以文字題優化解方程的學習

Enhance the Learning of Equation Solving with Word Problems

How variable(s) is introduced

- Introduce the symbol "x"
- as unknown or variable
- Use of real objects to support student grasping new idea
- Use

$$7x \text{ to represent } 7 \times x$$

$$\frac{x}{4} \text{ to represent } x \div 4$$

How Solving Equation is taught

- Operation by operation
- Making x as the single variable on left hand side by
  - Inversion operation on both sides
  - Keeping equality
- Logical !
- NOT natural to some students
- Word Problem is essential to be introduced side by side with equation solving operations/skills

Word Problem

- Scenario
  - Making meaning for all the operations
  - Easier to explain / to understanding
- Draw students' attention
- Increase motivation

Example: Solve $3x = 12$
Which way is more natural?

- How much is x to make

$$3x = 12$$

Divided both sides by 3

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

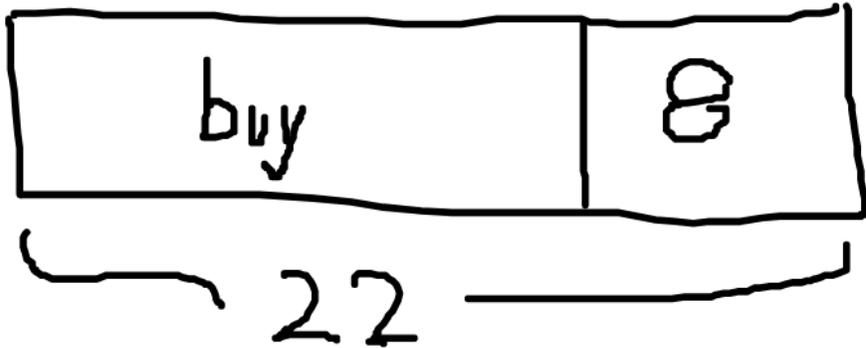- I paid 12 dollars to buy 3 apples, how much does an apple cost?

$$3x = 12$$

$$\frac{3x}{3} = \frac{12}{3} \quad \text{(one apple cost)}$$

$$x = 4$$

Basic Equation Solving Skills by Examples & Bar Models (1)

Rabbit Benny buys a few pieces of candy and now he has 22 pieces. If he has 8 pieces of candies before he buys, how many pieces does he buy?

buy | 8

22

Candy bought + 8 is 22

Candy bought is (22 - 8)
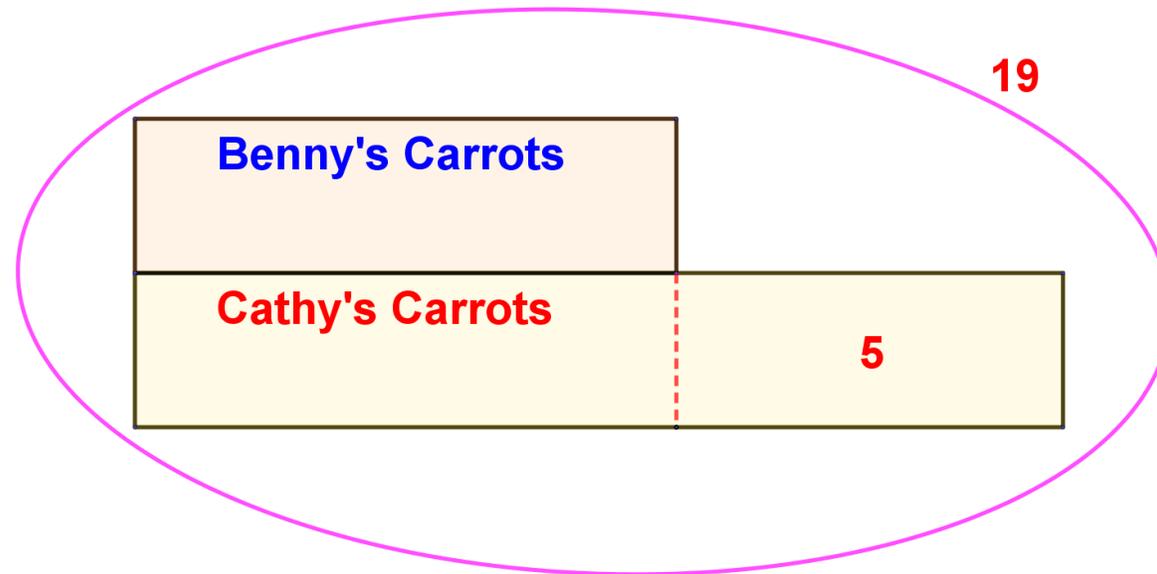
Candies bought is 14

$$x + 8 = 22$$

$$x = 22 - 8$$

$$x = 14$$

Basic Equation Solving Skills by Examples & Bar Models (2)

Rabbit Benny has some carrots. Rabbit Cathy has 5 more carrots than Benny. They have 19 carrots in total. How many carrots does Rabbit Benny have?

Logical vs Symbolic approach

- Give a problem
- Solve it by a sequence of logical deductive steps in words
- In parallel, show a sequence of equation solving steps

3 apples and a pack of candy ($10) cost $34

If we didn't buy candy, 3 apples cost ($34 - $10)

One apple costs

$$3x + 10 = 34$$
$$3x = 34 - 10$$
$$3x = 24$$
$$x = \frac{24}{3}$$
$$x = 8$$

Scenario

- Story

- Relation(s)
  - Formulae
  - Relationship between entities

- Different candidates to be assigned as **unknowns**

- A platform to explain, thus making sense of, the equation and related solving operations

I will win again in the coming race

No Way

The Race between the Hare and the Tortoise
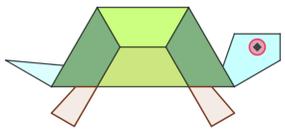https://padlet.com/samueltamchileung/nmycxcr09iwl

- Make scenario(s) based on the famous story to introduce simple equation
  - What is equation
  - Equation and expression / formulae
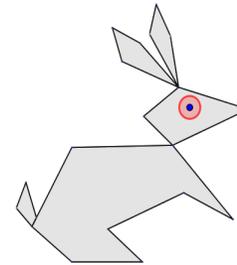 - Making sense of the solving procedure(s)
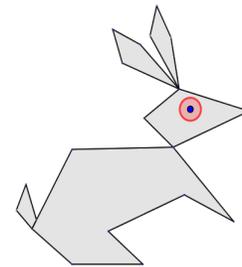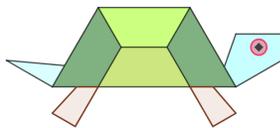
Question(s)

After 10 minutes, how far is the hare from the "finish line"?

How long does it take for the hare to complete a 15km race?

My speed is 60 km/h

I can travel 6 km in 20 hours