1 One yard is 0.914 m. One yard is 3 feet, and one foot is 12 inches. With $A = 9$ meters, $B = 10$ yards, and $C = 359$ inches,

a $A < B, C$ **b** $A > B, C$ **c** $C < A < B$

d none of the above

---

2 A sphere is the set of all of the points in the space which are at a fixed distance from a certain point. The intersection of two spheres, if it is non-empty, is

a a line **b** a plane **c** two points **d** a circle

---

3 An ice cube contains a stone. The stone is denser than water, but the average density of the ice cube (with the stone inside it) is smaller than the density of the water. This ice cube, when it is put in water, gradually melts. What happens to the ice cube?

a It will never sink

b It will sink, but only after all of the ice has melted

c It will sink, before all of the ice has melted

d It will immediately sink

---

4 In early universe, after the quarks had been hadronized in protons and neutrons, the neutrons combined with protons to produce Helium nuclei. So after that event, the universe consisted of essentially only Hydrogen and Helium nuclei, which were subsequently recombined with electrons to produce neutral Hydrogen and Helium atoms, roughly 0.75 Hydrogen and 0.25 Helium. This was before any star had been born. Inside a star, hydrogen nuclei combine to produce Helium nuclei. What is expected for x, the fraction of hydrogen in a star?

a $x = 1$ **b** $0.75 < x < 1$ **c** $x = 0.75$ **d** $x < 0.75$

---

5 A particles is at rest at $t = 0$. The acceleration of the particle is proportional to t^2, where t is the time. What is the ratio of the speed of the particle at the time $(2\,t)$, to the speed of the particle at the time t?

a 1 **b** 2 **c** 8 **d** 16

---

6 In the previous problem, What is the ratio of the distance the particle travels between 0 and $(2\,t)$, to the distance the particle travels between 0 and t?

a 1 **b** 2 **c** 8 **d** 16

7 The power a human needs to survive only, is 100 W. The intensity (power per area) of the sun at the earths surface is $1.4\,\mathrm{k\,W\,m^{-2}}$. The radius of the earth is 6400 k m. If all of the sun power radiated on the earth could be used for humans to let them survive only, at most how many people could live on the earth?

a 10^6 **b** 10^9 **c** 10^{12} **d** 10^{15}

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8 The Pythagoras theorem states that in a right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other sides of the triangle. In a right-angled triangle, the length of the two sides which are not hypotenuse are 7 and 24 units. How many units is the length of the hypotenuse?

a 25 **b** 27 **c** 31 **d** 49

---

9 The kilogram force k gf is a unit of force (not mass). It is equal to the weight of a body of mass 1 k g, near earth, where the acceleration of gravity is $9.8\,\mathrm{m\,s^{-2}}$. The pressure of the atmosphere (at the sea level) is 10^5 Pa. (Pa is Pascal, the unit of pressure in SI, which is equal to $1\,\mathrm{k\,g\,m^{-1}\,s^{-2}}$). How many $\mathrm{k\,gf\,cm^{-2}}$ is the pressure of the atmosphere at the sea level?

a 0.001 **b** 1 **c** 10^3 **d** 10^6

---

10 A circle is an ellipse in which the major axis is equal to the minor axis and half of the common quantity is called the radius. The surface area inside an ellipse is equal to $(\alpha\, a\, b)$, where α is a constant and a and b are half the major and minor axes, respectively. The surface area inside a circle is $\pi\, r^2$, where r is the radius of the circle. What is α?

a $\frac{\pi}{2}$ **b** π **c** $(2\,\pi)$ **d** $(4\,\pi)$

---

11 An 80-g paper is a sheet of paper for which the mass corresponding to $1\,\mathrm{m^2}$ is 80 g. The surface area of an A0 sheet of paper is $1\,\mathrm{m^2}$. The surface area of a sheet of An paper is $2^{-n}\,\mathrm{m^2}$, where n is an integer. What is the mass of a single sheet of A4 paper of the type 80-g?

a 80 g **b** 20 g **c** 5 g **d** 1 g

---

12 Lake Baikal (in Siberia) is the largest fresh water lake on the earth. It contains some one fifth of the total fresh water of the earth. It is about 600 k m long, 50 k m wide, and 700 m deep (on the average). What is the total volume of the fresh water on the earth?

a $10\,(\mathrm{k\,m})^3$ **b** $1000\,(\mathrm{k\,m})^3$ **c** $10^5\,(\mathrm{k\,m})^3$ **d** $10^7\,(\mathrm{k\,m})^3$

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13 Good luck!

English for special purposes, the final exam 1398/03/28

Please mark the correct answers in the answer sheet (the table below) and return it.

Name: Mohammad Khorrami
Student number: 0

	a	b	c	d
1	■			
2				■
3			■	
4				■
5			■	
6				■
7				■
8	■			
9		■		
10		■		
11			■	
12			■	