding of 'cancelling'. Or to give it a more accurate description: **Cancelling Common Factors**. You *must* factorise first, and then it will be clear what you may correctly cancel. Also note that when a **difference of two squares** occurs in a question it is likely that you are intended to use it!
10. You may be new to working with algebraic fractions, but you should employ the same principles that work with numerical fractions. You *must not* simply multiply both terms of the **expression** by x as this would change its value; whereas here we want to preserve the value of the expression.
11. Since this is an **equation** (which means that 'the number on the left is the same as the number on the right') you *may* in this case multiply both sides by the same thing. This will give a new equation which will also be true (because the *new* number on the left will be the same as the *new* number on the right). So in contrast to the previous question, you may multiply both sides by a and then b, (or if you're feeling confident, in one go by ab).
12. Full written working required here. If you haven't met an example of this before in the context of changing the subject of a formula at GCSE, it would be well worth learning how to do it as it is likely to crop up. The trick is to multiply out the brackets when they arise (line 2 to line 3 in the worked solutions), collect together all the x terms on the same side as each other, and then **factorise** (line 4 to line 5 in the worked solutions) so that you can isolate a single x term.

13. In contrast, this question is a non-standard presentation of a simultaneous equations problem. Unless you are confident that you can spot a clever trick that will give you $\frac{y}{x}$ directly, you might be best off applying the 'brute force' approach of solving the simultaneous equations normally to find x and y individually, and then remembering to divide them. On the other hand, you might want to see if there is a way of working with $\frac{y}{x}$:

$2x + y = 7 \qquad (1)$	Divide both equations by x
$3x - 2y = 5 \qquad (2)$	
$2 + \frac{y}{x} = \frac{7}{x} \qquad (3)$	Multiply by 5
$3 - 2\left(\frac{y}{x}\right) = \frac{5}{x} \qquad (4)$	Multiply by 7
$10 + 5\left(\frac{y}{x}\right) = \frac{35}{x} \qquad (5)$	Now subtract equation (6) from equation (5) to give…
$21 - 14\left(\frac{y}{x}\right) = \frac{35}{x} \qquad (6)$	
$-11 + 19\left(\frac{y}{x}\right) = 0$	
$\frac{y}{x} = \frac{11}{19}$	

14. This is another unusual presentation of an inequality. The trick is to realise that we will need to halve both sides to be able to have an expression involving $-x$ on the left-hand-side (LHS), and that before we do that we require the constant on the LHS to be 10. So add 7 to both sides and then halve.
15. It's easy to fall into the trap here of thinking that if $a: b = 3: 4$ that the 3 is associated with a and the 4 with b, and hence (incorrectly) $3a = 4b$. However it may be it may be illuminating for you to know that in many countries the colon symbol : actually represents the division operator equivalent to our ÷. So the equation $a: b = 3: 4$ actually means $\frac{a}{b} = \frac{3}{4}$ which of course you can rearrange to find the correct option.
16. The approach shown in the worked solutions is called 'equating coefficients' and is well worth practising if you are not familiar with it. Once again, we have decided to go for a brute force approach, finding the individual values of A and B rather than finding a 'clever' way of evaluating $A - B$ directly.
17. As in the question above, note the significance of the identity sign $\equiv$ which asserts that LHS and RHS represent the same number no matter what values the variables take. So you can think of this question as asking ' can the expression on the RHS be used to replace the expression on the LHS?'

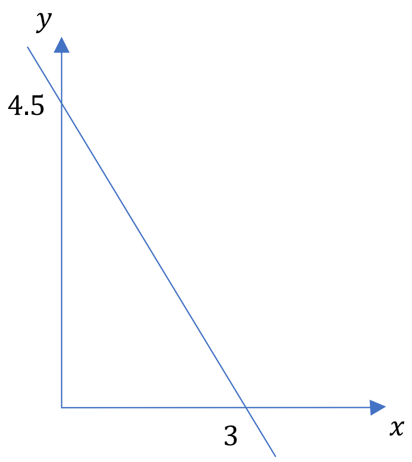
18. A quick sketch graph using the 'cover up method' would be very helpful here.

$$3x + 2y = 9$$

Since $x = 0$ when crossing the y-axis you can find the y-intercept by covering up the x term (literally stick your finger over it!) to show

$$2y = 9 \Rightarrow y = 4.5$$

Similarly you can cover up the y term to reveal quite easily that the curve crosses the x-axis when $x = 3$. A quick sketch;



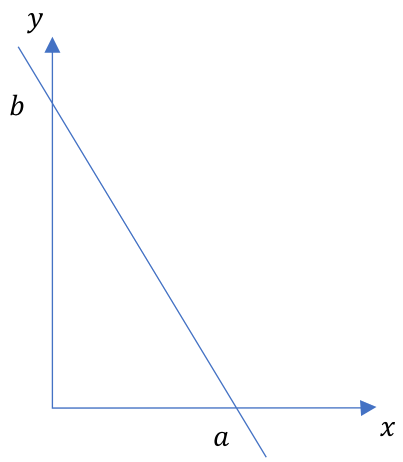
and you can quickly identify that option B is certainly false as the gradient is clearly negative.

19. An opportunity to use a similar idea in reverse: it is certainly worth drawing a quick sketch and labelling the intercepts:

From which it is obvious that the gradient is

$$-\frac{b}{a}$$

making the alternative approach in the model solutions quite efficient.



20. You should by now have picked up that options D and E can't be dismissed!
Interesting to observe that E *would* be the correct answer if option D were not provided.

21. The important thing here is to be conscious of the distinction between '4 cubic centimeters' and a 4 cm cube.

22. This is a test of your confidence in your own problem solving. Take assurance from the 'nice' answer of 3 cm for the radius, so that when you get a value for the volume not provided as an option you realise that this is the time when you get to select 'the correct answer is not given'

23. Confidence in the use of multiplicative scale factors for percentage change is necessary for this question. *Make sure you can identify the scale factor for any given % change, and identify the percentage change associated with any given scale factor. At GCSE this often appears in the context of calculator work, but for carefully chosen values, non-calculator approaches can make this sort of calculation surprisingly straightforward.
24. These sort of distance/speed/time questions can arise in a variety of guises and often the difficulty lies in selecting an efficient route through the problem. If you don't instantly perceive a strategy, then using a table to organise the information is a good start, and may help you identify an efficient route through the problem.

	Monday	Tuesday	Wednesday
Distance			
Speed	V	0.8V	
Time	T	T+M	

Filling out the table with the information provided is the first step, with a suitable choice of letters to represent the key unknowns. At this point you can observe that the distance on all three days is constant. It is also true that the usual DST relationships hold which means that in any table like this, the top row is the product of the bottom two (since $D = ST$). So before you choose to introduce a new variable to represent the distance of Beau's journey, you are able to perceive that you can form an equation involving V, T and M.

Interesting to note that Wednesday is essentially redundant as Wednesday's journey is identical to Monday, so the goal is to find out whether it is possible to express the actual answer T, in terms of M.

25. Clearly the easy alternative mentioned in the model solutions is by far the quickest way of answering the specific question, but if you fail to spot it, a complete description of the problem can once again be obtained with the help of a table:

1st race	Misbah	Paisley
Distance		
Speed	3.8	4.2
Time	t	t+2

From which an equation giving the solution $t = 19$ can easily be obtained.

You know now that the second race will take as long as Paisley's time of 21s, and from this you can work out the distances run in that time by both runners

2nd race	Misbah	Paisley
Distance		
Speed	3.8	4.2
Time	21	21