Results of Secondary 3 Mathematics in Territory-wide System Assessment 2025

The percentage of Secondary 3 students achieving Mathematics Basic Competency in 2025 is 78.2%.

Secondary 3 Assessment Design

- The design of assessment tasks for S.3 was based on the documents *Basic Competency Descriptors for Key Stage 3 Mathematics Curriculum* and *Mathematics Education Key Learning Area Curriculum Guide (Primary 1 – Secondary 6)* (2017). The tasks covered the three strands of the mathematics curriculum, namely **Number and Algebra**, **Measures**, **Shape and Space**, and **Data Handling**. They focused on the Foundation Part of the S.1 – 3 syllabuses in testing the relevant concepts, knowledge, skills and applications.

- The Assessment consisted of various item types including multiple-choice questions, fill in the blanks, answers-only questions and questions involving working steps. The item types varied according to the contexts of the questions. Some test items consisted of sub-items. Besides finding the correct answers, students were also tested on their ability to present solutions to problems. This included writing out the necessary statements, mathematical expressions and explanations.

- The Assessment consisted of 137 test items (191 score points), covering all of the 118 Basic Competency Descriptors. These items were organised into four sub-papers, each 65 minutes in duration and covering all three strands. Each student was required to attempt one sub-paper only. Some items appeared in more than one sub-paper to act as inter-paper links and to enable the equating of test scores. The number of items on the various sub-papers is summarised in Table 8.7. These numbers include several overlapping items.

Table 8.7 Number of Items and Score Points for S.3

Subject	No. of Items (Score Points)				
	Paper 1	**Paper 2**	**Paper 3**	**Paper 4**	**Total***
Mathematics					
Written Paper					
Number and Algebra	23 (29)	23 (30)	23 (30)	24 (29)	67 (87)
Measures, Shape and Space	17 (23)	18 (25)	17 (24)	17 (24)	53 (73)
Data Handling	7(13)	6 (10)	7 (11)	6 (12)	17 (31)
Total	47 (65)	47 (65)	47 (65)	47 (65)	137 (191)

***** Items that appear in different sub-papers are counted once only.

The item types of the sub-papers were as follows:

Table 8.8 Item Types of the Sub-papers

Section	Percentage of Score Points	Item Types
A	~ 30%	• Multiple-choice questions
B	~ 30%	• Calculate numerical values • Give brief answers
C	~ 40%	• Solve application problems showing working steps • Draw diagrams or graphs • Open-ended questions requiring reasons or explanations

Performance of Secondary 3 Students Achieving Basic Competency in 2025

Secondary 3 Number and Algebra Strand

S.3 students performed steadily in this strand. The majority of students had a good grasp of the basic concepts of basic computation, directed numbers, algebraic expressions and laws of integral indices. Quite a number of students could solve problems related to linear equations in one unknown, linear inequalities in one unknown, rational and irrational numbers and ratios, rates, and proportions. However, their performance in approximations and numerical estimation was quite weak. Comments on students' performances are provided with examples cited where appropriate (question number *x* / sub-paper *y* quoted as Q*x*/M*y*). More examples may also be found in the section ***General Comments***.

- Basic Computation: Students did well in using powers to express the repeated multiplication of a number and use repeated multiplication to express the power of a number, and performing mixed arithmetic operations of positive integers involving two levels and at most three pairs of brackets. Half of the students could find the greatest common divisor using the prime factorisation of two numbers and almost half of them could handle prime factorisation of positive integers.

Q21/M4		
Exemplar Item (Perform prime factorization of positive integers) Express 63 as a product of prime factors.		
Example of Student Work		
(1)	3X21	(Not able to express in product of prime factors)
(2)	6.3X10¹	(Wrongly expressed in scientific notation)

- Directed Numbers: Most students could demonstrate recognition of the ordering of integers on the number line. Students did well in using directed numbers to represent the changes of the weights of students and performing mixed arithmetic operations of directed numbers.

- Approximate Values and Numerical Estimation: Many students could round off a number to 2 decimal places, and almost half of them could round off a number to 3 significant figures. However, their performance in using suitable estimation strategies to solve simple real-life problems was weak, with the minority of students using rounding up as an estimation strategy.

Q40/M4
Exemplar Item (Estimate the total amount of 3 items and judge whether Jackie's budget is sufficient.) Jackie went to a store to buy 1 pack of biscuits, 1 pack of chocolates and 1 bottle of juice, priced at $29.8, $38.8 and $24.1 respectively. She found that she only had $100. Based on the description above, give an appropriate approximation for each **UNDERLINED VALUE**. Hence, estimate the total amount of these 3 items. Explain whether Jackie had enough money to buy all 3 items.
Example of Student Work (Did not give an approximation for the price of each item) 29.8 + 38.8 + 24.1 = $92.7 ∴ Jackie needs $92.7 to buy 3 item ∵ $100 > $92.7 ∴ Jackie *(had) / **did not have** enough money to buy all 3 items. (*Circle the correct answer)
Example of Student Work (Not able to use suitable estimation strategies) 30 + 39 + 24 = 93 ∴小美有 *(足夠) / **不足夠** 金錢購買該 3 件貨品。 (*圈出正確答案)
Example of Student Work (Good performance) 所需的金錢 = 29.8 + 38.8 + 24.1 ≈ 30 + 40 + 25 = $95 < $100 ∵將小數立即的數值全部進位至整數，結果依旧小于 $100 ∴小美有 *(足夠) / **不足夠** 金錢購買該 3 件貨品。 (*圈出正確答案)

- Rational and Irrational Numbers: Students did well in calculating the value of x in the expression $\sqrt{x} = a$ (where a is a positive integer). Quite a number of them could calculate the value of x in the expression $\sqrt[3]{a} = x$ and represent an irrational number on the number line, but more than half of the students could not recognise that $\sqrt{6}$ is irrational.

- Using Percentages: The majority of students were able to solve problems on percentage increase and percentage change in mathematical context. Their performance in solving simple problems on annual compound interest was fair. More than half of the students could solve simple problems on growths and half of them could solve simple problems on discount. However, their performance in solving problems on simple interest was not satisfactory.

Q40/M1
Exemplar Item (Find the annual interest rate) Daniel deposits \$54 000 in a bank at a **simple interest rate** of 4% p.a. Find the amount he will receive after 5 years.
Example of Student Work (Confused simple interests with compound interests) 
Example of Student Work (The calculation included interest only, while the total amount was omitted) 

- Rates, Ratios and Proportions: The performance of students was satisfactory in representing a ratio in the form $a : b$. Quite a number of students could solve simple real-life problems using rates, ratios, and proportions. There was room for improvement in distinguishing direct and inverse proportions.

- Algebraic Expressions: Most students could write down the next term of a sequence of odd numbers with several consecutive terms given. Many students were able to formulate algebraic expressions from word phrases and demonstrate recognition of notations of algebraic expressions. Their performance in finding a particular term from the general term of a sequence was acceptable, although some students did not complete the calculation of the term's value.

Q26/M4
Exemplar Item (finding a particular term from the general term of a sequence) The nth term of a sequence is $7 - 5n$. Find the value of the 3rd term of the sequence.
Example of Student Work (Did not complete the calculation of the term's value) (1) The value of the 3rd term of the sequence is 7-15 . (2) 該數列第 3 項的值是 7-5(3) 。

- Linear Equations in One Unknown: The performance of students was good in demonstrating understanding of the meaning of solutions of equations. Many students could solve simple linear equations in one unknown, but they were quite weak in formulating a linear equation in one unknown from a simple problem situation.

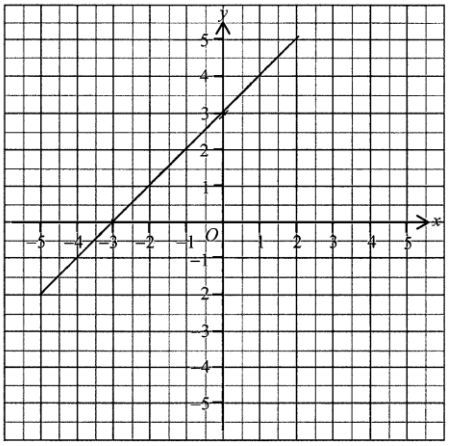
- Linear Equations in Two Unknowns: Students performed satisfactorily in demonstrating recognition that graphs of equations of the form $ax + by + c = 0$ are straight lines and solving simple simultaneous linear equations by the graphical methods. Quite a number of them were able to formulate simultaneous linear equations in two unknowns from simple problem situations and solve simple simultaneous linear equations by algebraic methods. Their performances in plotting graphs of linear equations in two unknowns and determining whether a point lies on a straight line given its linear equation were acceptable.

Q41/M1

Example of Student Work (Correctly calculate the corresponding y values, but failed to plot the corresponding graph.)

$2x + 3y - 3 = 0$

x	-3	0	3
y	3	1	-1

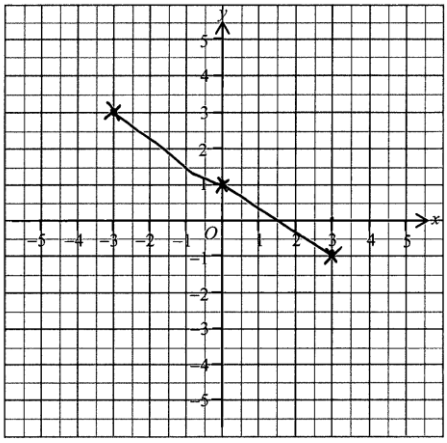


Q41/M3

Example of Student Work (Did not extend two ends of the line and did not use a ruler to draw the graph)

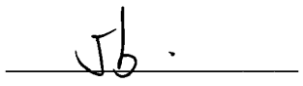
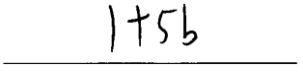
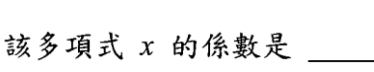
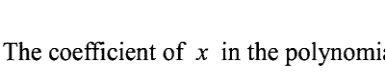
$y = -\frac{2}{3}x + 1$

x	-3	0	3
y	3	1	-1



- Laws of Integral Indices: Students performed well in converting a positive number expressed in scientific notation to an integer. The majority of them were able to find the value of a^n (where a and n are negative integers). Quite a number of students could simplify simple algebraic expressions using integer exponent laws and their performance in representing a positive number in scientific notations was acceptable.

- Polynomials: Many students were able to distinguish factorisation and expansion of polynomials, and perform multiplication of a monomial by a binomial. Their performance in factorising simple polynomials by taking out common factors was fair. More than half of the students could factorise expressions of the form $ax^2 + bx + c$, arrange the terms of polynomial in ascending order and perform multiplication of two binomials. Almost half of the students could perform addition or subtraction of two polynomials. Nevertheless, students showed weak performance in distinguishing polynomials from algebraic expressions and demonstrating recognition of coefficients.

Q27/M2
Exemplar Item (Perform addition or subtraction of two polynomials) Simplify $(2a + 8b) - (3b - 2a)$.
Example of Student Work (1)  (The negative sign was not handled correctly when removing the brackets) (2)  (Wrong computation)
Q27/M4
Exemplar Item (Demonstrate recognition of coefficients) Write down the coefficient of x in the polynomial $7x^3 - 8x^2 - 6x + 5$.
Example of Student Work (1)  (Confused coefficients with orders) (2)  (Confused coefficient of x with coefficient of x^3)

- Identities: Quite a number of students were able to indicate whether an equation was an identity and used the identity of difference of two squares to factorise simple polynomials. However, there was room for improvement in using the identity of perfect square to expand simple algebraic expressions.

Q29/M2
Exemplar Item (Use the identities of perfect square to expand simple algebraic expressions) Expand $(2x + 1)^2$.
Example of Student Work (1) $4x^2 + 1$ (Mistakenly thought $(a + b)^2 = a^2 + b^2$) (2) $(2x+1)(2x+1)$ (Did not fully expand the algebraic expression)

- Formulae: Students performed satisfactorily in substituting values into formulas in which all exponents are positive integers and finding the value of a specified variable. Half of the students could perform changes of subject in simple formulas not involving radical signs. Their performance in adding two algebraic fractions (both the numerators and denominators being monomials) was fair, and their performance in multiplication was not satisfactory.

Q30/M2
Exemplar Item (Perform multiplication of two algebraic fractions) Simplify $\left(\frac{6h}{5k^2}\right)\left(\frac{5k}{3h^2}\right)$.
Example of Student Work (Wrong computation) (1) $\frac{18h^3}{25k^2}$ (2) $\frac{2h}{(5k)(3h)}$

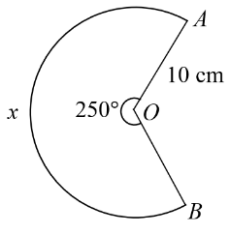
- Linear Inequalities in One Unknown: Students did well in determining whether a number satisfied a given inequality. The performance of students was fair in demonstrating recognition of the properties of inequalities, and representing inequalities on the number line in mathematical expressions. Half of the students could solve simple linear inequalities in one unknown with integral coefficients and constants, and formulate a linear inequality in one unknown from a simple problem situation.

Secondary 3 Measures, Shape and Space Strand

S.3 students performed acceptably in this strand. In the learning unit of this strand, the majority of them could solve problems related to quadrilaterals and Pythagoras' Theorem. Quite a number of students were able to solve problems involving polygons and trigonometry, while it was acceptable in arc lengths and areas of sectors, 3-D figures, mensuration, angles and parallel lines, centres of triangle, and the rectangular coordinate system. Students needed improvement in the areas of errors in measurement and similar triangles, and their understanding of congruent triangles was not satisfactory. Comments on students' performances are provided with examples cited where appropriate (question number *x* /sub-paper *y* quoted as Q*x*/M*y*). More items may also be found in the section ***General Comments***.

- Errors in Measurement: Students performed fairly in finding the range of measures in measurements of given degrees of accuracy. Some could calculate percentage error from given measurements. However, their performance in finding maximum absolute errors from the measuring tools was weak.

- Arc Lengths and Areas of Sectors: Many students were able to calculate areas of sectors, but only almost half of the students could calculate arc lengths.

Q43/M1
Exemplar Item (Calculate arc length) In the figure, the radius of sector OAB is 10 cm and reflex $\angle AOB = 250°$. Let x be the arc length of the sector. Find x correct to 3 significant figures. 
Example of Student Work (Confused perimeter of sectors with arc lengths) $JL = 10+10+2\times\pi\times10\times\frac{250°}{360°}$ $\approx 68.6\,cm$
Example of Student Work (Confused areas of sectors with arc lengths) $\pi(10)^2 \times \frac{250°}{360°}\ cm^2$ $= 218.2\ cm^2$

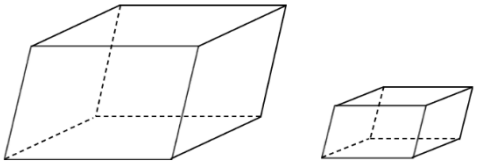
- 3-D Figures: Most students could demonstrate recognition of the sections of prisms. A considerable number of them were able to sketch the 2-D representations of right prisms, but their performance in demonstrating recognition of the concepts of right prisms was weak.

- Mensuration: Many students could calculate the volume of pyramids and use formulas for the volumes of prisms to find unknowns. Students showed acceptable performance in calculating the volume of prisms and using formulas for surface areas of right prisms to find unknowns. Almost half of them could calculate the surface area of right circular cylinders. However, students' performance in solving problems involving the relationship between sides and surface areas of similar 3-D figures was weak.

Q44/M1

Exemplar Item (Use the relationships between sides and surface areas of similar 3-D figures to solve problems)

In the figure, Solid A is similar to Solid B. The height of Solid A is 2 times that of Solid B. If the total surface area of Solid A is 3 600 cm^2, find the total surface area of Solid B.



Solid A Solid B

Example of Student Work (Mistakenly took the ratio of the surface areas of similar figures as the ratio of their corresponding sides)

Let the total surface area of Solid B be x

$\frac{x}{3600} = \frac{1}{2}$

$x = 1800$

∴ total surface area of Solid B is $1800\ cm^2$

Example of Student Work (Wrong computation)

設B的總表面面積為 x

$\frac{x}{3600} = (\frac{1}{2})^2$

$\frac{x}{3600} = \frac{2}{4}$

$4x = 7200$

$x = 1800$

∴ B的總表面面積為 $1800\ cm^2$

Example of Student Work (Good performance)

Let $x\ cm^2$ be the total surface area of Solid B.

$\left(\frac{1}{2}\right)^2 = \frac{x}{3600}$

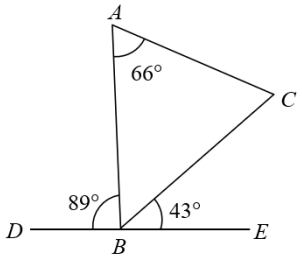
$x = 900$

∴ The total surface area is $900\ cm^2$

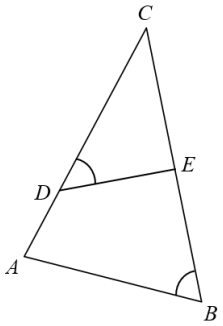
- Angles and Parallel Lines: Students were good at using angle properties associated with parallel lines to find unknowns. Many students could use the properties of adjacent angles on a straight line to find unknowns and identify corresponding angles. Quite a number of students were able to use the properties of angles of triangles to find unknowns. They showed acceptable performance in identifying alternate interior angles and using the conditions of alternate interior angles which are equal, corresponding angles which are equal, or interior angles which are supplementary to perform simple proof of two straight lines being parallel.

- Polygons: A considerable number of students could use common notations to represent pentagons, use the formula for the sum of the interior angle of a convex polygon to find unknowns and demonstrate recognition of the concepts of regular polygons. Students showed acceptable performance in using the formula for the sum of the exterior angles of a convex polygon to find unknowns.

- Congruent Triangles: The majority of students could demonstrate recognition of the properties of congruent triangles, but more than half of them could not demonstrate recognition of the conditions for congruent triangles. Their performance in using conditions for congruent triangles to perform simple proofs was quite weak. Half of the students could use the relationship between sides and angles associated with isosceles triangles to find unknowns, but many of them were unable to use the condition for isosceles triangles to perform simple proofs.

Q45/M2
Exemplar Item (Use the condition for isosceles triangles to perform simple proofs) In the figure, DBE is a straight line. $\angle BAC = 66°$, $\angle CBE = 43°$ and $\angle ABD = 89°$. Prove that $\triangle ABC$ is an isosceles triangle. 
Example of Student Work (Not able to provide sufficient reasons) $\angle ABC = 180° - 89° - 43°$ $= 48°$ $\angle ACB = 180° - 66° - 48°$ $= 66°$ $\therefore \angle ABC = \angle ACB = 66°$ $\therefore \triangle ABC$ 是等腰三角形
Example of Student Work (Good performance) $89° + \angle ABC + 43° = 180°$ (adj. $\angle$s on st. line) $\angle ABC = 48°$ $\angle ABC + \angle BCA + \angle CAB = 180°$ ($\angle$sum of $\triangle$) $48° + 66° + \angle BCA = 180°$ $\angle BCA = 66°$ $= \angle BAC$ $\therefore AB = BC$ (side opp. eq. $\angle$s) $\therefore \triangle ABC$ is an isosceles $\triangle$.

- Similar Triangles: Almost half of the students were unable to demonstrate recognition of the properties and conditions for similar triangles. Their performance in using the conditions for similar triangles to perform simple proofs was not satisfactory.

Q44/M4
Exemplar Item (Use the conditions for similar triangles to perform simple proofs) In the figure, ADC and CEB are straight lines, $\angle ABC = \angle EDC$. Prove that $\triangle ABC \sim \triangle EDC$. 
Example of Student Work (Not able to provide sufficient reasons) ∵ ∠ABC = ∠EDC (已知) ∠ACB = ∠DCE (公共角) ∠DEC = ∠BED ∴ △ABC ~ △EDC
Example of Student Work (Good performance) ∠ABC = ∠EDC (given) ∠ACB = ∠ECD (common ∠s) △ABC ~ △EDC (AA)

- Quadrilaterals: The majority of students could use the properties of rhombuses to find unknowns. Students performed satisfactorily in using the properties of parallelograms to find unknowns.

- Centres of Triangles: Students' performance in identifying perpendicular bisectors of a triangle was acceptable.

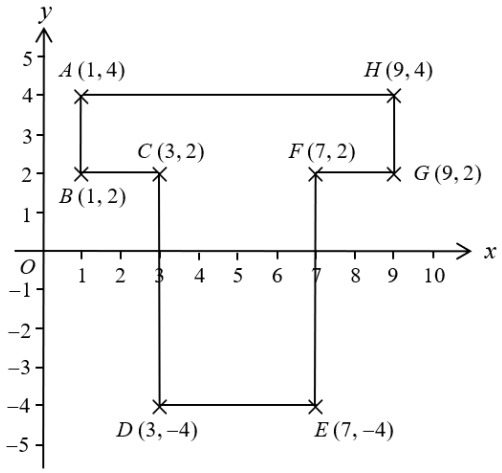
- Pythagoras' Theorem: Students were good at using the converse of Pythagoras' Theorem to identify right-angled triangles. Many of them could use Pythagoras' Theorem to find unknowns.

- Rectangular Coordinate System: In a rectangular coordinate plane, the majority of students could mark the point with given coordinates and many of them could use the slope formula to find the slope of the straight line which passes through two given points. They showed fair performance in using the midpoint formula to find the mid-point between two points and demonstrating recognition of the relationship between the slopes of perpendicular lines. More than half of students could use the distance formula to find the distance between two points, but only almost half of the students could calculate area of polygons in the rectangular coordinate plane. Their performance in finding the image of a given point rotating about the origin through 270° in an anticlockwise direction was not satisfactory. (Please refer to the General Comments)

Q44/M2

Exemplar Item (Calculate area of polygons in the rectangular coordinate plane)

Find the area of polygon $ABCDEFGH$ in the figure.



Example of Student Work
(Wrong computation and unit)

AH = 8, AB = 2, DE = 4
DE = 6

8 × 2 + 4 × 6
= 16 + 24
= 30
∴ 面積為 30

Example of Student Work
(Unclear expression)

ABCFGH = A CDEF = B
A = 2 × 8 = 16.
B = 6 × 4 = 24
A + B = 40

Example of Student Work (Good performance)

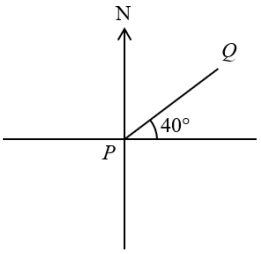
AB = 4-2 = 2 單位
AH = 9-1 = 8 單位
CD = 2-(-4) = 6 單位
DE = 7-3 = 4 單位
ABCDEFGH 面積
= AB × AH + CD × DE
= 2 × 8 + 6 × 4
= 40 平方單位

- Trigonometry: Many students could find the tangent of an angle and find the angle from a given sine. Quite a number of them could solve right-angled triangles involving sine and tangent, and solve simple problems involving one right-angled triangle. Nevertheless, their performance in demonstrating recognition of the concepts of bearings was quite weak.

Q36/M4

Exemplar Item (Demonstrate recognition of the concepts of bearings)

Referring to the figure, find the compass bearing of Q from P.



Example of Student Work

(1) 由 P 測得 Q 的羅盤方位角是 N 40° S 。 (Incorrect answer)

(2) The compass bearing of Q from P is S 50° W . (Wrongly represented using the compass bearing of P from Q)

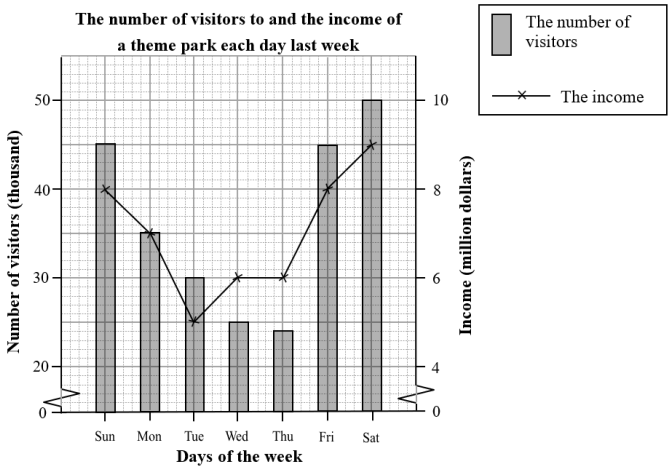
(3) The compass bearing of Q from P is 050° . (Wrongly represented using true bearing)

Secondary 3 Data Handling Strand

Students performed steadily in this strand. Many of them could organise data. Quite a number of students could present data, measure of central tendency, and find probability Comments on students' performance are provided below with examples cited where appropriate (question number *x* / sub-paper *y* quoted as Q*x*/M*y*). More examples may also be found in the section ***General Comments***.

- Organisation of Data: Many students were able to organise the same set of data by different grouping methods.

- Presentation of Data: Students performed satisfactorily in interpreting stem-and-leaf plots and constructing cumulative frequency polygons. Quite a number of students could interpret cumulative frequency curves, choose appropriate statistical charts to present data, and identify the abuses from examples of abuses of statistical charts. More than half of them could construct histograms. However, their performance in reading off data from statistical charts representing two different sets of data was not satisfactory.

Q38/M2
Exemplar Item (Read off data from statistical charts representing two different sets of data) The diagram below shows the number of visitors to and the income of a theme park each day last week.    According to the above diagram, answer the following questions. (a) What was the total number of visitors to the theme park last week ? (b) What was the difference between the highest and lowest incomes of the theme park last week ?

Example of Student Work

(1) (a) 該主題公園於上星期的總入場人數是 254 。 (Neglected that the left *y*-axis is shown in units of thousands of people)

(2) (b) 該主題公園於上星期最高與最低的收入相差 20 百萬元 。 (Wrongly used values from the left *y*-axis for income calculation)

(3) (b) The difference between the highest and lowest incomes of the theme park last week was 5.2 million dollars. (Wrongly used a bar chart for income calculation.)

- Measures of Central Tendency: Many students could find mean and median from a set of ungrouped data, calculate the weighted mean of a set of data, and find mean and modal class from a set of grouped data. However, their performance in indicating the abuses from examples of abuses of mode was weak.

Q47/M1

Exemplar Item (Indicate the abuses from examples of abuses of mode)

The following shows the prices of the 8 gifts in a class lucky draw event.

$5 $9 $12 $20 $40 $100 $100 $100

The chairperson of the class committee claimed, "Since the mode of the prices of the gifts is $100, over half of the gifts cost $100 . "
Do you agree with the chairperson's claim ? Explain your answer.

Example of Student Work (Misused the average in the explanation)

每件獎品相加再除开，一件獎品的平均價值排名比，

∴我 * 同意 / (不同意) 主席的說法。 (*圈出正確答案)

Example of Student Work (Incorrect reasoning)

受极端数据($9、$12)所影响，所以眾数并不能代表多於一半奖品的價值是$100，

∴我 * 同意 / (不同意) 主席的說法。 (*圈出正確答案)

Example of Student Work (Good performance)

∵ $100的件数只有3件，且共8件奖品

∴一半奖品的一半指 奖品件数≥4

∵ 3<4

∴ 少于一半奖品的价值是$100

∴

∴我 * 同意 / (不同意) 主席的說法。 (*圈出正確答案)

- Probability: Students showed satisfactory performance in calculating probability by listing, and about half of them were able to calculate relative frequency.

General Comments on Secondary 3 Student Performances

The overall performance of S.3 students was steady. They showed acceptable performance in the Measures, Shape and Space Strand. Performance was also steady in the Number and Algebra Strand and Data Handling Strand.

The areas in which students demonstrated adequate skills are listed below:

Basic Computation

- Use powers to express the repeated multiplication of a number and use repeated multiplication to express the power of a number (e.g. Q1/M1)
- Perform mixed arithmetic operations of positive integers involving two levels and at most three pairs of brackets (e.g. Q21/M1)

Directed Numbers

- Demonstrate recognition of the ordering of integers on the number line (e.g. Q22/M1)
- Use positive numbers, negative numbers and zero to describe situations such as profit and loss, floor levels relative to the ground level, temperature, etc (e.g. Q21/M3)
- Perform mixed arithmetic operations of directed numbers (e.g. Q21/M2)

Algebraic Expressions

- Write down the next term of a sequence of odd numbers, even numbers, square numbers and triangular numbers with several consecutive terms given (e.g. Q25/M3)

Linear equations in one unknown

- Demonstrate understanding of the meaning of solutions of equations (e.g. Q5/M1)

Laws of Integral Indices

- Find the value of a^n, where a ($a \neq 0$) is an integer and n is zero or a negative integer (e.g. Q7/M3)
- Convert a positive number in scientific notations to an integer or a decimal (e.g. Q7/M1)

Linear Inequalities in One Unknown

- Determine whether a number satisfies a given inequality of $x > a$, $x \geq a$, $x < a$ and $x \leq a$ (e.g. Q10/M3)

3-D figures

- Demonstrate recognition of the sections of prisms, circular cylinders, pyramids and circular cones (e.g. Q12/M3)

Angles and Parallel Lines

- Use the angle properties associated with parallel lines to find unknowns (e.g. Q31/M3)

Congruent triangles

- Demonstrate recognition of the properties of congruent triangles (e.g. Q34/M1)

Quadrilaterals

- Use the properties of rectangles, rhombuses and squares to find unknowns (e.g. Q35/M4)

Pythagoras' Theorem

- Use the converse of Pythagoras' theorem to identify right-angled triangles (e.g. Q33/M3)

Rectangular Coordinate System

- Use coordinates to represent the position of a point and mark the point with given coordinates (e.g. Q17/M3)

Other than items in which students performed well, the assessment data also provided some entry points to strengthen learning and teaching. Items worthy of attention are discussed below:

Basic Computation

- Find the greatest common divisor of two numbers which are expressed as products of prime factors (e.g. Q1/M3): Almost half of the students chose the correct answer D. Over 20% chose option A, mistakenly thought that the gcd is obtained by multiplying the two numbers.

Q1/M3
Find the greatest common divisor (gcd) of 3×5^2 and $3^2 \times 5 \times 7^2$. A. $3^3 \times 5^3 \times 7^2$ B. $3^2 \times 5^2 \times 7^2$ C. $3 \times 5 \times 7^2$ D. 3×5

Rational and irrational numbers

- Demonstrate recognition of the concepts of rational and irrational numbers (e.g. Q2/M2): Almost half of the students selected the correct answer B, but over 30% chose option C, mistakenly believed that recurring decimals were irrational. About 10% chose each of the remaining two options, mistakenly thought that decimals or fractions were irrational.

Q2/M2
Which of the following is an irrational number? A. 3.14 B. $\sqrt{6}$ C. $0.\dot{3}\dot{4}$ D. $\frac{22}{7}$

Linear equations in one unknown

- Formulate a linear equation in one unknown from a simple problem situation (e.g. Q5/M3): Almost half of the students chose the correct answer C. About 20% chose options B or D, indicating they did not clearly understand the increase in the number of candies Betty has, or the 'three times' relationship described in the situation.

Q5/M3
Eric has x candies, Betty has 22 less than him. If Eric gives 29 candies to Betty, Betty will have 3 times the number of candies that Eric will have. Which of the following equations can be used to find the value of x ? A. $3(x-29)=x-22$ B. $x-29=3(x-22)$ C. $3(x-29)=x-22+29$ D. $x-29=3(x-22+29)$

Polynomials

- Distinguish polynomials from algebraic expressions (e.g. Q8/M1): Less than 30% of the students chose the correct answer D. Almost half of the students chose option B, mistakenly thought that $5xy$ and – 3 cannot be terms of a polynomial.

Q8/M1
Which of the following is **NOT** a polynomial ? A. $5x - 3y$ B. $5xy - 3$ C. $\frac{x}{5} - \frac{y}{3}$ D. $5x - \frac{3}{y}$

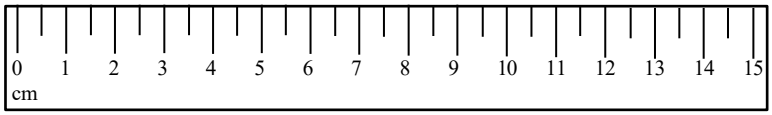
Linear inequalities in one unknown

- Formulate a linear inequality in one unknown from a simple problem situation (Q9/M1): Half of the students chose the correct answer D, but over 20% chose option B, incorrectly multiplied the selling price by 6.

Q9/M1
John bought a laptop from an electrical appliance shop. The marked price of the laptop was \$$m$, but this price was reduced by \$450 for selling. John paid by credit card in 6 installments. Each installment was at most \$2 500. Which of the following inequalities can be used to find the range of the values of m ? A. $6(m - 450) < 2\ 500$ B. $6(m - 450) \leq 2\ 500$ C. $m - 450 < 2\ 500 \times 6$ D. $m - 450 \leq 2\ 500 \times 6$

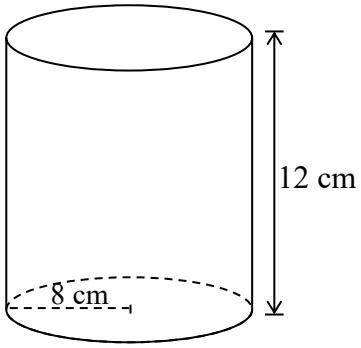
Errors in measurement

- Calculate percentage errors from given measurements (e.g. Q10/M1): 30% of students chose the correct answer B. Over 20% chose options A or C, mistakenly took the length of the pencil as 15 cm and the maximum absolute error as 0.5 cm.

Q10/M1
Kelvin uses the ruler shown in the figure to measure the length of a pencil and the result is 12.5 cm . Find the percentage error of the measured value. A. 1.67% B. 2% C. 4% D. 83.3% 

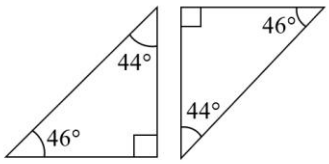
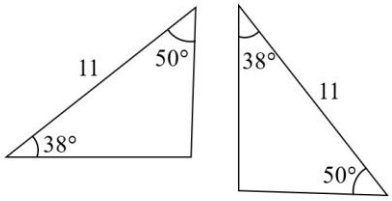
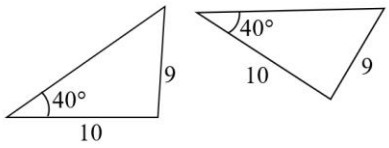
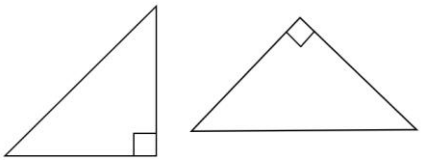
Mensuration

- Calculate the surface areas of right prisms, right circular cylinders, right pyramids, right circular cones and spheres (e.g. Q12/M2): Almost half of the students chose the correct answer C. However, nearly 30% chose options A, incorrectly used the volume formula of a circular cylinder to calculate the curved surface area.

Q12/M2
The figure shows a solid right circular cylinder. Its base radius is 8 cm and its height is 12 cm . Find the curved surface area of the circular cylinder. Express the answer in terms of π . A. 768π cm^2 B. 320π cm^2 C. 192π cm^2 D. 96π cm^2 

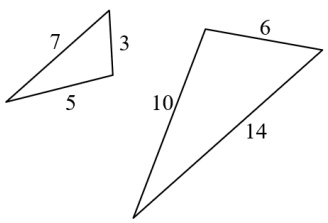
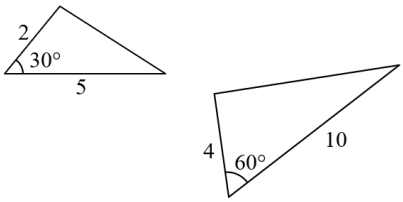
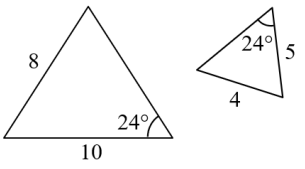
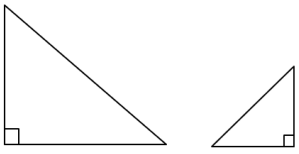
Congruent Triangles

- Demonstrate recognition of the conditions for congruent triangles (e.g. Q15/M4): Almost half of the students chose the correct answer B. Over 20% chose options A or C, mistakenly took 'AAA' or 'ASS' as a condition for congruence.

Q15/M4
Which of the following pairs of triangles **MUST** be congruent? A.  B.  C.  D. 

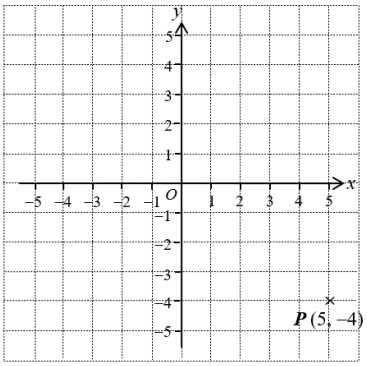
Similar Triangles

- Demonstrate recognition of the conditions for similar triangles (e.g. Q16/M4): Almost half of the students chose the correct answer A. However, nearly 30% chose options C, failing to recognise that when proving triangle similarity using two proportional sides, the included angles must also be equal.

Q16/M4
Which of the following pairs of triangles **MUST** be similar? A.  B.  C.  D. 

Rectangular coordinate system

- Find the image of a given point under a single transformation (Q17/M2): 30% of students chose the correct answer A. Over 20% chose each of the options B, C or D, indicating that they were not able to find the image of a point under rotation about the origin *O* through 270° in an anticlockwise direction.

Q17/M2
In the figure, $\boldsymbol{P}\,(5, -4)$ is rotated about the origin O through 270° in an anticlockwise direction to $\boldsymbol{P'}$. Find the coordinates of $\boldsymbol{P'}$. A. (–4, −5) B. (4, 5) C. (−5, 4) D. (−5, −4)   

Good Performance of Secondary 3 Students in 2025

- Students with good performance demonstrated mastery of the concepts and skills assessed by the sub-papers. They did well in numeracy skills and problem-solving skills. They were able to solve the problems related to basic computation, approximate values and numerical estimation, rational and irrational numbers, using percentages, rates, ratios and proportions. Students had a thorough conceptual understanding of algebra and could demonstrate an understanding of the meaning of solutions of equations. They were able to perform operations with polynomials, factorisations and expansions of simple polynomials, and were also familiar with laws of integral indices and linear inequalities in one unknown. They were capable of solving equations by using algebraic and graphical methods. They could also plot graphs of linear equations in two unknowns.

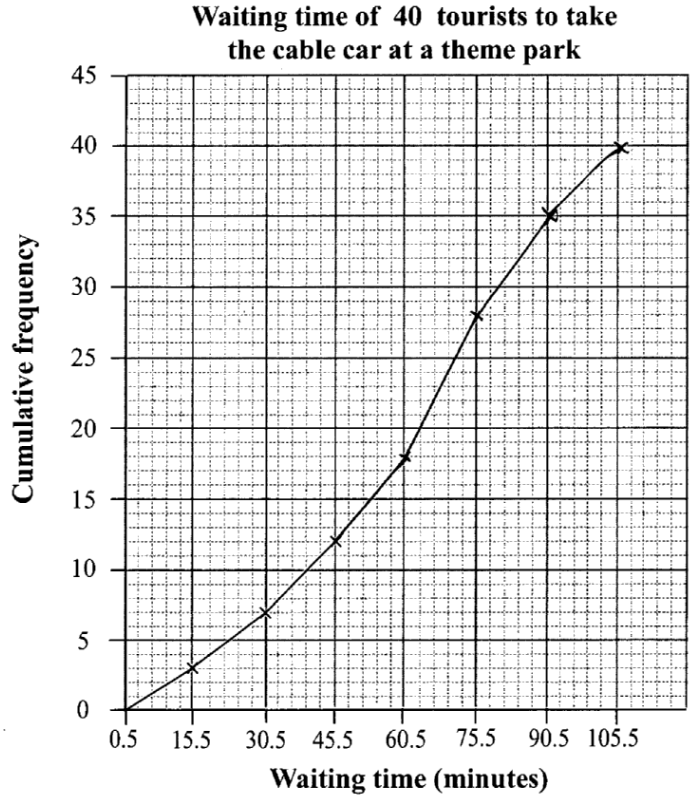
- Students with good performance were good at calculating arc lengths, areas of sectors, and the length, area, surface areas and volumes of 3-D figures. They were able to demonstrate good recognition of angles and parallel lines, congruent and similar triangles, rectangular coordinate system, polygons, quadrilaterals, trigonometry and Pythagoras' Theorem. They were able to complete the geometric proofs with the correct steps and sufficient reasons provided.

- Students with good performance had a good knowledge of organisation and presentation of data, as well as basic concepts of probability. They were able to construct and interpret simple statistical charts, choose appropriate statistical charts to present data, find the mean, median and mode/modal class from a set of data, and indicate the abuses from examples of abuses of mode.

- The examples of work by these students are shown as follows:

Students were able to construct statistical charts by using the given data.

Q46/M1
Example of Student Work (Construct cumulative frequency polygons)



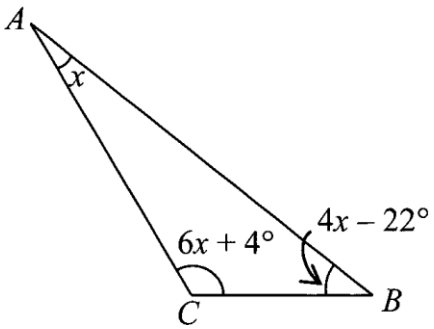
Students were able to solve the problem correctly with complete and clear presentation.

Q46/M2
Example of Student Work (Use the properties of angles of triangles to find unknowns)

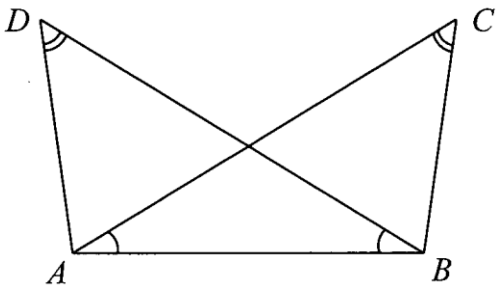
$x+(6x+4°)+(4x-22°)=180°$ (∠sum of △)

$x+6x+4x=198°$

$x=18°$



Students were able to make good use of the given conditions and solve the problem systematically.

Q44/M3
Example of Student Work (Use the conditions for congruent triangles to perform simple proofs) ∠ABD = ∠BAC (given) ∠ADB = ∠BCA (given) AB = BA (common side) ∴ △ABD ≅ △BAC (AAS) 

High-achieving students also have some common weaknesses such as:

- Some students were not able to demonstrate recognition of coefficients.
- Some students were not able to use the conditions for isosceles triangles to perform simple proofs.
- Some students were not able to use suitable estimation strategies to solve simple real-life problems.

Overview of Secondary 3 Student Performances in Mathematics in 2023, 2024 and 2025

The percentage of students achieving Basic Competency in the Territory-wide System Assessment this year was 78.2%.

The percentages of students achieving Basic Competency from 2023, 2024 and 2025 are listed below:

Table 8.9 Percentages of S.3 Students Achieving Mathematics Basic Competency in 2023, 2024 and 2025

Year	% of Students Achieving Mathematics Basic Competency
2023	76.6
2024	79.0
2025	78.2

A comparison of the strengths and weaknesses of S.3 students in 2023, 2024 and 2025 provides useful information for teachers to help students improve their learning. Table 8.10 provides an overview of student performances in each strand for these years.

Table 8.10 Overview of S.3 Student Performances in Mathematics in 2023, 2024 and 2025

Year / Number and Algebra	2023	2024	2025	Remarks
Strengths	• Students could use powers to express the repeated multiplication of a number and use repeated multiplication to express power of a number. • Students were good at performing mixed arithmetic operations of positive integers. • Students could demonstrate recognition of the ordering of integers on the number line. • Students could write down the next term of a sequence of triangular numbers with several consecutive terms given. • Students could convert a positive number in scientific notations to an integer. • Students could substitute values into formulae (in which all exponents are positive integers) and find the value of a specified variable.	• Students were good at performing mixed arithmetic operations of positive integers involving two levels and at most three pairs of brackets. • Students could use powers to express the repeated multiplication of a number and use repeated multiplication to express power of a number. • Students could demonstrate recognition of the ordering of integers on the number line. • Students could convert a positive number in scientific notations to an integer. • Students could find the value of a^n (where a and n are negative integers). • Students were good at determining whether a number satisfied a given inequality.	• Students were good at using powers to express the repeated multiplication of a number and use repeated multiplication to express the power of a number. • Students could demonstrate recognition of the ordering of integers on the number line. • Students could write down the next term of a sequence of odd numbers with several consecutive terms given. • Students performed well in converting a positive number in scientific notations to an integer or a decimal. • Students were good at determining whether a number satisfied a given inequality.	

Year / Number and Algebra	2023	2024	2025	Remarks
Weaknesses	• Many students were not able to perform prime factorisation of a positive integer. • The minority of students were able to use suitable estimation strategies to solve simple real-life problems. • Students were weak in solving simple problems on discount. • Only some students could demonstrate recognition of coefficients. • There was room for improvement in expanding simple algebraic expressions by using the perfect square expressions. • Students' performance was not satisfactory in performing change of subject in simple formulae not involving radical sign.	• Many students were not able to find the least common multiple using the prime factorisation of two numbers. • Students' performance in using rounding down as an estimation strategy to solve simple real-life problems was weak. • Only some students could solve problems on simple interest. • Students were weak in solving simple problems on discount. • Many students could not demonstrate recognition of powers. • Students' performance in distinguishing polynomials from algebraic expressions was not satisfactory. • Only some students could multiply two algebraic fractions (both the numerators and denominators being monomials).	• Only some students could perform prime factorisation of a positive integer, which is less than 200. • The minority of students were able to use rounding up as an estimation strategy to solve simple real-life problems. • Students' performance in solving problems on simple interest was not satisfactory. • Students showed weak understanding in distinguishing polynomials from algebraic expressions. • The majority of students could not demonstrate recognition of coefficients. • Only some students could perform operations of two algebraic fractions, both the numerators and denominators being monomials.	• Students always use rounding off for estimation without considering the actual requirements of questions. • Students were able to attempt stating the steps and strategies for solving problems, but their solutions were often incomplete or contained errors.

Year / Measures, Shape and Space	2023	2024	2025	Remarks
Strengths	• Students were able to find the range of measures in measurements of given degrees of accuracy. • Students were able to sketch the 2D-representation of a right prism. • Students could demonstrate recognition of the concepts of right pyramids. • Students were able to use the properties of vertical opposite angles to find unknowns. • Students were able to use the angle properties associated with parallel lines to find unknowns. • Students could demonstrate recognition of the conditions for congruent triangles. • Students did well in using the properties of rectangles and parallelograms to find unknowns. • Students were able to find the image of a given point under a translation in the rectangular coordinate plane.	• Students were able to find the range of measures in measurements of given degrees of accuracy. • Students were able to calculate the volume of circular cones. • Students were good at using properties of vertically opposite angles to find unknowns. • Students performed well in using the properties of parallelograms and rectangles to find unknowns. • Students were able to use Pythagoras' Theorem to find unknowns. • In a rectangular coordinate plane, the majority of students could mark the point with given coordinates. • Students were good at finding the cosine of angles.	• Students were able to demonstrate recognition of the sections of prisms. • Students were good at using the angle properties associated with parallel lines to find unknowns. • Students could demonstrate recognition of the properties of congruent triangles. • Students could use the properties of rhombuses to find unknowns. • Students did well in using the converse of Pythagoras' Theorem to identify right-angled triangles. • Students could use coordinates to represent the position of a point and mark the point with given coordinates.	

Year / Measures, Shape and Space	2023	2024	2025	Remarks
Weaknesses	• Students were weak in calculating percentage errors from given measurements. • Quite a number of students were not able to calculate arc lengths of sectors. • Students were weak in using the relationships between sides and volumes of 3-D figures to solve problems. • Students were weak in demonstrating recognition of the concepts of regular polygons. • Many students were not able to use the condition for isosceles triangles or the conditions for similar triangles to perform simple proofs.	• Students were weak in calculating maximum absolute errors when using a ruler for measurement. • Only some students could calculate percentage errors from given measurements. • Students' understanding of the concepts of right prisms and right pyramids was weak. • Many students were not able to use the conditions for isosceles triangles to perform simple proofs. • Students' performance in the conditions for similar triangles to perform simple proofs needed improvement. • Students' performance in calculating the area of triangles in the rectangular coordinate plane was not satisfactory.	• Students were not able to find maximum absolute errors from the measuring tools. • Students showed unsatisfactory performance in calculating percentage errors from given measurements. • Only a small proportion of students could demonstrate recognition of the concepts of right prisms. • Many students could not use the relationships between sides and surface areas of similar 3-D figures to solve problems. • Students were weak in using the condition for isosceles triangles to perform simple proofs. • Many students could not find the image of a given point under a single transformation.	• In doing geometric proofs, many students could not complete the proof such as using circular arguments, giving illogical reasoning and giving incorrect reasons. • Inappropriate or incorrect presentation frequently occurred (such as confused $\angle ABC$ with $\triangle ABC$, $AB = BC$ with $AB \parallel BC$). • Units were often omitted in the answers.

Year / Data Handling	2023	2024	2025	Remarks
Strengths	• Students were able to organise the same set of data by different grouping methods. • Students did well in reading off data from statistical charts representing two different sets of data. • Students were good at interpreting histograms. • Students were able to calculate the probability by listing.	• Students were able to organise the same set of data by different grouping methods. • Students performed satisfactorily in interpreting stem-and-leaf plots, constructing cumulative frequency polygons, and choosing appropriate statistical charts to present data. • Many students could find mean and median from a set of ungrouped data.	• Students were able to organise the same set of data by different grouping methods. • Students could interpret stem-and-leaf diagrams and construct cumulative frequency polygons. • Students were able to find mean and median from a set of ungrouped data and find modal class from a set of grouped data. • Students were able to calculate the probability by listing.	
Weaknesses	• The performance of students was not satisfactory in indicating the abuses from examples of abuses of mean.	• Students' performance in reading off data from statistical charts representing two different sets of data was not satisfactory. • Only some students could indicate the abuses from examples of abuses of mean.	• Only some students could read off data from statistical charts representing two different sets of data. • Students' performance in indicating the abuses from examples of abuses of mode was weak.	• When answering questions involving examples of the abuses of mode, students often merely restate the information provided in the question without offering sufficient explanation.

Comparison of Student Performances in Mathematics in Primary 3, Primary 6 and Secondary 3 in 2025

The percentages of P.3, P.6 and S.3 students achieving Basic Competency from 2004 to 2025 are as follows:

Table 8.11 Percentages of Students Achieving Mathematics Basic Competency**

Year / Level	% of Students Achieving Mathematics BC																		
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2023**	**2024**	**2025**
P.3	84.9	86.8	86.9	86.9	86.9	#	87.0	87.0	87.3	87.5	87.4	87.6	89.9$^{\Delta}$	88.2$^{\nabla}$	88.0$^{\square}$	87.7$^{\square}$	86.5$^{\square}$	85.3$^{\square}$	85.4$^{\square}$
P.6	---	83.0	83.8	83.8	84.1	#	84.2	84.1	^	84.2	^	84.0	^	84.0	^	84.2	78.3	^	79.0
S.3	---	---	78.4	79.9	79.8	80.0	80.1	80.1	79.8	79.7	79.9	79.9	80.0	79.9	80.0	79.6	76.6	79.0	78.2

\# Due to Human Swine Influenza causing the suspension of primary schools, the TSA was cancelled and no data was provided.

^ As participation in the P.6 TSA has been on a voluntary basis in even-numbered years since 2012, not all P.6 TSA were involved and hence no territory-wide data is provided in this report.

$^{\Delta}$ The 2016 P.3 level assessment was conducted as part of the 2016 Tryout Study. The BC attainment rate was calculated using the data from some 50 participating schools.

$^{\nabla}$ The 2017 P.3 level assessment was conducted as part of the 2017 Research Study, which was extended to all primary schools in the territory.

$^{\square}$ Starting from 2018, the P.3 TSA is conducted on a sampling basis. The BC attainment rates are inferred from the sample of all students participating in the assessment.

** Due to the volatility of the COVID-19 epidemic, the TSA 2020, 2021 and 2022 were suspended and no data was provided.

The data shows the performance of Primary 3, Primary 6 and Secondary 3 students in different strands. Teachers could adapt their teaching strategies and curriculum design in accordance with the strengths and weaknesses of students. The strands of Mathematics Curriculum at each key stage belong to different strands as shown below:

Table 8.12 Strands of Mathematics Curriculum for Primary 3, Primary 6 and Secondary 3

	Primary 3	**Primary 6**	**Secondary 3**
Strand	Number	Number	Number and Algebra
		Algebra	
	Measures	Measures	Measures, Shape and Space
	Shape and Space	Shape and Space	
	Data Handling	Data Handling	Data Handling

The following table compares student performances in Mathematics in Primary 3, Primary 6 and Secondary 3 in 2025:

Table 8.13 Comparison of Student Performances in Mathematics in Primary 3, Primary 6 and Secondary 3 in 2025

Level / Strand	P.3	P.6	S.3
Number	• Students could demonstrate the recognition of places of whole numbers and the values represented by the digits. • Students were able to perform four arithmetic operations of whole numbers. Only a minority of students had difficulties with subtraction involving decomposition or division. They had not yet mastered the computational rule of 'multiplication before addition or subtraction'. • Students were able to solve simple application problems. However, a small proportion of students misunderstood the questions or made computational mistakes, leading to incorrect answers. • Students could demonstrate recognition of fractions as parts of one whole. They were able to compare the magnitude of fractions with same denominators or same numerators. • Students were able to solve problems involving addition or subtraction of fractions with the same denominators that are illustrated by diagrams.	• Students were able to recognise whole numbers, decimals and percentages but a small proportion of students confused the common factors with the common multiples. • Students were able to perform the interconversion between fractions, decimals and percentages. • Many students were able to compare the magnitude of fractions. • Students were capable of performing the four arithmetic operations of whole numbers, decimals and percentages. However, their performance in operations of fractions was quite weak. • Students generally were able to solve application problems and showed the working steps. • Students were able to estimate the answer by choosing suitable approximate values.	• Students were good at using powers to express the repeated multiplication of a number and use repeated multiplication to express the power of a number. • Students could demonstrate recognition of the ordering of integers on the number line. • Students could write down the next term of a sequence of odd numbers with several consecutive terms given. • Students performed well in converting a positive number in scientific notations to an integer or a decimal.
Algebra	N.A.	• Students were able to use algebraic expressions to represent the operations of and relations between quantities and unknown quantities. • Students were capable of solving equations not involving collecting like terms. • Students were able to solve application problems by using simple equations.	• Students were good at determining whether a number satisfied a given inequality. • Students' showed weak understanding in distinguishing polynomials from algebraic expressions. • The majority of students could not demonstrate recognition of coefficients. • Only some students could perform operations of two algebraic fractions, both the numerators and denominators being monomials.

Level / Strand	P.3	P.6	S.3
Measures	• Students were able to identify the money in circulation in Hong Kong and read price tags. Their performance was fair in demonstrating recognition of the use of money in daily life. • Students could demonstrate recognition of the dates and days of a week, tell time from clocks and record the duration of time for activities. • Students in general were able to measure and compare the lengths and weights of objects as well as the capacities of containers. • Students were able to choose appropriate tools to measure the lengths and weights of objects, and the capacities of containers. • Students in general were able to choose appropriate units to record the lengths and weights of objects, and the capacities of containers. However, a few students mixed up the units of lengths, weights and capacities.	• Students were able to find the perimeters of squares and rectangles, the areas of 2-D shapes, and apply the formula of circumference. • Students could find the volumes of cubes and cuboids. They were also able to find the volume of irregular solids by displacement of water. • Students were able to recognise the relationship between capacity and volume. • Students were able to solve simple problems of speed. • Students could measure and compare the sizes of angles.	• Quite a number of students could find the range of measures in measurements of given degrees of accuracy. However, many students were unable to find maximum absolute errors from the measuring tools. • Many students were able to calculate areas of sectors, but they could not calculate arc lengths. • Students showed satisfactory performance in calculating the volumes of pyramids.
Shape and Space	• Students were capable of identifying cylinders and spheres intuitively. However, they had room for improvement in identifying prisms and pyramids. • Students in general were able to identify 2-D shapes including triangles, rectangles, parallelograms, trapeziums, pentagons, hexagons and circles. • Students were able to identify straight lines, curves and parallel lines. However, their performance was only fair in identifying perpendicular lines. • Students were able to identify right angles and compare the sizes of angles. • Students were able to demonstrate recognition of the four directions: east, south, west and north.	• Students were able to recognise cones, pyramids, cylinders, prisms and spheres, involving vertices, edges and faces of 3-D shapes. • Students were able to recognise the properties of 2-D shapes. However, some students mistook the hexagon of a particular shape as a trapezium. • Students were capable of recognising the eight compass points. • Students were able to find the axes of symmetry of symmetric 2-D shapes.	• Students were able to demonstrate recognition of the sections of prisms, but only a small proportion of students could demonstrate recognition of the concepts of right prisms. • Students could demonstrate recognition of the properties of congruent triangles. However, there was room for improvement in using the conditions for congruent triangles to perform simple proofs. • Only some students were able to use the condition for isosceles triangles to perform simple proofs. • Students could use the properties of rhombuses to find unknowns. • Students did well in using the converse of Pythagoras' theorem to identify right-angled triangles. • Students could use coordinates to represent the position of a point and mark the point with given coordinates. Their performance in finding the image of a given point under a single transformation was not satisfactory.

Level / Strand	P.3	P.6	S.3
Data Handling	• Students were able to interpret pictograms and bar charts. They could use the information given in statistical charts to answer simple questions. • The performance of students was good in constructing pictograms and bar charts. However, a small proportion of students were unable to give an proper title in order to express the purpose of conducting the survey.	• Students were capable of reading the data presented in bar charts and broken line graphs as well as using the data from the statistical graphs to answer simple questions. • Students were good at constructing bar charts. • Students were quite good at constructing broken line graphs. • Many students could read data from pie charts to perform simple calculations. • Students' performance was fair in calculating the average of a group of data and solving simple problems of averages.	• Students were able to organise the same set of data by different grouping methods. • Students could interpret stem-and-leaf diagrams and construct cumulative frequency polygons. However, their performance in constructing histograms was just acceptable. • Students were able to find mean and median from a set of ungrouped data and find modal class from a set of grouped data. • Students' performance in indicating the abuses from examples of abuses of mode was weak. • Students were able to calculate the probability by listing. • Only some students could read off data from statistical charts representing two different sets of data.