**Instructions for the mathematics report (Form 4 Attachment 1)**

Form 4 Attachment 1

Applicants must submit evidence of their work in the following sections:

Section 1. Mathematics problem solving

 Section 2. Mathematics inquiry-based report

This evidence can be in the form of photographs or digital scans of work from your school assignments or independent work conducted over the last year, or you may create a new piece of work for this application. The evidence can be pasted in the boxes provided in this document or uploaded as separate A4 PDF files.

Form 4 Attachments include:

* Formula Booklet (see Attachment 2)
* Mathematical Inquiry and Modelling (see Attachment 3)

**Formula Booklet (Form 4 Attachment 2)**

Form 4 Attachment 2

Please use at least one of mathematics formulae in section 1 and section 2 of this form.

|  |  |
| --- | --- |
| Name of formulae | Formulae |
| 1. Equation of a straight line
2. Gradient/slope formula between two points $(x\_{1}, y\_{1})$ and $(x\_{2}, y\_{2})$
3. Distance between two points $(x\_{1}, y\_{1})$ and $(x\_{2}, y\_{2})$
4. Solutions of a quadratic equation

⑤ Equation of a quadratic function⑥ Equation of the axis of symmetry of a quadratic function⑦ Volume of a sphere⑧ Volume of a cone and pyramid⑨ Pythagorean Theorem⑩ Area and volume ratio of similar triangles⑪ Probability of an event A⑫ Complementary events⑬ Combined events ⑭ Independent events ⑮ Conditional probability⑯ Mean of a set of data⑰ Interquartile range (IQR) | 1. $y=mx+c ; ax+by+d=0$

② $m=\frac{y\_{2}-y\_{1}}{x\_{2}-x\_{1}}$③ $d=\sqrt{(x\_{1}-x\_{2})^{2}+(y\_{1}-y\_{2})^{2}}$④ $\left(x-α\right)\left(x-β\right)=0$ ⇒ $x=α, x=β$$$ ax^{2}+bx+c=0$$ ⇒ $x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a} , a\ne 0$1. $f\left(x\right)=ax^{2}+bx+c , a\ne 0$
2. $f\left(x\right)=ax^{2}+bx+c , a\ne 0 ⇒ x=-\frac{b}{2a}$
3. $V=\frac{4}{3}πr^{3}$, where $r$ is the radius
4. $V=\frac{1}{3}πr^{2}h$, where $r$ is the radius and $h$ is the height
5. $c^{2}=a^{2}+b^{2}$, where $c$ is the hypotenuse of a right triangle

⑩ With a similarity ratio of $\frac{m}{n}$,  ⇒ the ratio of areas is $\left(\frac{m}{n}\right)^{2}$　　　 ⇒ the ratio of volumes is $\left(\frac{m}{n}\right)^{3}$　⑪ $P\left(A\right)=\frac{number of outcomes in A}{total number of outcomes}$⑫ $P\left(A^{'}\right)=1-P(A)$⑬ $P\left(A⋃B\right)=P\left(A\right)+P\left(B\right)-P(A∩B)$⑭ $P\left(A∩B\right)=P\left(A\right)×P\left(B\right)$⑮ $P\left(B\right)=\frac{P(A∩B)}{P(B)}$⑯ Mean $=\frac{sum of the values}{total number of values}$⑰ IQR $=upper quartile-lower quartile$ $=Q\_{3}-Q\_{1}$ |

**Mathematical Inquiry and Modeling (Form 4 Attachment 3)**

Form 4 Attachment 3

Please use one of the following descriptors when you write a mathematics report.

<Descriptors for mathematical inquiry>

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| --- | --- |
|  | Descriptors |
| Exploration | Research a topic to be studied, state the problem being explored and the desired end result. |
| Planning | Propose one or more mathematical processes to find the solution to the problem. |
| Testing | Show, with working, the processes chosen. Define all variables and units being used if appropriate. Clearly show the final solution.  |
| Justification | Determine if the answer found is correct or incorrect, with relevant working or explanations shown. Describe what it means in the context of the topic.  |
| Conclusion | Extend the results to further applications, reflect on the reliability of the work done, or explain any problems and complications faced.  |

<Descriptors for mathematical modelling>

|  |  |
| --- | --- |
|  | Descriptors |
| Exploration | Research a topic to be studied and state the systems or patterns to be modelled.  |
| Modelling | Show the pattern being observed and develop a mathematical model to represent it. Clearly define all variables and units as appropriate.  |
| Testing | Test whether the model holds true for observed data, discussing any error or differences that may arise.  |
| Application | Apply the model to other situations and describe the relevance of the results.  |
| Extension | Explain the use of the model or the importance of the results. Reflect on the reliability of the work done or explain any problems and complications faced.  |