MATTER PROPERTIES EXAM
NAME AND SURNAME:----------

1) Define the following concepts: 1 point

a) Mass.

b) Inertia.

ANSWER:

a) MASS: it is the amount of matter of a material system or body.
b) INERTIA: it is the resistance a body offers to changes to its state of rest or movement.

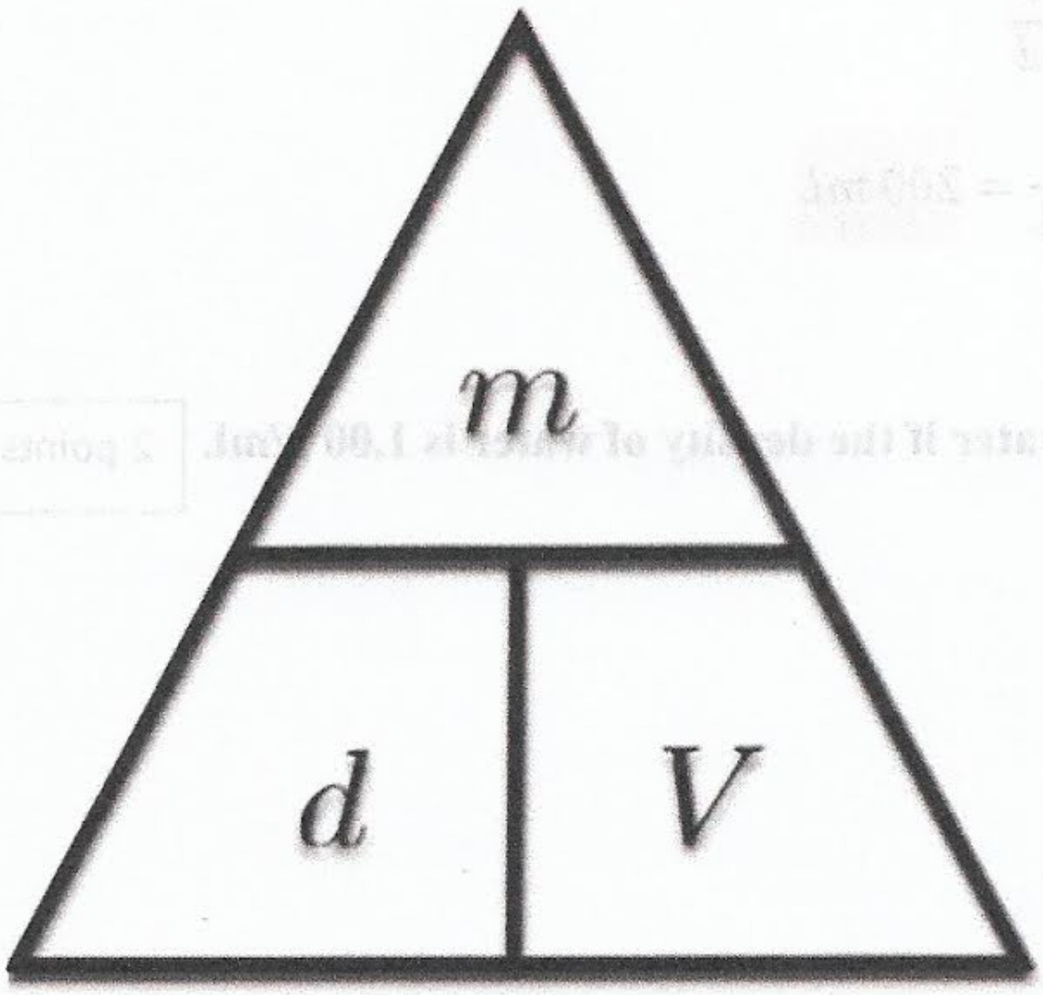
2) A platinum bar measures 5,0 cm long, 4,0 cm wide and 1,5 cm thick. It has a mass of 700,0 g. Calculate the density of the platinum bar. 2 points

SOLUTION:

First, let us calculate the volume of the platinum bar:

$V = 5{,}0\ cm \cdot 4{,}0\ cm \cdot 1{,}5\ cm = 30\ cm^3$

Then, let us use the density pyramid to obtain the density formula:

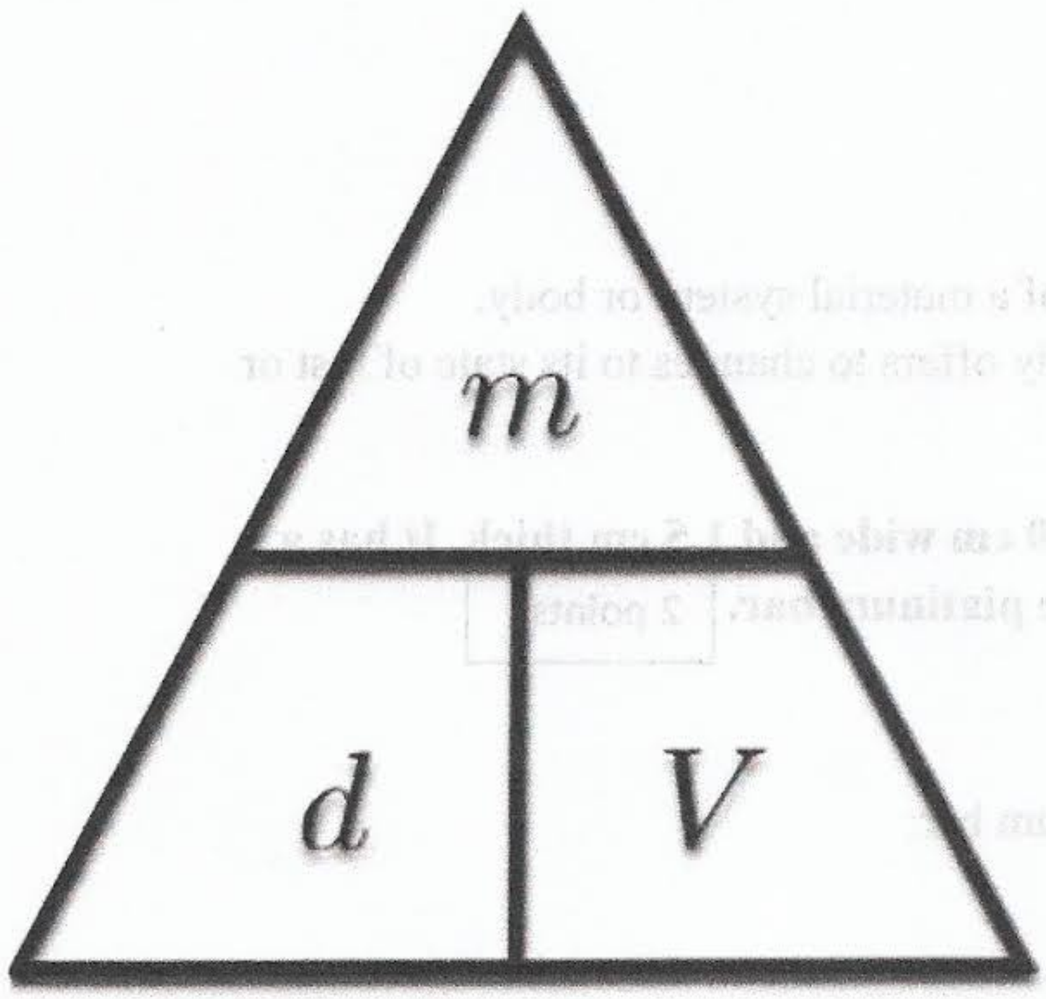


$$d = \frac{m}{V}$$

$$d = \frac{700{,}0\ g}{30\ cm^3} = 23{,}3\ g/cm^3$$

3) A lead cylinder has a mass of 540 g and a density of 2,70 g/mL. Calculate the volume of the lead cylinder. 2 points

SOLUTION:

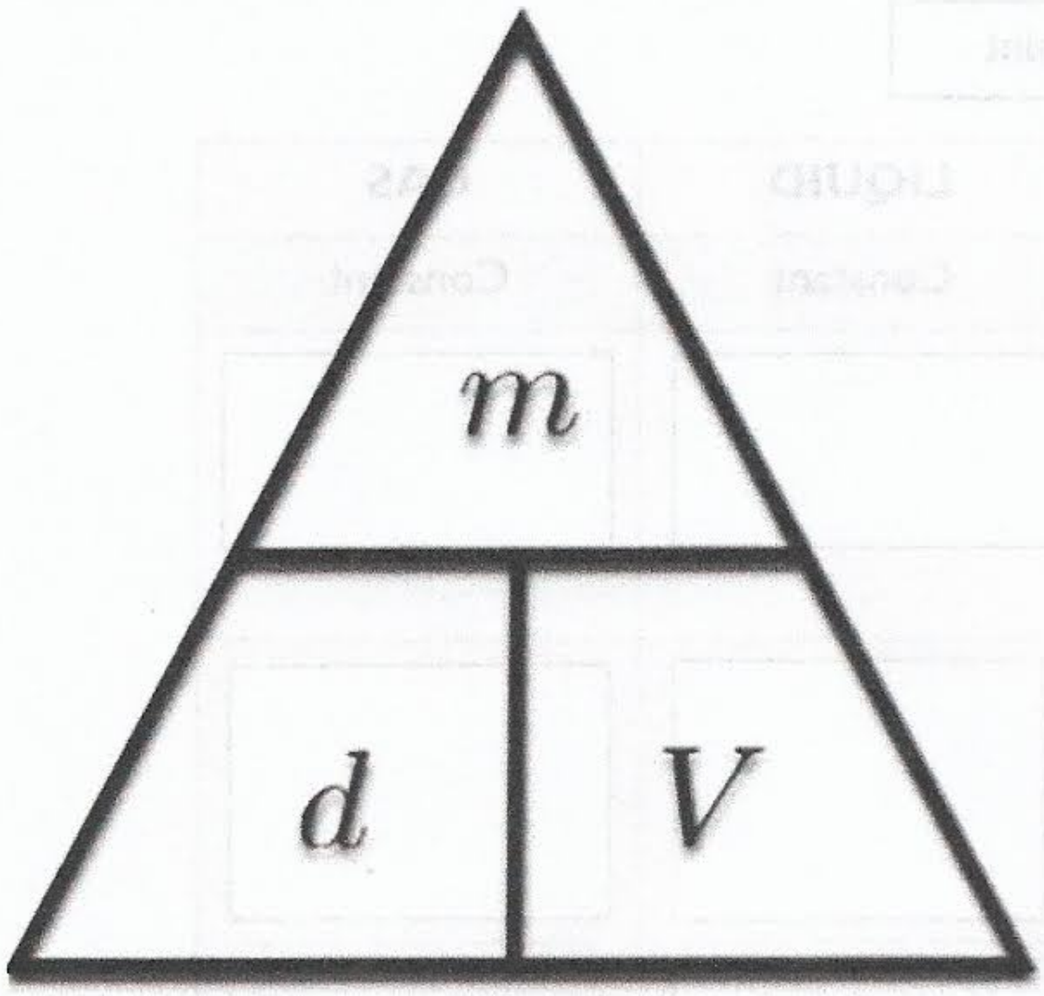


$$V = \frac{m}{d}$$

$$V = \frac{540\ \cancel{g}}{2{,}70\ \cancel{g}/mL} = 200\ mL$$

4) Find the mass of a 50,0 mL quantity of water if the density of water is 1,00 g/ml. 2 points

SOLUTION:



$$m = d \cdot V$$

$$m = 1{,}00\,\frac{g}{\cancel{mL}} \cdot 50{,}0\,\cancel{mL} = 50\ g$$

5) By means of conversion factors, transform the following units: 2 points

a) 8 940 kg/m³ into g/cm³

b) 19,3 g/cm³ into kg/m³

c) 11 340 kg/m³ into g/cm³

d) 7,86 g/cm³ into kg/m³

SOLUTION:

a) $8\,940\,\frac{\cancel{kg}}{\cancel{m^3}} \cdot \frac{1\,000\ g}{1\ \cancel{kg}} \cdot \frac{1\ \cancel{m^3}}{1\,000\,000\ cm^3} = 8{,}94\ g/cm^3$

b) $19{,}3\,\frac{\cancel{g}}{\cancel{cm^3}} \cdot \frac{1\ kg}{1\,000\ \cancel{g}} \cdot \frac{1\,000\,000\ \cancel{cm^3}}{1\ m^3} = 19\,300\ kg/m^3$

c) $11\,340\,\frac{\cancel{kg}}{\cancel{m^3}} \cdot \frac{1\,000\ g}{1\ \cancel{kg}} \cdot \frac{1\ \cancel{m^3}}{1\,000\,000\ cm^3} = 11{,}34\ g/cm^3$

d) $7{,}86\,\frac{\cancel{g}}{\cancel{cm^3}} \cdot \frac{1\ kg}{1\,000\ \cancel{g}} \cdot \frac{1\,000\,000\ \cancel{cm^3}}{1\ m^3} = 7\,860\ kg/m^3$

6) Fill the gaps in the following table: 1 point

	SOLID	LIQUID	GAS
Mass	Constant	Constant	Constant
Volume			
Shape			
Density			
Can be mixed?			
Can be compressed?			

ANSWER:

	SOLID	LIQUID	GAS
Mass	Constant	Constant	Constant
Volume	Constant (occupies a fixed volume)	Constant (occupies a fixed volume)	Variable (expands to fill its container)
Shape	Constant (has a fixed shape)	Variable (takes the shape of its container)	Variable (takes the shape of its container)
Density	High	High (lower than solids)	Low
Can be mixed?	Yes	Yes	Yes
Can be compressed?	No	Slightly	Yes