

## PSLE MATHEMATICS SUMMARY SHEET

### Numbers and Algebra

**Odd Numbers:** 1, 3, 5, 7, 9, ...

**Even Numbers:** 2, 4, 6, 8, 10, ...

**Proper Fractions:**  $\frac{1}{3}, \frac{2}{5}$

**Improper Fractions:**  $\frac{6}{5}, \frac{10}{7}$

**Mixed Numbers:**  $1\frac{2}{9}, 3\frac{1}{2}$

#### Ratios:

- Must always be in **simplest form**, eg:  $6 : 3 = 2 : 1$
- No units in final answer, eg:  $500 \text{ g} : 1000 \text{ g} = 1 : 2$
- Convert to same units then simplify, eg:  $1 \text{ min} : 30 \text{ s} = 60 \text{ s} : 30 \text{ s} = 2 : 1$

#### Common Conversions:

- \$1 = 100 cents
- 1 km = 1000 m, 1 m = 100 cm
- 1 l = 1000 ml = 1000 cm<sup>3</sup>
- 1 h = 60 min, 1 min = 60 sec
- 1 kg = 1000 g



#### Algebra:

- Add and subtract "LIKE" terms only:

$$a + 2b + 3a - b = 4a + b$$

- Evaluating Algebraic Expressions (Substitution) eg:

If  $a = 3$  and  $b = 2$ , evaluate  $2a - b$ .

$$2a - b = 2(3) - 2 = 6 - 2 = 4$$



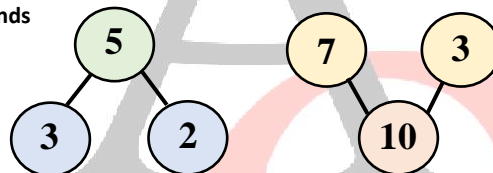
#### Square Roots and Cube Roots

$$\sqrt{4} = 2, \sqrt[3]{27} = 3$$

#### Ordinal Numbers

1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, ...

#### Number Bonds



#### Place Values:

1	2	3	4	5	6	7	8
Ten Millions	Millions	Hundred Thousands	Ten Thousand	Thousands	Hundreds	Tens	Ones

In Words: Twelve Million, Three Hundred and Forty-Five Thousand, Six Hundred and Seventy-Eight

In Numerals: 12 345 678

9.	8	7	6
Ones	Tenths	Hundredths	Thousandths

In Numerals: 9.876



Place Value Chart

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

#### Factors and Multiples

##### Factors of 12

$$1 \times 12 = 12$$

$$2 \times 6 = 12$$

$$3 \times 4 = 12$$

1, 2, 3, 4, 6, 12

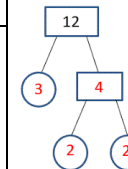
##### Factors of 15

$$1 \times 15 = 15$$

$$3 \times 5 = 15$$

1, 3, 5, 15

Common Factors of 12 and 15: 1 and 3



##### Multiples of 4

4, 8, 12, 16, 20, 24, ...

##### Multiples of 6

6, 12, 18, 24, 30, ...

First Two Common Multiples of 4 and 6: 12, 24



#### Percentage

$$35\% \text{ of } 120 = \frac{35}{100} \times 120 = 42$$

$$\text{Percentage Increase} = \frac{\text{New} - \text{Old}}{\text{Old}} \times 100$$

$$\text{Percentage Decrease} = \frac{\text{Old} - \text{New}}{\text{Old}} \times 100$$



#### Rounding Off

Nearest 10:  $2252 \approx 250$

Nearest 100:  $2252 \approx 2300$

Nearest 1000:  $2252 \approx 2000$

Nearest Whole Number:  $12.34 \approx 12$

**Addition of Fractions:**  $\frac{1}{4} + \frac{2}{3} = \frac{1 \times 3}{4 \times 3} + \frac{2 \times 4}{3 \times 4} = \frac{3}{12} + \frac{8}{12} = \frac{11}{12}$

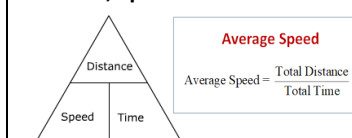
**Subtraction of Fractions:**  $\frac{5}{7} - \frac{2}{5} = \frac{5 \times 5}{7 \times 5} - \frac{2 \times 7}{5 \times 7} = \frac{25}{35} - \frac{14}{35} = \frac{11}{35}$

**Multiplication of Fractions:**  $\frac{5}{10} \times \frac{2}{15} = \frac{10}{150} = \frac{1}{15}$

**Division of Fractions:**  $\frac{6}{8} \div \frac{3}{4} = \frac{6}{8} \times \frac{4}{3} = \frac{24}{24} = 1$

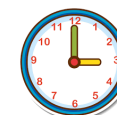


#### Distance, Speed and Time



**Units of Speed:**  
m/s, km/h, mm/s, km/min

**24-Hour Clock:**  
5:00 pm  $\rightarrow$  17 00  
12:00 am  $\rightarrow$  00 00  
12:30 pm  $\rightarrow$  12 30




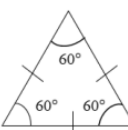

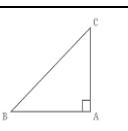
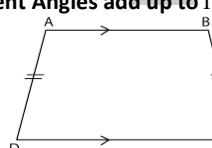
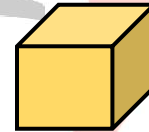

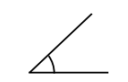
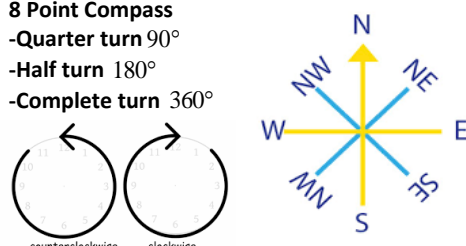

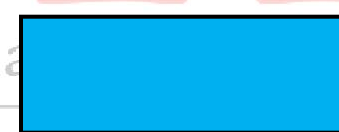

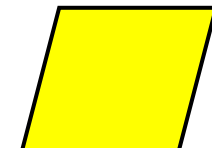
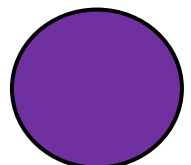
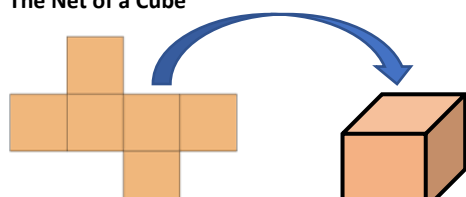
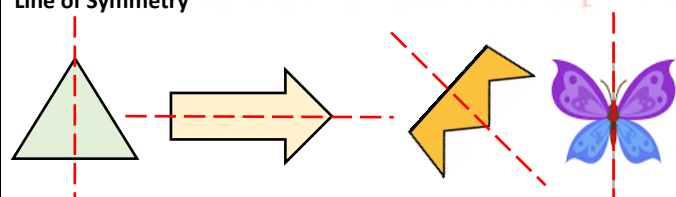
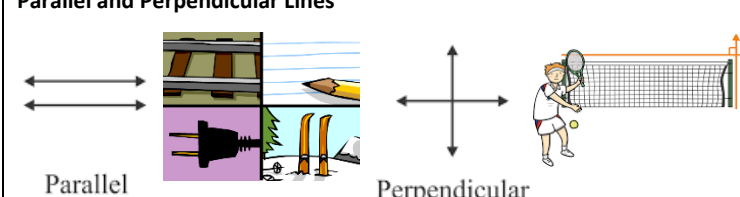
Distance = Speed x Time



Time =  $\frac{\text{Distance}}{\text{Speed}}$

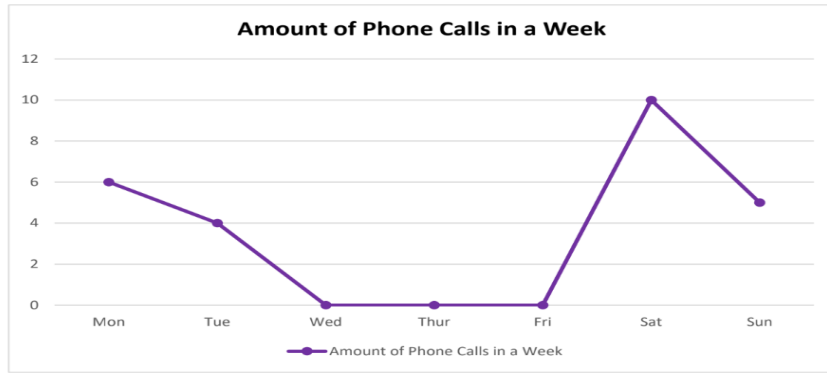


Speed =  $\frac{\text{Distance}}{\text{Time}}$

Geometry					
<b>Isosceles Triangle</b> - 2 equal angles - 2 equal sides		<b>Angles on a Straight Line</b> -Add up to 180°	<b>Angles at a point</b> -Add up to 360°	<b>Vertically Opposite Angles are equal</b>	<b>Angles in a Triangle</b> -Add up to 180°
<b>Equilateral Triangle</b> - 3 equal angles - 3 equal sides		<b>Angles in a Square</b> -Add up to 360°	<b>Angles in a Rectangle</b> -Add up to 360°	<b>Angles in a Parallelogram</b> -Add up to 360° -Opposite angles are equal -Adjacent Angles add up to 180°	<b>Angles in a Rhombus</b> -Add up to 360° -Opposite angles are equal -Adjacent Angles add up to 180°
<b>Obtuse Angle</b> - More than 90° but less than 180°		<b>Angles in a Trapezium</b> -Add up to 360° -Adjacent Angles add up to 180°	<b>Cube</b> -6 Faces -Volume = length x length x length	<b>Cuboid</b> -6 Faces -Volume = length x breadth x height	
<b>Right-Angled Triangle</b> - Contains 90 degrees angle					
<b>Acute Angle</b> - Less than 90°		<b>Square</b> A = length x length P = 4 x length	<b>Rectangle</b> A = length x breadth P = length + length + breadth + breadth	<b>Triangle</b> A = $\frac{1}{2} \times \text{base} \times \text{height}$	<b>Parallelogram</b> A = base x height
<b>8 Point Compass</b> -Quarter turn 90° -Half turn 180° -Complete turn 360°					
<b>Circle</b> A = $\pi r^2$ C = $\pi d$ or $2\pi r$		<b>The Net of a Cube</b>	<b>Line of Symmetry</b>	<b>Parallel and Perpendicular Lines</b>	
					

### Statistics

#### Line Graphs



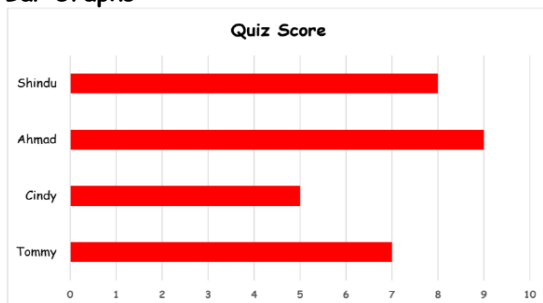
- x and y axes
- Allows for easy spotting of trends (upward/downward trends)
- Suitable for Timelines (Days in a week, Months in a year, etc)

#### Tables

Name of Student	Molly	Ismail	Muthu	Timothy	Eileen
Tally			/		
Number of Biscuits	3	1	5	4	2

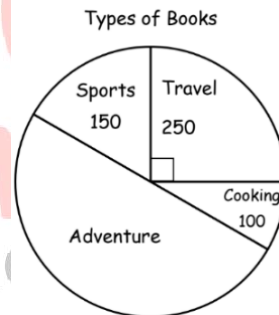
- Tallies are counted in groups of 5.  
(This can be a disadvantage if numbers are large)
- Shows the quantity for each person/type

#### Bar Graphs



- Each picture represents a certain quantity (shown by the key)
- Allows for easy comparison across different groups/persons/objects
- May not be the most suitable option if there are intermediate values (decimals and fractions)

#### Pie Charts



- Each portion represents a group
- Each "pie" is represented by angles (Total Angle Sum is 360 Degrees)
- Visually Simple
- Can be used for large amounts of data
- Difficult to determine exact quantity

#### Pictograms

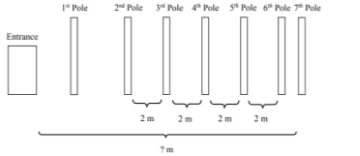







Team	Number of house points
Diamond	☆☆☆
Ruby	☆☆☆
Sapphire	☆☆☆☆
Emerald	☆☆☆

**Key**

☆ = 8 points

- Each picture represents a certain quantity (shown by the key)
- Half a picture represents half the quantity, a quarter of a picture represents a quarter of the quantity
- Allows for easy comparison
- If quantities include fractions and decimals, may not be the best diagram to use

### Mathematical Heuristics

<p><b>Heuristic #1: Use a Diagram/Model</b></p> 	<p><b>Step 1:</b> Draw a diagram/model to represent given information <b>Step 2:</b> Use diagram/model to obtain further information <b>Step 3:</b> Solve problem using new information from diagram/model</p>	<p><b>Heuristic #8: Restate the Problem</b> Eg: The shop has 2 more tables than sofas. → If we add two more sofas, the number of tables and sofas will be the same</p>	<p><b>Step 1:</b> Rephrase/paraphrase the problem in another way <b>Step 2:</b> Modify the criteria (eg: total number) accordingly <b>Step 3:</b> Solve the problem with the modified criteria</p>																																																												
<p><b>Heuristic #2: Guess-and-Check</b></p> <table border="1" data-bbox="94 446 451 552"> <thead> <tr> <th>Number of Chickens</th> <th>Total Number of Chickens Legs</th> <th>Number of Cows</th> <th>Total Number of Cow Legs</th> <th>Total Number of Legs</th> <th>Total Number of Chickens and Cows</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td><td>1</td><td>4</td><td>6</td><td>2</td></tr> <tr><td>2</td><td>4</td><td>2</td><td>8</td><td>12</td><td>4</td></tr> <tr><td>3</td><td>6</td><td>3</td><td>12</td><td>18</td><td>6</td></tr> <tr><td>4</td><td>8</td><td>4</td><td>16</td><td>24</td><td>8</td></tr> <tr><td>5</td><td>10</td><td>5</td><td>20</td><td>30</td><td>10</td></tr> <tr><td>6</td><td>12</td><td>6</td><td>24</td><td>36</td><td>12</td></tr> <tr><td>7</td><td>14</td><td>7</td><td>28</td><td>42</td><td>14</td></tr> <tr><td>8</td><td>16</td><td>8</td><td>32</td><td>48</td><td>16</td></tr> <tr><td>9</td><td>18</td><td>9</td><td>36</td><td>54</td><td>18</td></tr> </tbody> </table>	Number of Chickens	Total Number of Chickens Legs	Number of Cows	Total Number of Cow Legs	Total Number of Legs	Total Number of Chickens and Cows	1	2	1	4	6	2	2	4	2	8	12	4	3	6	3	12	18	6	4	8	4	16	24	8	5	10	5	20	30	10	6	12	6	24	36	12	7	14	7	28	42	14	8	16	8	32	48	16	9	18	9	36	54	18	<p><b>Step 1:</b> Obtain key information from problem <b>Step 2:</b> Construct a table for Guess-and-Check <b>Step 3:</b> Stop when criteria from problem is met <b>Step 4:</b> Conclude</p>	<p><b>Heuristic #9: Simplify the Problem</b></p> 	<p><b>Step 1:</b> Modify the Diagram/Simplify the Problem <b>Step 2:</b> Solve the simplified problem</p>
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<p><b>Heuristic #3: Make a Systematic List</b></p> <table border="1" data-bbox="94 592 273 714"> <thead> <tr> <th>Numbers Starting with 8</th> <th>Numbers Starting with 9</th> </tr> </thead> <tbody> <tr><td>8493</td><td>9438</td></tr> <tr><td>8439</td><td>9483</td></tr> <tr><td>8349</td><td>9384</td></tr> <tr><td>8394</td><td>9348</td></tr> <tr><td>8943</td><td>9843</td></tr> <tr><td>8934</td><td>9834</td></tr> </tbody> </table>	Numbers Starting with 8	Numbers Starting with 9	8493	9438	8439	9483	8349	9384	8394	9348	8943	9843	8934	9834	<p><b>Step 1:</b> Narrow down Options <b>Step 2:</b> List down all possibilities <b>Step 3:</b> Conclude</p>	<p><b>Heuristic #10: Solve Part of the Problem</b> Eg: The area of a square is 16 cm<sup>2</sup>, find its perimeter. → First find the length and then use it to find the perimeter.</p>	<p><b>Step 1:</b> Obtain information from the given problem <b>Step 2:</b> Use new information obtained to solve the rest of the question</p>																																														
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<p><b>Heuristic #4: Look for Patterns</b></p> 	<p><b>Step 1:</b> Search for a Pattern <b>Step 2:</b> Use pattern to predict subsequent figures</p>	<p><b>Heuristic #11: Think of a Related Problem</b></p> 	<p><b>Step 1:</b> Recall a similar/related problem <b>Step 2:</b> Recall the method used to solve the similar/related problem <b>Step 3:</b> Modify the approach to solve the given problem</p>																																																												
<p><b>Heuristic #5: Work Backwards</b></p> 	<p><b>Step 1:</b> Start from the result/the final value <b>Step 2:</b> Work backwards by adding instead of subtracting, multiplying instead of dividing and vice versa</p>	<p><b>Heuristic #12: Use Equations</b> Eg: There are twice as many sandals as shoes and there are a total of 30 shoes and sandals. → Let x be the number of shoes. Number of sandals = 2x and 2x + x = 30.</p>	<p><b>Step 1:</b> Represent given information using Algebraic terms and assigning variables <b>Step 2:</b> Form equations using given information <b>Step 3:</b> Solve the equations to solve the problem</p>																																																												
<p><b>Heuristic #6: Use Before-and-After Concept</b> Step 1: Before Jamie : Krishna : Total 2 : 5 : 7 Step 2: After Jamie : Krishna : Total 2 : 1 : 3</p>	<p><b>Step 1:</b> Compare values before and after a change <b>Step 2:</b> Look out for any quantity that remains the same <b>Step 3:</b> Solve the Problem</p>	<p><b>Heuristic #13: Spatial Visualisation</b> <small>* Observe that by drawing some lines to the octagon, we can split it into triangles.</small></p>  <p><small>Notice that the sum of all the angles in all the triangle will be the same as the sum of all the angles in the octagon.</small></p>	<p><b>Step 1:</b> Draw/modify Diagrams to link to existing knowledge <b>Step 2:</b> Use New/Modified Diagrams to solve the problem</p>																																																												
<p><b>Heuristic #7: Make Suppositions</b></p> 	<p><b>Step 1:</b> Make a Supposition <b>Step 2:</b> Find Big Difference <b>Step 3:</b> Find Small Difference <b>Step 4:</b> Big Difference ÷ Small Difference</p>	<p><b>Heuristic #14: Act It Out*</b></p> 	<p><b>Step 1:</b> Physically act out what is taking place in a word problem <b>Step 2:</b> Understand the question better through acting</p>																																																												

\*Not applicable during exams