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AS Level Physics

Examiners' Edition

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Pearson Edexcel 8PH0

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A Level Physics • Topic 1

Working as a Physicist

*Examiners' Edition: Securing A*s*

12 common mistakes • 24 practice questions • full mark schemes

Written for Pearson Edexcel AS and A Level Physics (8PH0, 9PH0).

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1.1 Units, prefixes and equations

MEMORISE THIS

base units: kg, m, s, A, K, mol

$$N = \text{kg m s}^{-2}$$

$$J = \text{kg m}^2 \text{s}^{-2}$$

$$\text{Pa} = \text{kg m}^{-1} \text{s}^{-2}$$

$$C = A \text{ s}$$

$$G \ 10^9, M \ 10^6, \mu \ 10^{-6}, n \ 10^{-9}$$

$$\text{mm}^2 = 10^{-6} \text{ m}^2$$

1 SI base units

AS & A Level

✗ Common mistake

Giving a derived unit (N, J, Pa, C) when the question asks for BASE units, or stopping halfway through the conversion.

✓ Do this instead

- The base units you need: kg, m, s, A, K, mol.
- N, J, W, Pa, C and V are DERIVED units. Break them down until only base units are left.
- $N = \text{kg m s}^{-2}$; $J = N \text{ m} = \text{kg m}^2 \text{s}^{-2}$; $\text{Pa} = N \text{ m}^{-2} = \text{kg m}^{-1} \text{s}^{-2}$. Check every power.
- $C = A \text{ s}$ (charge = current $\times$ time).
- To show two units are the same, reduce BOTH sides to base units and compare them line by line.

IN THE EXAM

Many students rearranged into base units and then simply declared the answer equal to Pa s with no justification. (Jun 2023, AS P2)

Exam tip: Write the defining equation first ($F = ma$, $W = Fs$, $p = F/A$), then swap in units.

Examiners flagged this in: Jun 2016 AS P1, Jun 2018 AS P1, Jun 2019 AS P2, Jun 2022 AL P1, Jun 2023 AS P2

Question 1.1 Check it

[Mark scheme >](#)

Express the pascal (Pa) in SI base units.

(2)

Question 1.2 Apply it

[Mark scheme >](#)

Stokes' law states that $F = 6\pi\eta rv$, where η is the viscosity of the fluid.

Show that the unit of η is equivalent to Pa s.

(3)

Mark schemes

Note: all answers use $g = 9.81 \text{ N kg}^{-1}$ (9.81 m s^{-2}), the value on the Edexcel data sheet.

1 SI base units

Question 1.1 Check it

[Back to question](#)

Part	Answer	Marks
	$\text{Pa} = \text{N m}^{-2}$ and $\text{N} = \text{kg m s}^{-2}$	1
	$\text{Pa} = \text{kg m}^{-1} \text{s}^{-2}$	1
Total		2

Question 1.2 Apply it

[Back to question](#)

Part	Answer	Marks
	$\eta = F \div 6\pi r v$, so unit = $\text{kg m s}^{-2} \div (\text{m} \times \text{m s}^{-1})$	1
	= $\text{kg m}^{-1} \text{s}^{-1}$	1
	$\text{Pa s} = \text{kg m}^{-1} \text{s}^{-2} \times \text{s} = \text{kg m}^{-1} \text{s}^{-1}$, so they are the same	1
Total		3

Common wrong answers: Declaring " Pa s " straight after rearranging, without showing the units, doesn't show anything. Reduce BOTH η 's unit and Pa s to base units ($\text{kg m}^{-1} \text{s}^{-1}$) and compare.

2 Prefixes and powers of ten

Question 2.1 Check it

[Back to question](#)

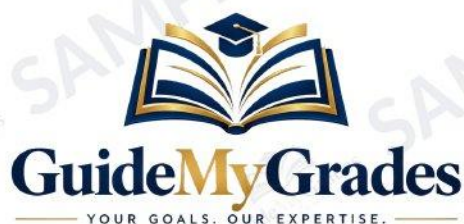
Part	Answer	Marks
	$r = 0.19 \times 10^{-3} \text{ m}$; $A = \pi (0.19 \times 10^{-3})^2$	1
	$1.1 \times 10^{-7} \text{ m}^2$	1
Total		2

Question 2.2 Apply it

[Back to question](#)

Part	Answer	Marks
	$F = 180 \times 10^6 \times 1.13 \times 10^{-7}$	1
	20 N	1
Total		2

Common wrong answers: Using 0.38 mm as the radius gives $4.5 \times 10^{-7} \text{ m}^2$. Writing M as 10^3 gives 0.02 N.



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