Mass, Volume and Density without Numbers

We have recently talked about the relationship between mass, volume and density. In this worksheet we will continue to explore this relationship. Below are several squares of various sizes which represent their volume. The number of dots inside the squares represents the mass of the object. Answer the questions about the squares that follow.

Assume that each dot represents the same quantity of mass.

1. Which object has the greatest mass? Explain. ____________________________________________
   __________________________________________________________________________________

2. Which object has the smallest mass? Explain. ____________________________________________
   __________________________________________________________________________________

3. Which object has the largest volume? Explain. ____________________________________________
   __________________________________________________________________________________

4. Which object has the smallest volume? Explain. __________________________________________
   __________________________________________________________________________________

5. Which two objects have the same volume? Explain. _______________________________________  
   __________________________________________________________________________________

6. Which two objects have the same mass? Explain. _________________________________________
   __________________________________________________________________________________
7. If two objects have the same volume do they have to have the same mass? Explain. __________________________
______________________________________________________________________________________________

8. Which object has the greatest density? Explain. _____________________________
______________________________________________________________________________________________
______________________________________________________________________________________________

9. Which object has the smallest density? Explain. _____________________________
______________________________________________________________________________________________
______________________________________________________________________________________________

10. Which two objects have the same density? Explain. ___________________________
______________________________________________________________________________________________
______________________________________________________________________________________________

11. Which two objects would you expect to be made of the same material? Explain. ___________________________
______________________________________________________________________________________________

12. Why does the object with the largest volume not have the largest mass also? ___________________________
______________________________________________________________________________________________

13. Using squares and dots draw two pictures of objects with different volumes and densities in the space below. The object with smaller volume must have a smaller mass but greater density than the object with greater volume.
Mass, Volume and Density without Numbers – ANSWER KEY

We have recently talked about the relationship between mass, volume and density. In this worksheet we will continue to explore this relationship. Below are several squares of various sizes which represent their volume. The number of dots inside the squares represents the mass of the object. Answer the questions about the squares that follow.

1. Which object has the greatest mass? Explain. ____________________________________________
   
2. Which object has the smallest mass? Explain. ____________________________________________
   
3. Which object has the largest volume? Explain. ____________________________________________
   
4. Which object has the smallest volume? Explain. ____________________________________________
   
5. Which two objects have the same volume? Explain. ____________________________________________
   
6. Which two objects have the same mass? Explain. ____________________________________________

Object “e” has the greatest mass because it has the greatest number of dots.

Object “b” has the smallest mass because it has the least amount of dots.

Object “f” has the largest volume because it takes up the most amount of space.

Object “a” has the smallest volume because it takes up the least amount of space.

Object “b” and “c” have the same volume because they both take up the same amount of space.

Object “c” and “f” have the same mass because they have the same number of dots.
7. If two objects have the same volume do they have to have the same mass? Explain. __________
   No they do not have to have the same mass. The mass of a smaller object can be bigger than the mass of a
   larger object. Object “f” was larger than object “c” but had the same mass.

8. Which object has the greatest density? Explain. __________
   Object “c” had the greatest density because the dots are packed closest together.

9. Which object has the smallest density? Explain. __________
   Object “d” has the smallest density because the dots are spread out the most.

10. Which two objects have the same density? Explain. __________
    Objects “a” and “f” have the same density because the dots are packed together in a similar fashion.

11. Which two objects would you expect to be made of the same material? Explain. __________
    I would expect objects “a” and “f” to be made out of the same material because if you took a piece of the
    larger object “f” it would look the same as object “a”.

12. Why does the object with the largest volume not have the largest mass also? __________
    Because the density of the object with the largest volume has a smaller density than the object with the
    greatest mass.

13. Using squares and dots draw two pictures of objects with different volumes and densities in the space
    below. The object with smaller volume must have a smaller mass but greater density than the object with
    greater volume.

   ![Diagram of objects with different volumes and densities]

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