Motivating Learning and Catering for Learner Diversity in LAC
(A practical approach)

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Vice-Chairperson of Academic Committee

Vice-Panel Chairperson of Mathematics

P.O.H. 80th Anniversary Tang Ying Hei College

School Background

- S1 (all classes using English to learn Maths),
  S2 to S6 (at least 1 class using English to learn Maths)

- S.1 (1 high ability class, 3 mix-ability classes)

Teaching Activities

- Co-operative Learning
  - Enhances learners' motivation
  - Enhances L&T effectiveness
  - Caters for learners' diversity
  - Enhances students interaction

- Flipped Classroom
  - Promotes self-directed learning

Cooperative Learning

- Promotes student learning and academic achievement
- Increases student satisfaction with their learning experience
- Helps students develop oral skills
- Develops students' social skills
- Promotes student self-esteem
- Promotes positive race relations

Elements of Cooperative Learning

- Positive Interdependence(work as a team)
- Face to Face Interaction
- Individual & Group Accountability
- Interpersonal & Small-group Skills
- Group Processing
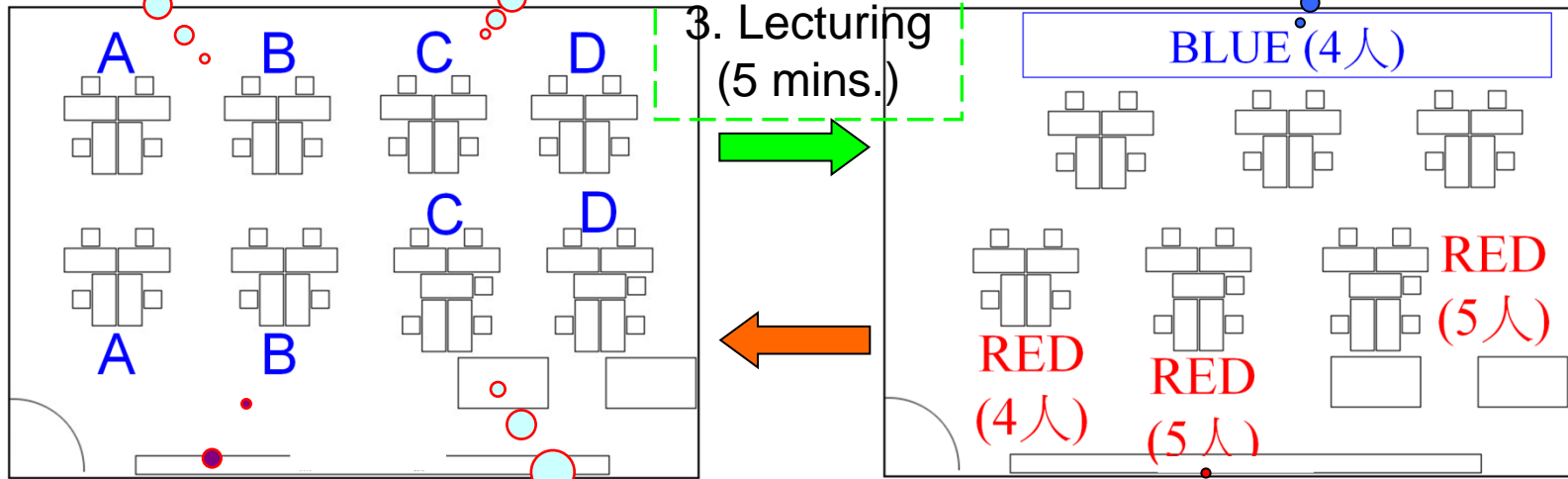
Learning Mathematics through Cooperative Learning

2011-2012 (version 1, traditional style for S.1)

1. Warm-up Task

2. Presentation

3. Lecturing (5 mins.)

4.Expert team learning

A   B   C   D

C   D

A   B

BLUE (4人)

RED (4人)

RED (5人)

RED (5人)

6. Challenge

5. Group Task Combine Red Team and Blue Team learning outcome

4.Expert team learning

# Learning Mathematics through Cooperative Learning

- 2011-2012 (version 1)

- Reflection

  - ✓ Students being engaged in learning (80% of the lesson)

  - ✓ Students developing ownership of learning

  - ✓ Higher learning motivation

  - ✓ Improved social skills

  - ✗ Flow of lessons too complicated

  - ✗ Efficiency (preparation time vs learning outcomes)

Learning Mathematics through Cooperative Learning

- 2012-2013 (version 2, for S.1)

1. Introduction

2. Competition (Learning)

A   B   C   D

C   D

A   B

3. Group Task (Practice, Peer Learning)
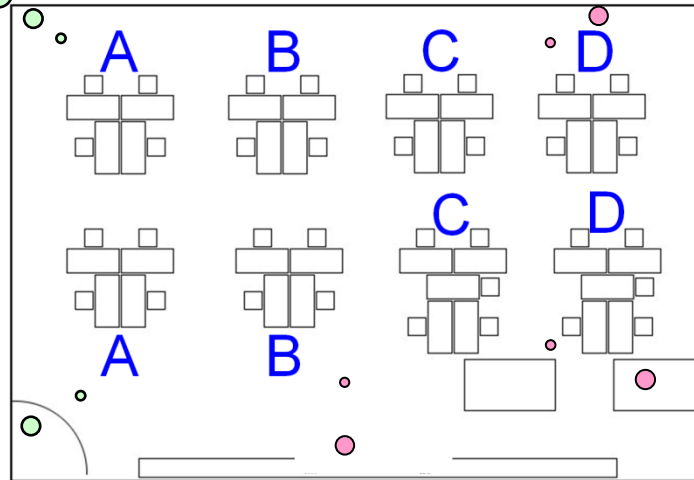
5. Individual Test

4. Presentation

Lesson Plan

Subject : Mathematics

Topic : Solving problems with consecutive numbers by using equation

Class : 1D   Classroom : Room 602   Teacher : Mr. Yip Hoi Kit (YHK)

Date : 2012.11.28 (Wed)   Time : 1000 – 1110 (70 mins)

Teaching Strategy : Cooperative Learning – TGT (Team Game Tournament)

Teaching Flow

Time	Task	X-centre	Remark
1000 - 1005	Sit in each group	Teacher	
1005 - 1010	Introduction	Teacher	
1010 – 1025	Learning the concept of "consecutive" & group activities	Student	
1025 – 1045	Solve advance problem involve concept of "consecutive"	Student	
1045 – 1050	Tournament arrangement	Teacher	
1050 - 1105	Tournament time	Student	
1105 - 1110	Assign homework	Teacher	

Student-centre : 64% of lesson ; Teacher-centre : 36% of lesson

Key concepts/points of the lesson

1. concept of "consecutive" (academic)

2. Classical approach in solving equation involve concept of "consecutive" (academic)

3. Helping each others within the group (Social)

Questions

- Q1 : Two <u>consecutive</u> numbers, if the smaller one is 20, what is the bigger one?

- Q2 : Three <u>consecutive</u> numbers, if the bigger one is 30. The other two numbers are ….

- Q3 : Write down an even number on your board.

- Q4 : Write down two <u>consecutive</u> <u>odd</u> numbers on your board.

Questions

- Q5 : Three <u>consecutive</u> <u>even</u> numbers, if the smaller one is 12. The other two numbers are ....

Question 06

- Two consecutive numbers, if smaller is 11, the bigger number will be 12.

- Two consecutive numbers, if smaller is x, the bigger number is …

Questions

- Q7 : Three consecutive numbers, if the smallest is x, the other two numbers are ....

- Q8 : Two <u>consecutive</u> <u>odd</u> numbers, if the smaller is x, the bigger number is ...

- Q9 : Two <u>consecutive</u> even numbers, if the smaller is x, the bigger number is ...

"consecutive numbers"

Real number ⟶ algebra

+

"odd/even numbers"

Real number ⟶ algebra

⬇
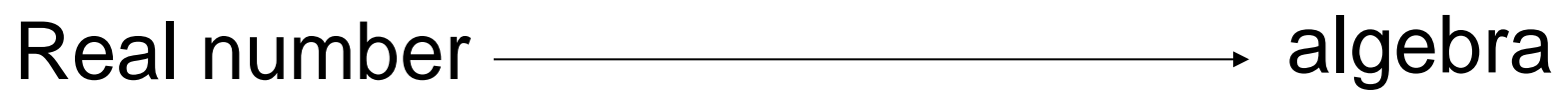
"consecutive odd/even numbers"

⬇

Set up equation

Learning Maths. through C.L.

- 2012-2013 (version 2)
- Reflection
  - ○ ✓ Student being engaged in learning (80% of the lesson)
  - ○ ✓ Students developing ownership of learning
  - ○ ✓ Much higher learning motivation(through competitions)
  - ○ ✓ Catering for learner diversity
  - ○ ✓ Improved social skills
  - ○ ✗ If a learning concept is complicated, it is impossible to learn it through competitions → version 3

Learning Maths. through C.L.

- 2013-2014 (version 3, for S.1)

1 day before

Preparation

Worksheet

1. Peer checking

2. Competition (Learning)

A B C D

C D

A B
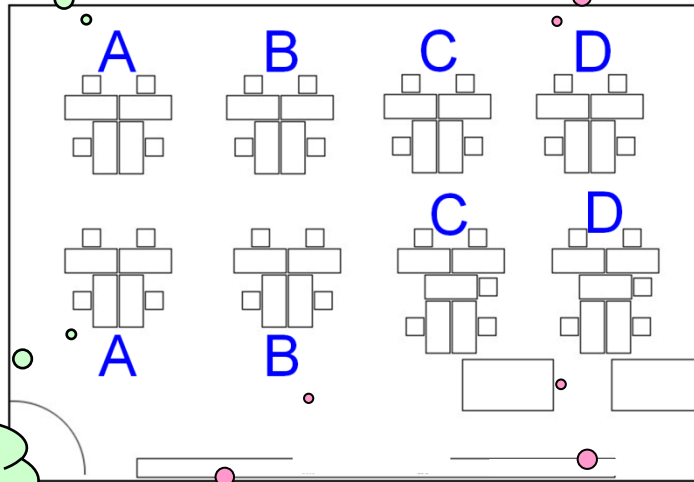
5. Individual Task

4. Multi-Presentation

3. Group Task (Practice, Peer Learning)

Competition

Each Question carries 2 marks
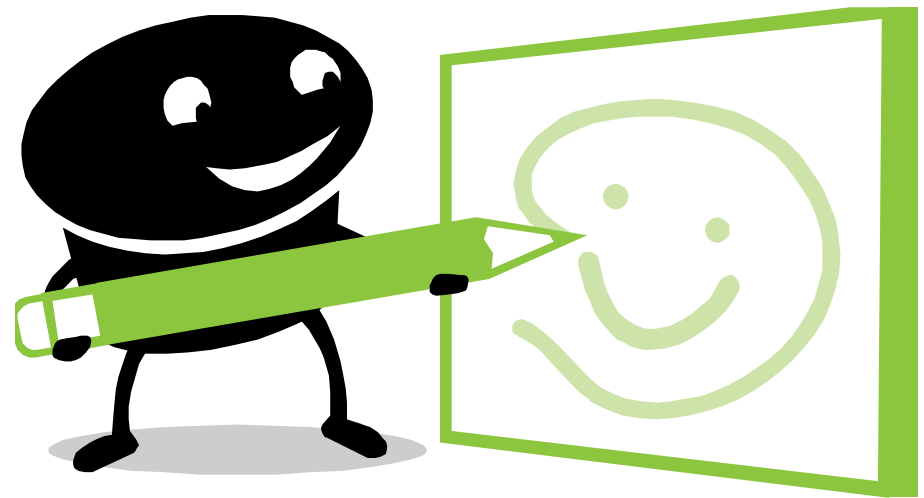
26/02/2014

Question 1

- What is the name of this figure?

4 cm

4 cm

4 cm

4 cm

26/02/2014

Question 2

- What is the name of this figure?

26/02/2014

Question 3

a) What is the name of this figure?

b) Find the area of this figure.

5 m

6 m

26/02/2014

Question 4

a) What is the name of this figure?

b) Find the area of this figure. (in terms of x)

5 cm

x cm

26/02/2014
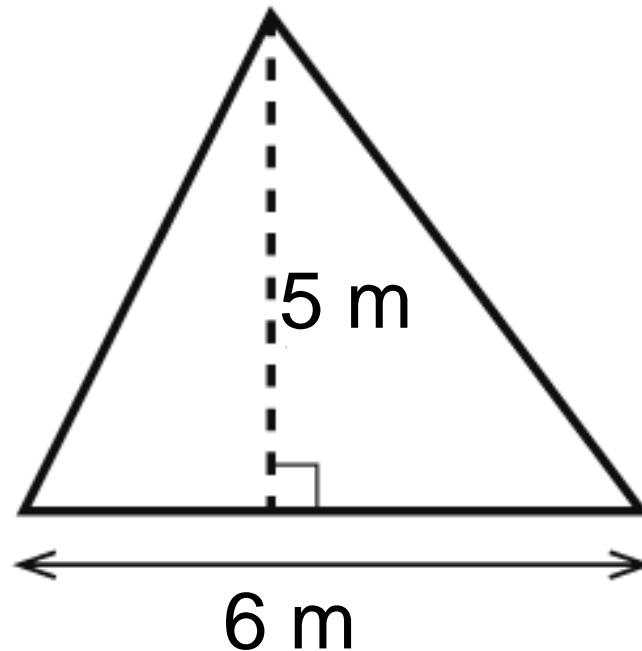
Question 6

a) How will you find the area of this polygon?

b) Find the area of this figure. (in terms of x)

26/02/2014
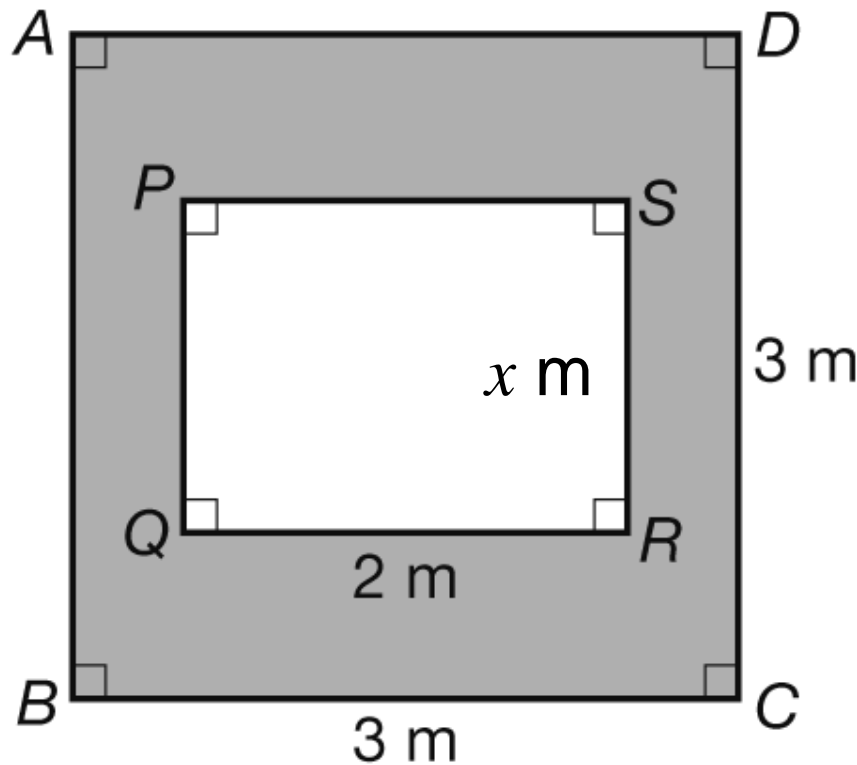
Learning Maths. through C.L.

- 2013-2014 (version 3)
  - Preparation worksheet
    - Revision of Mathematics vocabulary
    - Reading and preparing for the next lesson

  - Competition
    - Presenting Mathematics ideas verbally
    - Improving learning motivation

Learning Maths. through C.L.

- 2013-2014 (version 3)
  - Group Task
    - Peer learning
    - Discussing with others (in English)
    - Social Skills

  - Multi-Presentation
    - Let students show and explain their work
    - Let all students criticize others in a positive environment

Learning Maths. through C.L.

- Role of a teacher
  - A facilitator
  - Maintaining learning motivation
  - Maintaining a positive learning environment
  - Providing enough opportunities for students to use English

Flipped Classroom

DURING

Students practice applying key concepts with feedback.

IN CLASS

BEFORE

Students prepare to participate in class activities

OUT OF CLASS

AFTER

Students check their understanding and their learning
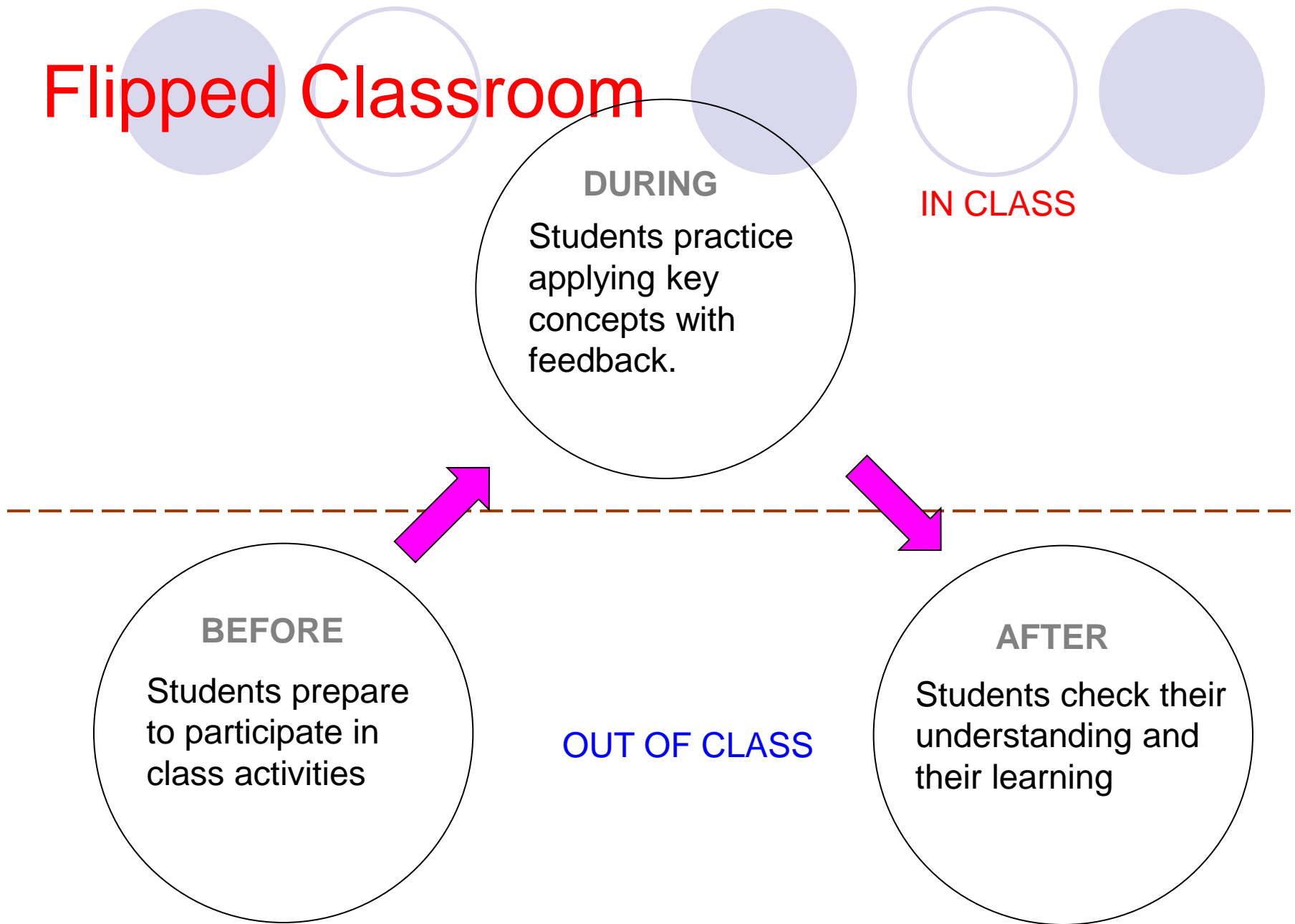
Flipped Classroom vs LAC

- Extended Learning Hours
- Well prepared for learning (language part)
- Catering for learners' diversity
  - Playback, Slow Motion, if needed
- Promoting discussion among students

- *Assisting apps : whatsapp group, Schoology*

Flipped Classroom

DURING

Students practice applying key concepts with feedback.

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Students prepare to participate in class activities

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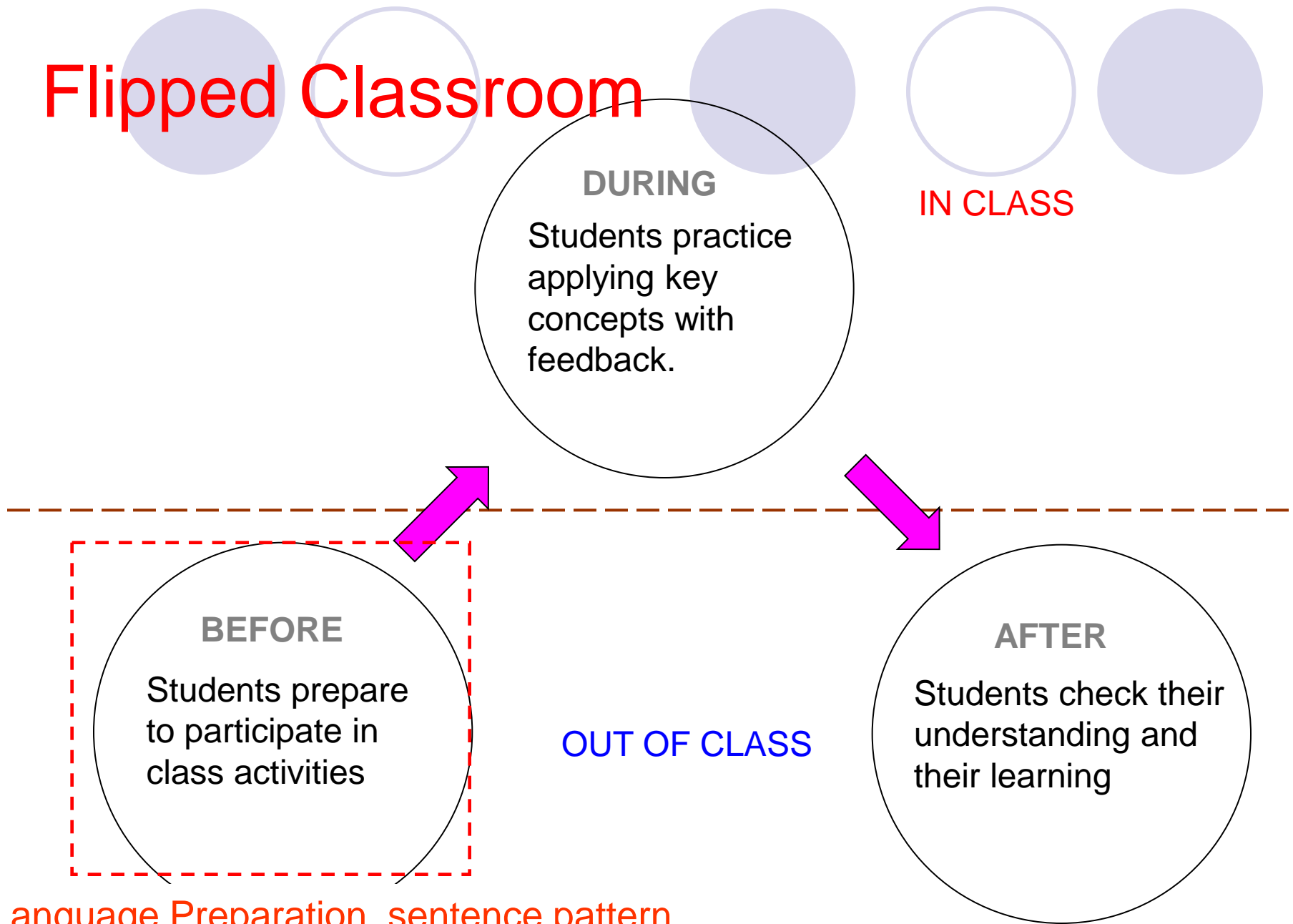
Language Preparation, sentence pattern, try attempting similar questions

Flippe [overlapping text]

(A) Concept of comparative $A > B$

(a) A has $\underline{\$10 \text{ more than}}$ B. If B has $\underline{\$12}$, A has \$ $\underline{12 + 10} = 22$.

(b) A has $\underline{\$15 \text{ more than}}$ B. If B has $\underline{\$13}$, A has \$ _____.

$A > B$

(c) A has $\underline{\$8 \text{ more than}}$ B. If B has \$x, A has \$ $\underline{x + 8}$. (in terms of x)

(d) A has \$10 $\underline{\text{less than}}$ B. If B has \$30, A has \$ _____.

(e) A has \$6 $\underline{\text{less than}}$ B. If B has \$x, A has \$ _____. (in terms of x)

* *

(f) David has $\underline{\$20}$. May has $\underline{3 \text{ times as much money as}}$ David.

May has \$ $\underline{3(20)} = 60$ 20

(g) Jack has $\underline{\$40 \text{ dollars}}$. Eric has $\underline{\text{twice that of}}$ Jack.   twice = 2 times
↑
two

Eric has \$ _____.

(h) Zoe has $\underline{\$x \text{ dollars}}$. Star has $\underline{\text{twice that of}}$ Zoe.   2nd

Star has \$ _____. (in terms of x)
↑

(i) Jimmy's weight is $\underline{5 \text{ kg more}}$ twice times that of Kenny. If Kenny weighs $\underline{30 \text{ kg}}$,
1st ↗
Jimmy's weight will be $\underline{65}$ kg. $2(30) + 5$

(j) Jimmy's weight is $\underline{10\text{kg more}}$ three times that of Kenny. If Kenny weighs x kg,

Jimmy's weight will be _____ kg. (in terms of x)
↑

BE

Stude
to par
class

(A) Concept of comparative

(a) A has $10 more than B. If B has $12, A has $ _12+10=22_

(b) A has $15 more than B. If B has $13, A has $ _13+15=28_

(c) A has $8 more than B. If B has $x, A has $ _$x+8$_ . (in terms of x)

(d) A has $10 less than B. If B has $30, A has $ _30-10=20_

(e) A has $6 less than B. If B has $x, A has $ _$x-6$_ . (in terms of x)

* *

(f) David has $20. May has 3 times as much money as David.

20

May has $ _$3(20)=60$_

(g) Jack has $40 dollars. Eric has twice that of Jack.

Eric has $ _$2(40)=80$_

(h) Zoe has $x dollars. Star has twice that of Zoe.

Star has $ _$2x$_ . (in terms of x)

(i) Jimmy's weight is 5 kg more twice times that of Kenny. If Kenny weighs 30 kg,

Jimmy's weight will be _$2(30)+5=65$_ kg.

(j) Jimmy's weight is 10kg more three times that of Kenny. If Kenny weighs x kg,

Jimmy's weight will be _$3x+10$_ kg. (in terms of x)

(A) Concept of comparative

$A > B$

(a) A has $\underline{\$10\ more\ than}$ B. If B has \$12, A has \$ $\underline{12+10=22}$.

(b) A has $\underline{\$15\ more\ than}$ B. If B has \$13, A has \$ $\underline{15+13=28}$.

$A > B$

(c) A has $\underline{\$8\ more\ than}$ B. If B has \$x, A has \$ $\underline{x+8}$. (in terms of x)

$A < B$

(d) A has $\underline{\$10\ less\ than}$ B. If B has \$30, A has \$ $\underline{30-10=20}$.

$A < xB$

(e) A has $\underline{\$6\ less\ than}$ B. If B has \$x, A has \$ $\underline{6-x}$. (in terms of x)

$x - 6$

* *

(f) David has \$20. May has $\underline{3\ times\ as\ much\ money\ as}$ David.

May has \$ $\underline{3(20)=60}$.

(g) Jack has \$40 dollars. Eric has twice that of Jack.

Eric has \$ $\underline{40(2)=80}$.

(h) Zoe has \$x dollars. Star has twice that of Zoe.

$$2x + 19 \qquad 2x \quad x$$

(B) Word problem related to comparative

1. Samuel's weight is <u>19 kg more than</u> <u>twice that of his daughter.</u> If he weighs 71 kg, find the weight of his daughter.

Let x be the weight of his daughter.

$$2x + 19 = 71$$

The weight of his daughter is......

3. John's money is less than twice that of Mary by $38. If John has $140, find the amount Mary has.

$$2x-38 \qquad 2x \qquad x$$

Let x be the amount of Mary has.

$$2x-38 = 140$$
$$2x = 140+38$$
$$2x = 178$$
$$x = \frac{178}{2}$$
$$x = 89$$

The amount of Mary has 89.

Flipped Cl

Discuss some harder examples in the lesson

DURING

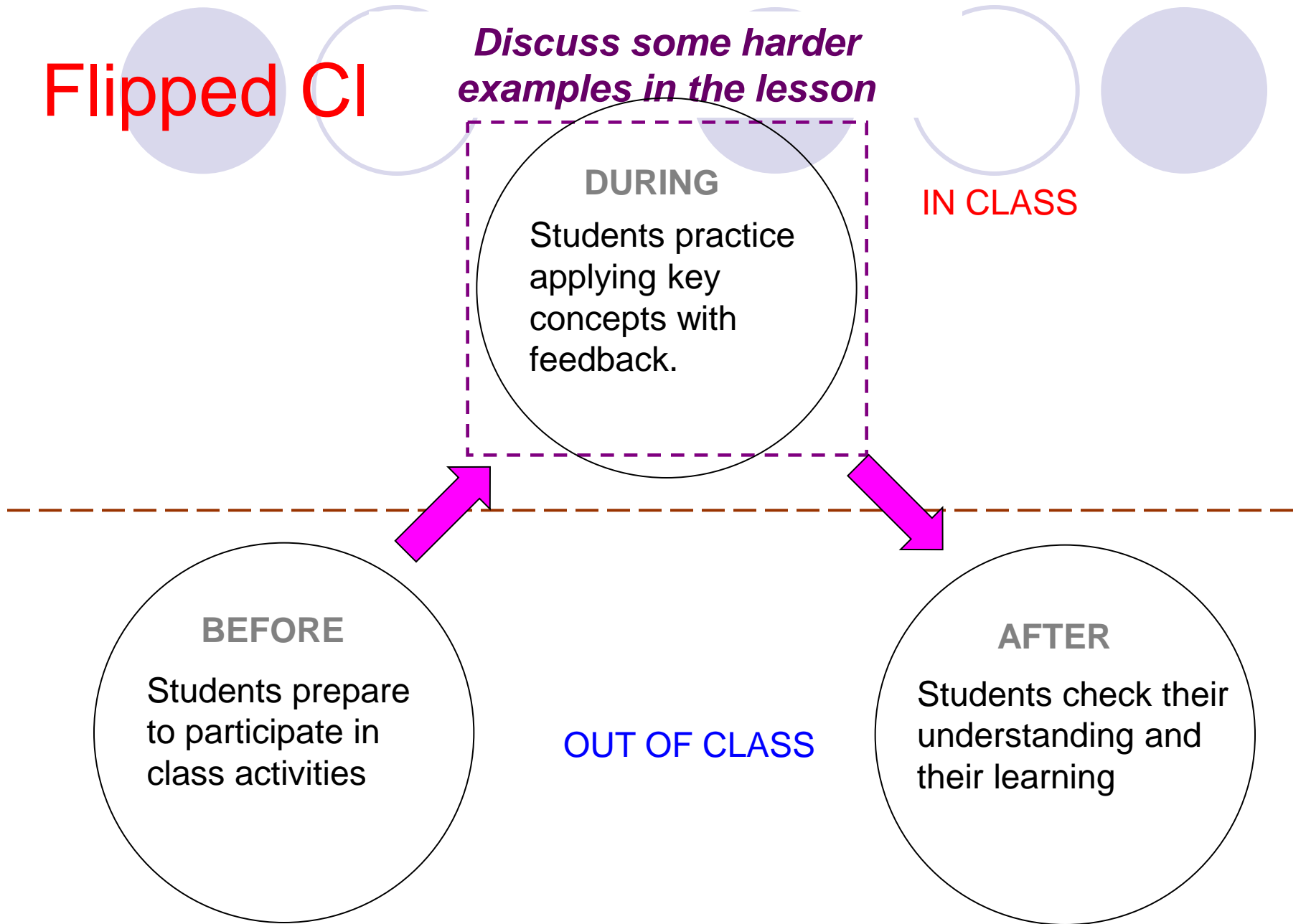Students practice applying key concepts with feedback.

IN CLASS

BEFORE

Students prepare to participate in class activities

OUT OF CLASS

AFTER

Students check their understanding and their learning

5. Mandy has pocket money $x. Clare has pocket money $47, which is $10 less than three times Mandy's amount. Set up an equation to find the value of x. [modified from 2009-MC2-Q.7]

x

$$3x - 10 = 47$$
$$3x = 47 + 10$$
$$\frac{3x}{3} = \frac{57}{3}$$
$$x = \frac{57}{3}$$
$$x = \$19,$$

Mandy has pocket money $19 ow much

Flipped Classroom

6. Mary and Sam have a total of $320, and Mary has 3 times as much money as Sam. money does Sam have?

Let x be the money does Sam have.
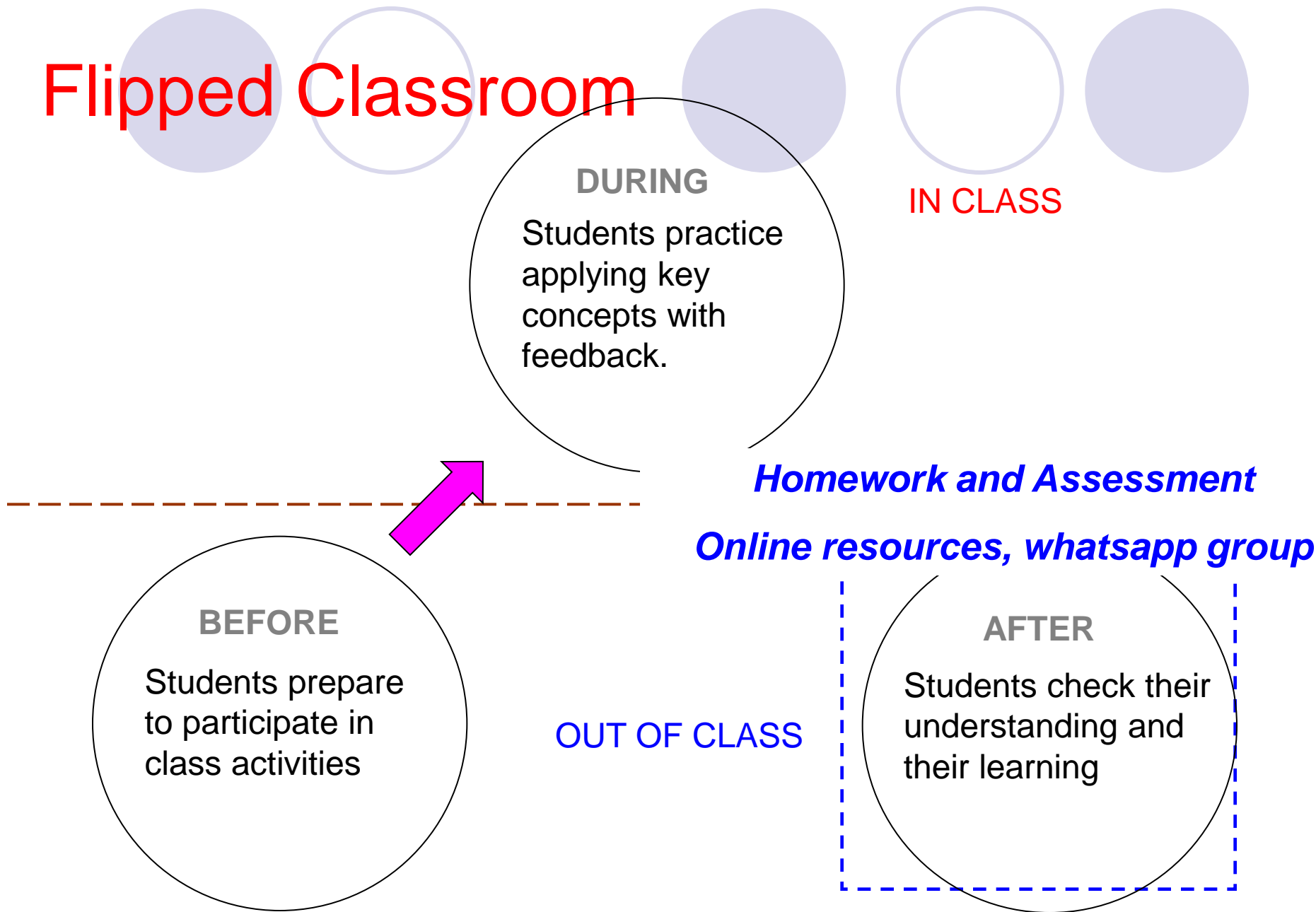
$$3x + x = 320$$
$$4x = 320$$
$$x = \frac{320}{4}$$
$$x = 80$$

∴ Sam ~~have~~ $80.

has

Flipped Classroom

DURING

Students practice applying key concepts with feedback.

IN CLASS

Homework and Assessment

Online resources, whatsapp group

BEFORE

Students prepare to participate in class activities

OUT OF CLASS

AFTER

Students check their understanding and their learning

Challenges in LAC

- School Level
  - Ability of student intake
  - Consensus among colleagues. Example: the number of classes adopting English as the medium of instruction or Chinese as the medium of instruction
  - School Development Learning.
- Subject Level
  - Teachers' readiness to teach in English
  - Optimization of syllabus?
  - Trade off between subject performance and English ability
- Classroom\Student Level
  - Implementation by teachers
  - Ability or confidence to present ideas by Ss and Ts