# Density Calculation Worksheet – Honors

Name: _____

1. A student measures the mass of an 8 cm^3 block of brown sugar and finds it to be 12.9g. What is the density of the brown sugar?

2. A chef fills a 50 mL container with 4.35 dag of cooking oil. What is the density of the oil? (Hint: are your units correct?)

3. Calculate the mass of a liquid with a density of 2.5 g/mL and a volume of 15 mL.

4. Calculate the volume of a liquid with a density of 5.45 g/mL and a mass of 65 g.

5. A machine shop worker records the mass of an aluminium cube as 0.176 kg. If one side of the cube measures 4 cm, what is the density of the cube?

6. A teacher performing a demonstration finds that a piece of cork displaces 2.35 cL of water. The mass of the cork is 57 dg. What is the density of the cork?

7. A carver begins work on a block of granite that has a mass of 27 hg. The granite as dimensions as shown, what is the density of the granite?

1 dm

50 mm

20 cm
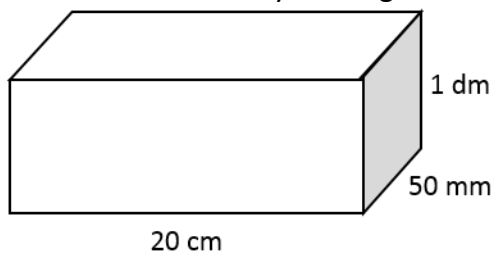
8. A piece of PVC pipe displaces 60 mL when placed in a container of water. If the pipe has a mass of 7,800 cg, what is the density of the PVC?

9. A solid magnesium flare has a mass of 1.3 kg and a volume of 743 cm^3. What is the density of magnesium?

10.   A student performs an experiment with three unknown liquids. The following measurements are obtained.

Fluid A: m = 2060 g, V = 2 L
Fluid B: m = 6720 dg, V = 85 cL
Fluid C: m = 0.990 kg, V = 0.11 daL

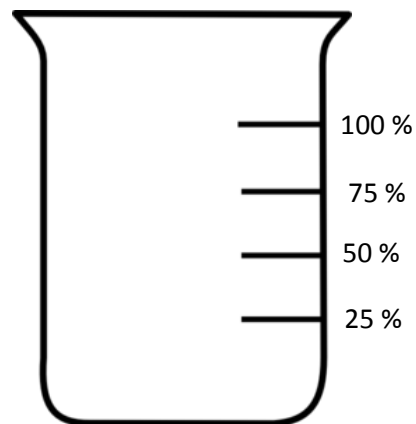Draw how the fluids would be layered if they were combined in a beaker.

— 100 %

— 75 %

— 50 %

— 25 %

TABLE OF DENSITIES			
Solid	Density g/cm³	Solid	Density g/cm³
Marble	2.56	Copper	8.92
Quartz	2.64	Gold	19.32
Diamond	3.52	Platinum	21.4

Use the table above to identify the mystery object in each problem.

11.   While digging in the backyard, you find an old coin. The coin's mass is 26,760,000 µg and its volume is 3 cm³. What is the coin made of? _____

12.   You think you have found a diamond. The crystal you found has a mass of 0.00528 kg and a volume of 2 cm³. What substance did you find? _____

13.   You find a ring with a mass of 1.07 hg. You fill a graduated cylinder up with 10 mL of water and put the ring in the cylinder. The water rises up to the 15 mL mark. What is the ring made of? _____

14.   There is a block on your desk acting as a paperweight. Its measurements are 30 mm by 0.4 dm by 60,000,000 nm. The block has a mass of 0.0001842 Mg. What is the block made of? _____

$$d = \frac{m}{V}$$

Density Calculation Worksheet – Honors

Name: __Answer Key__

1. A student measures the mass of an 8 cm³ block of brown sugar and finds it to be 12.9g. What is the density of the brown sugar? $d = \frac{m}{V}$ $d = \frac{12.9g}{8cm^3}$ ⟹ $d = 1.61 \frac{g}{cm^3}$

2. A chef fills a 50 mL container with 4.35 dag of cooking oil. What is the density of the oil? (Hint: are your units correct?) $d = \frac{m}{V}$ $d = \frac{4.35 \, dag}{50 \, mL} = \frac{43.5g}{50mL}$ ⟹ $d = 0.87 \frac{g}{mL}$

3. Calculate the mass of a liquid with a density of 2.5 g/mL and a volume of 15 mL.
$m = dv$ $m = \frac{2.5g}{mL} \cdot 15mL$ ⟹ $m = 37.5g$

4. Calculate the volume of a liquid with a density of 5.45 g/mL and a mass of 65 g.
$V = \frac{m}{d}$ $V = \frac{65g}{5.45 \, g/mL}$ ⟹ $V = 11.93 mL$

5. A machine shop worker records the mass of an aluminium cube as 0.176 kg. If one side of the cube measures 4 cm, what is the density of the cube?
$d = \frac{m}{V}$ $d = \frac{0.176 \, kg}{64 cm^3} = \frac{176g}{64cm^3}$ ⟹ $d = 2.75 \frac{g}{cm^3}$

$V_{cube} = 4cm \cdot 4cm \cdot 4cm = 64 cm^3$

6. A teacher performing a demonstration finds that a piece of cork displaces 2.35 cL of water. The mass of the cork is 57 dg. What is the density of the cork?
$d = \frac{m}{V}$ $d = \frac{57dg}{2.35cL} = \frac{5.7g}{23.5mL}$ ⟹ $d = 0.24 \, g/mL$

7. A carver begins work on a block of granite that has a mass of 27 hg. The granite as dimensions as shown, what is the density of the granite?

1 dm
50 mm
20 cm
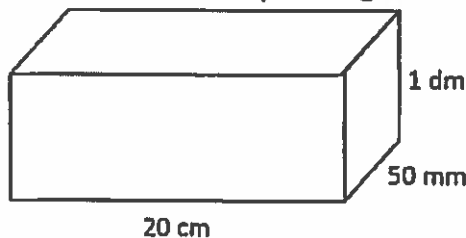
$d = \frac{m}{V}$ $d = \frac{27hg}{1000cm^3} = \frac{2700g}{1000cm^3}$ ⟹

$V = 20cm \cdot 5cm \cdot 10cm$
$V = 1000 cm^3$

$d = 2.7 \, g/cm^3$

8. A piece of PVC pipe displaces 60 mL when placed in a container of water. If the pipe has a mass of 7,800 cg, what is the density of the PVC?
$d = \frac{m}{V}$ $d = \frac{7800cg}{60mL} = \frac{78g}{60mL}$ ⟹ $d = 1.3 \, g/mL$

9. A solid magnesium flare has a mass of 1.3 kg and a volume of 743 cm³. What is the density of magnesium?
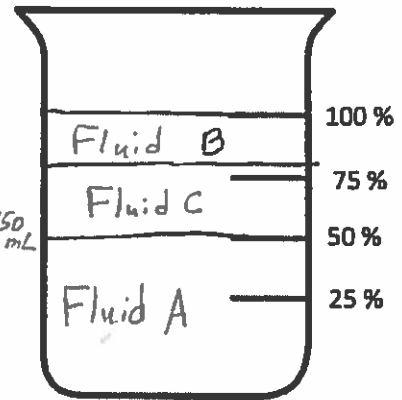$d = \frac{m}{V}$ $d = \frac{1.3 \, kg}{743 cm^3} = \frac{1300g}{743 cm^3}$ ⟹ $d = 1.75 \frac{g}{cm^3}$

10. A student performs an experiment with three unknown liquids. The following measurements are obtained.

Fluid A: m = 2060 g, V = 2 L
Fluid B: m = 6720 dg, V = 85 cL
Fluid C: m = 0.990 kg, V = 0.11 daL

$d = \dfrac{m}{V}$

Draw how the fluids would be layered if they were combined in a beaker.

$d_A = \dfrac{2060g}{2000mL} = 1.03\dfrac{g}{mL}$

$d_B = \dfrac{672g}{850mL} = 0.79\dfrac{g}{mL}$

$d_C = \dfrac{990g}{1100mL} = 0.90\dfrac{g}{mL}$

$V_{Total} = 2000mL + 850mL + 1100mL = 3950\,mL$

$\%V_A = 50.6\%$

$\%V_B = 21.5\%$

$\%V_C = 27.8\%$

	100 %
Fluid B	
	75 %
Fluid C	
	50 %
Fluid A	25 %

TABLE OF DENSITIES

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Quartz	2.64	Gold	19.32
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Use the table above to identify the mystery object in each problem.

11. While digging in the backyard, you find an old coin. The coin's mass is 26,760,000 µg and its volume is 3 cm³. What is the coin made of? _____ Copper _____

$d = \dfrac{m}{V}$ $d = \dfrac{26.76\,g}{3cm^3} \implies d = 8.92\dfrac{g}{cm^3}$

12. You think you have found a diamond. The crystal you found has a mass of 0.00528 kg and a volume of 2 cm³. What substance did you find? _____ Quartz _____

$d = \dfrac{m}{V}$ $d = \dfrac{5.28g}{2cm^3} \implies d = 2.64\dfrac{g}{cm^3}$

13. You find a ring with a mass of 1.07 hg. You fill a graduated cylinder up with 10 mL of water and put the ring in the cylinder. The water rises up to the 15 mL mark. What is the ring made of? Platinum

$d = \dfrac{m}{V}$ $d = \dfrac{107g}{5mL} \implies d = 21.4\dfrac{g}{mL}$

$V = V_{After} - V_{Before} = 15mL - 10mL = 5mL$

14. There is a block on your desk acting as a paperweight. Its measurements are 30 mm by 0.4 dm by 60,000,000 nm. The block has a mass of 0.0001842 Mg. What is the block made of? Marble

$d = \dfrac{m}{V}$ $d = \dfrac{184.2g}{72cm^3} \implies d = 2.56\dfrac{g}{cm^3}$

$V = 3cm \times 4cm \times 6cm = 72cm^3$