Math 3 Classwork 20

Warm Up

Practice Math Kangaroo

Independent work

1

$$4 \times 4 + 4 + 4 + 4 + 4 + 4 \times 4 = ?$$

A) 32 B) 44 C) 48 D) 56 E) 100

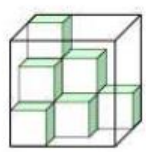
2

What is the first number greater than 2007 such that the sum of the digits is the same?

A) 2016 B) 2115 C) 2008 D) 7002 E) 2070

3

Daniela has got cubes with their edges 1 dm long. She has put some of them into the aquarium in the shape of a cube with the edges measuring 3 dm in the way you see on the picture. What maximum number of further cubes can she put into the aquarium?

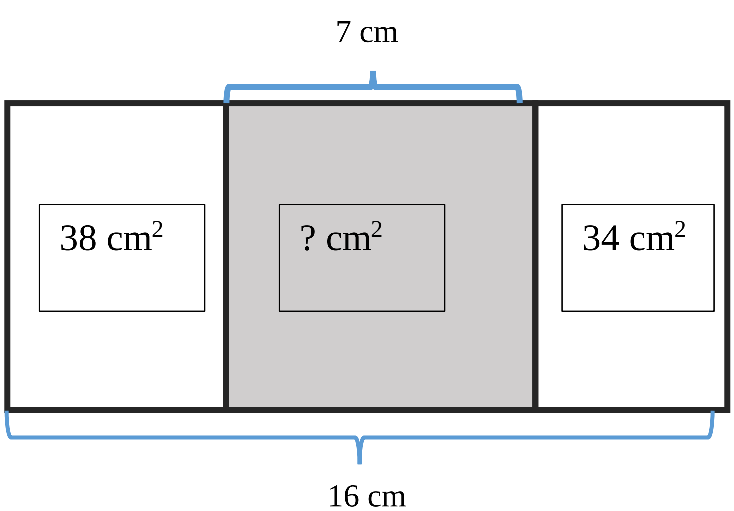


A) 9 B) 13 C) 17 D) 21 E) 27

Homework Review

4

Find an area of a middle rectangle. Find a perimeter of the entire shape.



A = ____________________

P = ____________________

New Material II from last class

Any collection of things or objects we call a **"Set."**
Here are some examples:
- Set of all digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9
- Set of all days of the week.
- Set of all months.

A common property amongst the objects may define a set.
For example, the set E of positive even numbers is the set E={2, 4, 6, 8, 10…}.

There is a fairly simple notation for sets. We list each element (or "member") of the set separated by a comma and then put curly brackets around the whole thing:{1, 2, 3, …}.

1, 2, and 3 are "elements" or "members" of the set. Three dots means that it goes on forever. This set is **infinite**. Not all sets are infinite.

For example, consider the set of all letters of the English alphabet: {a, b, c, ..., x, y, z}
In this case, it is a **finite** set (there are only 26 letters, right?)

When talking about sets, it is fairly standard to use Capital Letters to represent the name of the set, and lowercase letters to represent the elements in that set.
For example, **A** is a name of a set and ***a*** is an element in A. A= {a}.

14 Name the set that the following elements belong to.
Then name another element that belongs to the set.
Example: A rose, a tulip, a sunflower. This is a set of flowers and A rose, a tulip, a sunflower are the elements of this set. Another element of the set would be: a lily.

a) A mother, a baby, a father, a grandfather. Is a set of: ________________.
Another element of the set is: ________________.

b) Math, Science, English. Is a set of: ________________.
Another element of the set is: __________________.

c) A penny, a quarter, a nickel. Is a set of: ________________.
Another element of the set is: ________________.

d) A cucumber, a pepper, an onion. Is a set of: ________________.
Another element of the set is: __________________.

e) Come up with your own example of a set and its elements. A set of: ________________.
The elements of the set are: ____

Sometimes we have sets which are different but still have some common elements.
For example - all flowers and white flowers or all fish and freshwater fish.

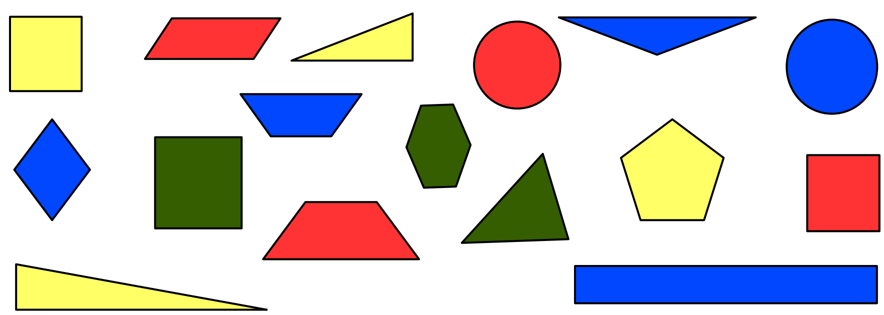
We illustrate relationship between various sets by using **Venn diagrams**: we draw all objects as points on the plane, and then we draw a loop (or some other shape) around all objects of a particular set.
Different loops correspond to different sets.

15

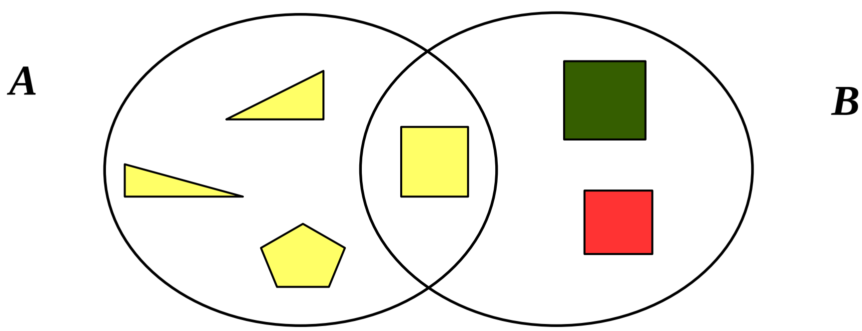
Let us sort those shapes out into different groups (sets).

a) Name different properties that can be used to sort the following shapes:

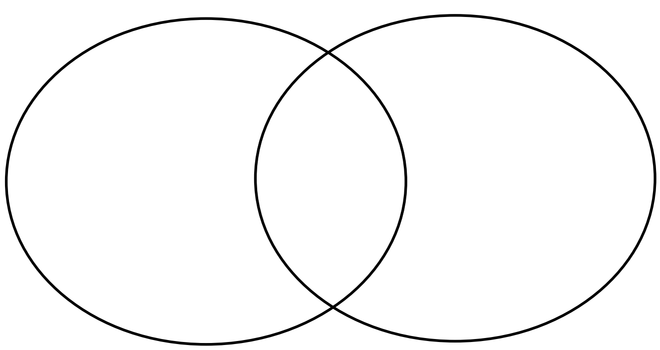
- __________________
- __________________
- __________________



Look at the drawing below. All yellow shapes are in the set ***A;*** all squares are in the set ***B.***
Yellow squares form a set that belongs to both sets – ***A*** and ***B***.



b) In circle ***A*** place all red shapes (draw those shapes using red pencil)
In circle ***B*** place all circles. What shapes will be in the overlap of two sets ***A*** and ***B***?



New Material I

"Divisible By" means when you divide one number by another the result is a whole number.
Remember: The whole numbers are all counting numbers including 0. NO fractions.
"Divisible by" and "can be exactly divided by" mean the same thing.
Example: 12 ÷ 3 = 4r0 and we can say that 12 is divisible by 3.

How can you test if one number is divisible by another number?
There are some "shortcuts" or Divisibility rules.

Rule # 1: Any whole number is divisibly by 1

Rule # 2: A number is divisible by 2 if the last digit of the number is 0, 2, 4, 6 or 8

Rule # 3: A number is divisible by 3 if the sum of the digits of the number is divisible by 3.

Example: Is the number 222 divisible by 2? Yes, because the last digit of the number is 2

Is the number 222 divisible by 3? Yes, because 2 + 2 + 2 = 6 and 6 ÷ 3 = 2

Rule # 4: A number is divisible by 4 if the last two digits of the number are divisible by 4.

5

a) Which of the following number are divisible by 2 (circle all such numbers)? By 3? (underline such numbers).
542, 315, 890, 67, 432, 744, 915, 101.

b) Find the only number in the set below which is divisible by 4: {945, 736, 118, 429}

6

True or false:

The number 542 is divisible by 4 ______ The number 542 is divisible by 3 _________
The number 112 is divisible by 4 ______ The number 112 is divisible by 2 _________
The number 216 is divisible by 4 ______ The number 216 is divisible by 3 _________

Rule # 5: A number is divisible by 5 if the last digit of the number is 0 or 5.

Rule # 6: A number is divisible by 6 if a number is divisible by both 2 and 3.

Rule # 7: A number is divisible by 9 if the sum of all digits is divisible by 9

Example: Is the number 7,065 divisible by 9? Yes, because 7 + 6 + 5 = 18 and 18 ÷ 9 = 2

Is the number 7,065 divisible by 5? Yes, because the last digit is 5

Is the number 7,065 divisible by 6? No, 7, 065 is not divisible by either 2 or 3.

Rule # 8: A number is divisible by 10 if the last digit of the number is 0.

7 Here is a set of whole numbers: {876, 2056, 8215, 3680, 455, 513, 7025}

a) Circle all numbers from the set which are divisible by 9.
b) Underline all numbers divisible by 4
c) Cross all numbers divisible by 6

8 True or False:

The number 1,012 is divisible by 3 ______
The number 6,012 is divisible by 3 ______
The number 1,012 is divisible by 4 ______
The number 1,012 is divisible by 6 ______

REVIEW I

9 For each Venn diagram describe the property based on which elements were classified. Make your own example for the last diagram.

____
____
____
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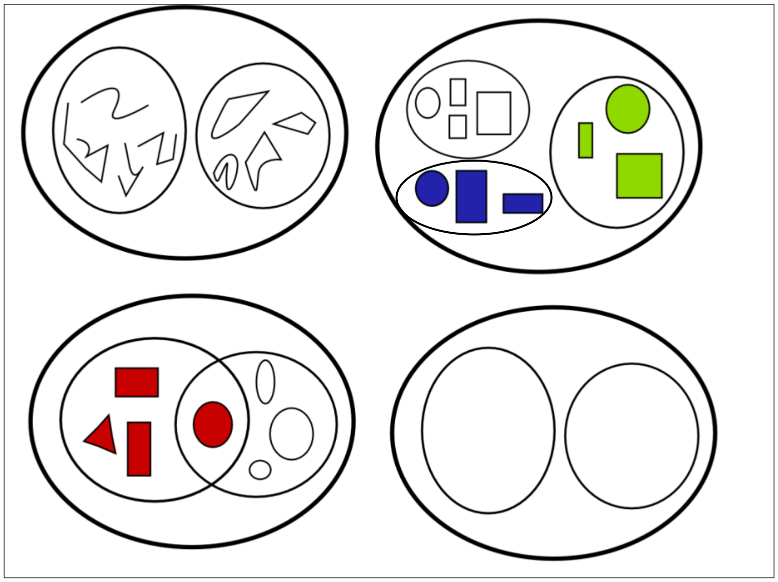

10 On the drawing you see a rectangle and a square.
If you know the areas of both shapes, find the length of unknown side.

____
____
____
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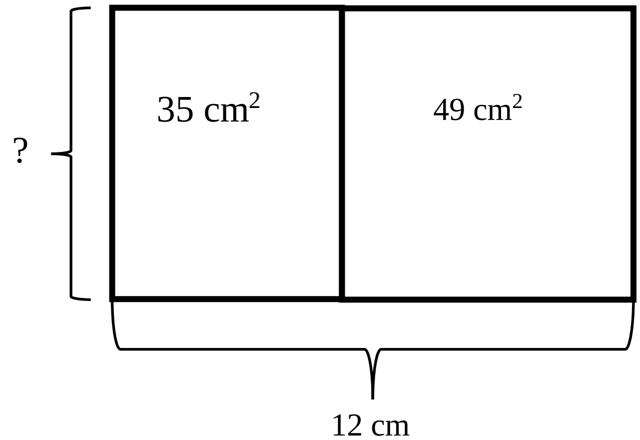


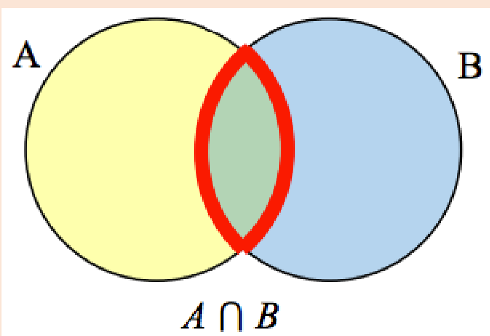
New Material II

To visualize the interaction of sets, John Venn in 1880 thought to use overlapping circles, building on a similar idea used by Leonhard Euler in the eighteenth century.
These illustrations now called **Venn Diagrams**.

A Venn diagram represents each set by a circle (or any other closed line), usually drawn inside of a containing box representing the **universal set.**

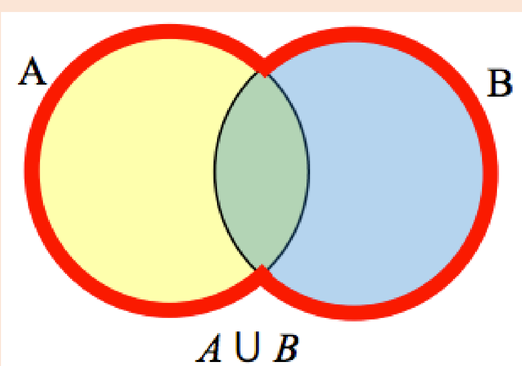
A **universal set** is a set that contains all the elements we are interested in. This would have to be defined by the context.
Example: If we were discussing searching for books, the universal set might be all the books in the library.
Universal set is usually represented by a box and all other sets are drawn inside this box

Intersection of the sets – Overlapping areas indicate elements common to both sets
$A \cap B$ contains only those elements in both sets—in the overlap of the circles.



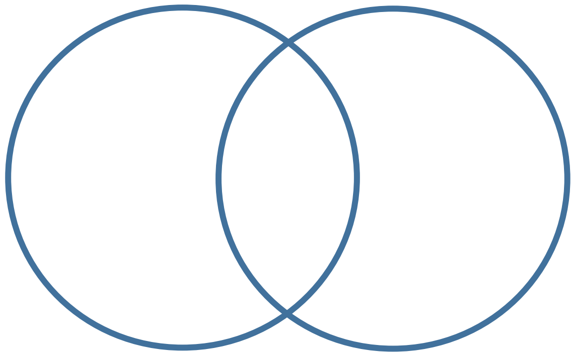
$A \cap B$
Means elements which are in A and B

The union of two sets is the set obtained by combining the elements of each. To find the union of two sets, we look at all the elements in the two sets together.



$A \cup B$
Means elements which are in A or B.

11 There are two sets A = {2, 4, 6, 8, 10, 12} - whole numbers divisible by 2 and set B = {3, 6, 9, 12, 15, 18} - whole numbers divisible by 3. Draw the Venn diagram representing both sets where the intersection of 2 sets are numbers divisible by 6.



Types of sets:

1. Finite. *Example: Let S be the set of all letters in the English alphabet. This set has 26 elements in it therefore this set if finite*

2. Infinite. *Example: Let N be the set of all points on the line. There are infinite number of the points on the line therefore the set N is infinite.*

3. Empty set. *Example: Let M be a set of all triangles with 4 sides. All triangles by definition have 3 sides therefore set M is the empty set.*

It is represented by the symbol { } or Ø

12 Which of the following is an infinite set? __________

a) {states in the US}

b) {vowels}

c) {primary colors}

d) {whole numbers}

13 Which of the following is an empty set? _________

a) {cars with 10 doors}

b) {cats with 15 legs}

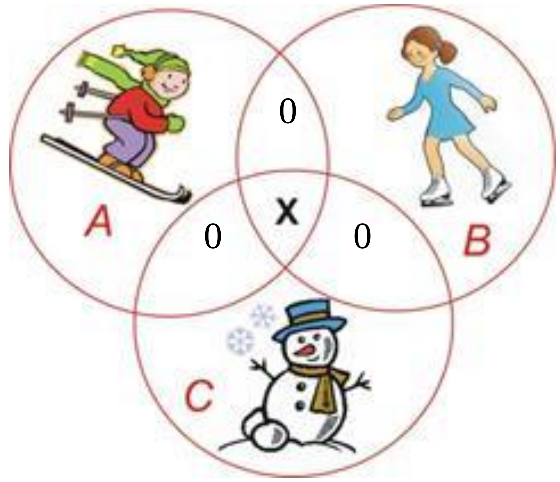
c) {months with 32 days}

d) All of the above

14 There are 24 students in the class. They all have had a wonderful winter break and participated in various activities. 10 of them went skiing, 16 went skating and 12 were making a snowman. None of the students were involved in 2 activities. How many students could do all 3 activities?

____

____



Did you know …

John Venn (4 August 1834 – 4 April 1923), was a British logician and philosopher.

John Venn came up with Venn Diagrams in 1880, while working in the famous University of Cambridge. Venn's main area of interest was logic, and it was in this field that he made his most important contribution. This was the introduction of Venn diagrams (that is, overlapping circles used to represent properties of sets and subsets) in his book "Symbolic Logic" in 1881. Venn was not the first person to use these diagrams, they had been used by others before him such as Gottfried Leibniz in the 17th century. Venn did, however, make important contributions and additions to it and his efforts led them to be standardized and widely used in academia and research.

Venn also had a rare skill in building machines. He used his skill to build a machine for bowling cricket balls, which was so good that when the Australian Cricket team visited Cambridge in 1909, Venn's machine clean bowled one of its top stars four times.

With his son he wrote a two-volume history of Cambridge and complied an extensive database of biographical information on some 136,000 Cambridge graduates and staff, from "the earliest times" to the dawn of the 20th century.