

Higher Order Thinking Skills

Primary 5

Lesson 10:
Revision (Heuristics)

enquiry@mathsheuristics.com
www.mathsheuristics.com
www.facebook.com/mathsheuristics

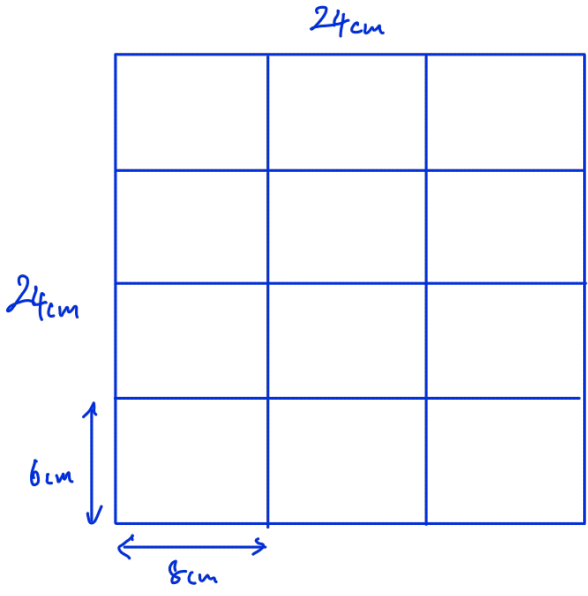
LESSON 10: REVISION (HEURISTICS)

COMMONLY USED HEURISTICS

- 1) Systematic Listing
- 2) Guess & Check
- 3) Making Supposition
- 4) Patterns
- 5) Working Backwards

GUIDED EXAMPLE 1 *same lengths LCM of 8 and 6*

Tom wants to make a square with rectangular cards each measuring 8 cm by 6 cm.
 How many such rectangular cards must he use to make the smallest possible square?



(CHIJ SNGS SA2 Q1)

8, 16, 24
 6, 12, 18, 24

Ans : 12

GUIDED EXAMPLE 2

When a number is divided by 5, the remainder is 2.

When the same number is divided by 6, the remainder is 1.

What is / are the possible number(s) if it is between 25 and 50? *Range*
 ↑
excludes 25 and 50.

M5	20 , 25, 30, 35, 40, 45, 50	
+2	22 , 27, 32, (37), 42, 47, 52	←
M6	24 , 30, 36, 42, 48, 54	
+1	25 , 31, (37), 43, 49, 55	←

Ans : 37

GUIDED EXAMPLE 3

Ali has some ducks and sheeps in her farm.

There are 5 more ducks than sheeps. No.

If there are 148 legs altogether, Total legs
how many ducks are there?

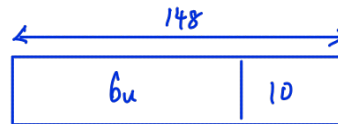
	No.	Legs	Total Legs
Ducks	$u+5$	2	$2u + 10$
Sheep	u	4	$4u$
		Total	$6u + 10$

$$6u + 10 = 148$$

$$\begin{aligned} 6u &= 148 - 10 \\ &= 138 \end{aligned}$$

$$\begin{aligned} u &= 138 \div 6 \\ &= 23 \end{aligned}$$

$$\begin{aligned} u + 5 &= 23 + 5 \\ &= 28 \end{aligned}$$



Ans : 28

GUIDED EXAMPLE 4

Study the following pattern carefully.

$$1 + 2 + 3 + \dots + 95 + 96 + 97$$

When all the numbers from 1 to 97 are added up, what is the digit in the ones place?

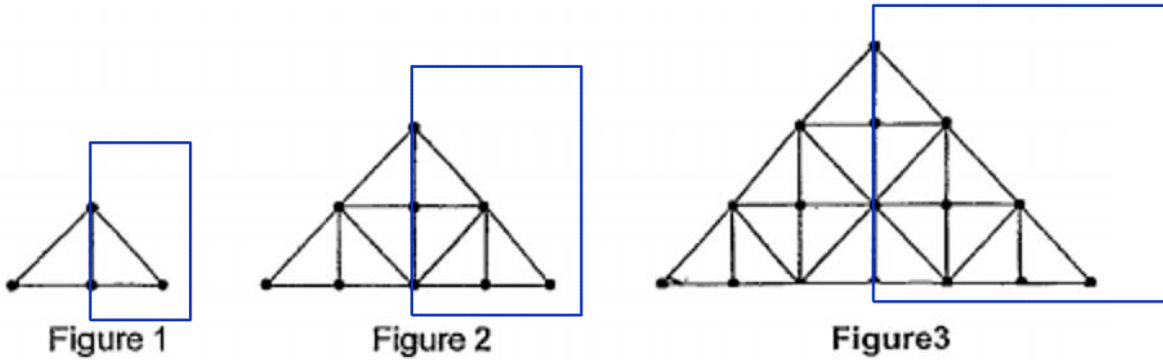
$$\begin{aligned} 1 + 2 + \dots + 96 + 97 &= \frac{1}{2} \times 97 \times 98 \\ &= 4753 \end{aligned}$$

Ans : 3

GUIDED EXAMPLE 5

Isolate symmetrical patterns to simplify

The following figures are made up of small right-angled triangles. A dot is placed at the corner of each small right-angled triangle.



The total number of dots and small right-angled triangles in each figure is shown in the table below.

Figure	Total number of dots	Number of small right-angled triangles
1	4	2
2	9	8
3	16	18
4	25	32

Square numbers

↓

$$2 \times 1 = 2 \times 1 \times 1$$

$$2 \times 4 = 2 \times 2 \times 2$$

$$2 \times 9 = 2 \times 3 \times 3$$

$$2 \times 16 = 2 \times 4 \times 4$$

- a) Fill in the blanks in the table above for Figure 4.
- b) Find the number of dots in Figure 73.

$$74 \times 74 = 5476$$

- c) Find the number of small right-angled triangles in figure 23.

$$2 \times 23 \times 23 = 1058$$

- d*) Given that there are 200 small right-angled triangles in a particular figure, what is this figure number?

$$200 = 2 \times \underline{10} \times \underline{10}$$

$$\therefore \text{Figure no.} = 10$$

GUIDED EXAMPLE 6

Mr Tan was asked how many horses and chickens were there in a farm. He answered: "Among the animals, there were 118 eyes and 148 legs." How many of each kind of animals were there?

* Simplify.

$$\begin{array}{l} \text{Total No. animals} = 118 \div 2 \\ \qquad \qquad \qquad = 59 \end{array} \quad \left. \vphantom{\begin{array}{l} \text{Total No. animals} \\ \qquad \qquad \qquad = 59 \end{array}} \right\} \text{ use supposition.}$$

Suppose that all 59 animals are horses.

$$59 \times 4 = 236$$

$$D: 236 - 148 = 88$$

$$d: 4 - 2 = 2$$

$$D \div d: 88 \div 2 = 44$$

Replace 44 horses with 44 chickens.

$$\begin{aligned} \therefore \text{No. horses} &= 59 - 44 \\ &= 15 \end{aligned}$$

$$\text{No. chickens} = 44$$

GUIDED EXAMPLE 7

Work backwards

There was a total of 400 marbles in Bottle A and Bottle B. *Before*
 Jacky removed $\frac{2}{5}$ of the marbles from bottle A.
 He added more marbles to bottle B until the number of marbles in bottle B doubled. *change*
 As a result, there were $\frac{1}{4}$ times as many marbles in bottle A than bottle B. *After*
 How many more marbles were there in bottle B than in bottle A in the end?

	A	B	Total
B	3u	2u	5u 400 ↓
C	-2u	×2	
A	↓ 1u	4u	

$$\begin{aligned}
 5u &= 400 \\
 1u &= 400 \div 5 \\
 &= 80 \\
 4u - 1u &= 3u \\
 &= 3 \times 80 \\
 &= 240
 \end{aligned}$$

Ans : 240

BUILD YOUR UNDERSTANDING

1. Stanley had some strawberries in a carton. *M10*
 When the strawberries are packed into boxes of 10,
 there are 6 strawberries ⁺⁶ leftover. *M8*
 When the strawberries are ⁺⁴ put into boxes of 8,
 there are 4 strawberries leftover.
 What is the smallest possible number of strawberries in the carton?

<i>M10</i>	10, 20, 30, 40
+6	16, 26, <u>36</u> , 46
<i>M8</i>	8, 16, 24, 32, 40
+4	12, 20, 28, <u>36</u> , 44

Ans : 36

2. Farmer Ben has cows, goats and chickens on his farm.
 The number of cows is twice the number of goats.
 The number of chickens is double times the number of cows.
 The animals have a total of 100 legs.
 Find the number of cows, goats and chickens on the farm.

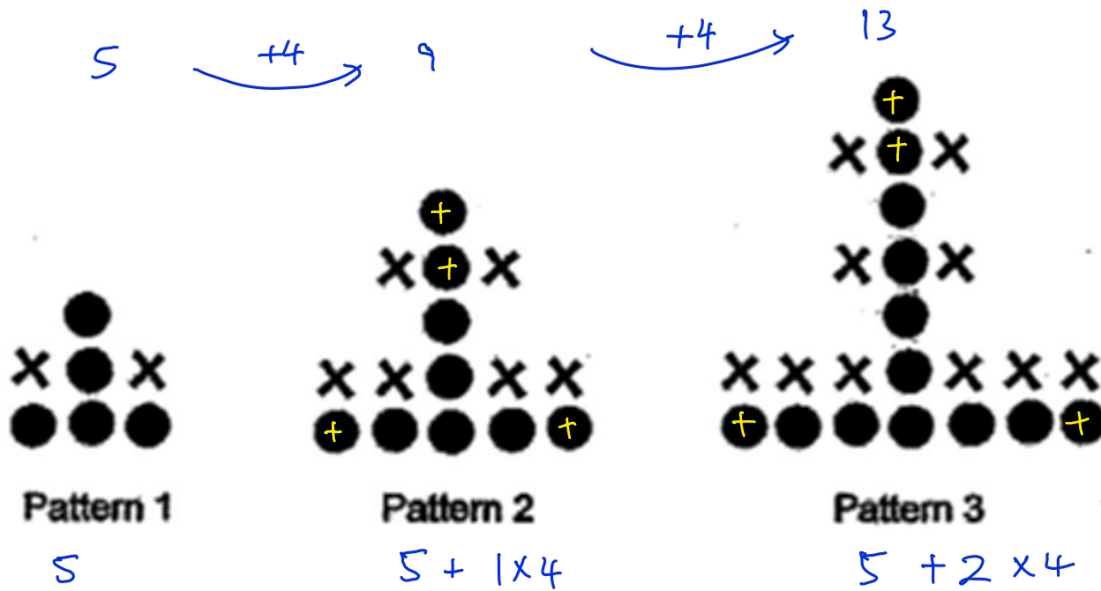
} No.

	No. animals	Legs	Total Legs
Cows	2u	4	8u
Chickens	4u	2	8u
Goats	1u	4	4u
		Total	20u

$$\begin{aligned}
 20u &= 100 \\
 1u &= 100 \div 20 \\
 &= 5 \\
 2u &= 2 \times 5 \\
 &= 10 \\
 4u &= 4 \times 5 \\
 &= 20
 \end{aligned}$$

Ans : 5 Goats,
10 cows,
20 chickens

3. Study the pattern carefully.
Then answer the questions below.



- a) How many dots are there in Pattern 11?

$$5 + 10 \times 4 = 45$$

- b) How many dots are there in Pattern 30?

$$5 + 29 \times 4 = 121$$

- c) Which pattern will have 281 dots?

$$5 + \underline{69} \times 4 = 281$$

$$281 - 5 = 276$$

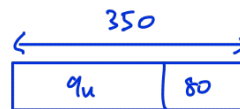
$$276 \div 4 = 69$$

$$69 + 1 = 70$$

4. ^B [Mr Chew had a total of 350 fishballs and fish cakes.]
^{B, C, A} [After selling $\frac{1}{7}$ of the fish cakes and 80 fish balls,]
^A [he had $\frac{1}{3}$ as many fishballs as fish cakes left.]
 How many fishballs did he have at first?

(Nanyang P5 SA1 Q12)

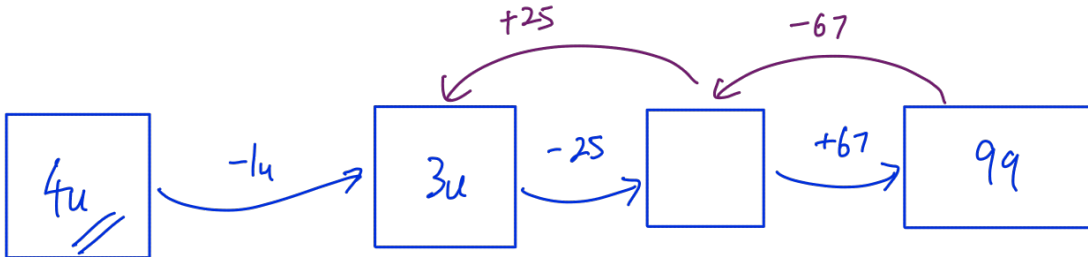
	F B	F C	Total
B	$2u + 80$	$7u$	$9u + 80$ 350
C	-80	-1u	
A	$2u$ 1 $\uparrow \times 2$	$6u$ 3 $\uparrow \times 2$	



$$\begin{aligned}
 9u + 80 &= 350 \\
 9u &= 350 - 80 \\
 &= 270 \\
 1u &= 270 \div 9 \\
 &= 30 \\
 2u + 80 &= 2 \times 30 + 80 \\
 &= 140
 \end{aligned}$$

Ans : 140

5. Claire went to buy some strawberries from the supermarket. She threw away $\frac{1}{4}$ of the rotten strawberries, *because they were rotten,* ate 25 of the strawberries and she bought another 67 strawberries. If she had 99 strawberries now, how many strawberries did she buy at first?



$$3u = 99 - 67 + 25$$

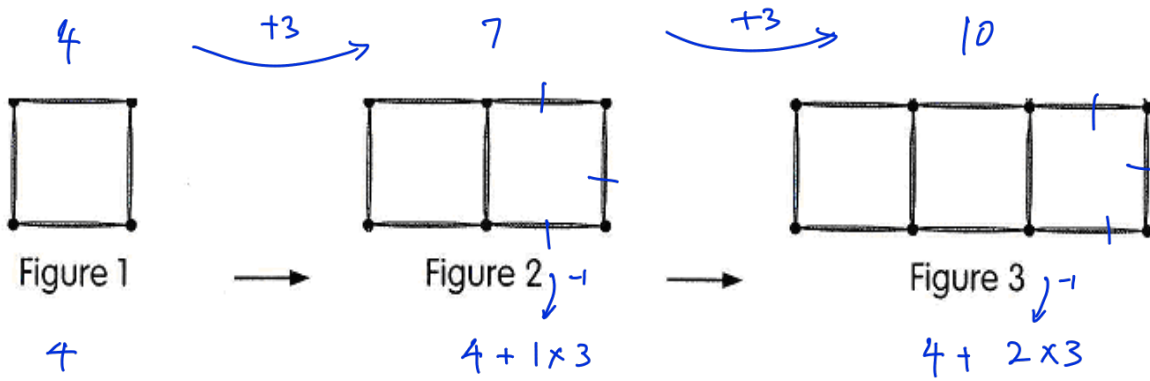
$$= 57$$

$$4u = 4 \times \frac{57}{3}$$

$$= 76$$

Ans : 76

6. Study the pattern below and answer the following questions:



a) How many sticks will figure 5 have?

$$4 + 4 \times 3 = 16$$

b) How many sticks will figure 91 have?

$$4 + 90 \times 3 = 274$$

c) Which figure number has 2317 sticks?

$$4 + \underline{771} \times 3 = 2317$$

$$2317 - 4 = 2313$$

$$2313 \div 3 = 771$$

$$771 + 1 = 772$$