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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Physical Quantities & Measurement — Paper 1

Worked Answer Key (Multiple Choice)

Fahad H. Ahmad

Contact: +92 323 509 4443

M.Eng NUS Singapore · B.Eng NUST · 15+ years of teaching experience in Singapore, UAE & Pakistan · 60,000+ subscribers and 20 million+ video lecture views.

Fahad H. Ahmad · **+92 323 509 4443**

Physical Quantities & Measurement — Paper 1 · Worked Answer Key

These are **Megalecture worked answers** for the topical multiple-choice compilation on **Physical Quantities, Units & Measurement (IGCSE Physics 0625, Paper 1)**. Every answer below was solved from first principles by the Megalecture team. This compilation does not print individual Cambridge exam references, so the *Reference* column gives the section topic and the printed question number. The compilation is organised into four parts and the printed numbering restarts in each part, so we tag every row with a part letter (A–D) to keep each answer unambiguous.

Part A · Measurement Techniques

Q #	Reference	Answer	Brief working / reason
A1	Measurement · Q1	**A**	Wire ≈ 80 cm long → a **metre rule** for length; diameter ≈ 0.2 cm (2 mm) is small → a **micrometer** for accuracy. Length = metre rule, diameter = micrometer.
A2	Measurement · Q2	**D**	The internal diameter of a pipe in a single reading is taken with the inside jaws of **vernier calipers** (a micrometer cannot reach inside a bore).
A3	Measurement · Q3	**C**	Sleeve scale reads 7.0 mm; thimble reads 30 → 0.30 mm. Total = 7.0 + 0.30 = **7.30 mm**.
A4	Measurement · Q4	**C**	Internal diameter ≈ 2 cm → **vernier calipers**; length ≈ 80 cm (<1 m) → a rigid **rule**. Internal diameter = calipers, length = rule.
A5	Measurement · Q5	**A**	Length 0.4 m → **metre rule**; thickness 0.005 m (5 mm) → **micrometer**; width 0.08 m → **vernier calipers**. Matches row A.
A6	Measurement · Q6	**B**	Length 30 m → a **rule** (only rule/micrometer offered for length here); diameter 2 mm → **micrometer**. Length = rule, diameter = micrometer.
A7	Measurement · Q7	**A**	For an accurate micrometer result you **find the zero error and add or subtract it** from the reading; the two scales are read together, not subtracted.
A8	Measurement · Q8	**A**	A 100 m track is far too long for a rule or micrometer; the appropriate instrument is a **measuring tape**.
A9	Measurement · Q9	**D**	Internal diameter ≈ 2 cm → **vernier calipers**; length ≈ 600 cm (6 m) exceeds a rule → flexible **tape**. Internal diameter = calipers, length = tape.
A10	Measurement · Q10	**D**	The pointer is just past the 36 s mark, on the 0.6 s fine division, giving **36.6 s**.

Q #	Reference	Answer	Brief working / reason
A11	Measurement · Q11	**A**	Diameter of a thin wire → **micrometer**; length ≈ 50 cm → a **rule**. Diameter = micrometer, length = rule.
A12	Measurement · Q12	**D**	A **tape** can be wrapped around the ball, so its reading is directly the circumference (a rule gives only a straight chord).
A13	Measurement · Q13	**B**	To measure the circumference of a football directly, wrap a flexible **measuring tape** around it.
A14	Measurement · Q14	**A**	0.15 mm is very small, so only a **micrometer** can measure it accurately. Length 0.15 mm / micrometer is the correct pairing → row A.
A15	Measurement · Q15	**C**	A micrometer measures small **lengths** (thicknesses/diameters), not area, current or mass.
A16	Measurement · Q16	**B**	Winner 00:57.76 s, other 01:03.84 s. Difference = 63.84 − 57.76 = **6.08 s**.
A17	Measurement · Q17	**D**	Sleeve scale shows 7.5 mm (past 7, half-mark exposed); thimble reads 14 → 0.14 mm. Total = 7.5 + 0.14 = **7.64 mm**.
A18	Measurement · Q18	**B**	To reduce timing error, **time 20 oscillations and divide by 20** — this averages out the reaction-time error.
A19	Measurement · Q19	**C**	The blocks touch the beaker at 2.0 cm and 7.5 cm on the ruler, so diameter = 7.5 − 2.0 = **5.5 cm**.
A20	Measurement · Q20	**C**	A curved track ≈ 0.5 m long is best followed with a flexible **tape measure**; a rigid rule cannot follow the curve.
A21	Measurement · Q21	**B**	Vernier calipers read to 0.1 mm = 0.01 cm, so a reading to that precision is **3.31 cm** (2 d.p. in cm).
A22	Measurement · Q22	**D**	The stone displaces its own volume of water: new level = 75 + 20 = **95 cm³**.
A23	Measurement · Q23	**D**	Volume of copper needs the length (several metres → **tape**) and the diameters (a few cm → **calipers**). Tape and calipers.
A24	Measurement · Q24	**B**	A single sheet of paper is far too thin for a rule; its thickness is measured with a **micrometer**.
A25	Measurement · Q25	**B**	The rise in water level equals the stone's volume, so **the difference between the readings gives the volume of the stone** (density also needs the mass, which is not measured here).
A26	Measurement · Q26	**A**	Two revolutions span the 1.0 cm to 9.8 cm marks = 8.8 cm for 2 turns. Circumference = 8.8 ÷ 2 = **4.4 cm**.

Part B · Units

Q #	Reference	Answer	Brief working / reason
B1	Units · Q1	**D**	"Millions" = mega = M (capital); watt = W (capital). Millions of watts = **MW**.
B2	Units · Q2	**B**	Latent heat is an energy, measured in joules. Correct quantity–unit pair is **latent heat / J** (e.m.f. → V, pressure → Pa, weight → N).
B3	Units · Q3	**C**	"m" = milli = 10^{-3}, so mW = **milliwatt = 10^{-3} W**.
B4	Units · Q4	**B**	One tenth of a millimetre is 0.01 cm, so the reading ends at the 0.01 cm place: **3.31 cm**.
B5	Units · Q5	**B**	Sizes: 1 MC = 10^{6} C > 1 kC = 10^{3} C > 1 mC = 10^{-3} C. Largest → smallest = **1 MC → 1 kC → 1 mC**.
B6	Units · Q6	**D**	"ms" means milliseconds (10^{-3} s), so 6.2 ms is measured in **milliseconds**.
B7	Units · Q7	**C**	Correct units: frequency → Hz, acceleration → m/s², latent heat → J, power → W. The row linking all four correctly is **C**.
B8	Units · Q8	**B**	A normal adult has a mass of roughly **75 kg** (7.5 kg is a baby; 750 kg+ is impossible).
B9	Units · Q9	**B**	Latent heat is an energy → joule (J). Correct pair is **latent heat / J** (e.m.f. → V, pressure → Pa, weight → N).

Part C · Scalars and Vectors

Q #	Reference	Answer	Brief working / reason
C1	Scalars/Vectors · Q1	**D**	Scalars have magnitude only. **Mass, speed, time** are all scalars; the other lists contain vectors (acceleration, force, velocity).
C2	Scalars/Vectors · Q2	**B**	Both force and velocity have a direction, so **both are vectors**.
C3	Scalars/Vectors · Q3	**B**	Energy (scalar) with force (vector) is the only row holding exactly one scalar and one vector → row **B**.
C4	Scalars/Vectors · Q4	**B**	A scalar has magnitude only, so the correct statement is **"a scalar has size but no direction"** → option B. (A vector has both size and direction.)
C5	Scalars/Vectors · Q5	**B**	Vectors need direction. Statement 1 (due East) and statement 3 (straight line towards a lettuce) have direction → **1 and 3**.
C6	Scalars/Vectors · Q6	**C**	Temperature is a scalar and velocity is a vector, so the pair with one of each is **temperature & velocity**.
C7	Scalars/Vectors · Q7	**D**	The row needs a true vector in the vector column and a true scalar in the scalar column. **Weight (vector) and volume**

Q #	Reference	Answer	Brief working / reason
			(scalar) fit → row D. (Row C fails because acceleration is a vector, not a scalar.)
C8	Scalars/Vectors · Q8	**C**	The magnitude of velocity equals the speed, so **velocity of a car** (vector) and **speed of the car** (scalar) are equal in size → row C.
C9	Scalars/Vectors · Q9	**B**	Mass is a **scalar**; acceleration is a **vector** → row B.
C10	Scalars/Vectors · Q10	**C**	Of the choices, **temperature** is the only scalar (acceleration, force and velocity are vectors).
C11	Scalars/Vectors · Q11	**A**	**Acceleration, displacement, velocity** all have direction, so all three are vectors.
C12	Scalars/Vectors · Q12	**B**	Underlined quantities: acceleration, speed, mass, force. The vectors are **acceleration** and **force** (speed and mass are scalars) → **2**.
C13	Scalars/Vectors · Q13	**B**	Displacement, velocity and acceleration are vectors; only **a time of 4.0 s** is a scalar.
C14	Scalars/Vectors · Q14	**C**	Mass, temperature and average speed are scalars; only **a weight of 15 N** is a vector (a force).
C15	Scalars/Vectors · Q15	**D**	**Velocity and acceleration** are both vectors (length and distance are scalars).
C16	Scalars/Vectors · Q16	**A**	Of the four, only **acceleration** is a vector (distance, speed and time are scalars).
C17	Scalars/Vectors · Q17	**D**	Terms in the equations: power, work, time, force, mass, acceleration, velocity, displacement. The vector quantities are **force, acceleration, velocity, displacement** → **4**.
C18	Scalars/Vectors · Q18	**C**	"Velocity = change in displacement / change in time." The vectors are **velocity** and **displacement** (time is a scalar) → **2**.
C19	Scalars/Vectors · Q19	**D**	Length, mass and speed are all scalars, so the list of only scalars is **length, mass, speed**.
C20	Scalars/Vectors · Q20	**B**	Density, energy and speed are scalars; **displacement** is the vector.

Part D · Resultant of Vectors

Q #	Reference	Answer	Brief working / reason
D1	Resultant · Q1	**A**	By the parallelogram rule, R is the diagonal drawn from the common tail of the 3 N and 4 N forces to the far corner (pointing up-right) → diagram **A**.
	Resultant · Q2		

Q #	Reference	Answer	Brief working / reason
D2		**B**	X points up-left, Y points right. Their resultant lies between them, tilted up and just right of vertical → arrow **B**.
D3	Resultant · Q3	**D**	F_1 points up-right, F_2 straight down. Their sum points down and to the right → arrow **D**.
D4	Resultant · Q4	**C**	Perpendicular 3.0 N and 4.0 N: R = √(3² + 4²) = √25 = **5.0 N**.
D5	Resultant · Q5	**B**	Vertical: 2 N up − 2 N down = 0. Horizontal: 8 N − 4 N = 4 N. Resultant = **4 N**.
D6	Resultant · Q6	**D**	One vector points up-right, the other horizontally right. The parallelogram diagonal from the common tail gives R pointing right and slightly up → diagram **D**.
D7	Resultant · Q7	**D**	For 3.0 N and 4.0 N, R ranges from 1 N (180°) up to 7 N (0°). For angles only between 0° and 90° the resultant is below 7 N, so **7.0 N is not possible**.
D8	Resultant · Q8	**B**	4.0 N and 2.0 N give a resultant of exactly 4.0 N only when the angle between them is obtuse (≈104°). Diagram **B** shows the 2.0 N angled back, giving a 4.0 N diagonal.
D9	Resultant · Q9	**C**	Using the tip-to-tail (triangle) method, X then Y, R joins the start of X to the tip of Y → diagram **C**.
D10	Resultant · Q10	**D**	For 3 N and 4 N, R lies between 1 N and 7 N. **8 N is outside this range**, so it cannot be the resultant.
D11	Resultant · Q11	**A**	Perpendicular 9 N (OR) and 12 N (OP): magnitude = √(9² + 12²) = √225 = 15 N; direction along the diagonal **OQ**. Magnitude 15 N, direction OQ → row A.
D12	Resultant · Q12	**A**	30 N and 50 N give R between 20 N and 80 N. **10 N is below 20 N**, so it cannot be the resultant.
D13	Resultant · Q13	**C**	Existing horizontal forces: 11 N right − 3 N left − 2 N left = 6 N right. To get a 3 N resultant to the left we add **9 N to the left** (6 − 9 = −3 N).
D14	Resultant · Q14	**A**	Engine 20 m/s due North, wind 12 m/s towards the East. Tip-to-tail North then East gives R up-and-to-the-right → diagram **A**.
D15	Resultant · Q15	**A**	25 N up-right and 40 N straight down combine to a resultant pointing up and to the right of horizontal → arrow **A**.
D16	Resultant · Q16	**C**	Net force: A = 30 − 20 = 10 N; B = 0; C = (5 + 5) − 30 = 20 N; D = 15 N. Largest is **C (20 N)**.
D17	Resultant · Q17	**C**	3.0 N up and 4.0 N right; the rectangle diagonal R runs from the common origin up-and-right → diagram **C**.
D18	Resultant · Q18	**D**	

Q #	Reference	Answer	Brief working / reason
			The resultant of X and Y points up-right; the balancing force Z must be equal and opposite (down-left along the same line) → diagram **D**.
D19	Resultant · Q19	**A**	Adding 4.0 N (right) and 3.0 N (up) tip-to-tail gives the 5.0 N hypotenuse from the tail of the 4 N to the tip of the 3 N → diagram **A**.
D20	Resultant · Q20	**B**	Walking X→Y→Z→X returns to the start, so total displacement = **0**; total distance = 5.0 + 12.0 + 13.0 = **30 m** → row B.

Note from Megalecture. This compilation prints only “QUESTION # n” headers (no Cambridge session references), and the numbering restarts in each of the four sections, so we tag every row with a part letter (A–D) and the section name. These are original Megalecture worked solutions prepared for revision use.