Week One Answers and Method

Dear everyone,

Very well done for this week's lesson! I thought you all did very well. Please do not be dispirited if you did not win or didn't get a very high score. These are questions designed for 17-18 year olds, many of whom do not get very good scores. Even getting a single question right is genuinely impressive and means you are on the right track. The process is also very time-pressured; I gave you a similar amount of time for these questions as you would for the real exam, so that also makes it very difficult.

There will be a couple of changes for next week. First, I will set slightly fewer questions; I want to make sure we have enough time at the end to go through the methods and the answers. This week we were slightly rushed for time because of tech issues and me explaining the format. Next week I will make sure we have more time to go through question-by-question.

I am also planning to randomise the teams again next week and for future sessions. This does not mean you will never be with the same person again! But it does hopefully mean that everyone will have worked with everyone by the end of the program.

Best wishes,

James

Question 1:

The answer here is D. All groups got this answer correct. One way to approach this question is by simple algebra:

Let x be the number of girls in the class. Therefore, the number of boys will be (24-x).

Each girl plants three plants so the number of plants overall planted by girls will be: 3x
Three boys each plant one plant between them so the number of plants overall planted by boys will be: (24-x)/3

Therefore, $3x + (24-x)/3 = 24$

Multiply both sides by three to get rid of the fraction:

$9x + 24 - x = 72$

Therefore $8x = 48$

So x = 6, meaning there are 6 girls in class and 18 boys. The difference between the two is 12.

Question 2:

Slightly trickier since it is much harder to solve with algebra. The trick here is to find the "key" to the question, which is that the 20p coupons are the rarest and also that they always sum to a number ending in 0 (i.e.. 20, 40, 60, 80 etc). Therefore, you're looking for a combination of 14s and 9s which sum to probably either 130 or 110.

One way to do this is just to create a quick number table of multiples:

14s: 14, 28, 42, 56, 70, 84, 98, 112
9s: 9, 18, 27, 36, 45, 54, 63, 72

Because 14 is even and 9 is odd, you can immediately discount multiples of 9 which are odd which leaves you with: 18, 36, 54, or 72.

What hopefully jumps out is that 112 + 18 = 130.

112 = 14 x 8 (so 8 14p coupons)
18 = 9 x 2 (so 2 9p coupons)
20 = 20 x 1 (so 1 20p coupon)

Therefore the answer is C: 11.

Question 3:

Didn't cause too much trouble. A runs counter to the core argument. B is unclear: the reference to a "new approach" indicates that children *are* now required to learn them off by heart. C is a bit trickier, but all that is actually assumed is that A-level and University studies *are* currently available. D is wrong: "such as" implies that imagery and alliteration may be present but are not necessarily required. E is the answer since the author assumes a difference between "analysing literature" (old approach) and "appreciating its value" (new approach).

Question 4:

Can be tricky because of converting fractions into minutes. Best to just be thorough:

15KM @ 60KM/H = 15 minutes
5 Hours for Motorway + Rest Stops
20KM @ 40KM/H = 30 minutes

Therefore total travelling time of 5h and 45 minutes. If we arrive at Midday, that means set off at 6.15AM.

There are two traps in this question. They are both in the clause: "then 5 hours on the motorway, including two 15-minute rest stops, travelling at an average driving speed of 80 km / hour". First, it does not matter what their average speed was for the question because all you care about is *time* and it tells you the time. Secondly, it is "5 hours...including two 15-minute rest stops". So do not add 30 minutes to the overall time!

Question 5:

Another question where there are a couple of traps but which you can beat by being thorough. Work through it gradually:

Morning:

40 pizzas sold @ $2 each so (40 x 2) = $80
35 flapjacks sold @ $1 each so (35 x 1) = $35

Afternoon:

8 more pizzas sold @ $1 each (half-price) so (8 x 1) = $8
14 more flapjacks sold @ $0.5 each (half-price) so (14 x 0.5) = $7

Added up the total is $130 (80 + 35 + 8 + 7). Since there is $30 of costs, profit is ($130 - $30) = $100 so A.

Question 6:

The answer is A. Did not trouble too many people. As you can see, the whole argument is based off the premise that “there is a tendency not to change banks”. A shows this is untrue.

Question 7:

The trick in this question is to notice that the £500 bonus criteria are *all* more relaxed than the £1000 bonus criteria, so you only have to check to see if they meet the £500 criteria.

Working from left to right:

Smith receives a bonus as his absences are 5% (which is less than 10%), he is over his production target (so it is met), and only 2% of his work is rejected (which is less than 8%).

Jones does *not* receive a bonus as his absences are 10%. The point here is that 10% is not less than 10%. If they had intended people with 10% absence to be included in the bonuses, they would have said “absences of 10% or less”. Once you realise this, no need to look at Jones’ other figures.

Patel receives a bonus for same reasons as Smith.

Owololu receives a bonus for same reasons as Smith. Note that he has “met” his production target, although he has not exceeded it.

McKay does not receive a bonus because his production targets are not met: he is 4% under target.

Therefore answer is D.

Question 8:

I have saved this for next week! The approach to take is “brute force”: make a quick Calendar and just write down how many shows on Saturdays, how many on Sundays etc. then add them up.

Question 9:

I should have indicated at the start what the ideal form for these was so this is my mistake. Generally, I'm happy with one-to-two sentences explaining an argument. Today I accepted:

1. Statistics helps us realise the scale and size of problems facing us.
2. Statistics is an important tool in business in relation to stocks and shares.
3. Statistics is a core component of mathematics without which it is difficult to progress into more complex areas. It is also necessary for other areas of STEM.
4. Statistics helps us understand the news and to understand when figures are being manipulated.

Question 10:

This was a "stretch" question. Generally the best answers for the "for side" are:

1. We should refuse because this will incentivise the country's government to adhere to human rights standards and to outlaw child labour.
2. We should refuse because that will encourage large companies not to use child labour and not to have factories in that country.

For the against side:

3. Not trading with another country simply makes it poorer and hurts the children and the families themselves.
4. By trading with countries which use child labour, we can gradually require and incentivise less child labour to be used through progressive increases in requirements and import/export taxation strategies.
5. It is unfair to legitimate enterprises based in the country to be punished only because some other companies use child labour. It would be fairer to place a ban only on the companies which use it, not on the country.

Generally arguments like "we should refuse to trade because child labour is wrong/illegal" are weak becaue both sides will accept that it is morally wrong; what both sides are doing is trying to work out how to deal with the problem!