Forces - Scalars/Vectors

Mark Scheme 1

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Forces Sclaras/Vectors
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 1

Time Allowed: **40 minutes**

Score: **/33**

Percentage: **/100**

1	**(a**	**(i)**	any scalar quantity other than mass	B1
		(ii)	any vector quantity other than force	B1
	(b)		F = ma in any form OR (a =) F / m	C
			50 000 / 290 000 OR 50 / 290	
			a = 0.17 m / s^2	A1
	(c)		1 cm: 20 000 N / 20 kN	
		(ii)	triangle completed	B1
			230 000 N OR 230 kN in range 220 000 N – 240 000 N / 220 kN – 240 kN	
			by calculation: 110°	
			OR by measurement: 108° – 112°	B1

[Total: 9]

2	**(a**		2 vectors correct direction AND relative length by eye	B1
			correct triangle OR rectangle with resultant on correct diagonal	B1
			7.2 kN tolerance 7.0 – 7.4 kN	B1
	(b)	**(i)**	(moment =) force × distance	C1
			(moment = 11 000 × 1.8 =) 20 kNm	A1
		(ii)	(moment of weight = 19 000 x 1.25 =) 24 (kNm)	B1
			correct statement based on <u>two moments seen</u>	B1

[Total: 7]

3 **(a** velocity has direction/is a vector AND speed doesn't/isn't/is a scalar B1

(b) horizontal arrow to right AND touching parachutist (when extended) B1
arrow/line horizontal AND arrow / line vertical AND making two sides of triangle OR rectangle

(ii) correct diagonal (i.e. top left to bottom right) B1
$10.4 – 10.5\,\text{m/s}$ B
51–55° to horizontal OR 35–39° to vertical (NOT more than 2 sig.figs.) B1

(iii) $\frac{1}{2}mv^2$ OR $0.5 \times 85 \times 10.5^2$ (e.c.f. from **(b)(ii)**) C
$0.5 \times 85 \times 10.5^2$ (e.c.f. from **(b)(ii)**) C
$4.7/4.69/4.685625 \times 10^3$ J (e.c.f. from **(b)(ii)**) A [9]

4 **(a (i)** (both have) magnitude o.w.t.t.e. B1

(only) vector has direction B1 [2]

(ii) valid example of vector quantity
e.g. displacement, weight, force, veloci B1

valid example of scalar quantity
e.g. distance, length, time, pressure, mass, energy accept heig B1 [2]

(b) each vector to scale and correct angle,
larger vector clockwise by acute angle from smaller B1

parallelogram or correct two sides of triangle B1

resultant drawn correct, from his parallelogram or his sides of triangle M1

magnitude $4.5 – 5.4 \times 10^4$ N, accept 1 sig. fig. if exact
AND direction 4 – 12° from 3×10^4 N force OR 8 – 16° from 2×10^4 N force
accept values from diagram A1 [4]

[Total: 8]