

FRACTIONS

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FINDINGS IN BASELINE TEST

8 Share a bar of chocolate equally among 5 children.

What fraction of the chocolate bar does each child get?

$$\frac{\square}{\square}$$


(42%, 67%, 80%), (3%, 6%, 7%)

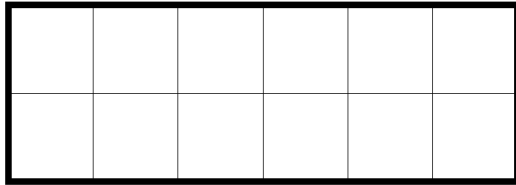
11 Fill in the blanks.



(a) $\frac{1}{5}$ of 15 is (40%, 35%, 72%), (5%, 8%, 2%)

(b) $\frac{3}{5}$ of 15 is (23%, 26%, 67%), (5%, 10%, 4%)

9 Shade two-thirds of this rectangle. (29%, 41%, 57%), (5%, 5%, 0%)



- 3N6 Fractions(I): Develop the concept of fractions as a part of one whole and a part of a set of objects
- 分數 (一): 認識分數作為整體的部分及一組物件的部分。

WHY FRACTION IS SO DIFFICULT?

- What does it mean by $\frac{1}{4}$?
- Different meanings of fractions:
 - Part-whole relationship (a part of a whole)
 - Unit fraction (as a basic unit)
 - Dividing (part of a set of objects)
 - Representation of numbers (on a number line)
 - Idea of ratios

WHY FRACTION IS SO DIFFICULT?

- Some common mistakes of students
- $\frac{1}{2} + \frac{2}{3} = \frac{1+2}{2+3}$
- $\frac{1}{2} \div \frac{2}{3} = \frac{2}{1} \div \frac{3}{2}$
- $2 \times \frac{1}{3} = \frac{2 \times 1}{2 \times 3}$
- $\frac{11}{9} = 1\frac{1}{9}$
- Peter has 6 candies. He gives one-thirds of his candies to John. How many candies does Peter have at the end?
- $6 - \frac{1}{3}$

PROCEDURAL UNDERSTANDING VS CONCEPTUAL UNDERSTANDING

- When students learn without conceptual understanding, they memorize different procedures / algorithms.
- Since there are many different meaning of fractions and many different procedures in the fraction operation, students get mixed up when everything comes together.
- In the delivery of the concept of fraction, some teachers explain a lot. However, students sometimes do not follows teachers' line of thoughts.

USING TOOLS

- Part-whole (Halving paper, cutting shapes - pizza, folding paper, shading shapes)
- Unit fraction (Counting of same unit fraction, fraction bar, number lines, fraction stripes)
- Multiplication (Grid boxes)
- Division (fraction bars)

TOOLS, TALK, TASKS

- Tools:
 - Square paper, stripes with equal division, pizza, fraction slides, grid boxes, fraction bar, virtual tools, etc.
 - Can the tools become students' tools?
- Talk:
 - Students' talk (verbal, written works or drawing)
 - Are students allowed to talk or to express their ideas?
- Tasks:
 - Learning tasks, exploring tasks, ...
 - Are students doing repetitive task (e.g. drilling exercises only)?

SOME EXAMPLES

- Meaning of Unit Fractions

<https://www.illustrativemathematics.org/progressions>

(A fraction can be built from copies of unit fractions.)

- Using number line and fraction stripes to show equivalent fraction

<http://www.doe.mass.edu/frameworks/math/2017-06qrg-fractions.pdf>

(number lines, fraction stripes, fraction slides can be used)

- MALATI Fractions materials

<http://academic.sun.ac.za/mathed/malati/Fractionsd.htm>

MULTIPLICATION OF FRACTIONS

- Models in mind

<https://nrich.maths.org/8348>

Using array model (or area model) to explain the meaning of multiplication of fraction

DIVISION OF FRACTIONS

- Two methods – Common denominators, Invert

<https://www.youtube.com/watch?v=tBxPYosbyVWw>

- Explaining why the division of fraction is the same as the division of integers with the common denominators method.

$$\frac{2}{3} \div \frac{1}{5} = \frac{10}{15} \div \frac{3}{15} = 10 \div 3 = \frac{10}{3} = 3\frac{1}{3}$$

- Using fraction bars to explain division of fraction is the same as the multiplication of its reciprocal.

$$\frac{2}{3} \div \frac{1}{5} = \frac{2}{3} \times 5 = \frac{10}{3} = 3\frac{1}{3}$$

BASELINE TEST QUESTIONS

- What is a whole?
- What is the unit fraction?
- What does it mean by a third a rectangle?
- What does it mean by $\frac{1}{5}$ as part of a set of objects?

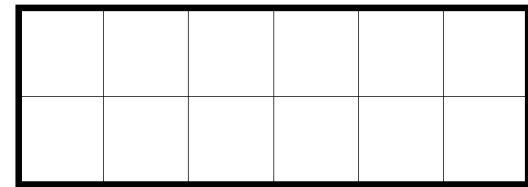
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TOOLS, TALK, TASKS

- Tools
 - Allow students to play with the tools
 - Allow students to use different tools
 - Linking the tools to the mathematics concepts and mathematics representation
- Talk
 - Allow students to express their thoughts (verbal, written works and drawings)
 - Guiding students to express with key mathematics terminologies.
- Tasks
 - building up from students' prior knowledge
 - linking up different mathematics concepts
 - contains open-ended questions

RESOURCES

<p>「以行求知」研討會 / 經驗分享會系列</p> <p>建構分數乘法的概念</p> <p>從分數除法的理解到應用</p>	<p>http://www.edb.gov.hk/tc/edu-system/primary-secondary/applicable-to-primary-secondary/sbss/school-based-curriculum-primary/professional-sharing/journey-ss/index.html</p> <p>http://cdl.edb.hkedcity.net/cd/sbcdp/seminar/2007/attachment/tc/m05.ppt</p> <p>http://cdl.edb.hkedcity.net/cd/sbcdp/seminar/2007/attachment/tc/m08.ppt</p>
<p>GeoGebra Institute of Hong Kong (GIHK)</p>	<p>http://www.geogebra.org.hk/materials/ks2/n</p>
<p>MALATI Materials (from South Africa) GET MATLATI MATERIALS → By downloading it from this site → Fractions</p>	<p>http://academic.sun.ac.za/mathed/malati/</p>
<p>Illustrative Mathematics Fractions Progression Model</p>	<p>https://www.illustrativemathematics.org/progressions</p>