Question 3 (Answer: **B**)

- $1\ \text{W} = 1\ \text{J s}^{-1}$, and $1\ \text{J} = 1\ \text{N m} = \text{kg m}^2\ \text{s}^{-2}$.
- Dividing by the second gives $\text{kg m}^2\ \text{s}^{-3}$.
- A and D are correct units for power, but they are derived units, not base units.

Question 22 (Answer: **B**)

- Stress is force divided by area, so its unit is N m^{-2}.
- In base units $1\ \text{N} = \text{kg m s}^{-2}$, so $\text{N m}^{-2} = \text{kg m s}^{-2}\ \text{m}^{-2}$.
- Combining the metres leaves $\text{kg m}^{-1}\ \text{s}^{-2}$.

Question 3 (Answer: **C**)

- Write the newton in base units: $\text{N} = \text{kg m s}^{-2}$.
- Then $\text{N s}^2\ \text{m}^{-1} = \text{kg m s}^{-2} \times \text{s}^2 \times \text{m}^{-1}$.
- Every metre and second cancels, leaving kg – a mass.

1(a)	air temperature: K **and** air pressure: kg m^{-1} s^{-2}
	scalar only ticked for both air temperature and air pressure
1(b)(i)	upthrust $= 1.1 \times 9.81 \times (4\pi \times 0.90^3 / 3)$
	$= 33$ N
1(b)(ii)	(due to difference in height / depth there is a) difference in pressure between top and bottom (of balloon)
	(due to pressure difference, upwards) force on bottom of balloon is greater (than downwards force on top of balloon, so resultant force is upwards)
1(b)(iii)	$(\Sigma)F = 33 - 19$ $(= 14$ N)
	$m = 19 / 9.81$ $(= 1.94$ kg)
	$a = (33 - 19) / (19 / 9.81)$ $= 7.2$ m s^{-2}
1(c)	$5 + 3 + (2 \times 4)$ (= 16%)
	absolute uncertainty in $c = 1.8 \times 0.16$ $= (\pm) 0.3$

Question 2 (Answer: **D**)

- First the force: 0.25 kN = 250 N.
- Then the area: 1 $m^2 = 10^6$ mm^2, so 1 $mm^{-2} = 10^6$ m^{-2}.
- $250 \times 10^6 = 2.5 \times 10^8$ N m^{-2}, which is 250 000 000.

Question 4 (Answer: **C**)

- The pendulum equation is $T = 2\pi(L/g)^n$, and L/g has units of s^2.
- For the left-hand side to be a time, $(s^2)^n = s$, so $n = \frac{1}{2}$.
- A negative n would make a longer pendulum swing faster, which is not what happens.