

Name:

School:



TONBRIDGE SCHOOL

Scholarship Examination 2021

Science I

Monday, 26th April 2021

2:15 pm

Time allowed: 45 minutes

Answer all the Questions

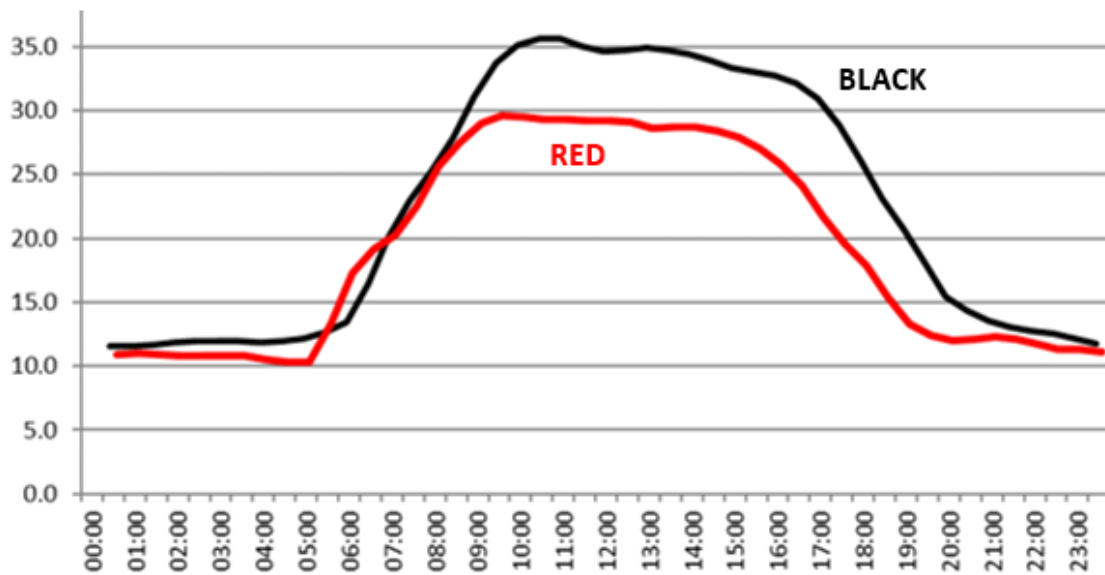
You may use a calculator

The entire paper is worth 40 marks and the number of marks for each question is shown in brackets.

1. Tonbridge School recently opened a state-of-the-art science centre. One of the considerations when designing a new building is the long-term energy usage of the building.



The below graph shows the electricity usage in the building on two typical school days:



Both lines were recorded during term time, but one was from May and the other was from November.

a) Which of the lines corresponds to the November reading? Explain your answer (3)

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b) Why does electricity demand increase during the day? (1)

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c) Why is electricity still being used at 01:00am? (1)

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d) Describe two measures that could be introduced to reduce electricity consumption in the new building? (2)

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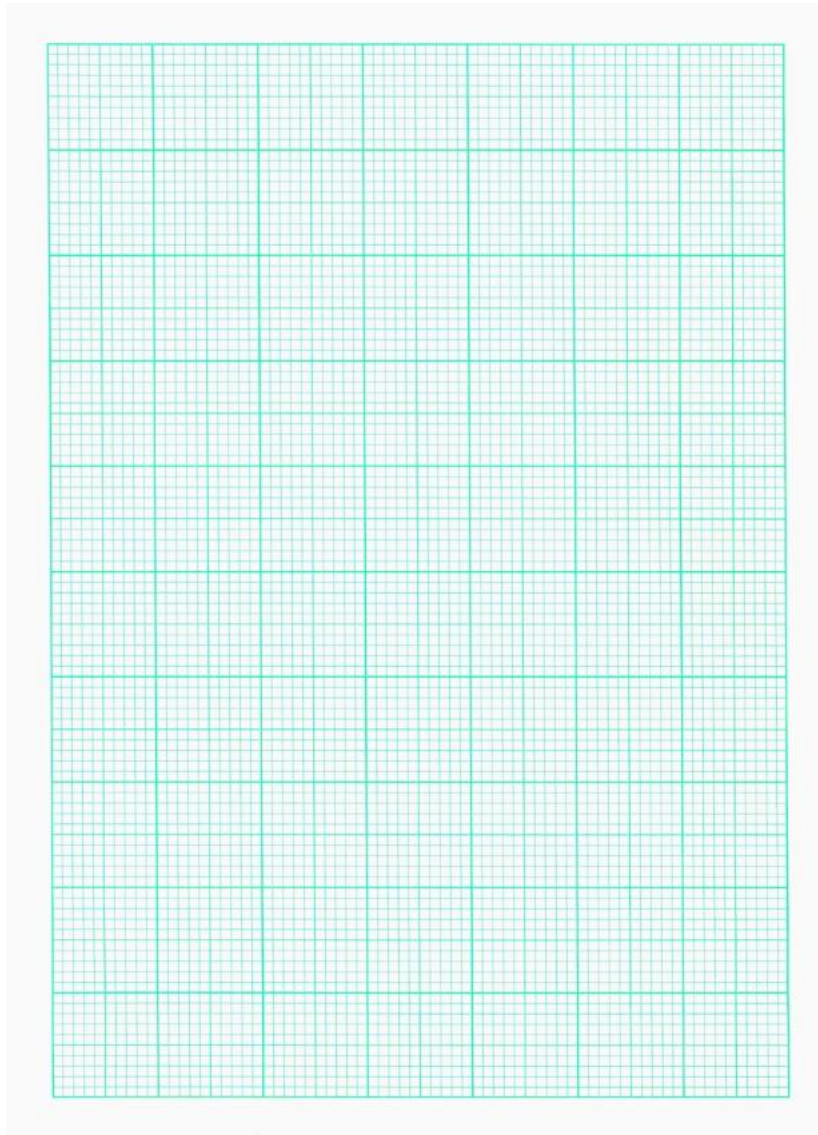
2. The building was officially opened by two NASA astronauts who worked with our students for a week.



The table below shows the height of one of the astronauts when he was on the International Space Station:

<u>Number of days in space</u>	<u>Height (inches)</u>
0	66
10	68
20	69
30	70
40	71
50	71
60	71

- a) Plot a **line graph** to show the relationship between “Number of Days in Space” (x-axis) against “Height” (y-axis) (5)



- b) Describe the relationship demonstrated by the graph: (3)

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c) Explain why this relationship exists when astronauts are on the International Space Station: (2)

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d) Estimate the astronaut's height after 70 days in space: (1)

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e) A standard classroom ruler has two scales the same length, 30cm and 12 inches. With this information, calculate the change in height of the astronaut between day 0 and day 60, **giving your answer in cm:** (3)

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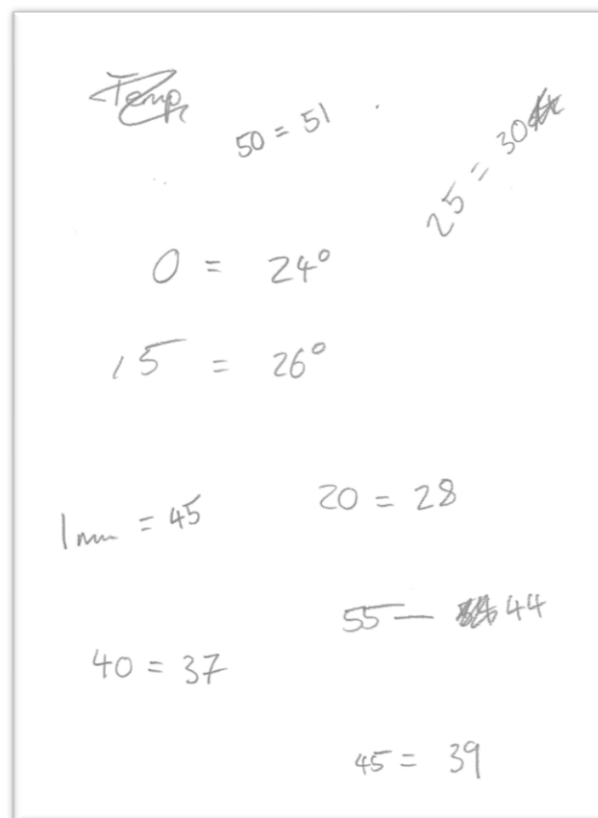
QUESTIONS CONTINUE OVERLEAF

3. The new science centre has enabled Tonbridgians to complete many interesting experiments during lessons.



Two students are working on an experiment in which they measure the temperature rise of a substance over a minute. Their initial results on scrap paper are included on the right:

- a) Copy these results into a table below, in a format suitable for a formal experimental report: (3)



b) Identify the anomalous result: (1)

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c) What could the students do to improve the reliability of the results (1)

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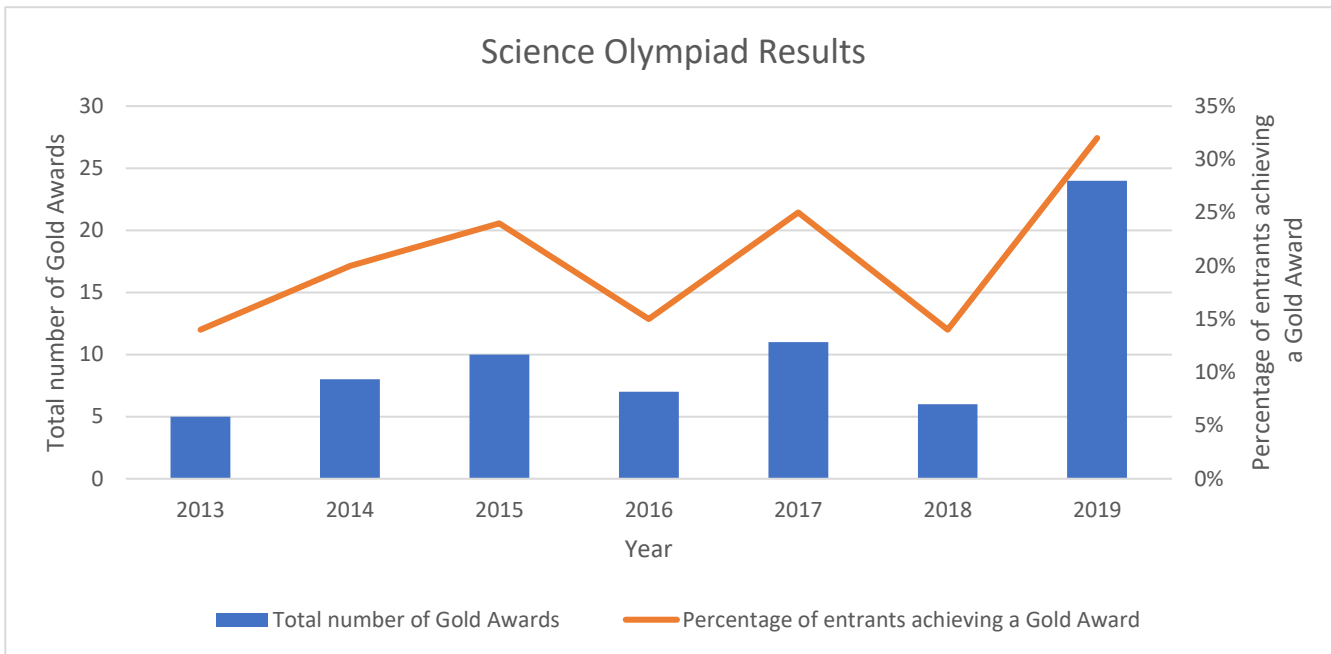
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d) How could the students make their results more precise: (1)

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4. The Barton Science Centre is a great space for students to prepare for extension competitions called Olympiads. The following graph shows both the number of gold awards achieved in recent Olympiads and the percentage of Tonbridgian entrants achieving gold awards:



The building opened at the start of 2019.

- a) How could the graph’s data help the Head of Science to suggest that the building has had a positive impact on the department’s Olympiad results? (4)

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- b) The Headmaster is cautious about making conclusions about the building's impact from the graph. Why might he be hesitant? (2)

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5. When working with the astronauts at the opening of the Barton Science Centre, our L6th students designed a variety of experiments to be taken up to the International Space Station (ISS) for completion in 2020 by current astronauts.



Outline an experiment to be carried out on the ISS to explore an area of science that you are interested in. You should consider:

- What would you investigate - what kind of experiment would be worth conducting on the ISS?
- What would the astronauts vary, measure and control etc?
- Feasibility - e.g. size of equipment to transport up to the ISS, safety, any additional resources needed?
- What could be done with the results?
- How would the experiment aid future research?

(7)

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[Space to draw a diagram if needed]

END OF PAPER 1