

Event C

Problem #1 ("Quickie"; 1 point)

Try to solve each problem within one minute. Unless otherwise stated, no calculator is allowed.

1. In the geometric sequence  $\{a_n\}$ ,  $a_2 = 8$  and  $a_5 = 216$ . Calculate the value of  $a_6$ . (MSHSML 2017-18 4C #1)

1. In arithmetic sequence  $\{a_n\}$ ,  $a_2 = 4$  and  $a_{22} = 444$ . Determine  $a_{222}$  exactly. [calculator allowed] (MSHSML 2016-17 4C #1)

Event C

Problem #2 ("Textbook"; 2 points)

Try to solve each problem within two minutes. Unless otherwise stated, no calculator is allowed.

2. What is the integer coefficient of the  $x^8$  term in the expansion of  $(2x^2 - 5)^7$ ? (MSHSML 2017-18 4C #2)

2. In geometric sequence  $\{a_n\}$ ,  $a_1 = 2$  and  $a_3 \cdot a_4 =$

5. Determine exactly  $a_5 \cdot a_6 \cdot a_7$ . [calculator allowed] (MSHSML 2016-17 4C #2)

Event D

Problem #1 (“Quickie”; 1 point)

Try to solve each problem within one minute. Unless otherwise stated, no calculator is allowed.

1. What are the coordinates of the focus of the parabola  $y = (x + 1)^2 - 1$ ? (MSHSML 2017-18 4D #1)

1. Determine exactly the vertex of  $y = 2x^2 + 4x + 1$ . (MSHSML 2016-17 4D #1)

Event D

Problem #2 ("Textbook"; 2 points)

Try to solve each problem within two minutes. Unless otherwise stated, no calculator is allowed.

2. What are the coordinates of the center of the conic  $4x^2 - 9y^2 + 28x - 180y = 7$ ? (MSSHML 2017-18 4D #2)

2. An ellipse has center  $(-2,7)$  and is tangent to both the  $x$ - and  $y$ -axes. If the minor axis is parallel to the  $x$ -axis, determine exactly the sum of the lengths of the major and minor axes. (MSSHML 2016-17 4D #2)