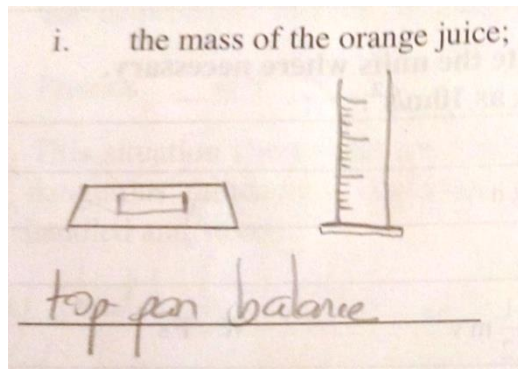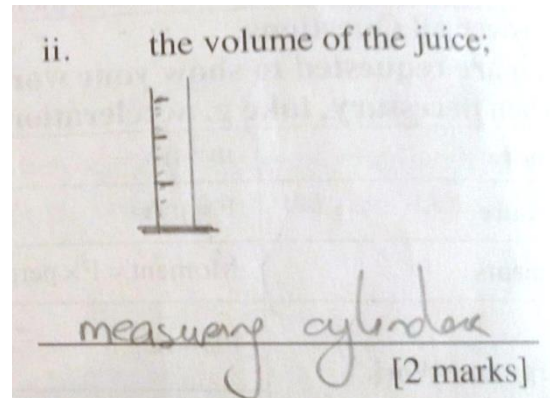# Physics Sept 2012

Paper 1IB

1ai)

1aii)

[2 marks]

1aiii) weigh measuring cylinder on a top pan balance m_1

put orange juice in measuring cylinder, measure new mass, m_2

m of orange juice = $m_2 - m_1$

1aiv) use mass found in 1aiii) and volume from measuring cylinder in the equation density = mass/volume

1b) highest density – white grape juice

lowest density – pomegranate juice

since the material with the highest density sinks and the material with the least density floats

1c) if glasses are identical and since volume is constant, use a top pan balance to find the mass of each full glass.

the heaviest glass would be the salted water since its density is greater than that of pure water

1di) fill measuring cylinder with water, read volume V_1

Place tower in cylinder, read volume V_2

To find volume of tower, $V_2 - V_1$

1dii) lower the tower gently using a non-absorbent string

Take reading of volume at eye level from the bottom of the meniscus

1diii) 8.92 g/cm^3

1div) No, because density is constant for the same material no matter the size

2ai) vacuum is a good insulator so it will prevent heat transfer by conduction
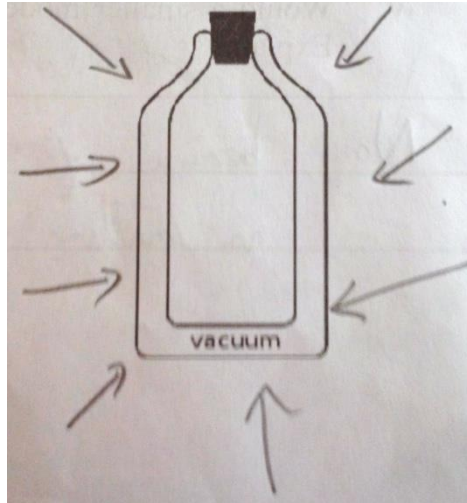
2aii) convection and conduction

2aiii) radiation

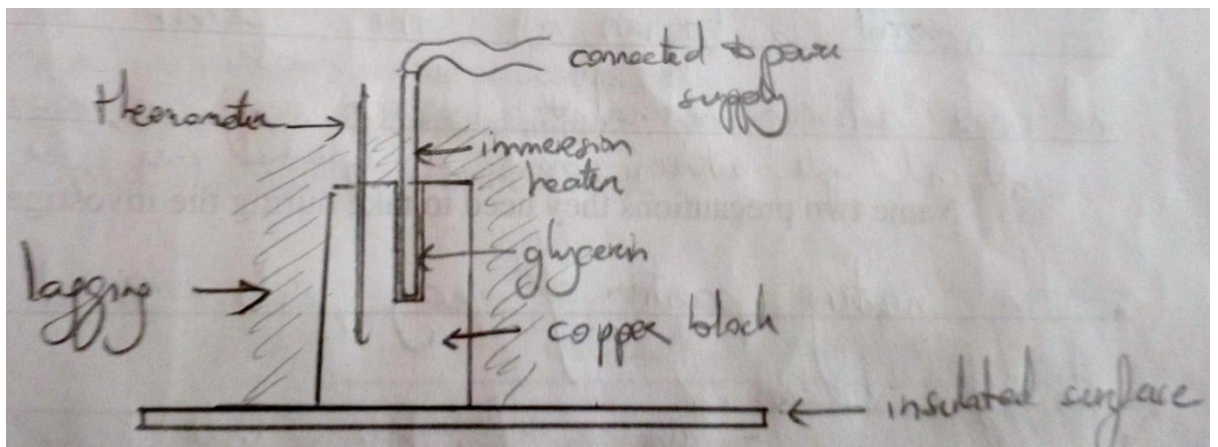**2aiv)** shiny surface inside of flask since shiny surfaces are good reflectors of heat

2av) rubber or plastic since they are good insulators

2avi)

2avii) radiation since the outside of the flask is not a shiny surface and so heat is not reflected but passes through
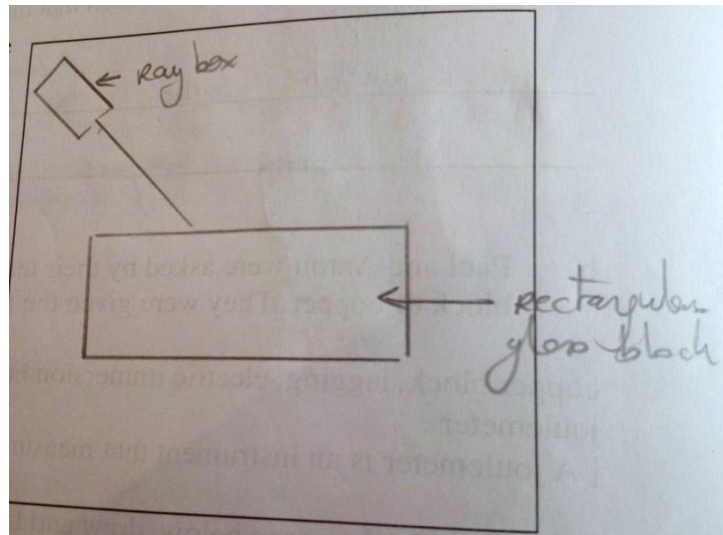
2bi)

2bii) so that the air between the heater and block is filled with a better conductor than air

2biii) to stop heat losses by conduction

2biv) current, voltage and time

3ai)

3aii) a normal is drawn at the point of incidence

Angle between normal and incident ray is angle of incidence

Angle between the normal and refracted ray is angle of refracgtion

3aiii) perform experiment in a dark room and use a fine beam of light

When marking the postion of the beam, mark fine crosses at the centre of the beam

3aiv) air to glass : ray bent towards the normal

Glass to air : ray bent away from normal

3bi) speed slows down since fibre is denser than air

3bii) 65°

3biii) 65° since total internal reflection occurs

3biv) Angle X is larger than the critical angle

3bv) total internal reflection

3ci) refraction

3cii) 30 – 10 = 20 cm

3ciii) 1.5

4ai) planets move around the sun along the same elliptical path

4bi) Mercury

4bii) 687 days

4biii) sun is at centre, Earth rotates about its own axis, when one side of Earth is facing the sun, that side is in daytime, while opposite side is in night time since it is facing away from the sun

4biv)   the tilt of the Earth and the position along the Earth's revolution around the sun

4ci)   it is a unit of distance, referring to the distance travelled by light in a year

4cii)   since this star is a very very long distance away from Earth, the light coming from it takes long to arrive on Earth, hence we see light that started to travel years ago

4ciii)   telescope

4civ)   a dwarf planet has not cleared its neighbourhood while a planet has

4cv)   a collection of millions and millions of stars

4di)   although they are small, they are travelling at a very high speed so they have a large momentum and a big amount of energy, hence collision would have a large impact

4dii)   350,000J

4diii)   heat and sound energy

5a)   work is the energy when an object is moved over a distance by an external force

5b)   height and weight

5c)   ??

5di)   2m

5dii)   900J

5diii)   30W

5div)   t decreases, P increasesm therefore more work done in a second since P is inversely proportional to t

5ei)   4N

5eii)   20 m/s²

5eiii)   m increases, a decreases since a is inversely proportional to m when pulling force remains constant