

M1. (a) (i) 720
*allow 1 mark for correct substitution,
ie 72×10 provided no subsequent step shown* 2

(ii) 720 or their (a)(i) 1

(b) (i) gravitational potential
*allow gravitational
allow potential* 1

(ii) 432
*allow 1 mark for correct substitution, ie $\frac{21600}{50}$ provided no
subsequent step shown* 2

watt / W 1

[7]

M2. (a) (i) gravitational potential
accept gravitational
accept potential 1

(ii) 2250 (N) 1

forces must be balanced
or
forces are equal and opposite
do not accept because it is not moving
do not accept 'equilibrium' by itself
do not accept 'it is not balanced'
do not accept 'forces are equal'
do not accept 'forces are the same' 1

(b) 1500
1 mark for correct substitution 2

[5]

- M3.** (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]

M4. (a) (i) horizontal arrow pointing to the left
judge by eye
drawn anywhere on the diagram 1

(ii) 60 (N) 1

(at steady speed) resultant force must be zero
accept forces must balance/are equal
accept no acceleration
*do **not** accept constant speed* 1

(b) 1680
allow 1 mark for correct substitution, ie 60 x 28 provided no subsequent step shown 2

joule
accept J
do not accept j 1

[6]

M5. (a) potential

1

(b) (i) 13 200

allow 1 mark for correct substitution, ie 660×20 provided no subsequent step shown

2

(ii) 16.5

allow 1 mark for correct

or

their (b)(i)

800 correctly calculated

13 200

their (b)(i)

substitution, ie 800 or 800

provided no subsequent step shown

2

[5]

M6.(a) (i) 24

*allow 1 mark for converting time to 600 seconds
or showing method ie 14400/10*

$$\text{or } \frac{14400}{10 \times 60}$$

provided no further steps shown

2

(ii) 24

ignore any unit

or
their (a)(i)

1

(b) (i) 20 45

both required – either order

1

(ii) the block transfers energy to the surroundings

1

[5]

M7.(a) 1800 (N)

allow 1 mark for correct substitution ie 180×10 provided no further steps shown

2

(b) 3780 **or**
their (a) $\times 2.1$ correctly calculated

*allow 1 mark for correct substitution
ie 1800 **or** their (a) $\times 2.1$ provided no further steps shown*

2

joule

*accept J
accept any clear indication of correct answer*

1

(c) 0

reason does not score if 0 not chosen

1

work is only done when a force makes an object move

*accept distance moved is zero
accept no energy transfer (to the bar)
accept the bar is not moving/is stationary
'it' refers to the bar/weights*

1

[7]

M8. (a) D 1

(b) C 1

(c) $W = 300 \times 45$ 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]