Entry

This is the third year of running the competition but circumstances are unexpectedly different. The software is a clone of that used in the equivalent Biology Competition and is now feeling a little old. . It was specifically written and then tuned over a number of years for this purpose. It is not perfect, but it serves the purpose quite well, with a few glitches. Some of its deficiencies, notably resetting passwords, have been identified and will be addressed when it is replaced, probably for next year.

The entry was half the size this year, but it is still encouraging that students were happy to participate. It appeared to go well, with a few positive comments returned. The teacher email accuracy seem to be much better so that there have been almost no bounced emails this time.

The most notable aspect this year is that the grade boundaries have been loosened. This competition is for fun and to encourage students, as well as seeing how their ability to deal with the physics style of question, which means looking for clues and eliminating unlikely candidates. It is not based on a set of topics, although inevitably there are technical questions that not all students have covered. But some can be guessed from units and what is reasonable, but students may not always be able to do every question. We do not want them preparing for this by studying past questions and revising topics. It is a snapshot of their broader physics knowledge and interest; it is definitely not an exam. It should be the result of longer term preparation; reading scientific articles in the newspaper, listening to the news and reading generally about scientists and how the subject has developed. It is meant to be low key, very much a pub quiz, in which it is good to do well, but not to be taken too seriously. It will perhaps encourage students to read more widely. So obtaining medal certificate for many is a good sign that their physics is going well. The distribution of the marks is very similar to last year.

	2020	**2019**	**2018**
Candidates	5169	10964	5867
Schools	100	205	140

This year we have the information relating to gender and the distributions of marks for male and female candidates are shown. There is a difference, with girls less often only taking Paper 1. Other factors play a role but it is not clear what they are.

It is most encouraging to see not only the girls competing very favourable with the boys in this subject, but also the large numbers taking part.

Male	2830	57%
Female	2170	43%

About 11% of students only took Paper 1 and were unable to continue on to Paper 2. This is why the mark distributions have a bump at the lower end. When the individual paper marks are plotted these bumps are absent.

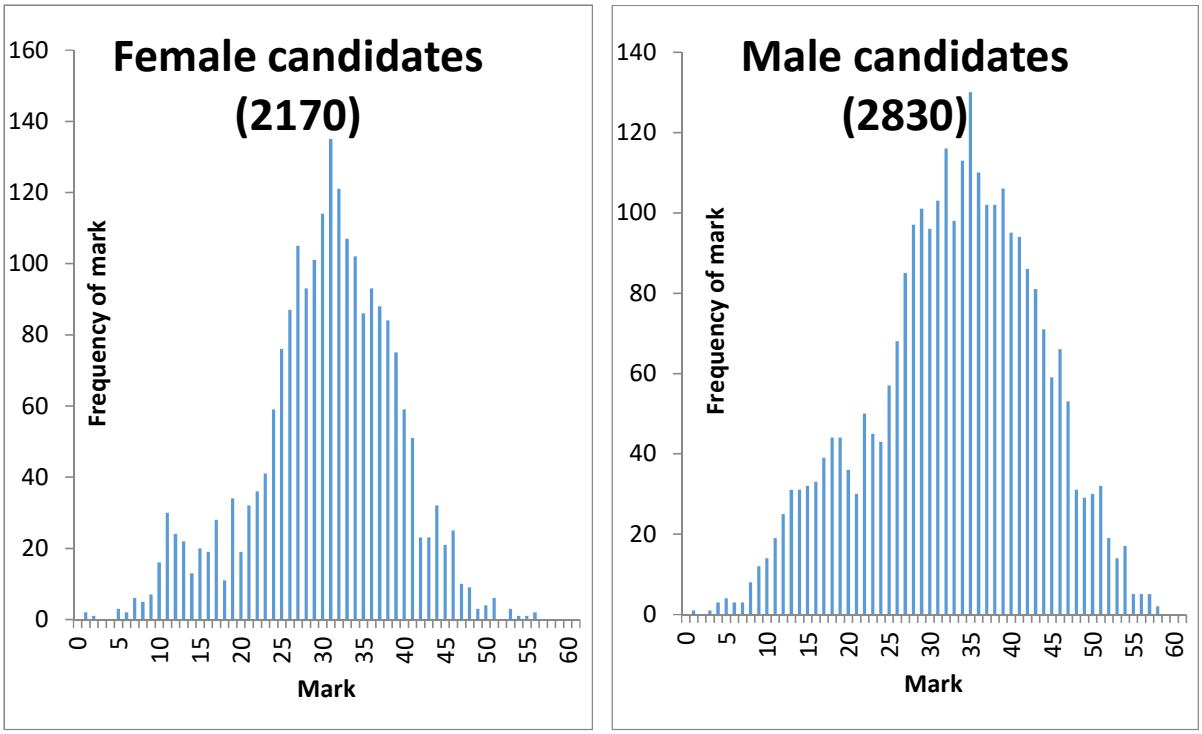

Figure 1. Candidate results by gender.

The average for Paper 1 is 16.3/30, and Paper 2 17.6/30, and since the majority of students take both papers, the overall average of the two is an expected 32.0/60.

The distributions for the papers are shown in Figs. 2, 3 and 4. Paper 2 is meant to be very slightly harder than Paper 2, but this fine tuning is hard to achieve and does not appear to be the case. They should be very slightly different in style, with the second paper containing slightly more numerical calculations.

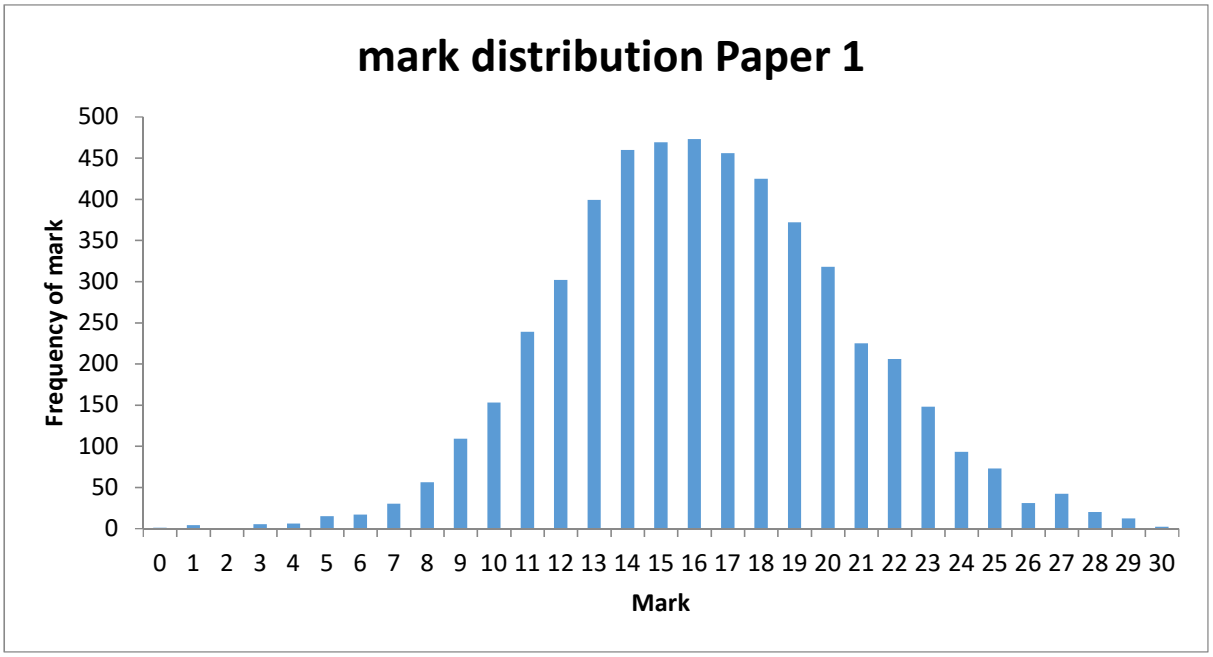

Figure 2. Distribution of marks for Paper 1.

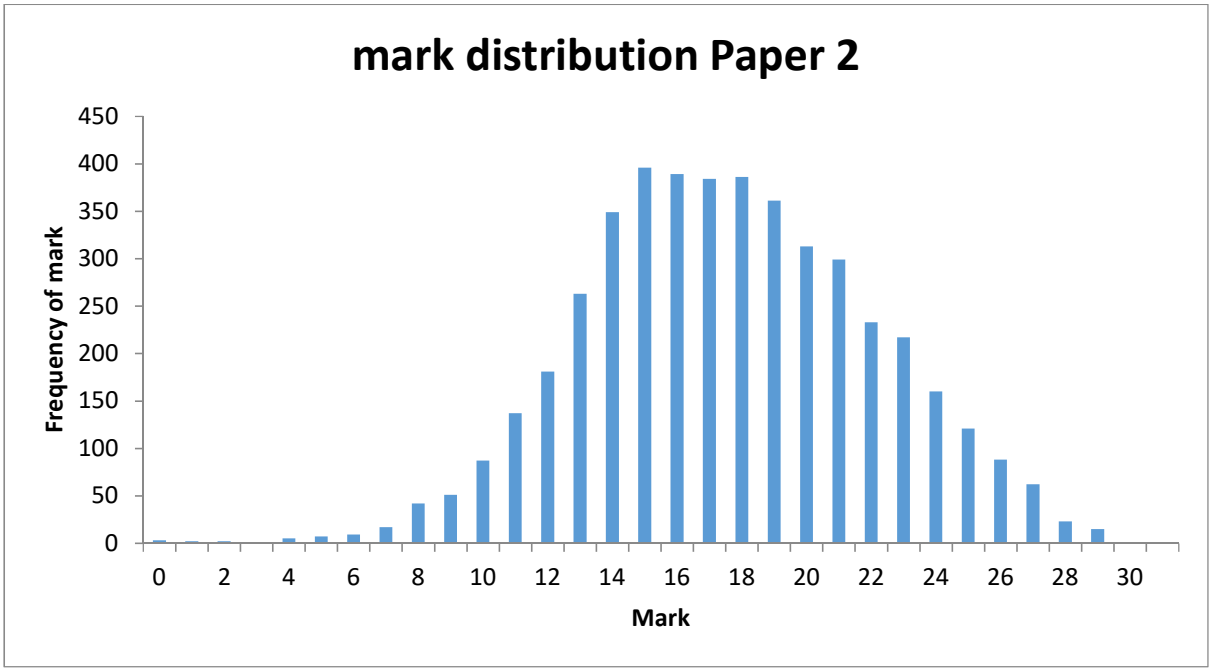

Figure 3. Distribution of marks for Paper 2.

The grade boundaries are determined from the marks for both papers. Candidates who have only sat Paper 1 are not removed 11% of students in this group can be seen as the lower bump in Fig. 4 for the 2020 and 2019 mark distributions. It can be seen that the consistency of the papers with the 60 questions has been maintained.

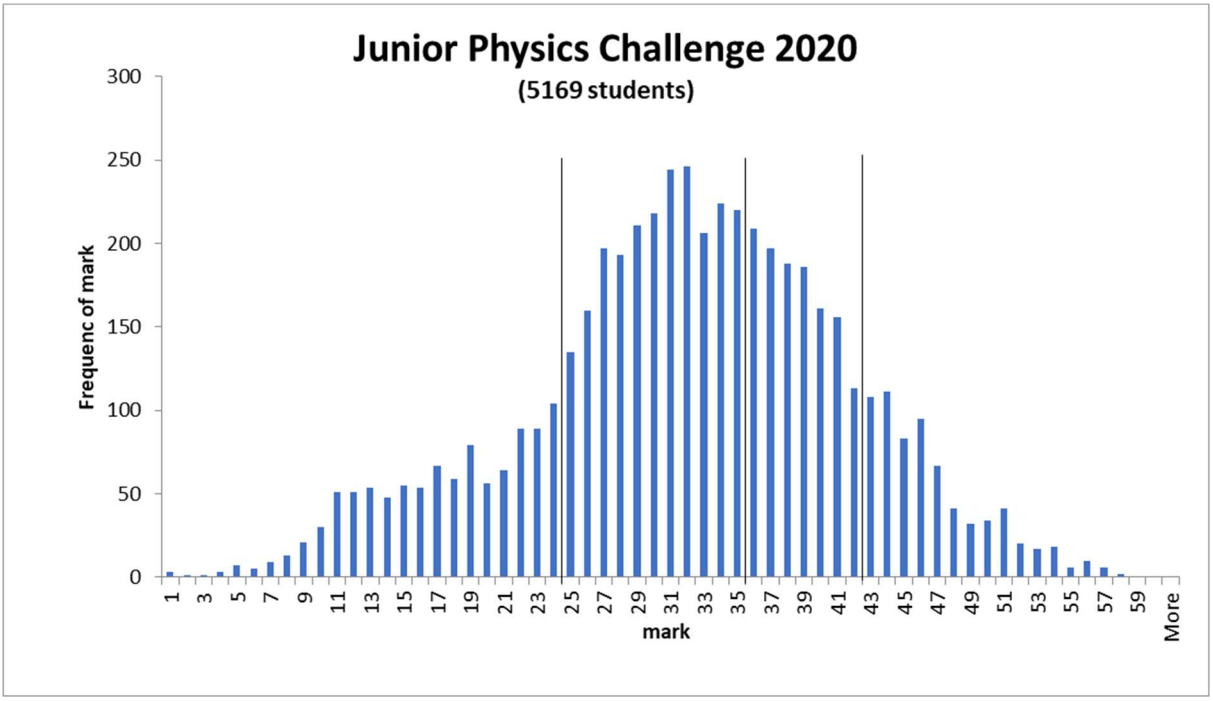

Figure 4. Mark distribution for all 5169 students entered.

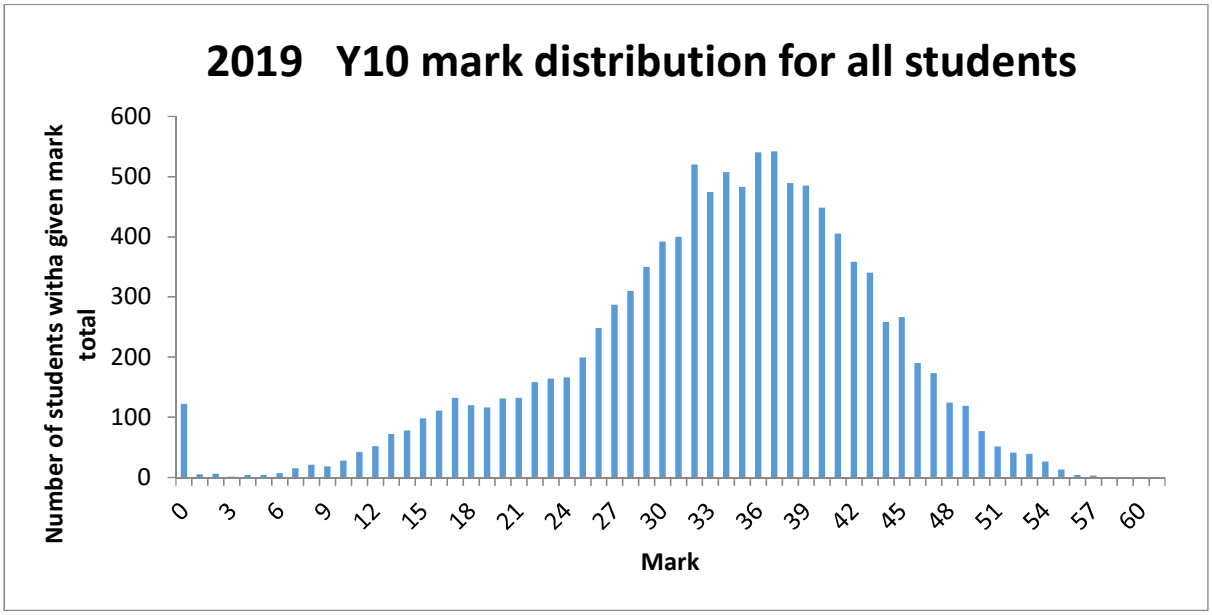

Figure 5. Mark distribution for all 10960 students taking both papers

The distributions are satisfactorily broad and reach towards the top end of the mark range. This gives good discrimination whilst not making students feel that there are a large number of impossible questions to defeat them.

The small team of question writers is led by Iain Holmes of Kettering Buccleugh Academy.

Questions

An analysis by question type is not presented here. This can be extracted from the database (but not individual student reports), but the question choice and setting is done more on experience of teaching students of this age than by statistical analysis. Judgement plays a large role in the overall level and style of the paper.

In the end the competition is to encourage students in their physics. It is not about practising past sets of questions and short term preparation. Even in the tougher competitions for older age groups, success is achieved by longer term preparation, doing questions during the course which stretch students, challenging them in their thinking and raising their aspirations, confidence and experience.

Grade Boundaries 2020

	Range	% of candidates	No of candidates	Cumulative %	Cumulative candidates
Gold	**43 – 60**	**13.4**	**691**	**13.4**	**691**
Silver	**36 – 42**	**23.4**	**1210**	**36.8**	**1901**
Bronze	**25 – 35**	**43.6**	**2254**	**80.4**	**4155**
Participation	**0 – 24**	**19.6**	**1013**	**100**	**5168**
		100%	**5168**		

The grade boundaries have been considerably relaxed from those of the previous two years. This gives 80% of students a medal award certificate.

Grade Boundaries 2019

	Range	% of candidates	No of candidates	Cumulative %	Cumulative candidates
Gold	45 – 60	10.3	1126	10.3	1126
Silver	41 – 44	12.4	1361	22.7	2487
Bronze	37 – 40	18.9	1964	41.6	4451
Participation	0 – 36	58.4	6513	100	10964
		100%	10964		

Grade Boundaries 2018

	range	% of candidates	No of	Cumulative %	Cumulative
Gold	50 – 60	9.2	541	9.2	541
Silver	47 – 49	12	704	21.2	1245
Bronze	44 – 46	18.4	1077	39.6	2322
Participation	0 – 43	60.4	3545	100	5867
		100%	5867		

RWH 21st May 2020