Heuristics

A workshop for P6 Parents



Workshop Objective

- To create awareness among parents of the different types of heuristics taught in schools.
- To give suggestions on how parents can engage or help their children learn mathematics at home.

Workshop Outline

9 am to 9.30 am - Guess and Check/ Make a Supposition 9.30 am to 9.50 am - Systematic Listing 9.50 am to 10.20 am – Model Drawing 10.20 am to 10.30 am – Parental Involvement - Q & A and Feedback



Q : What is a heuristic?

A strategy used to solve word problems e.g. model drawing, guess and check

Q: Why is it important to learn heuristics ? Mathematics curriculum is centred on Problem-Solving.



Heuristics covered in workshop

- Guess and Check
- Supposition
- Systematic Listing
- Model Drawing



1. Guess and Check

> What is it ?

Columns, Headings and checkpoint

> When to use? Two or more unknown with checkpoint

e.g.1 There were 10 cars and motorcycles altogether. They had 28 wheels in all. How many cars were there?

No. of Cars	Cars (4 Wheels)	No. of Motorcycles	Motorcycles (2 wheels)	Total wheels	Check (28?)	
5	<u>5</u> x 4 = 20	5	<u>5</u> x 2 = 10	20 + 10 = 30	A A	
4	<u>4</u> x 4 = 16	6	<u>6</u> x 2 = 12	16 + 12 = 28	Yest	P

here were 4 cars. www.fppt.info

2. Make a Supposition

- What is it?
- *e.g 1* There were 10 cars and motorcycles altogether. They had 28 wheels in all. How many cars were there?

Suppose all are motorcycles.

10 x 2 = 20 wheels

- 28 20 = 8
- 4 2 = 2
- 8 ÷ 2 = 4

There were 4 cars.

• When to use? To meet given conditions or criteria in order to obtain answer



Guess and Check / Supposition (T)

A delivery man had to deliver 200 parcels to his customers every month. For every parcel he delivered on time, he was paid \$25. If he delivered the parcel late, he had to pay \$5. He made \$3740 from the deliveries. What is the ratio of the number of parcels delivered on time to the total number of parcels delivered?



<u>Guess and Check</u> / Supposition (T)

No. of parcels delivered		Cost		Amt Earned	Check (\$3740)
On time	Late	On time	Late		
150	50	150 x \$25 = \$3750	50 x \$5 = \$250	\$3750 - \$250 = \$3500	X
160	40	160 x \$25 = \$4000	40 x \$5 = \$200	\$4000 - \$200 = \$3800	X
158	42	158 x \$25 = \$3950	42 x \$5 = \$210	\$3950 - \$210 = \$3740	Yes!

158: 200 = 79 : 100

The ratio is 79:100

Guess and Check / <u>Supposition</u> (T)

Assume all parcels are delivered on time.

 $200 \times $25 = 5000 \$5000 - \$3740 = \$1260 \$25 + \$5 = \$30 $1260 \div 30 = 42$ (delivered late) 200 - 42 = 158158:200 = 79:100The ratio is 79: 100.





Hands-on Session 1 (10 min)



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Guess and Check / Supposition (H1)

A school paid \$434 for admission ticket to a concert for 101 pupils and teachers. An adult ticket cost \$6 and a child ticket cost \$4. How many adult tickets did the school buy?



Guess and Check / Supposition (H1)

A school paid \$434 for admission ticket to a concert for 101 pupils and teachers. An adult ticket cost \$6 and a child ticket cost \$4. How many adult tickets did the school buy?

No. of Adults	No. of Pupils	Total Cost	Check
1	100	$(1 \times \$6) + (100 \times \$4) = \$406$	
2	99	(2 x \$6) + (99 x \$4) = \$408	
3	98	(3 x \$6) + (98 x \$4) = \$410	
15	86	(15 x \$6) + (86 x \$4) = \$434	Yes!

The school bought 15 adult tickets.

Guess and Check / Supposition (H1)

A school paid \$434 for admission ticket to a concert for 101 pupils and teachers. An adult ticket cost \$6 and a child ticket cost \$4. How many adult tickets did the school buy?

If all were child tickets,

Total cost
$$\rightarrow$$
 101 x \$4
= \$404
Difference in the cost of 1 adult ticket and 1 child ticket \rightarrow \$2
Number of adult ticket \rightarrow (\$434 - \$404) \div \$2
= 15

The school bought 15 adult tickets.

Guess and Check/Supposition(H2)

Meng sold a total of 368 large and small durians. He sold the large durians at \$9 each and the small durians at \$5 each. He collected \$2760. How many large durians did Meng sell? Past PSLE Q



Guess and Check/Supposition(H2)

Meng sold a total of 368 large and small durians. He sold the large durians at \$9 each and the small durians at \$5 each. He collected \$2760. How many large durians did Meng sell? Past PSLE Q

No. of large durians	Amt (x \$9)	No. of small durians	Amt (x \$5)	Total	Check
200	\$1800	168	\$840	\$2640	X
210	\$1890	158	\$790	\$2680	X
230	\$2070	138	\$\$690	\$2760	Yes!

Meng sold 230 large durians.

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Guess and Check/<u>Supposition(H2)</u>

Meng sold a total of 368 large and small durians. He sold the large durians at \$9 each and the small durians at \$5 each. He collected \$2760. How many large durians did Meng sell?

Assume all are small durians.

$$368 \times \$5 = \$1840$$

 $\$2760 - \$1840 = \$920$
 $\$9 - \$5 = \$4$
 $\$920 \div \$4 = 230$

Meng sold 230 large durians.



3) Systematic Listing

What is it?

Day	Distance climbed	Distance after
	during the day (m)	sliding (m)
1	5	3
2	2 + 5 = 7	7 - 3 = 4
3	4 + 5 = 9	9 – 3 = 6
4	6 + 5 = 11	11 – 3 = 8
5	8 + 5 = 13	13 - 3 = 10
6	10 + 5 = 15	15 – 3 = 12
7	12 + 5 = 17	17 - 3 = 14
8	14 + 5 = 19	

• When to use?

There are given conditions or criteria in a problem e.g. A koala wants to climb to the top of a tree which

is 18 m tall. During the day, it climbs up 5 m but in the night it slides down 3 m. How many days will it take the koala to reach the top of the tree?

Systematic Listing Vs Guess and Check

Systematic Listing	Guess and Check	
List in order	Logical guess and can skip guesses	
Check points such as final ratio	Checkpoint such as total given	E
	¥	-7

Systematic Listing (T)

John had the same number of red and blue marbles at first. During a game, he lost 10 red and 36 blue marbles. The ratio of the red and blue marbles became 3:1. How many red marbles did he have at first?



Systematic Listing (T)

	After			Before	
	Ratio	Blue	Red	Blue	Red
	30:4=15:2	40-36=4	40-10=30	40	40
) nad 49 1 marbles	31:5	41-36=5	41-10=31	41	41
first.	32:6=16:3	42-36=6	42-10=32	42	42
	33:7	43-36=7	43-10=33	43	43
	34:8=17:4	44-36=8	44-10=34	44	44
U.S.	35:9	45-36=9	45-10=35	45	45
THE	36:10=18:5	46-36=10	46-10=36	46	46
J ×	37:11	47-36=11	47-10=37	47	47
1 L	38:12=19:6	48-36=12	48-10=38	48	48
TT	39:13=3:1	49-36=13	49-10=39	49	49



Hands-on Session 2 (10 min)



Systematic Listing (H1) The ratio of Hafiz's age to his mother's age is 1:3 now. Five years later, Hafiz's age will be $\frac{3}{7}$ that of

his mother's age. How much older is Hafiz's mother than Hafiz?



Systematic Listing (H1)

Now		5 years later			
Hafiz	Mother	Hafiz	Mother	Ratio	
6	18	6+5=11	18+5=23	11:23	
7	21	7+5=12	21+5=26	12:26=6:13	
8	24	8+5=13	24+5=29	13:29	
9	27	9+5=14	27+5=32	14:32=7:16	
10	30	10+5=15	30+5=35	15:35=3:7	

35 - 15 = 20

Hafiz's mother is 20 years older than Hafiz.

Systematic Listing (H2)

The ratio of the number of pears to oranges that James had at first was 2:5. After selling 11 pears and 21 oranges, the ratio of the number of pears to oranges became 1:3. How many oranges did James have at first?



Systematic Listing (H2)

Before (2:5)		After			
Pears	Oranges	Pears (-11)	Oranges (-21)	Ratio (1:3)	
12	30	1	9	1:9	
14	35	3	14	3:14	
16	40	5	19	5:19	
18	45	7	24	7:24	
20	50	9	29	9:29	
22	55	11	34	11:34	
24	60	13	39	13:39=1:3	
James had 60 oranges at first.					

4. Model Drawing

> What is it ?

Visual representation of information Essentially algebra in pictorial form.

> When to use?

Useful tool in solving word problems involving topics such as whole numbers, fractions, decimals, ratio and percentage.



Model Drawing (T1)

Mr Lim had a total of 540 long and short rulers. 1 After selling an equal number of both types, he had - of $\frac{1}{3}$ the long rulers and $\frac{1}{-}$ of the short ones left.

What was the total number of rulers left?



Model Drawing (T2)

Ted, Joe and Bob shared a box of apples. Ted took – of the apples and another 6 apples from the box. 3

Joe took – of the remaining apples and another 9 apples $\frac{2}{2}$ from the box. Bob took the last 5 apples. How many apples were there in the box at first?



Model Drawing (T3)

Gerald and Sally went shopping with a total of \$475. After shopping, the amount of money that Gerald had left was 4 times the amount he spent while the amount of money Sally had left was thrice the amount she spent. In the end, they had a total of \$370 left. How much money did Gerald have at first?





Hands-on Session 3 (10 min) *



Model Drawing (H1)

Three girls used the same number of beads to make necklaces. Devi used $\frac{2}{5}$ of her beads, Esther used $\frac{3}{4}$ of hers and Farah used $\frac{2}{3}$ of hers. They had a total of 1440 beads at first.

How many beads did each girl use? Past PSLE Q



Model Drawing (H1)

Three girls used the same number of beads to make necklaces. Devi used $\frac{2}{5}$ of her beads, Esther used $\frac{3}{4}$ of hers and Farah used $\frac{2}{3}$ of hers. They had a total of 1440 beads at first.

How many beads did each girl use? Past PSLE Q



Model Drawing (H2)

The ratio of Hafiz's age to his mother's age is 1:3 now. Five years later, Hafiz's age will be $\frac{3}{7}$ that of his mother's age. How much older is Hafiz's mother than Hafiz?



Hafiz's mother is 20 years older than him.



Model Drawing (H3)

Siti and Joey baked 226 cookies altogether.

 $\frac{1}{5}$ of the number of cookies Siti baked was 6 less than $\frac{1}{3}$ of the number

of cookies Joey baked. How many cookies did Siti bake?

Siti baked 130 cookies.





Model Drawing (H4)

Ali and Bill had a total of 366 bookmarks. Bill and Craig had a total of 544 bookmarks. Craig had thrice as many bookmarks as Ali. How many bookmarks did Bill have?



$$Bill \rightarrow 366 - 89 = 277$$

Bill had 277 bookmarks



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Model Drawing (H5)

A stationery shop had 150 pens and pencils at first. After a week, $\frac{2}{3}$ of the pens and $\frac{3}{4}$ of the pencils were sold. The total number of pens and pencils left was 42. How many pencils were there at the stationery shop at first?



Parental Involvement

Motivation & Support

- Affirm their effort in learning mathematics.
- Share personal experiences dealing with failures.
- Encourage your child to persevere and be self-directed in their learning(Koobits)

Parental Involvement

Be Present

- Show interest in their learning through regular chats with them.
- Let your child verbalise their solutions to selected questions.
- Encourage alternative solutions(if possible)
- Learn together with your child.

Parental Involvement

Making Connections

-Seize opportunities to relate math to the real world.

- Eg:
- * Shopping Choosing the cheaper products.
- Percentage discounts / Interest / GST
- •Car park rate
- •Taxi charges vs Grab charges

Q & A



Thank you!

