M1. (a) D

1

(b) C

1

(c) W = 300 × 45

1

W = 13 500

1

*allow 13 500 with no working shown for **2** marks*

(d) straight line drawn from 13 m / s to 0 m / s

1

finishing on x-axis at 65 s

1

[6]

##

(a) (i) plasticine stretches/snaps
stays stretched/snapped
for 1 mark each

2

(ii) spring compresses OWTTE
returns to **original** length/shape or gets longer
for 1 mark each

2

(iii) ruler bends/breaks
returns to original shape or stays broken
for 1 mark each

2

(b) (i) 1.5N
for 1 mark

1

(ii) 4 cm
for 1 mark

1

(iii) 19 cm
for 1 mark

1

[9]

M3. (a) B

more aerodynamic **or** most streamlined shape **or**
smaller (surface) area

*accept less air/wind resistance **or** less drag **or** less friction*
*clothing traps less air **or** rolled up into ball **or** arms, legs drawn in*

accept converse

2

(b) (i) gravity

1

(ii) air resistance

1

(iii) go up

1

(iv) stays the same

1

(c) bigger the area, the bigger force Y

accept the converse

or bigger the area more drag

accept when the parachute opens then force Y bigger

or bigger the area more air resistance

need the relation of area to force

1

[7]

M4. (a) (i) friction

accept any way of indicating the correct answer

1

(ii) gravity

accept any way of indicating the correct answer

1

(b) (i) accelerates **or** <u>speed</u> / velocity increases

accept faster <u>and</u> faster (1 mark)

*do **not** accept faster pace / falls faster*
or suggestions of a greater but constant speed

1

downwards / falls

accept towards the Earth / ground

this may score in part (b)(ii) if it does not score here and there is no contradiction between the two parts

1

(ii) constant speed / velocity **or** terminal velocity / speed or zero acceleration

stays in the same place negates credit

1

[5]

M5. (a) (i) 0.6

*allow **1** mark for correct substitution*

2

newtons

accept N
*do **not** accept n*
accept Newtons

1

(ii) the same as

1

(b) (i) changed velocity

accept increased/ decreased for change
accept speed for velocity
accept change direction
accept getting faster/ slower
accept start/ stop moving
accept correct equation in terms of change in speed or change in velocity

1

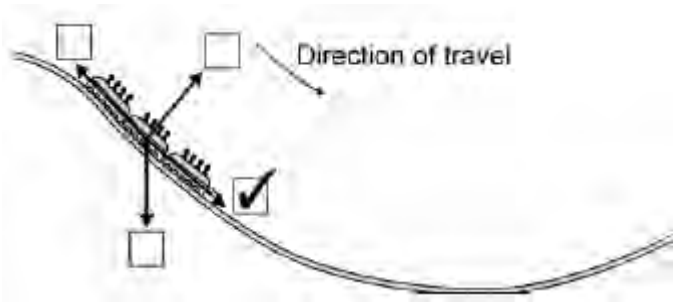
(ii) down(wards)

accept towards the ground
accept ↓
*do **not** accept south*

1

[6]

M6. (a) correct box ticked



1

(b) (i) 30

ignore added units

1

(ii) 2250 **or** their (b)(i) × 75 correctly calculated

*allow **1** mark for correct substitution ie 75 × 30 **or** their (b)(i) × 75 provided no subsequent step shown*

*an answer of 750 gains **1** mark only if answer to (b)(i) is 10*

2

[4]

M7. (a) (i) 50 (N)

ignore any units

1

(ii) resultant force

1

(iii) 4000

*accept their (a)(i) × 80 correctly calculated for **2** marks*

*allow **1** mark for correct substitution i.e. 50 × 80 or their (a)(i) × 80*

ignore any units

2

(b) (i) joule

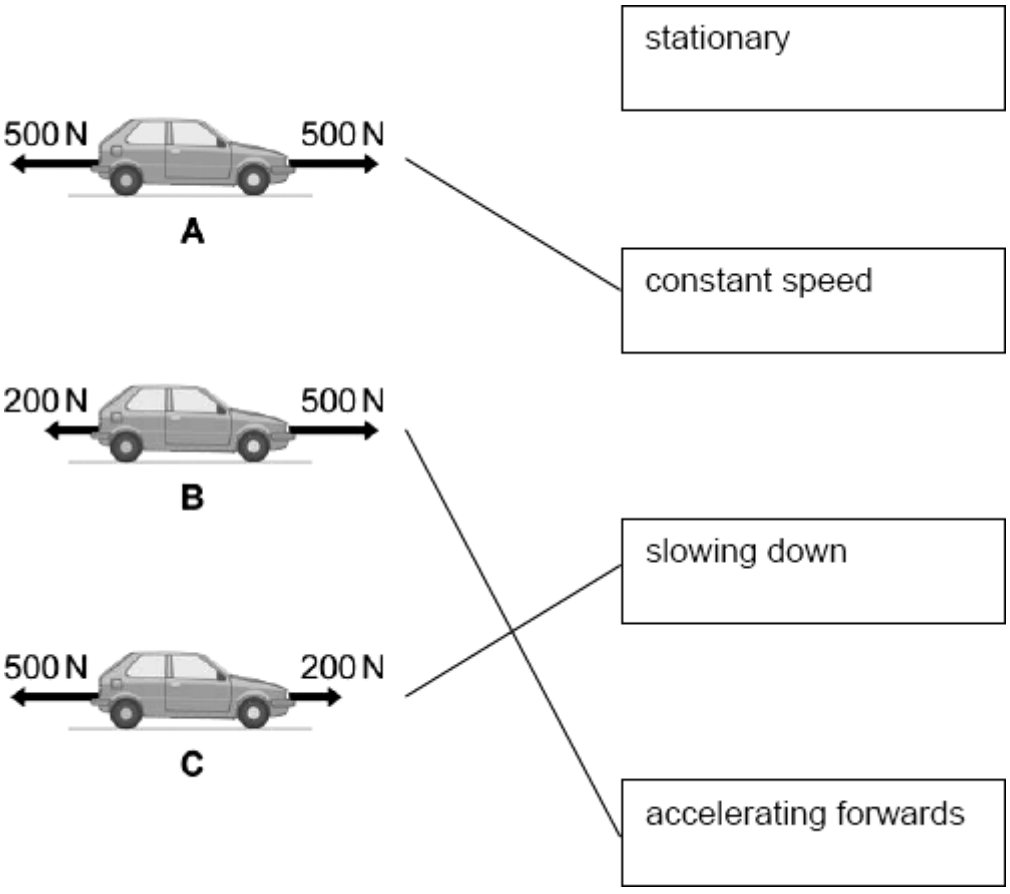
1

(ii) heat

1

[6]

M8.(a) *3 lines drawn*
all correct
*allow **1** mark for each correct line*
if two or more lines are drawn from any diagram then all these lines are incorrect



3

(b) (i) horizontal arrow to the right
judge by eye
accept an arrow drawn outside the box if it is labelled correctly

1

(ii) horizontal arrow to the left
judge by eye
accept an arrow drawn outside the box if it is labelled correctly

1

(iii) equal to

1

(iv) to measure the forces exerted on the dummy during the impact

1

[7]

M9. (a) 4 N to the right

1

(b) (i) bigger than

1

equal to

1

(ii) reduces it

1

increases air resistance / drag / force C
accept parachute has large(r) (surface) area

1

[5]

M10. (a) (i) electrons

1

a positive

1

(ii) (forces are) equal
accept (forces are)the same
forces are balanced is insufficient

1

(forces act in) opposite directions
accept (forces) repel
both sides have the same charge is insufficient

1

(b) aluminium

1

[5]