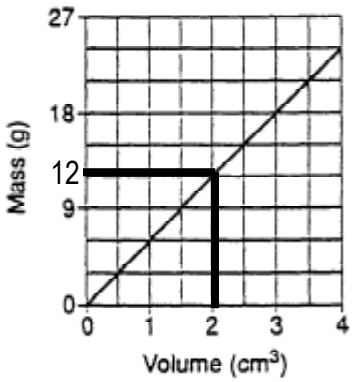
Topic 1 Review Exam
Answers and Explanations

1. **(2) 12.0 g** - Just go to the x-axis where is says 2 cm^3. Go straight up to the graph line and across to the x-axis. Since the interval of the y-axis is 3, you end up with a mass of 12g



2. **(2) 1.6 g/cm^3**

This is determined by a basic density formula calculation

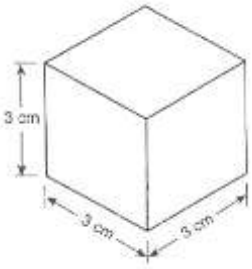
D = m / V
D = 65 / 40.6
D = 1.6 g/cm^3

3. **(3) remain the same**

Since a piece of the same material is being removed, the density of the substance does not change. Remember: no matter the size or shape of a uniform material, the density of that material remains the same.

4. **(4) 108 g**

This problem requires some algebra or the use of the density triangle.
The density of the substance is given: 4 g/cm^3
The volume can be determined by v=lwh (which is 27 cm^3)

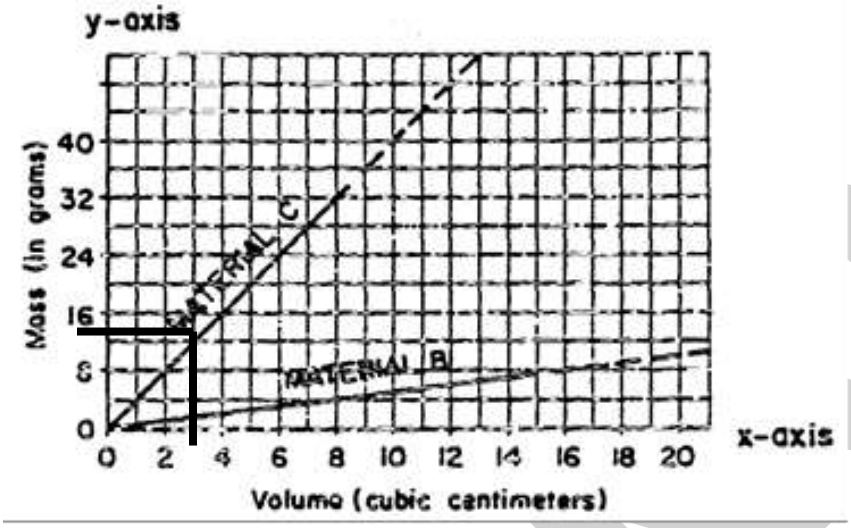


$D = \frac{m}{V}$ $\quad 4 = \frac{m}{27}$ $\quad m = (4)(27) = 108$ g

or

m = D x V
m = (4)(27)
m = 108 g

5. **(4) decreases because water molecules spread farther apart**
During a phase change from a liquid to a gas, the molecules move farther apart making the density of the substance less. Most substances (except water) are most dense as solids and least dense as a gas.

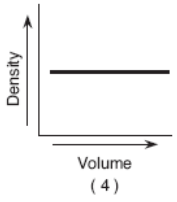


6. **(4) 4.0 g/cm^3**
Pick any point on Material C's graph line to plug into the density formula – choose one that makes the math easy.
D = m / V
D = 16 / 4
D = 4 g/cm^3

7. **(3) material C would sink, but material B would float**
In the previous question, Material C's density was determined to be 4 g/cm^3 . This is more dense than 1 (the density of water) and therefore the material would sink in water. Do the same process you used in question 6 to figure out the density of Material B. Material B's density is 0 .5 g/cm^3 , which is less than 1, therefore Material B will float in water.

8. **(1) The astronaut's mass is the same as it was on Earth, but he weighs considerably less because the Moon has a smaller core.**
Mass is the amount of matter in a substance: it's the stuff that makes us up. Mass is unaffected by the force of gravity. The weight of an object is dependent on the force of gravity pulling on it. Since the Moon is smaller than the Earth, is would have less of a gravitational attraction on any objects on its surface. This would cause the object to have less weight.

9. **(4)**



Data Table

Sample	Mass (g)	Volume (cm^3)	Density (g/cm^3)
A	50	25	5
B	100	50	5
C	150	75	5

Remember: the size of a uniform substance does not affect density.

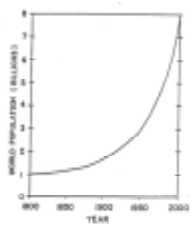
10. **(3) rises because it is less dense (molecules spread farther apart)**
Remember how a hot air balloon works: The air gets heated and the molecules spread out to inflate the balloon. As a result the heated air is less dense than the surrounding air and the balloon rises up.

11. **(2) 2 mb/hr**

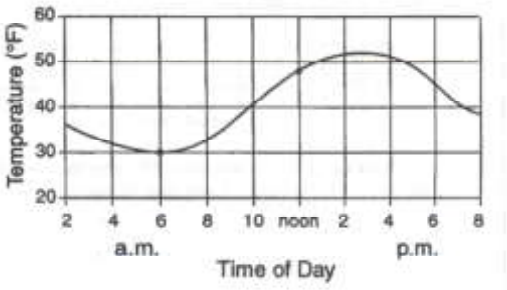
$$\text{rate of change} = \frac{\text{change in value}}{\text{time period}} = \frac{1012\text{-}1004 \text{ mb}}{11 - 7} = \frac{8 \text{ mb}}{4 \text{ hrs}} = 2\text{mb/hr}$$

12. **(1) an earthquake in California -** Natural disasters such as earthquakes are non-cyclic because they are random, unpredicatable, and do not repeat in any pattern.

13. **(4) 1975 and 2000 -** The fastest rate of change is illustrated by the steepest part of the graph. The end of the graph is the most steep showing that population increased the fastest from 1975-2000.



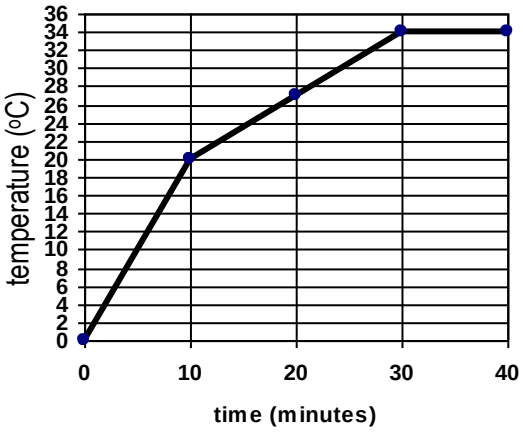
14. **(3) 6a.m. to 12p.m.**
A direct relationship occurs when both variables increase. The only time that occurs on the graph is between 6am to noon where the temperature rises from 30 to 48°F.



15. **(2) inverse relationship**
In any situation where on variable increases causing the other to decrease, an inverse relationship exists – that is the definition of an inverse relationship: when one thing goes up, the other goes down..

16. **(2) 0.7°C/min**

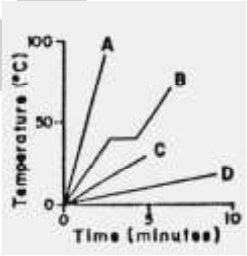
$$\text{Rate of Change} = \frac{V_2 - V_1}{T_2 - T_1} = \frac{34 - 20\ (^{o}C)}{30 - 10\ (\text{min})} = 0.7\ ^{o}C/\text{min}$$



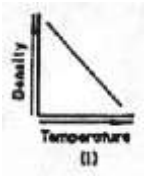
17. **(1) The volume would decrease and the density would increase.**
Adding pressure to a substance pushes the molecules of that substance closer together – this makes the substance more dense. The pressure also makes the substance smaller and it will take up less space (its volume decreases).

18. **(1) Ice is less dense than liquid water and will float when placed in it.**
Water is most dense as a liquid. When water freezes to become ice, it actually expands a little making is less dense than the liquid water (think about when you put a water bottle in the freezer and is expands a little). As a result, ice will float in water.

19. **(4) D** – A more gradual change is one that occurs slowly. The steeper the line, the faster the rate of change. That means that the less steep a line is (flatter lines), the more gradual the rate of change. Line D is the least steep making it the most gradual change.

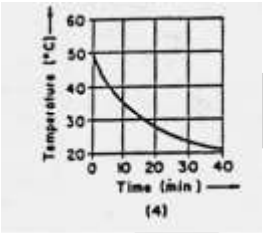


20. **(1)**



As the temperature on a substance increase, it density decreases. This is an inverse relationship as shown by graph 1
The most important E.S. relationship of the year!! Know it! LIVE IT!!!

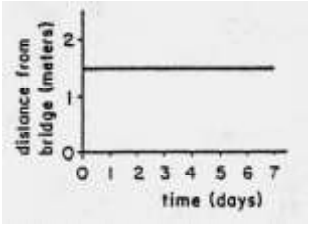
21. **(4)**



Just read the data given in the question and apply to the graphs shown.
A cup of hot water would eventually cool down to the temperature of the room.
There is only one graph that shows a start temperature of 50°C and an end temperature of 20°C – choice 4.

22. **(3) cyclic and predictable**
Moon phases are one of the most observable cyclic changes.
The phases of the Moon repeat in a full cycle every 29.5 days.

23. **(4) As time increased, distance remained the same.**
The graph shown is an unaffected relationship.
An unaffected relationship occurs when one variable increases, while to other variable remains the same.
The graph appears as a horizontal (totally flat) line.



24. **(1)** 

Remember, no matter what its size (volume) or shape, a uniform material (such as aluminum) will have the same density.

25. **(4) cyclic and collected over long periods of time**
First, to predict something accurately, it needs to have a pattern.
Second, the more data you have, the easier it is to see the pattern of re-occurrence.

26. **(4) the impact of a meteorite on the Earth**
This is just a fact. Meteorite impacts on Earth are random events. – we don't know when or where they will occur.

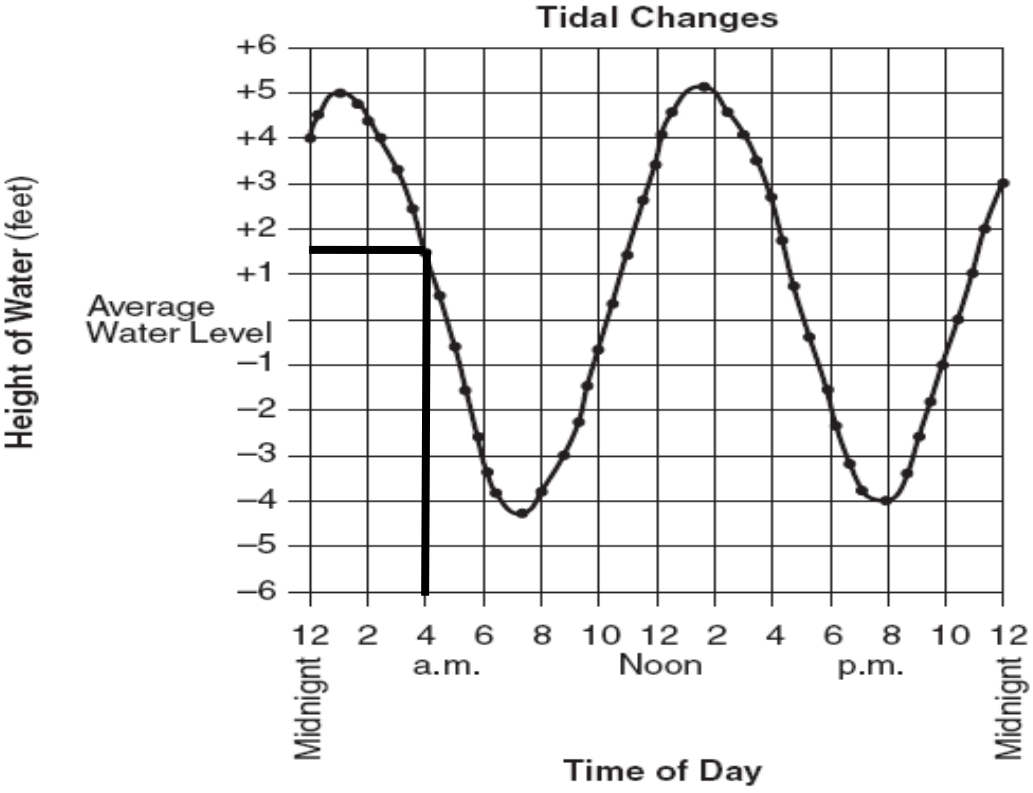
27. **(4) an eclipse of the Sun**
An eclipse is caused by the alignment of objects in the Solar System.
They are totally predictable and we know when they are able to be viewed well in advance.

28. **(2) predictable changes**
Tides are one of the examples we have repeatedly used as a cyclic change.
Tides repeat in a pattern (usually about 12.5 hours between high tides) and we know exactly when they will occur.

29. **(1) time of sunrise**
Sunrise / sunset was one of our examples of a cyclic change. We know the time of sunrise and sunset for every location on Earth for every day of the year well in advance. The other choices are weather examples (non-cyclic) and earthquakes (natural disasters), which are also non-cyclic.

30. **(3) Many Earth changes occur over such a long period of time that they are difficult to measure.**
We said in class that sometimes cyclic changes (like comets) appear to be non-cyclic because it takes so long for the event to repeat so that people don't realize that there is a pattern.

Base your answers to **questions 31-33** on the graph below. The graph shows the recorded change in water level (ocean tides) at a coastal city in the northeastern United States during 1 day.



31. **(4) The tidal change is cyclic.**

First of all, you should know that tides are cyclic. Second, the graph illustrates maxima and minima of a typical cyclic change graph. It would be great if the graph was for a longer time period to better see the pattern, but you should know that tides are cycles.

32. **(2) 2:00 a.m.**

First you need to find the interval between the high tides. The first high tide occurs at 1am. The second high tide occurs at 1:30 pm (it is not 2pm – you can clearly see that the maxima is a little before 2pm). This gives the typical difference of 12.5 hours between high tides. If you extrapolate the graph and add 12.5 hours onto the last high tide, the next high tide will occur at 2:00am.

33. **(2) at 4 a.m. the water height was 1.5 feet above average**

Just go through the choices until you find the only answer that is true of the graph. If you go to 4am on the x-axis and then up and across to the y-axis, you see that the tide height at that time was +1.5 feet above average.