

Multiple Choice Answers

Q2: A

Q3: D

Multiple Choice Answers

Q1: A

Q3: C

1(a)	only ampere and kilogram underlined
1(b)(i)	percentage uncertainty = $2.1 + 0.6 + (1.5 \times 2)$
	= 5.7%
1(b)(ii)	absolute uncertainty = $(5.7 / 100) \times 8.245 \times 10^9$
	(= 4.7×10^8 Pa or 0.47×10^9 Pa)
	$E = (8.2 \pm 0.5) \times 10^9$ Pa

1(a)	(SI base unit of α) $\text{m}^3 \text{s}^{-1} \times \text{m} / \text{m}^4 = \text{s}^{-1}$
1(b)	(percentage uncertainty =) $3 + 4 + 2 \times 4 = 15$ (%)
1(c)	$\alpha = QL / r^4$
	= $2.72 \times 10^{-8} \times 2.5 \times 10^{-2} / (7.1 \times 10^{-5})^4$
	= 2.7×10^7
	absolute uncertainty = $0.15 \times [2.7 \times 10^7]$
	= 0.4×10^7
	$\alpha = (2.7 \pm 0.4) \times 10^7 \text{s}^{-1}$

2(a)	force $\times$ displacement in the direction of the force
2(b)	units: $\text{kg m s}^{-2} \times \text{m} = \text{kg m}^2 \text{s}^{-2}$
2(c)	T_1 : K and T_2 : K
	A: m^2 and t : s and L: m
	$c = (\text{kg m}^2 \text{s}^{-2} \text{m}) / (\text{m}^2 \text{K s})$
	= $\text{kg m s}^{-3} \text{K}^{-1}$

1(a)	10^{12}
	pico (p)
1(b)	ampere and metre both underlined (and no other units underlined)
1(c)(i)	percentage uncertainty = $3.5 + (3.0 \times 2) + 2.5 + 2.0$
	= 14%
1(c)(ii)	absolute uncertainty = $4.1 \times 10^{-7} \times 14 / 100$
	= $6 \times 10^{-8} \Omega \text{m}$

1(a)	only ampere and kelvin underlined
1(b)	initial speed / velocity is zero
	(non-zero magnitude of) acceleration is constant / uniform (and in a straight line)
1(c)(i)	$a = 2.75^2 / (2 \times 3.89)$
	= 0.97 m s^{-2}
1(c)(ii)	percentage uncertainty = $(2 \times 0.8) + 0.5$
	= 2.1%
1(c)(iii)	absolute uncertainty = $(2.1 / 100) \times 0.97$
	= 0.02 m s^{-2}

1(a)	base quantity	coulomb
	base unit	current
	derived quantity	force
	derived unit	kilogram
	any two joined correctly	
	all four joined correctly	
1(b)(i)	the measurements have a small range	
1(b)(ii)	(average of the) measurements not close to the true value	
1(c)(i)	percentage uncertainty = $(3 + 5 + 4) / 2$	
	= 6%	
1(c)(ii)	absolute uncertainty = $(6 / 100) \times 15.0$	
	= 0.9 m s^{-1}	