Developing Conceptual Understanding of Number

Set C: Representing Numbers

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Representing Numbers 1

Vocabulary

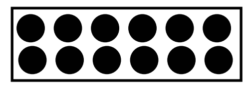
- represent
- symbols
- operations
- diagrams
- percent
- fraction

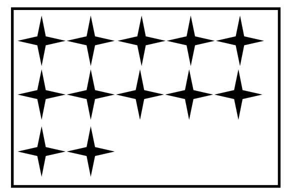
Notes

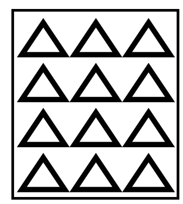
- For #1:
  - "deux" is the French word for 2
  - "niso" is the Cree word for 2
  - "douze" is the French word for 12.
  - "mitatith nisosap" is the Cree word for 12.
- Students should be encouraged to provide words from other languages.
- For #1, students could create a poster.

Answers

1. Possible Answers:
   - One dozen
   - One ten and 2 ones
   - Twelve
   - douze
   - mitatith nisosap
   - 6 + 6
   - 14 – 2
   - 6 × 2
   - 24 ÷ 2
   - XII
   - 𝍸 𝍸 ||
   - …







2. a) 50%
   b) 100%
   c) 25%
   d) 75%

3. a) $\frac{1}{4}$

   b) $\frac{2}{4}$ or $\frac{1}{2}$

   c) $\frac{5}{8}$

Representing Numbers 1

1. Numbers can be represented in different ways. For example, “two" can be shown using :

– Words:	two	deux	niso	pair
– Symbols:	2	II	••	
– Operations:	$6-4$	$8\div4$	$1.5+0.5$	
– Diagrams:	⊔ ⊔			

Represent 12 in eight different ways. Use words, symbols, operations, and diagrams.

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2. What percent of each rectangle is shaded?

a) 

b) 

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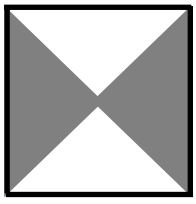
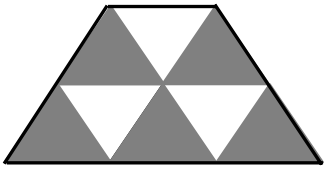
c) 

d) 

3. What fraction of each figure is shaded?

a) 

b) 

c) 

Representing Numbers 2

Vocabulary

- digits
- dozen
- equivalent fractions

Notes

- Question #1 needs to be read carefully. For example, students are not being asked for the number of days in a month but rather for the number of digits in the number of days in a month.

Answers

1. a) 2
   b) 2
   c) 3

2. 06400

3. a) 90.6
   b) 101
   c) 6487.4
   d) 99.1
   e) 79.50

4. a) 50% ; $\frac{50}{100}$ or $\frac{1}{2}$

   b) 75% ; $\frac{75}{100}$ or $\frac{3}{4}$

   c) 20% ; $\frac{20}{100}$ or $\frac{1}{5}$

Representing Numbers 2

1. How many digits are in the number of:
   a) days in a month?
   b) eggs in a dozen?
   c) minutes in 3 hours?

2. The meter below counts people entering a baseball stadium.

0	6	3	9	9

   Show the meter after one more person has entered.

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3. What number is:
   a) 1 more than 89.6?
   b) 10 more than 91?
   c) 100 more than 6387.4?

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   d) 1 less than 100.1?
   e) 10 less than 89.50?

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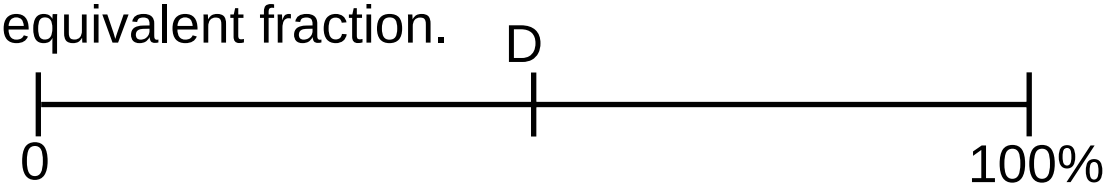
4. For each diagram, give values of D. Use both a percent and an equivalent fraction.

a)



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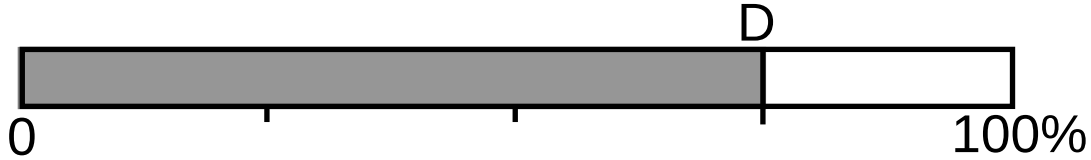

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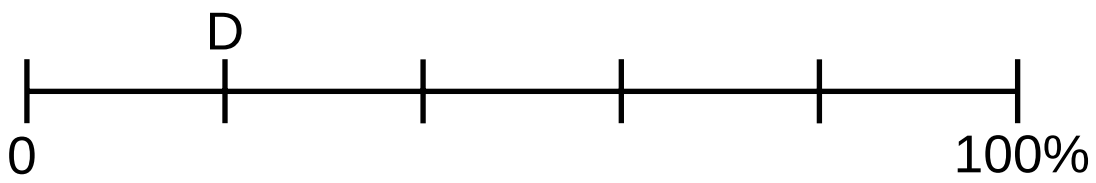


Representing Numbers 3

Vocabulary

Notes

- For #1, the number chosen is not important, but the reasons are very important.
- For #2, the answers could be made into posters to hang in the room. Students could be grouped according to which fraction they chose to represent and each group could make a poster.

Answers

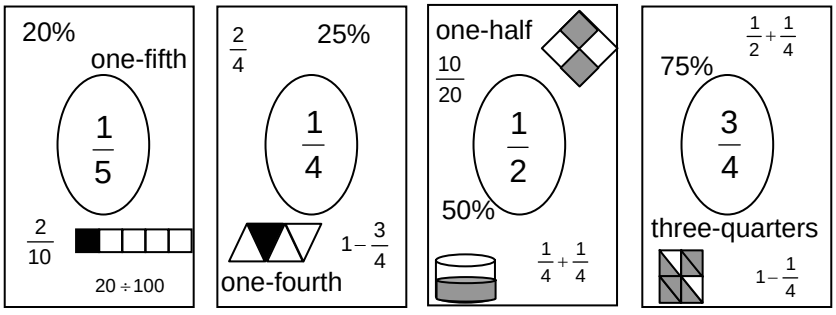
1. Possible Answers for 2.7:
   - only odd number
   - only number whose digits add to 9
   - only number divisible by 9
   - …

   Possible Answers for 24:
   - only number > 10
   - only whole number
   - only multiple of 12
   - …

   Possible Answers for 6.8:
   - only number that does not start with a 2
   - only number between 5 and 10
   - only number whose sum of the digits is divisible by 7
   - only number whose numerals are all curves
   - …

   Possible Answers for 2.54:
   - only number written to the hundredths place
   - only number whose digits are not in ascending order
   - only 3 digit number
   - only number whose sum of the digits is prime
   - …

2. Possible Answers:



Representing Numbers 3

1. Which number does not belong? Give 2 reasons for your answer.

   2.7 24 6.8 2.54

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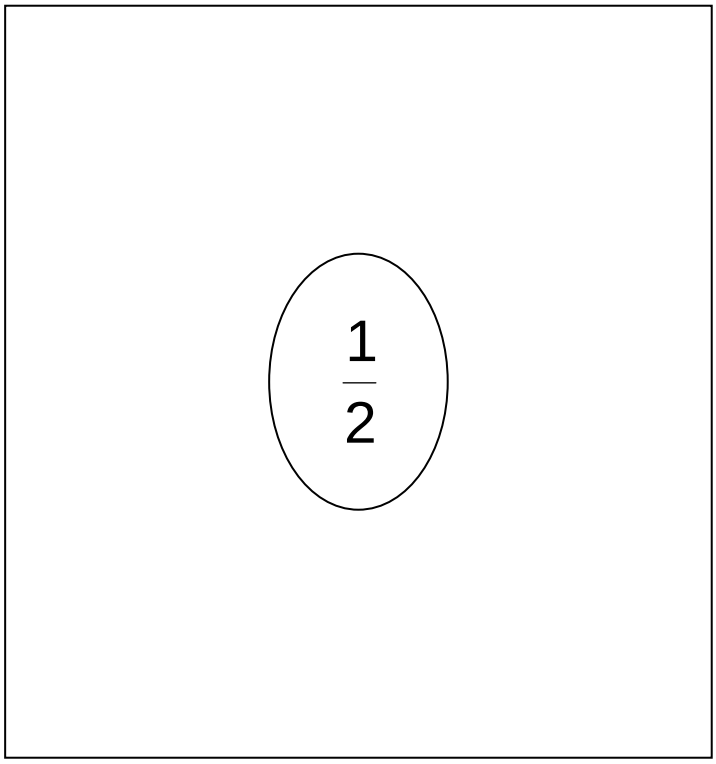
2. Select one of the following fractions:

$$\frac{1}{5}, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$$

   Place your fraction in the centre of a piece of paper as shown below. Represent the fraction using words, symbols, operations, and diagrams.

   Use at least 6 different representations for your fraction.



Representing Numbers 4

Vocabulary

- expression

Notes

- For 1c), students might find it easier to find the percent if they think of the shaded piece as halfway between 25% and 50% (or $\frac{2}{8}$ and $\frac{4}{8}$).

Answers

1. a) 25% ; $\frac{1}{4}$

   b) 75% ; $\frac{3}{4}$

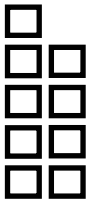
   c) 37.5% ; $\frac{3}{8}$

2. a) 2
   b) 3

3. a) 1000
   b) 999.9
   c) 599.41
   d) 979.9
   e) 9999

4. $4 < 4.3 < 6$

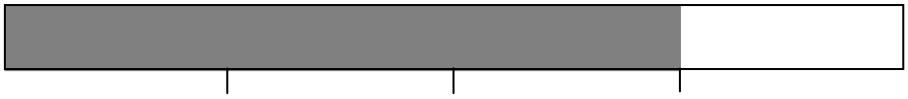
5. Possible Answers:
   - Nine
   - Three Squared
   - One less than ten
   - IX
   - ~~IIII~~ IIII
   - 10 – 1
   - 3^2
   - 72 ÷ 8
   - 1×9
   - 5 + 4
   - …

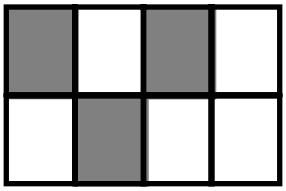


Representing Numbers 4

1. Give the percent and fraction value for the shaded part of each figure.

a) 

b) 

c) 

2. How many digits are in the answer to each question?
   a) How many seconds are in 1 minute?
   b) How many legs do 25 dogs and 10 ducks have?

3. What number is:
   a) 1 more than 999?
   b) 10 more than 989.9?
   c) 100 less than 699.41?
   d) 10 less than 989.9?
   e) 1 less than 10000?

4. Use > or < to create an expression showing 6, 4, and 4.3 arranged from least to greatest.

5. Express 9 in eight different ways. Use words, symbols, operations, and diagrams. Give at least 1 example for each.

Representing Numbers 5

Vocabulary

- denominator

Notes

- For #2, it is important that students understand “between”, mathematically, does not include the endpoints.
- For #4, students should think that the larger the denominator, the smaller the pieces that the whole is cut into.
- For #5, although calculation can assist with the answer, estimation is all that is required.

Answers

1. 50

2. a) Possible Answers:
$\frac{3}{4}$; $\frac{2}{3}$; $\frac{4}{5}$; $\frac{9}{10}$; $\frac{23}{24}$; …

   b) Possible Answers:
$\frac{5}{8}$; $\frac{6}{8}$; $\frac{7}{8}$

3. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ or $\frac{1}{8} < \frac{1}{4} < \frac{1}{2}$

4. $\frac{3}{4}$ is larger

   Possible Answers:
   - Since the numerators are the same, we can compare the denominators. The fraction with the smallest denominator is larger.
   - $\frac{3}{4}$ is the same as 75% but $\frac{3}{5}$ is only 60%.
   - $\frac{3}{4} = \frac{15}{20}$ and $\frac{3}{5} = \frac{12}{20}$
   - …

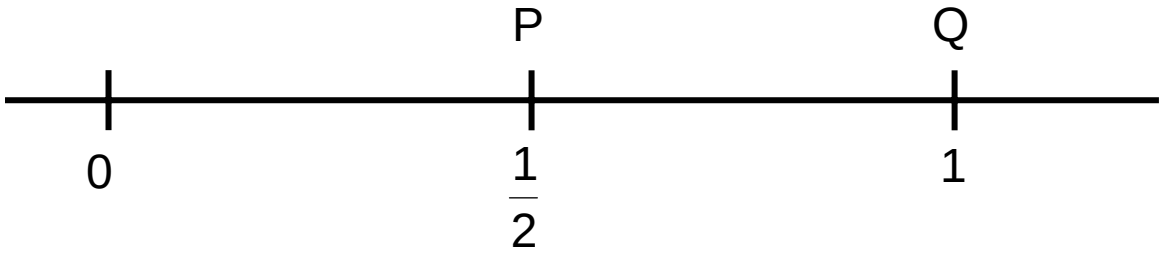
5. a) 3
   b) 1

Representing Numbers 5

1. The numbers shown are part of a 100-chart. What number would be at C?

	28	29	30	
	38	39	B	
	A	49	C	

2. Use the following diagram.



   a) Name a fraction that is between P and Q.

   b) Name a fraction that is between P and Q and has a denominator of 8.

3. Arrange the following fractions from smallest to largest.

$$\frac{1}{2}, \frac{1}{8}, \frac{1}{4}$$

4. Which is larger: $\frac{3}{4}$ or $\frac{3}{5}$? Explain why in two different ways.

5. How many digits are in the answer to:
   a) $26 + 34 + 56$ b) $225 - 219$

Representing Numbers 6

Vocabulary

Notes

- For 1b), think of the percent as halfway between 50% and 75%.
- For 1c), think of the percent as halfway between 25% and 50%.
- For #4, students may want to create a poster.

Answers

1. a) 75%, $\frac{1}{4}$

   b) 62.5% ; $\frac{5}{8}$ or $\frac{625}{1000}$ or $\frac{62.5}{100}$ or …

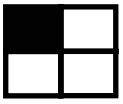
   c) 37.5% ; $\frac{6}{16}$ or $\frac{3}{8}$ or …

2. a) 4
   b) 2

3. a) 1299.9
   b) 2999.9
   c) 1900.4

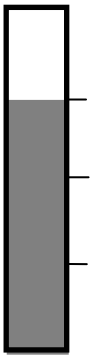
3. a) 19.99 > 19.9 > 19.89
   b) 19.89 < 19.9 < 19.901

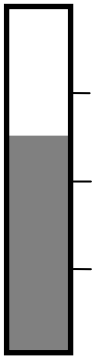
4. Possible Answers:
   - $\frac{25}{100}$
   - $\frac{1}{4}$
   - $\frac{5}{20}$
   - 0.25
   - 50% - 25%
   - Twenty-five percent
   - One-quarter
   - Twenty-five out of one hundred
   - 100% ÷ 4
   - ...

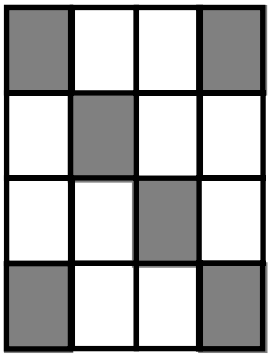


Representing Numbers 6

1. Give the percent and fraction value for the shaded part of each figure.

a) 

b) 

c) 

2. How many digits are in the answer to each question?
   c) How many seconds are in 1 hour?
   d) How many legs do 8 dogs, 2 chickens and 1 snake have?

3. What number is:
   f) 10 more than 1289.9?
   g) 1000 greater than 1999.9?
   h) 100 less than 2000.4?

4. Use > or < to create an expression showing:
   a) 19.9, 19.99, 19.89 arranged from greatest to least
   b) 19.9, 19.89, 19.901 arranged from smallest to largest.

5. Express 25% in eight different ways. Use words, symbols, operations, and diagrams. Give two examples for each.

Representing Numbers 7

Vocabulary

Notes

- For #1, a Gattegno chart is named for a mathematician. Students should only worry about finding patterns in the chart. They should not try to memorize what a Gattegno chart is.
- For #2, review with students that mathematically, "between" does not include the endpoints.

Answers

1. 50 000

2. $\frac{5}{8}$, $\frac{6}{8}$, $\frac{7}{8}$

3. $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ or $\frac{1}{4} < \frac{1}{3} < \frac{1}{2}$

4. $\frac{2}{5}$

   Possible Answers:
   - Since the numerators are the same, we can compare the denominators. The fraction with the smallest denominator is larger.
   - …

5. a) 2
   b) 3

Representing Numbers 7

1. The numbers shown are part of a Gattegno chart. What number would be at B?

40	50	60
400	500	600
4000	5000	6000
A	B	C

2. Name all the fractions between $\frac{1}{2}$ and 1 that have 8 in the denominator.

3. Arrange the following fractions in ascending order.

$$\frac{1}{4}, \frac{1}{2}, \frac{1}{3}$$

4. Which is larger: $\frac{2}{5}$ or $\frac{2}{7}$? Why?

5. How many digits are in the answer to:

   a) $26 + 15 + 52$

   b) $1225 - 226$