INTERHOUSE MATHEMATICS TEAM

CHALLENGE 2023

# YEARS 11-12 TEAM EVENT Time: 30 minutes

**(*Calculators are allowed)* Total: 100 points\_**

***Please write answers on the answer sheet.***

**T1** (20 points)

Two skyrockets are launched simultaneously vertically upwards. The heights of the sky rockets are modelled by the equations below, where *t* is the time in seconds.

 $f\left(t\right)= -4.9t^{2}+14.7t$

$$ g\left(t\right)= -4.9t^{2}+19.6t$$

What is the greatest distance between the skyrockets at any instant? Do not give units.

**T2** (20 points)

The largest known prime number is $2^{82589933}-1.$ It was found in 2018 by Patrick Laroche of the Great Internet Mersenne Prime Search (GIMPS). How long would the prime number be if it was written out in full in base 10 with 4 digits per centimetre. Answer to the nearest whole kilometre.

**T3** (20 points)

A jury consists of 12 individuals who are randomly selected from the general population. What is the probability that a jury consists of 6 males and 6 females?

**T4** (20 points)

Anita has 12 identical 2-metre long wooden planks from which she wishes to make a vegetable garden enclosure with a maximum area. What is the maximum area in m2? Answer to two decimal places.

**T5** (20 points)

A target consists of an infinite number of concentric circles. The outermost circle has a radius of 1 metre, and each successive circle has a radius which is half of the previous circle. When a dart hits the target, it will land within some of the circles. For example, the dart below is contained within the two outermost circles, so the points allocated is the sum of the circumferences of these two circles. Points = $2π×1+2π×\frac{1}{2}$ = 3$π$. What is the highest possible score obtained when the dart lands in the bullseye? Answer in exact value.



### **2023 INTERHOUSE MATHS TEAM CHALLENGE**

#### **YEARS 11-12 TEAM EVENT**

RESPONSE SHEET

|  |  |  |
| --- | --- | --- |
| Question | Answers | Points |
| **T1.** (20 points) |  |  |
| **T2.** (20 points) |  |  |
| **T3.** (20 points) |  |  |
| **T4.** (20 points) |  |  |
| **T5.** (20 points) | \_\_\_\_ |  |

|  |  |
| --- | --- |
| House | Total Score |

### **2023 INTERHOUSE MATHS TEAM CHALLENGE**

#### **SENIOR (Year 11 & 12)**

TEAM EVENT

**ANSWER SHEET**

|  |  |  |
| --- | --- | --- |
| Question | Answers | Points |
| **T1.** (20 points) | 14.7  |  |
| **T2.** (20 points) | 62 kilometres |  |
| **T3.** (20 points) | $\frac{231}{1024 }$ or 0.2256 or 22.56% |  |
| **T4.** (20 points) | 44.78 m2 |  |
| **T5.** (20 points) | 4$π$ |  |