

# 6 What if?

In "What if?" kind of tasks two kinds of demand are made on the pupils' cognition. The first is when the given information is changed. This modification permits pupils to reexamine the task and see what effect these changes have on the solution process as well as the answer. In this way pupils are reinforcing their critical thinking as they analyze what is taking place (Krulik and Rudnick, 1999). The second is the generation of "what if" questions after they have solved a given task. This draws on the creative thinking skills of the pupil and engages him or her in problem posing (Brown and Walter, 1985). Problem posing is the generation of new problems and the reformulation of given ones (Silver, 1994). Whole class discussion must precede individuals working on such tasks because pupils need to share the "what if?" tasks they created with the others as well as make their thinking visible.

## EXAMPLE 1

### Cookies and Boxes

Mrs Tan baked 24 cookies.

Each box holds 4 cookies.

At least how many boxes are needed to hold all the cookies?

What if Mrs Tan baked 30 cookies?

What if each box can hold 5 cookies?

What if each box can hold up to 4 cookies?

Generate another 3 "What if" tasks and answer them.

Look out for any interesting observation/pattern.

## EXAMPLE 2

### Beans and bag

A sack of green beans had mass of 7kg.

Chee Keong divided the beans equally into 3 bags for his customers.

What was the mass of each bag?

What if the mass of green beans is 10 kg?

What if there are 5 bags?

What if Chee Keong divided the beans in the ratio 1 : 2 : 3?

Generate another 3 "What if" tasks and answer them.

Look out for any interesting observation/pattern.

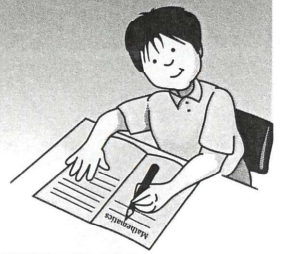
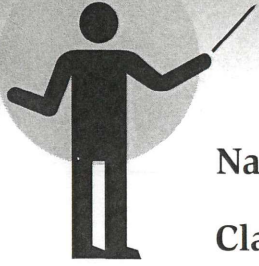
**Teaching Goal**

After participating in this lesson, pupils should be able to generate tasks for their self practice by varying the variables in the given task. They may also note interesting observations / patterns, thereby making connections amongst all that they learn during mathematics. After all mathematics is about the study of structures and patterns!

**Teaching Plan**

1. Present the problem to the pupils.
2. Have pupils read the problem individually.
3. Engage the whole class in a discussion and check for comprehension of the data in the problem.
4. If necessary, do a quick review of the basic concepts that may be applicable to the data in the problem.
5. In pairs, ask pupils to do the tasks and generate the "what if" questions and answer them.
6. Ask pupils to present their questions and solutions.
7. Encourage peer evaluation and check for validity of the questions.
8. Ask pupils to share with the class any observations they made.

# What if?



Name: \_\_\_\_\_ Date : \_\_\_\_\_

Class : \_\_\_\_\_ Levels 4 - 6

1

Topic: Fractions

Table-tennis balls

There are 180 table-tennis balls in a box.

$\frac{4}{9}$  of them are yellow and the rest are white.

How many white table-tennis balls are there?

What if there are 189 table-tennis balls?

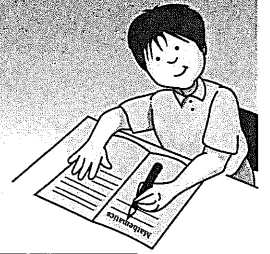
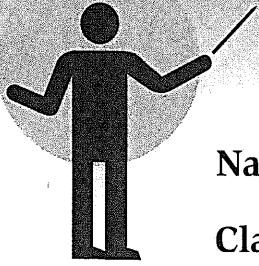
What if  $\frac{2}{3}$  of them are yellow?

Generate another 3 “What if” tasks and answer them.

Look out any interesting observation/pattern.

Created by Abdul Rahman

# What if?



Name: \_\_\_\_\_ Date : \_\_\_\_\_

Class : \_\_\_\_\_ Levels 4 - 6

2

Topic: Whole Numbers

Roses

Rosy bought a bouquet of 16 roses for her mother's birthday.

10 of the roses were red.

What fraction of the roses were not red?

What if 12 of the roses were red?

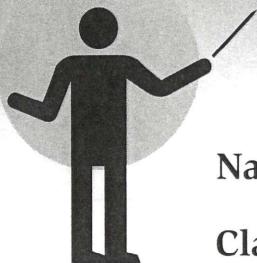
What if Rosy bought a bouquet of 20 roses?

Generate another 3 "What if" tasks and answer them.

Look out for any interesting observation/pattern.

Created by Wan Mohamed & Harry lim

# What if?



Name: \_\_\_\_\_ Date : \_\_\_\_\_

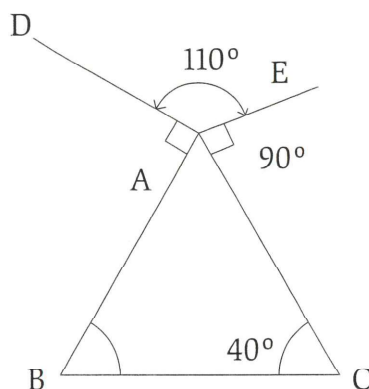
Class : \_\_\_\_\_ Levels 5 - 6

3

Topic: Angles - Problem Solving

Angles

The figure is not drawn to scale.  $\angle BAD$  is a right angle. Find  $\angle ABC$ .



What if  $\angle DAB$  increases to  $120^\circ$  and  $\angle DAE$  as well as  $\angle EAC$  remains the same?

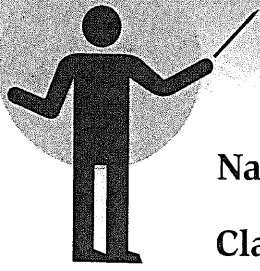
What if  $\angle ACB$  is the same as  $\angle BAC$ ?

What if  $\angle DAE$  decreases to  $90^\circ$  and  $\angle DAB$  and  $\angle EAC$  remains the same?

Generate another 3 "What if" tasks and answer them.

Look out for any interesting observation/pattern.

Adapted from : Shaping Maths (Workbook 5B Part 2, Q3, p9)  
by Tay Ailing & Ang Kailing



# What if?



Name: \_\_\_\_\_

Date : \_\_\_\_\_

Class : \_\_\_\_\_

Levels 5 - 6

4

Topic: Volume

## Depth of water

A rectangular tank, 25 cm long and 20 cm wide, contains water to a depth of 12 cm. If 3 litres of water is added into the tank, what will the new depth of the water be?

What if 4 litres of water is added into the tank?

What if the length of the tank is 30 cm?

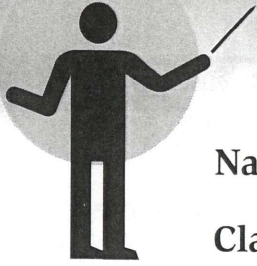
What if the tank is filled with water up to a depth of 15 cm at first?

Generate another 3 "What if" tasks and answer them.

Look out for any interesting observation/pattern.

Adapted from : In Step Math (Workbook 5B Part 2, Q8, p52)  
by Lim Siew Choo & Carmen Fernando

# What if?



Name: \_\_\_\_\_ Date : \_\_\_\_\_

Class : \_\_\_\_\_ Levels 6

5

Topic: Percentage

Price of tyres

A tyre shop is selling a particular brand of tyres at \$68 this month.  
The selling price is 15% lower than the usual price.

What is the usual price?

What if the selling price is \$90 this month?

What if the selling price is 20% higher than the usual price?

What if the selling price is 25% lower than the usual price?

Generate another 3 "What if" tasks and answer them.

Look out for any interesting observation/pattern.

Created by Evelyn Chee



# What's the question if you know the answer?

In "What's the question if you know the answer?" kind of tasks pupils are presented with the context and data of a problem but with the question/s missing. They are given a solution and asked to write a question that matches it. Such tasks provide an opportunity for pupils to engage in critical thinking skills. Whole class discussion must precede individuals working on the task as it is important for pupils to recognize that there may be several questions that have the same answer.

## EXAMPLE 1

Red & white chalk

Mr Lee had 3 boxes of red chalk and 8 boxes of white chalk.  
Each box contained 5 pieces of chalk.

1. What's the question if the answer is 40 ?

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2. What's the question if the answer is 15 ?

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3. What's the question if the answer is 11 ?

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4. What's the question if the answer is 3 : 8 ?

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