Answers prepared by Leong Yee Pak

****1 June 02 P1 Q21** A $\rho_m = \frac{m_m}{V_m}$ where m = mixture. $M_m = 2m$. $V_1 = \frac{M_1}{\rho_1} = \frac{m}{\rho}$ and $V_2 = \frac{M_2}{\rho_2} = \frac{m}{2\rho}$. $V_m = \frac{m}{\rho} + \frac{m}{2\rho}$

***2 Nov 02 P1 Q20** C
****3 Nov 02 P1 Q22** A
***4 Nov 03 P1 Q20** A
***5 June 04 P1 Q19** A
***6 June 04 P1 Q20** D

*****7 June 04 P1 Q21 C** $\rho_P > \rho_Q$. $\left(\frac{M}{V}\right)_P > \left(\frac{M}{V}\right)_Q$. $\left(\frac{NM_P}{V}\right) > \left(\frac{NM_Q}{V}\right)$.

***8 Nov 04 P1 Q21** A
***9 June 05 P1 Q19** C
****10 Nov 05 P1 Q19** B
****11 June 06 P1 Q19** C
***12 June 06 P1 Q20** A
***13 Nov 06 P1 Q19** C
***14 June 07 P1 Q16** C
*****15 Nov 07 P1 Q17** C same as June 04 P1 Q21
***16 Nov 08 P1 Q19** D

***17 June 09 P1 Q16** C

Section B

1 June 05 P2 Q2

2	(a)	speck of light	B1	
		that moves haphazardly/randomly/jerkily/etc.	B1	[2]
	(b)	randomness of collisions would be 'averaged out'	B1	
		so less (haphazard) movement	B1	[2]
		(do not allow 'more massive so less movement')		

2 June 06 P2 Q3

3	(a)	sum of (random) kinetic and potential energies	M1	
		of the atoms/molecules of the substance	A1	[2]
	(b) (i)	potential energy unchanged as atoms remain in same positions	M1	
		allow 'reduced because atoms slightly closer together'		
		vibrational kinetic energy reduced because temperature lower	M1	
		so internal energy less	A1	[3]

(ii)	potential energy increases because separation increases	M1	
	kinetic energy unchanged because temperature unchanged	M1	
	so internal energy increases	A1	[3]

3 Nov 06 P2 Q5

5 (a)		metal: crystalline / lattice / atoms in regular pattern	B1	
		(atoms in regular) pattern that repeats itself (within crystal)	B1	[2]
		polymer: long chains of atoms / molecules	B1	
		chain consists of 'units' that repeat themselves	B1	[2]
(b)	(i)	e.g. latex is soft / not strong / flows / ductile	B1	
		elastic limit easily exceeded	B1	[2]
		(*allow any two sensible comments, 1 each*)		
	(ii)	more solid / does not flow / stronger / higher ultimate tensile stress		
		more brittle		
		elastic limit much higher		
		increased toughness		
		(*any two, 1 each*)	B2	[2]

4 Nov 08 P2 Q5

5 (a)		haphazard / random / erratic / zig-zag movement	M1	
		of (smoke) particles (*do not allow molecules / atoms*)	A1	[2]
(b)		motion is due to unequal / unbalanced collision rates (on different faces)	B1	
		(unequal collision rate due to) random motion of (gas) molecules / atoms	B1	[2]
(c)	*either*	collisions with air molecules average out	M1	
		this prevents haphazard motion	A1	[2]
	or	particle is more massive / heavier / has large inertia (M1)		
		collisions cause only small movements / accelerations (A1)		

Pressure in Liquids
Change of Phase

***1 June 02 P1 Q20** B

****2 Nov 02 P1 Q21** Cp = (20×10^{-2}) x 1800 g; $p_2 = (60 \times 10^{-2})$ x 1200 g. Dividing and simplify

*****3 June 03 P1 Q20** A $0.1\ P_0 = h\rho g$

****4 Nov 03 P1 Q19** BApply $p = h\rho g$. $\frac{p}{h} = \rho g$. Hence ρ = gradient x $\frac{1}{9.81}$

***5 Nov 04 P1 Q19** C

****6 Nov 04 P1 Q20** A $h_1\rho_1 g + P_{atm} = h_2\rho_2 g + P_{atm.}$ Hence (2x) $\rho_P = x\ \rho_Q$

****7 June 05 P1 Q18** A pressure $p = \frac{F}{A} = \frac{W}{A} = \frac{mg}{A} = \frac{\rho Vg}{A}$ where $m = \rho V$

****8 Nov 05 P1 Q17** C

****9 Nov 05 P1 Q18 ?** Liquid X: $p_X = h_X\rho_X g$. Liquid Y: $\rho_Y = h_y\rho_Y g$.

Equating, $h_X\rho_X g = h_y\rho_Y g$

$$\frac{h_X}{h_Y} = \frac{\rho_Y}{\rho_X} = \frac{1200}{800}$$

***10 Nov 06 P1 Q20** B

****11 Nov 06 P1 Q21** x **830 x 9.81 + (2000 –** x**) x 1000 x 9.81 = 17.5 x 10^6**

****12 June 07 P1 Q15** A **p = hρg. 100 x 10^3 = h x (13.6 x 10^3) x 9.81.**

****13 Nov 07 P1 Q18** **100 x 10^3 + h x 1030 x 9.81 = 450 x 10^3**

***14 June 08 P1 Q15** D

****15 Nov 08 P1 Q20** C

***16 June 09 P1 Q17** B

*****17 June 09 P1 Q18** D change in height = 2h.

Section B
Pressure in Liquids
Change of Phase

1 June 06 P2 Q4

4	(a)	mass per unit volume (*ratio idea must be clear, not units*)	B1	[1]
	(b) (i)	pressure is same at the surface of mercury because at same horizontal level	B1	[1]
	(ii)	$h\rho g$ is same for both	B1	
		$53 \times 10^{-2} \times 1.0 \times 10^3 \times g = 71 \times 10^{-2} \times \rho \times g$	C1	
		$\rho = 7.5 \times 10^2$ kg m^{-3}	A1	[3]

2 June 07 Q3

3	(a)	mass / volume (ratio idea essential)	B1	[1]
	(b) (i)	mass = $Ah\rho$	B1	[1]
	(ii)	pressure = force/area	B1	
		weight (of liquid)/force (on base) = $Ah\rho g$	B1	
		pressure = $h\rho g$	A0	[2]

(c)	**(i)**	ratio = 1600 or 1600:1	A1	[1]
	(ii)	ratio = $\sqrt[3]{1600}$	C1	
		= 11.7 (*allow 12*)	A1	[2]
(d)	**(i)**	density of solids and liquids are (about) equal	B1	[1]
	(ii)	strong forces: fixed volume	B1	
		rigid forces: retains shape / does not flow / little deformation	B1	[2]
		(allow 1 mark for fixed volume, fixed shape)		