

Secondary Application Questions (for entry in 2024)

Student name (please type or print using BLOCK LETTERS)

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First Name

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Surname/Family name

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Preferred Name

Address: _____

School attended: _____ Year Level: _____
(in 2023) (2023)

Parent Name

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First Name

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Surname/Family name

Contact Phone Number

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Parent email address

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Submission instructions

BY POST



Postal address:

The Mathematical Association of Western Australia
12 Cobbler Place
MIRRABOOKA WA 6061

SCAN AND EMAIL



Email to:

psp@mawa.edu.au

Scan and attach as a single PDF document.
Include student name as your email subject.

**Applications must be received by Monday 30 October 2023.
Late applications will NOT be accepted.**

Instructions for applicants

Complete as many of the following questions as you can. Remember:

- These questions are designed to be challenging
- You are not expected to know how to solve all of them
- Explain your reasoning and show your working where possible
- You can use the spare pages if you require additional space.

Student declaration

*I understand admission to the MAWA Problem Solving Program is **by invitation** based on the work I have submitted. I declare that these solutions are entirely my own work.**

Student signature: _____

*MAWA reserves the right to remove students from the MAWA Problem Solving Program in the event of a false or misleading declaration.

Problem 1

Explain why no square number ends in 7 or 8.

Problem 2

The mean (average), median and mode of the five numbers below are all equal:

12, 9, 11, 16, x

What is the value of x ?



Problem 3

Kathy owns more cats than Alice and more dogs than Bruce.

Alice owns more dogs than Kathy and fewer cats than Bruce.



Which of the following statements *must* be true?

- A. Bruce owns the fewest cats.
- B. Bruce owns the most cats.
- C. Kathy owns the most cats.
- D. Alice owns the most dogs.
- E. Kathy owns the fewest dogs.

Problem 4

Each of a , b , c , and d is a positive integer and is greater than 3.

If

$$\frac{1}{a-2} = \frac{1}{b+2} = \frac{1}{c+1} = \frac{1}{d-3}$$

then which of these orderings is correct?

- i. $a < b < c < d$
- ii. $c < b < a < d$
- iii. $b < a < c < d$
- iv. $d < a < c < b$
- v. $b < c < a < d$

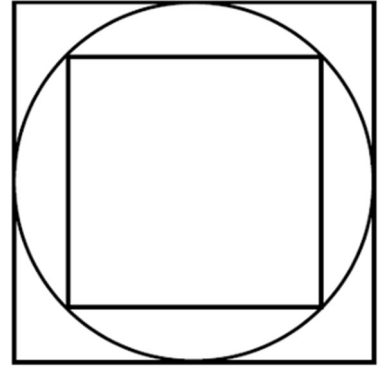
Explain your reasoning.

Problem 5

A circle is inscribed in a large square, and a smaller square is inscribed in the circle.

The large square has a perimeter of 24 cm.

Calculate the area of the smaller square, explaining how you calculated your answer.



Problem 6

Suppose that $x\#$ means $\frac{1}{x}$, the reciprocal of x .
For example, $5\#$ means $\frac{1}{5}$.

How many of the following statements are true?

- i. $2\# + 4\# = 6\#$
- ii. $3\# \times 5\# = 15\#$
- iii. $7\# - 3\# = 4\#$
- iv. $12\# \div 3\# = 4\#$

Spare page