**Dynamics**

**Multiple Choice**

1 – A

2 – E

3 – D

4 – D

5 – E

6 – C

7 – C

8 – B

9 – C

10 – B

11 – B

12 – E

13 – D

14 – D

15 – E

16 – C

**Section 2**

1 a)(i) a = (v-u)/t (1) = (4.8-0)/25 (1) = 0.19 ms-2 (1) (ii) Constant Velocity (1)(iii) Drag Thrust (1) for arrows (1) for names

b) (i) distance = area under graph (1) = (0.5 x 4.8 x 25) + (4.8 x 425) + (0.5 x 4.8 x 60) (1) = 2244m (1)

(ii) v = s/t (1) = 2244/510 (1) = 4.4 m/s (1)

2 a) So total weight is not above 24000N (1)

b) 13500+6125 = 19625 N (1)

c) t = d/s (1) = 201000/67 (1) = 3000 s (1)

3 a)(i) Pythagoras, a2 = 60002+80002 (1) a = 10000N (1) (ii) tan-1θ = 6000/8000 (1) θ = 37° S of W. Or bearing 127(1)

(iii) a = F/m (1) = 10000/5x106 (1) = 2 x 10-3 ms-2 (1)

b) Diagram with arrows (1) Down labelled WEIGHT (1) Up labelled UPTHRUST or BUOYANCY (1)

4 a)(i) Length of card (1) Time to pass light gate (1) Time to reach light gate (1) (ii) Timing might be off due to human reaction time (1)

b) a = (v-u)/t (1) = (1.6-0)/2.5 (1) = 0.64 ms-2 (1)

5 a)(i) Pythagoras XY2=752+402 (1) XY = 85m (1) (ii) tan-1θ = 75/40 (1) θ= 62° E of N or bearing 062 (1)

b)(i) v=s/t (1) = 85/68 (1) = 1.25 m/s (1) (ii) Speed is distance over time, not displacement (1) so 143m not 85m. (1) or by calculation.

6 a) a = (v-u)/t (1) = (2.5-0)/1.4 (1) = 1.8ms-2 (1)

b) distance = area under graph (1) = (0.5 x 2.5 x 1.4) + (2.5 x 1.6) + (0.5 x 1.2 x 1.6) (1) = 6.71m (1)

c) Diagram as shown (1) Down arrow labelled WEIGHT (1) Up arrow labelled DRAG (1)

7 a) Zero (1)

b) (i)distance = area under graph (1) = (0.5 x 1 x 3) + (3 x 3) + (0.5 x 3 x 24) (1) = 46.5m (1)

(ii) a = (v-u)/t (1) = (27-3)/3 (1) = 8 ms-2 (1)

c) s=d/t (1) = 1520/79 (1) = 19.2 m/s (1)

8 a) Equal AND Opposite (1)

b) m = W/g (1) = 1176/9.8 (1) = 120 kg (1)

c) Fun = 1344-1176 = 168 N (1);

a = Fun/m (1) = 168/120 (1) = 1.4 ms-2 (1) IF 168N NOT CALCULATED MAX (1) FOR F=ma.

9 OEQ. No understanding (0) Limited (1) Reasonable (2) Good (3)