

Teaching sentence level comprehension using grammar in word problems

Rebecca Yeo and Siti Aishah



DYSLEXIA ASSOCIATION OF SINGAPORE

HELPING DYSLEXIC PEOPLE ACHIEVE

About Us



Siti Aishah Shukri



Rebecca Yeo

- Senior Educational Therapists
- More than 5 yrs of experience teaching literacy and maths to students with dyslexia.

The DAS Family



**DYSLEXIA ASSOCIATION
OF SINGAPORE**
HELPING DYSLEXIC PEOPLE ACHIEVE

- MAP Literacy
- MAP Assessments
- Specialised Educational Services



DAS Academy
ENABLING EXCELLENCE



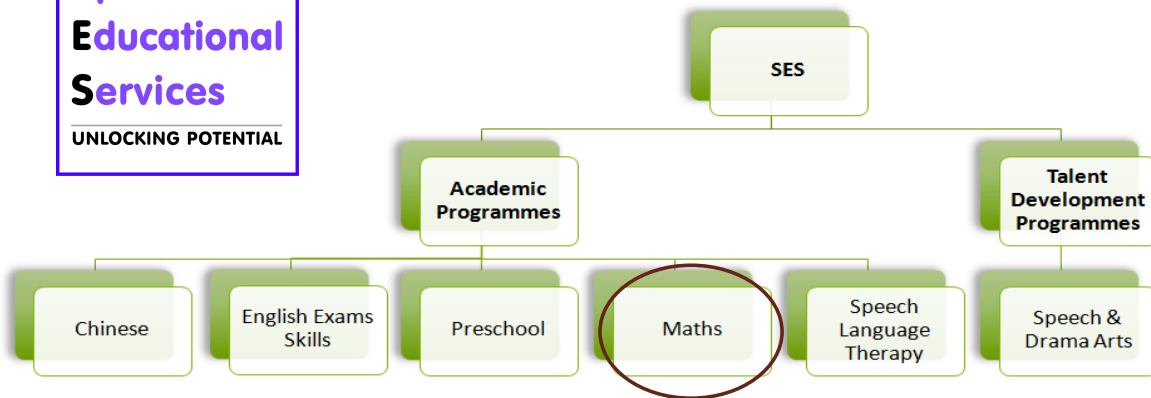
DAS International
EMPOWERING SUCCESSFUL LEARNING



**DYSLEXIA ASSOCIATION
OF SINGAPORE**
HELPING DYSLEXIC PEOPLE ACHIEVE

Specialised Educational Services

UNLOCKING POTENTIAL



**DYSLEXIA ASSOCIATION
OF SINGAPORE**
HELPING DYSLEXIC PEOPLE ACHIEVE

Services of DAS International

- Specialist Tutoring
- Psycho-educational Assessments



Ms Anaberta Oehlers-Jaen
Director, DAS International

Profile of our Maths students

- ❑ Students with dyslexia who have maths difficulties
- ❑ Primary 1 to Primary 6
- ❑ English as a second language



Amelia Teng ✉

SINGAPORE - Singapore students are the world's best in mathematics and science, according to a global benchmarking study released on Tuesday (Nov 29).

Primary 4 pupils and Secondary 2 students here topped both subjects in the Trends in International Mathematics and Science Study (TIMSS), a widely recognised achievement test by policymakers and educators worldwide.

Around 12,600 students here took part in the latest test which was conducted in Singapore in October 2014. Students across all schools - 179 primary schools and 167 secondary schools - as well as streams were included in the sample.

Tang, A. (2016, November 29). Singapore students top global achievement test in mathematics and science. *The Straits Times*. Retrieved from <http://www.straitstimes.com/singapore/education/singapore-students-top-global-achievement-test-in-mathematics-and-science>

Top five performers in Timss 2015

Grade 4 Mathematics

Education system	Mean score
Singapore	618
Hong Kong	615
South Korea	608
Chinese Taipei	597
Japan	593

Grade 8 Mathematics

Education system	Mean score
Singapore	621
South Korea	606
Chinese Taipei	599
Hong Kong	594
Japan	586

Tang, A. (2016, November 29). Singapore students top global achievement test in mathematics and science. *The Straits Times*. Retrieved from <http://www.straitstimes.com/singapore/education/singapore-students-top-global-achievement-test-in-mathematics-and-science>

What is a word problem?

Mobile Telephone

Kate was going to buy a new Supertext mobile phone.

She looked at these two advertisements.

Company X	Company Y
The New Supertext Mobile Phone Get this great phone free!	The New Supertext Mobile Phone Cheap rates for calls and texts!
250 zeds monthly charge Calls 3 zeds per minute Text messages 2 zeds each	Buy the phone for 2500 zeds Only 50 zeds monthly charge Calls only 2 zeds per minute Text messages only 1 zed each

Kate decided to compare how much it would cost to have the phone for a year without making any calls or sending any text messages.

A. Work out the cost of having the Supertext phone for a year from Company X and from Company Y.

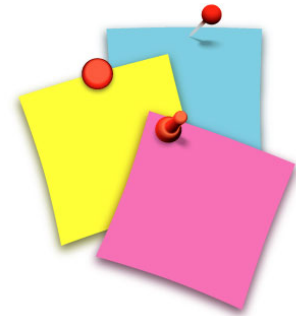
Tang, A. (2016, November 29). Singapore students top global achievement test in mathematics and science. *The Straits Times*. Retrieved from <http://www.straitstimes.com/singapore/education/singapore-students-top-global-achievement-test-in-mathematics-and-science>

Learning objectives

By the end of this session, you will be able to:

1. Explain why some students have difficulties with understanding word problems
2. Teach students to make meaning out of words problems by:
 - (A) identifying different types of sentences in word problems
 - (B) making annotations of pronouns and their references

Activity 1: Gallery Walk



Using the post-its, write down the skills/process
needed in solving
word problems.

Skills/Processes needed in problem solving

Decoding skills

Reading comprehension
skills

Identifying key points
from the statements

Transform textual
information into a
mathematical model

Retrieving relevant
knowledge and facts
from long-term memory

Ability to monitor and
control their thinking
(metacognition)

All these tax the....



Working memory

The process of problem solving

- Most models of problem solving agree that individuals undergo the following phases when solving maths problems:
 1. Read and Understand the problem
 2. Transform textual info into a schematic representation
 3. Carry out mathematical procedures
 4. Encode answer
 5. Check the solution.

At which stage do you think
our students will fumble in?

Why can read but cannot understand?

- According to the Simple View of reading (Gough & Turner, 1986), students need to have good decoding and language comprehension skills to achieve reading comprehension.
- Language comprehension depends on:
 - Ability to process grammar (at the sentence level) AND receptive vocabulary

What can we do?

- Explicitly teach components of grammar in the context of word problems.
- Instil awareness of different types of sentences within a word problem.
- Check students' understanding of vocabulary terms and context within the word problem.

Types of statements in word problems

Statement type	Explanation	Example	Subtypes
1. Tell	Sentence that gives information.	There were 3000 students in a school.	Passive tell
		40% of the students are boys.	Active tell
2. Compare	Sentence that contains a comparison term	There were 250 <u>more</u> boys <u>than</u> girls in the school.	Additive compare
		There were twice as many red pens as blue pens.	Multiplicative compare

Practice: Tell or Compare?

- Sort the statements into “tell” statements or “compare” statements.
- Highlight the clue words for “compare” statements.
- Check your answers with your friends.



Tell or Compare

- A "tell" statement gives you information about the problem.
- A "compare" statement compares the subjects in the problem.

Classify the sentences.

Put "T" if it is a telling statement and "C" if it is a compare statement.

Highlight the comparison terms.

Statement	Tell or Compare
1. There were 3000 people at a concert.	T ✓
2. There were 3 times as many adults as girls.	C ✓
3. There were 120 more boys than girls.	C ✓
4. There are 1450 beads in three boxes: A, B and C.	T ✓
5. Box A has 4 times as many beads as Box B.	C ✓
6. Box B contains 208 fewer beads than Box C.	C ✓

Grade 5
student

Types of statements in word problems

Sentence type	Explanation	Example
3. Combine	Sentence that implies putting things together.	How many pupils were there altogether ?
4. Change	Sentence that involves before and after concept.	If 200 pupils graduated from the school, how many pupils are there left?
5. Question	Statement that asks for something; ends with a question mark.	How many pupils were there in the school?

Why is this important?

- Train students to read and analyze the problem sentence by sentence.
- A useful skill for them before they move on to annotating the statements within the word problem.

Two kinds of compare statements

Additive compare (AC)

- Uses compare words that mean “more than” or “less than” a certain amount.
- Example:
Joshua has \$7 **more than** Sally.

Multiplicative compare (MC)

- Uses words that require you to repeat a unit group.
- Example:
Gideon ate **twice as many** cookies as Victor.

Two kinds of compare statements

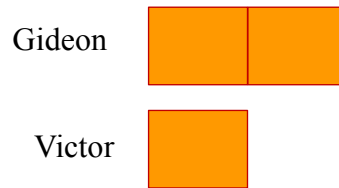
Additive compare (AC)

- Example:
Joshua has \$7 **more than** Sally.



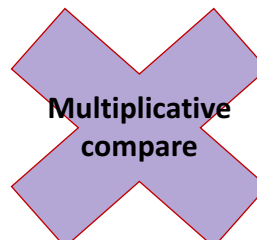
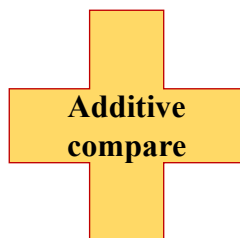
Multiplicative compare (MC)

- Example:
Gideon ate **twice as many** cookies as Victor.



Group practice

Identify the types of compare statements in the given word problems.



Additive Compare or Multiplicative Compare

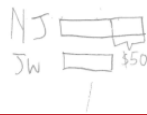
- An "additive compare" statement uses compare words that mean "more than" or "less than" a certain amount.
- A "multiplicative compare" statement uses words that require you to repeat the unit a number of times (e.g. twice as many).

Classify the sentences.

Put "AC" if it is an "additive compare" statement and "MC" if it is a "multiplicative compare" statement. Highlight the comparison terms.

Statement	Tell or Compare
1. The capacity of a tin is twice that of a bottle.	MC ✓
2. Sally's mother gave her another \$9.70.	AC ✓
3. Tina is 4 times as old as Fred.	MC ✓
4. Larry paid \$90 more for the jacket than the T-shirt.	AC ✓

Additive model



Multiplicative model



Grade 5
student

Multiplicative stack model

Your turn:

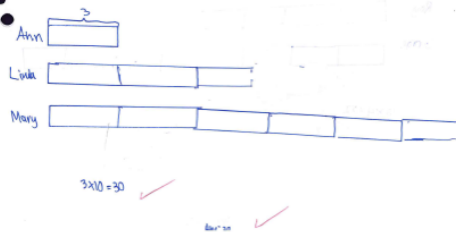
Step 1:

Mary has twice as many stamps as Linda.	MC ✓
Linda has thrice as many stamps as Ann.	MC ✓
Ann has 3 stamps.	T ✓
How many money do the three girls have altogether?	Q ✓

Step 2: Circle the model you would draw

Additive compare ☐ Multiplicative compare (stack) ☒

Step 3: Draw your model. Begin from the "T" statement.



Multiplicative stack model

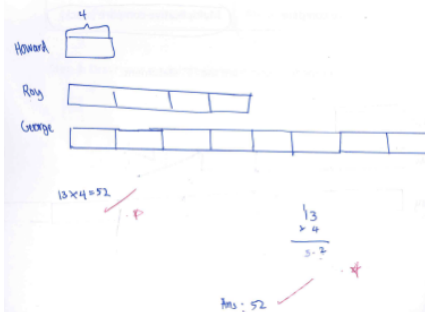
(T) (ML)
Howard has 4 pens. Roy has 4 times as many pens as Howard.

(ML) (Q)
George has twice as many pens as Roy. How many pens do the three boys have altogether?

Step 2: Circle the model you would draw

Additive compare ☐ Multiplicative compare (stack) ☒

Step 3: Draw your model. Begin from the "T" statement.



Part 2: Making Annotations of Pronouns and their references

Annotation helps build good reading skills for

- students who struggle with processing multi step problems
- students with low active-working memory

Underlining and highlighting directions before they start to solve the word problems will help them to 'walk' or 'talk' through their thought processes. Writing everything down may help them to improve on their understanding and accuracy as it facilitates the amount of information they are able to remember .

But do they know what to annotate?

Why learn pronouns?

Knowledge of pronouns is crucial as they are used extensively in word problems



Pronouns are often used to refer to a noun that has already been mentioned

This helps in **referencing** of word problems



Key Comprehension Strategy

Activity 2: Let's sort things out...

Sort the pronoun cards into two groups
Can you tell us why you have grouped them as such?

Let's add more cards in. Match the new cards to the pronouns.



Types of pronouns

Singular Pronouns	Plural Pronouns
he/she/her/his/him (for people)	they (for people/animals)
It (for an animal/a thing/an activity)	these/those (for things/situations)
this/that (for things or situations)	them (for people)
Each (every or per person)	few (more than one)

Backward referencing

John has 45 Pokemon cards. He has three times as many cards as Sue.
How many cards do they have altogether?

John has 45 Pokemon cards	
<u>He</u> has three times as many cards as Sue.	
How many cards do they have altogether?	

What does 'he' refers to?

'He' refers to _____.

Step by step instructions

Step 1

Look for the given pronoun in the passage.

Step 2

Read the sentence before the pronoun to understand the context

Step 3

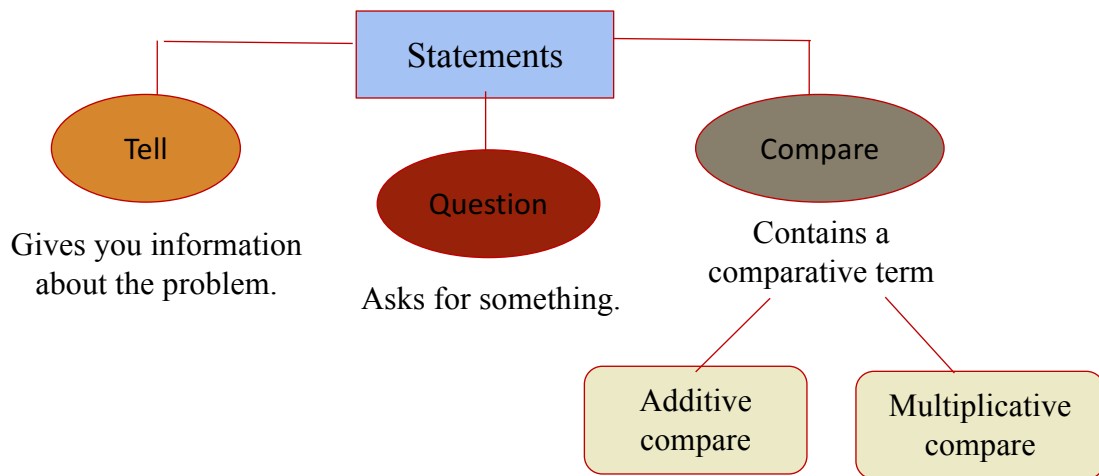
Find a word or group of words that can replace the pronoun in the sentence

Individual Practice

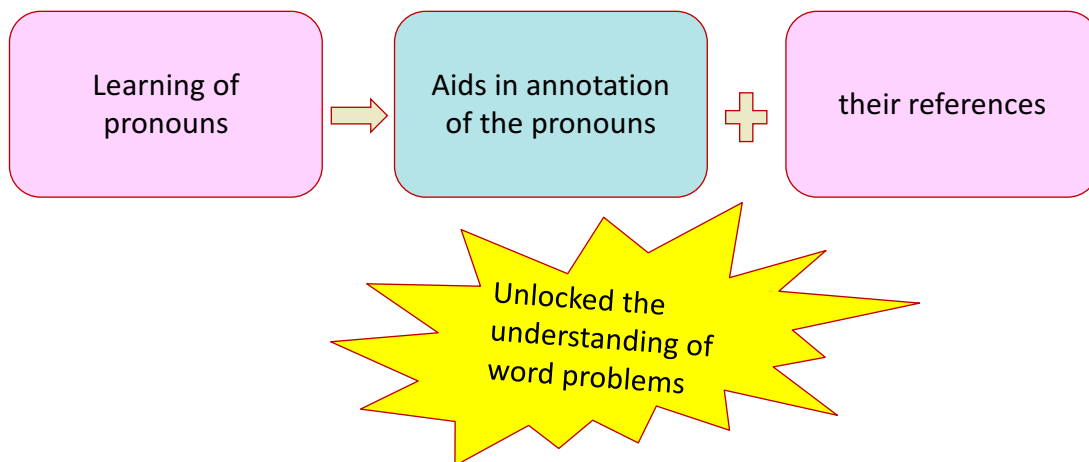
Answer what each of the pronouns refer to in the worksheets.



Summary



Summary



Final practice

(T)

(MC)

Taro buys a bowl of ramen. It costs thrice as much as a sushi set.

(Q)

If the bowl of ramen is \$15, how much was the sushi set?

Final practice

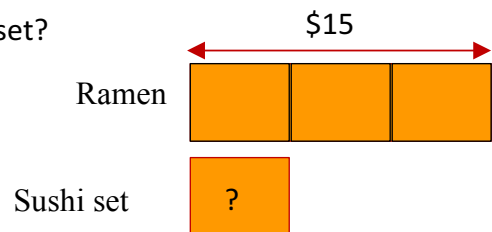
(T)

3X (MC)

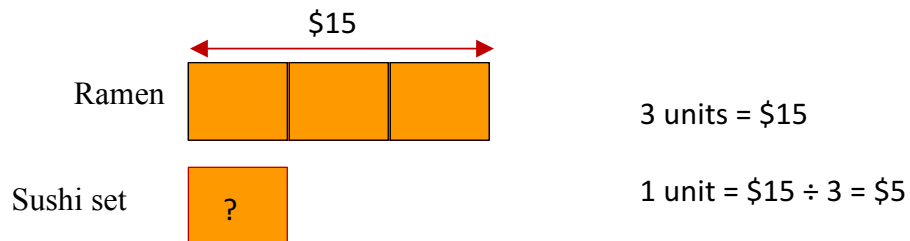
Taro buys a bowl of ramen. It costs thrice as much as a sushi set.

(Q)

If the bowl of ramen is \$15, how much was the sushi set?



Final practice



The sushi set costs \$5.



rebecca@das.org.sg

ありがとう
Thank You!



siti.aishah@das.org.sg

Resources

Asian Pacific Journal of Developmental Differences (APJDD)

- <https://www.das.org.sg/publications/research-journal>

DAS Handbook

- <https://www.das.org.sg/publications/das-handbook>

