Work Done and Energy Transfer

Mark Scheme

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.5 Forces
Sub-Topic	Work Done and Energy Transfer
Difficulty Level	Bronze Level
Booklet	Mark Scheme

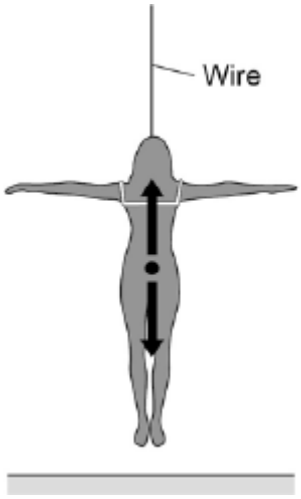
Time Allowed: **54 minutes**

Score: **/53**

Percentage: **/100**

Grade Boundaries:

M1.(a)



arrow pointing vertically upwards

1

arrow pointing vertically downwards

1

(b) Gravitational force

*if more than **two** boxes ticked apply list principle*

1

Tension force

1

(c) 0 (N)

1

(d) weight = 70 × 9.8 (= 686)

1

weight = 690 (N)

1

*allow 690 (N) with no working shown for **2** marks*
*allow 686 (N) with no working shown for **1** mark*

(e) 34 (N) / 30 (N)

allow ecf from 05.4 correctly calculated

1

(f) resultant force = mass × acceleration

accept F = ma

1

accept equation correctly rearranged for a

(g) 25 = 65 × a

1

a = 25 / 65

1

a = 0.38(4615…) (m / s^2)

1

*allow 0.38 (m / s^2) with no working for **3** marks*

[12]

M2.(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

$\frac{\text{their (b)(i)}}{800}$ correctly calculated

substitution, ie $\frac{13\,200}{800}$ ***or*** $\frac{\text{their (b)(i)}}{800}$

provided no subsequent step shown

2

[5]

M3.(a) 1800 (N)

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

2

(b) 3780**or**

their (a) × 2.1 correctly calculated

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

*ie 1800 **or** their (a) × 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]

M4.(a) (i) 24

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

M5. (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]

M6. (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]

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) (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]