IGCSE Cambridge Topical Past Papers

PHYSICS

0625 Paper 4

2017 — 2023

PHYSICS 0625

TOPICAL PAST PAPER WORKSHEETS

2017 - 2023 | Questions + Mark scheme

AVAILABLE PAPERS

P1	P2	P3	P4	P6
1413 Questions	1401 Questions	511 Questions	491 Questions	177 Questions

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TOPICS	P1	P2	P3	P4	P6
MEASUREMENT & UNITS	76	64	33	15	15
FORCES & MOTION	170	212	64	66	15
FORCES & PRESSURE	101	85	51	43	20
FORCES & ENERGY	88	101	41	40	5
THERMAL EFFECTS	210	181	53	66	35
WAVES & SOUNDS	80	76	39	34	2
RAYS & WAVES	134	129	53	51	37
ELECTRICITY	191	182	54	64	42
MAGNETS & CURRENTS	143	141	60	36	1
ELECTRICITY & ELECTRONICS	72	90	18	26	5
RADIOACTIVITY	130	119	39	41	0
SPACE PHYSICS	18	21	6	9	0

1 – (0625/43_Summer_2017_Q3) – *Measurements And Units*

A block of wood has a volume of 210 cm^3 and a mass of 180 g.

(a) Calculate the density of the block of wood.

density = ...[2]

(b) The block is held just above the surface of a liquid of density 0.88 g/cm^3.

Predict and explain what happens when the block is released.

.....

.....

.....[2]

2 – (0625/42_Winter_2017_Q1) – *Measurements And Units, Forces And Pressure*

Fig. 1.1 shows a cylinder made from copper of density 9000 kg / m^3.

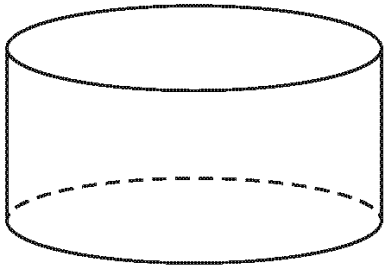

Fig. 1.1

The volume of the cylinder is 75 cm^3.

(a) Calculate the mass of the cylinder.

mass = ...[2]

(b) The gravitational field strength is 10 N / kg.

(i) Calculate the weight of the cylinder.

weight = ...[2]

(ii) State **one** way in which weight differs from mass.

.....

.....

.....[1]

(c) Fig. 1.2 shows the cylinder immersed in a liquid.

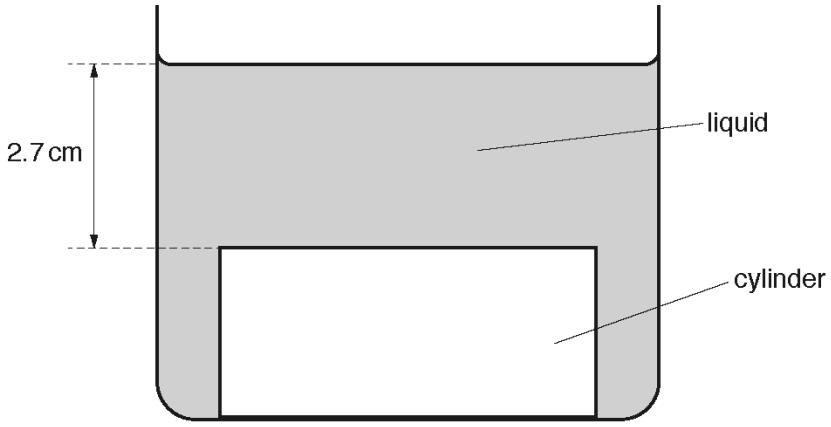

Fig. 1.2 (not to scale)

The upper face of the cylinder is at a depth of 2.7 cm below the surface of the liquid.

The pressure due to the liquid at the upper face of the cylinder is 560 Pa.

(i) Calculate the density of the liquid.

density = ...[2]

(ii) Explain why the cylinder does **not** float in this liquid.

.....

.....[1]

3 - (0625/43_Winter_2017_Q2) - *Measurements And Units, Forces And Pressure*

Fig. 2.1 shows a measuring cylinder that contains a coloured liquid.

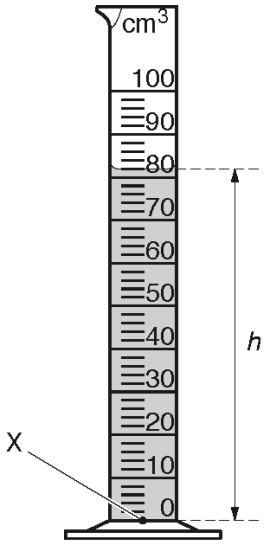

Fig. 2.1

The measuring cylinder contains 82 cm^3 of the liquid. The density of the liquid is 950 kg/m^3.

(a) Calculate the mass of the liquid.

mass = ...[3]

(b) The height *h* of the liquid in the measuring cylinder is 0.094 m.

(i) Calculate the pressure due to the liquid at point X in Fig. 2.1.

pressure = ...[2]

(ii) The true pressure at point X is different from the value calculated in **(b)(i)**.
Explain why.

.....

.....[1]

(c) A small object is made of steel. It is placed level with the top surface of the liquid in the measuring cylinder and then released. The object sinks in this liquid.

(i) Explain why the object sinks in this liquid.

.....

.....[1]

(ii) Describe how the volume of the object can now be determined.

.....

.....

.....[1]

4 – (0625/41_Winter_2017_Q3) – *Measurements And Units, Forces And Pressure*

All the sides of a plastic cube are 8.0 cm long. Fig. 3.1 shows the cube.

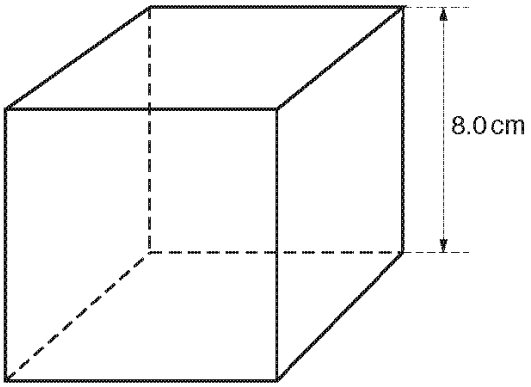

Fig. 3.1 (not to scale)

The mass of the cube is 0.44 kg.

(a) Explain what is meant by *mass*.

.....[1]

(b) **(i)** Calculate the density of the plastic from which the cube is made.

density = ...[2]

(ii) The density of one type of oil is 850 kg / m^3.

State and explain whether the cube floats or sinks when placed in a container of this oil.

.....

.....[1]

(c) On the Moon, the weight of the cube is 0.70 N.

(i) Calculate the gravitational field strength on the Moon.

gravitational field strength = ...[2]

(ii) In a laboratory on the Moon, the plastic cube is held stationary, using a clamp, in a beaker of the oil of density 850 kg / m^3.

The arrangement is shown in Fig. 3.2.

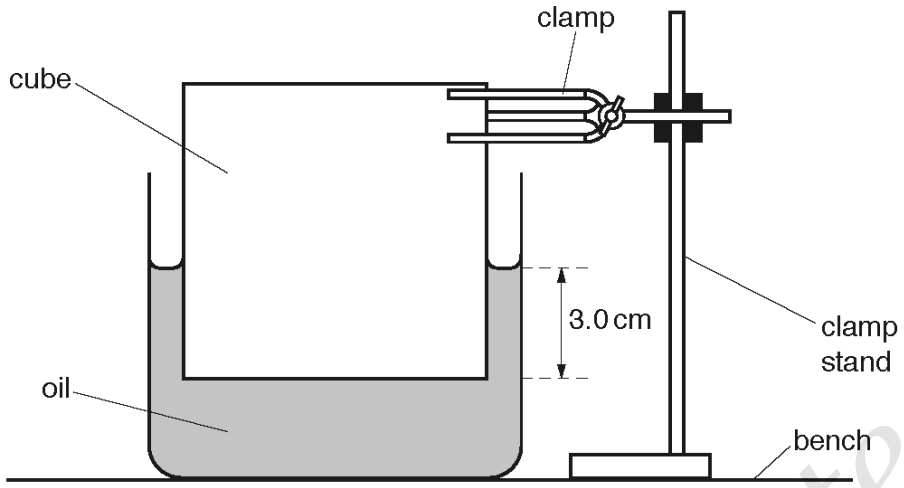

Fig. 3.2

The lower face of the cube is 3.0 cm below the surface of the oil.

Use your answer to **(c)(i)** to calculate the pressure due to the oil on the lower face of the cube.

pressure = ...[2]

ANSWERS

1 – (0625/43_Summer_2017_Q3) – *Measurements And Units*

(a)	$(\rho =) \frac{m}{V}$ OR 180 ÷ 210 OR 0.18 ÷ 210	C1
	0.86 g / cm^3	A1
(b)	floats OR words to the same effect	B1
	density of wood is less than density of liquid	B1

2 – (0625/42_Winter_2017_Q1) – *Measurements And Units, Forces And Pressure*

(a)	$\rho = m / V$ in any form OR $(m =) \rho V$ OR $(m =) 9000 \times 7.5 \times 10^{-5}$	C1
	$(m =)$ 0.68 kg **accept** 680 g	A1
(b)(i)	$W = m g$ in any form or $(W =) m g$ OR $(W =) 0.68 \times 10$	C1
	$(W =)$ 6.8 N	A1
(b)(ii)	any **one** of: weight has direction / mass does not weight is a vector / mass is not weight varies / mass does not mass is amount of matter weight is a force / mass is not	B1
(c)(i)	$\rho = h \rho g$ in any form OR $(\rho =) \rho / h g$ OR $(\rho =) 560 / (0.027 \times 10)$	C1
	$(\rho =) 2.1 \times 10^3$ kg / m^3	A1
(c)(ii)	explains why there is a resultant downward force	B1

3 – (0625/43_Winter_2017_Q2) – *Measurements And Units, Forces And Pressure*

(a)	$(m =) \rho V$ **or** $950 \times 8.2 \times 10^{-5}$ **or** 0.95×82	C1
	$7.8 / 7.79 \times 10^N$ (where N is a integer)	C1
	0.078 / 0.0779 kg **or** 78 / 77.9 g	A1
(b)(i)	$(p =) h \rho g$ **or** $0.094 \times 950 \times 10$	C1
	890 / 893 Pa	A1
(b)(ii)	atmospheric pressure (is acting)	B1
(c)(i)	steel is denser (than liquid) **or** denser than 950 kg / m^3	B1
(c)(ii)	take new reading **and** subtract 82 (cm^3) / original reading	B1

4 – (0625/41_Winter_2017_Q3) – *Measurements And Units, Forces And Pressure*

(a)	(Measure of) quantity / amount of matter OR (property) that resists change in motion / speed / momentum OR measure of a body's inertia	B1
(b)(i)	$d = m / V$ OR in words OR $0.44 / 0.080^3$ OR $0.44 / 5.12 \times 10^{-4}$ OR $440 / 8^3$ OR 440 / 512 OR $0.44 / 8^3$ OR 0.44 / 512	C1
	0.86 g / cm^3 OR 860 kg / m^3 OR 8.6×10^{-4} kg / cm^3	A1
(b)(ii)	Sinks OR does not float AND (cube) denser (than oil)	B1
(c)(i)	$W = mg$ OR $(g =) W / m$ OR 0.70 / 0.44	C1
	1.6 N / kg	A1
(c)(ii)	$(P =) hdg$ OR $0.030 \times 850 \times 1.6$	C1
	41 Pa	A1

4 – (0625/43_Summer_2023_Q9) – *Space Physics*

(a)	both positions correctly marked S_1 and J_1 on the diagram	**A3**
	Saturn moved $360 \times 5 / 30$ (= 60°) **OR** S_1 in correct position	**C1**
	Jupiter moved $360 \times 5 / 12$ (= 150°) **OR** J_1 in correct position	**C1**
(b)(i)	S_2 at 240° **AND** J_2 at (600° – 360° =) 240°	**B1**
(b)(ii)	(Saturn and Jupiter) are aligned / Jupiter exactly in front of Saturn / there is a conjunction owtte	**B1**
(c)(i)	(Jupiter) gaseous **AND** large **AND** (Earth) rocky **AND** small	**B1**
(c)(ii)	any **three** from: (density) • Jupiter has a low density because it is composed of gas / Earth has a high density because it is a solid (gravitational field strength) • Jupiter (has a large GFS so it) has a large mass / Earth (has a small GFS so it) has a small mass • Jupiter's mass is larger than the Earth's mass because the volume of Jupiter is larger even though the density of Jupiter is smaller	**B3**
(d)	(mass =) 1.8×10^{27} kg	**A3**
	$\rho = m / V$ **OR** $(m =) \rho V$ **OR** $(m =) 1300 \times 1.4 \times 10^{15} \times 10^9$	**C1**
	$(m =) 1300 \times 1.4 \times 10^{15} \times 10^9$ (kg) **OR** $1.8(2) \times 10^N$	**C1**

5 – (0625/43_Summer_2023_Q10) – *Space Physics*

(a)	$v = s / t$ **OR** $(s =) vt$	**B1**
	$(c =) 3 \times 10^8$ (m / s)	**B1**
	(1 year =) $365 \times 24 \times 3600$ (s) **OR** 3.2×10^7 (s) **OR** 32×10^6 **OR** 8760×3600	**B1**
	(s =) candidate's speed of light × candidate's time (m)	**B1**
(b)(i)	change of wavelength (of galaxy's starlight) **OR** redshift	**B1**
(b)(ii)	$H_0 = v / d$	**B1**
(b)(iii)	brightness of a supernova	**B1**

6 – (0625/41_Winter_2023_Q10) – *Space Physics*

(a)	hydrogen nuclei fuse to become helium nuclei	**A3**
	nuclear reactions **OR** (nuclear) fusion	C1
	hydrogen fuses into helium	C1
(b)(i)	(observed) wavelength is longer / wavelength is shifted towards the red end of the spectrum	**A2**
	(light from galaxy) redshifted / shifted towards red (end of spectrum)	C1
(b)(ii)	change in wavelength (or starlight due to redshift)	**B1**
(c)(i)	5.9×10^{24} m	**A2**
	$H_0 = v/d$ **OR** $(d =) v / H_0$ **OR** $1.3 \times 10^7 / 2.2 \times 10^{-18}$ **OR** 5.9×10^N (m)	C1
(c)(ii)	1.4×10^{10} (years)	**A2**
	(age =) $1 / H_0$ **or** $1 / 2.2 \times 10^{-18}$ **or** 4.5×10^{17}	C1

7 – (0625/42_Winter_2023_Q9) – *Space Physics*

(a)	Venus	B1
(b)	The larger the mass (of the planet), the larger the gravitational field strength (at the surface)	B1
(c)	orbit of planets is elliptical / is not circular owtte	B1
(d)	correct conversion of T into seconds i.e. $365.2 \times (24 \times 60 \times 60)$ **OR** 3.2×10^7	B1
	$(v =) \{2\pi r\} / T$	B1
	$2\pi \times 149.6 \times 10^6 / 365.2 \times 24 \times 60 \times 60$	B1

8 – (0625/42_Winter_2023_Q10) – *Space Physics*

(a)	(interstellar clouds of) gas and dust **OR** (stellar) nebula	B1
(b)	(inward) force of gravitational attraction (is balanced by)	B1
	(outward) force due to the high temperature (in the centre of the star)	B1
(c)	hydrogen	B1
(d)	planetary nebula	B1

9 – (0625/43_Winter_2023_Q10) – *Space Physics*

(a)(i)	1 Hubble constant	B1
	2 $H_0 = v / d$	B1
(a)(ii)	per second **OR** s^{-1} **OR** 1 / s	B1
(a)(iii)	4.5×10^{17} (s)	A2
	$d / v = 1 / H_0$ **OR** (age of Universe =) $1 / H_0$ **OR** (age of Universe =) d / v **OR** (age of Universe =) $1 / 2.2 \times 10^{-18}$	C1
(b)	shortly after the Universe was formed **OR** shortly after the Big Bang	B1
	all points in space	B1