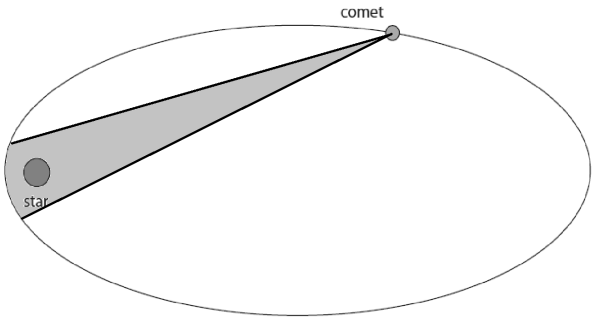
Mark Scheme (Results)

Summer 2021

Pearson Edexcel International GCSE

In Physics (4PH1) Paper 1P and Science (Double Award) (4SD0) Paper 1P

Question number	Answer	Notes	Marks
1 (a) (i)	C (white); A is incorrect because its temperature is the second lowest B is incorrect because its temperature is the lowest D is incorrect because its temperature is the second highest		1
(ii)	D (white dwarf); A is incorrect because the Sun is not massive enough to form a black hole B is incorrect because the Sun is not massive enough to form a neutron star C is incorrect because the Sun is not massive enough to form a supernova		1
(iii)	C (supernova); A is incorrect because this is during the middle of the life cycle B is incorrect because this is an early stage of the life cycle D is incorrect because this is a late stage in the life cycle of stars like our Sun		1
(b)	arrow pointing from the comet to the star; force labelled 'gravitational';  	accept any arrow pointing from comet to star within shaded area ignore starting position of arrow allow 'gravity' or 'weight'	2

Total for Question 1 = 5 marks

Question number	Answer	Notes	Marks
3 (a) (i)	neutron;		1
(ii)	nucleus/nuclei splitting; releasing (two) daughter nuclei / neutrons / energy;	condone nucleus/nuclei breaking apart ignore daughter cells allow smaller/lighter nuclei for daughter nuclei	2
(iii)	neutrons released (by fission) are absorbed by **other** (uranium) nuclei; causing fission/splitting in **other** (uranium) nuclei;	condone atoms for nuclei condone atoms for nuclei	2
(b)	concrete / lead / (thick) steel;		1
(c)	graphite; slow; boron; absorb;		4

Total for Question 3 = 10 marks

Question number	Answer	Notes	Marks
10 (a)	use of p = h × density × *g*; conversion of 57 cm into 0.57 m; evaluation; e.g. pressure difference = 57 × 820 × 10 pressure difference = 0.57 × 820 × 10 (pressure difference =) 4700 (Pa)	allow mark if formula on its own is seen in working allow use of *g* = 9.8, 9.81 470 000, 467 000, 467 400, 458 052, 458 519.4 etc. score 2 marks allow 4670, 4674, 4580.52, 4585.194 etc.	3
(b) (i)	substitution into W = m × g; evaluation; correct unit; e.g. W = 24 × 10 (W =) 240 newtons / N	no mark for formula on its own allow use of *g* = 9.8, 9.81 -1 for POT error e.g. incorrectly changing kg to g mark independently allow 235.2, 235.44	3
(ii)	substitution into p = F/A; evaluation; e.g. p = 240 / 1.2 (p =) 200 (Pa)	no mark for formula on its own allow ecf from (i)	2
(iii)	substitution into p = F/A; rearrangement; evaluation; e.g. 200 = F / 4.8 F = 200 × 4.8 (F =) 960 (N)	no mark for formula on its own allow ecf from (ii)	3
(c)	GPE of piston X = decrease; GPE of piston Y = increase; chemical energy of piston Y = no change; kinetic energy of piston Y = no change;	allow marks if the meaning is clear e.g. allow +, ↑ for increase etc.	4

Total for Question 10 = 15 marks

Question number	Answer	Notes	Marks
11 (a) (i)	line drawn in top-right quadrant; correct angle by eye;	accept if drawn on diagram 1 instead of diagram 2 DOP	2
(ii)	32 (degrees);	allow in range 31-33 (degrees)	1
(iii)	refractive index = sin(angle of incidence) / sin(angle of refraction);	allow standard symbols and rearrangements e.g. 'i' for angle of incidence 'r' for angle of refraction 'n' for refractive index	1
(iv)	substitution; evaluation to at least 3s.f.; e.g. n = sin(64) / sin (32) n = 1.70	allow ecf from (ii) allow 1.696…	2
(v)	sin(c) = 1 / n;	allow standard symbols and rearrangements	1
(vi)	substitution OR rearrangement; evaluation; e.g. sin(c) = 1/1.7 OR c = $\sin^{-1}(1/n)$ (c =) 36 (degrees)	allow ecf from (iv) allow 36.03…(degrees)	2
(b)	light undergoes total internal reflection; angle of incidence is above the critical angle; light (would be) going from more (optically) dense to less (optically) dense;	allow TIR for 'total internal reflection' allow idea that light would speed up if it travelled through the boundary / light travels faster in air than in material	3

Total for Question 11 = 12 marks