

GCSE Physics

Worksheet: Work done and energy transfer

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Work done and energy transfer

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

A gardener pushes a wheelbarrow full of soil 30 m along a level garden path, using a constant horizontal force of 40 N.

0 1 . 1

Calculate the work done by the gardener.
Use the equation:
work done = force × distance

.....

.....

.....

.....

Work done = J

[2 marks]

0 2

A worker pushes a heavy box 12 m across a warehouse floor, using a constant horizontal force of 105 N.

0 2 . 1

Calculate the work done by the worker.

Use the equation:

work done = force $\times$ distance

.....

.....

.....

.....

Work done = J

[2 marks]

0 3

0 3 . 1

A removal worker pushes a box 6.0 m along a corridor with a horizontal force of 150 N.

Calculate the work done by the worker.

Use the equation:

work done = force $\times$ distance

.....

.....

.....

.....

Work done = J

[2 marks]

0 3 . 2

Which unit is equivalent to the joule?

Tick (✓) **one** box.

N/m

☐

N m

☐

N/m²

☐

kg m/s

☐

[1 mark]

0 3 . 3

Friction acts between the box and the floor.

What happens to the temperature of the box and the floor as the box is pushed?

.....

.....

.....

[1 mark]

0 3 . 4

Complete the sentence.

When a force causes an object to move through a distance, is done on the object.

.....

.....

.....

[1 mark]

0 4

0 4 . 1

Which of these is the correct unit for work done?

Tick (✓) **one** box.

Newton

☐

Joule

☐

Watt

☐

Pascal

☐

[1 mark]

0 4 . 2

A force acts on an object. In which **two** of these situations does the force do no work on the object?

Tick (✓) **two** boxes.

- The object does not move ☐
- The object moves in the same direction as the force ☐
- The object moves at right angles to the direction of the force ☐
- The object moves in the opposite direction to the force ☐

[2 marks]

0 4 . 3

Write down the equation that links distance moved along the line of action of the force (s), force (F) and work done (W).

.....

.....

[1 mark]

0 5

A lift car and its passengers, of total mass 840 kg, rise through a height of 34 m at a constant speed.

gravitational field strength = 9.8 N/kg

0 5 . 1

Calculate the work done against gravity in raising the lift car and its passengers.

.....

.....

.....

.....

.....

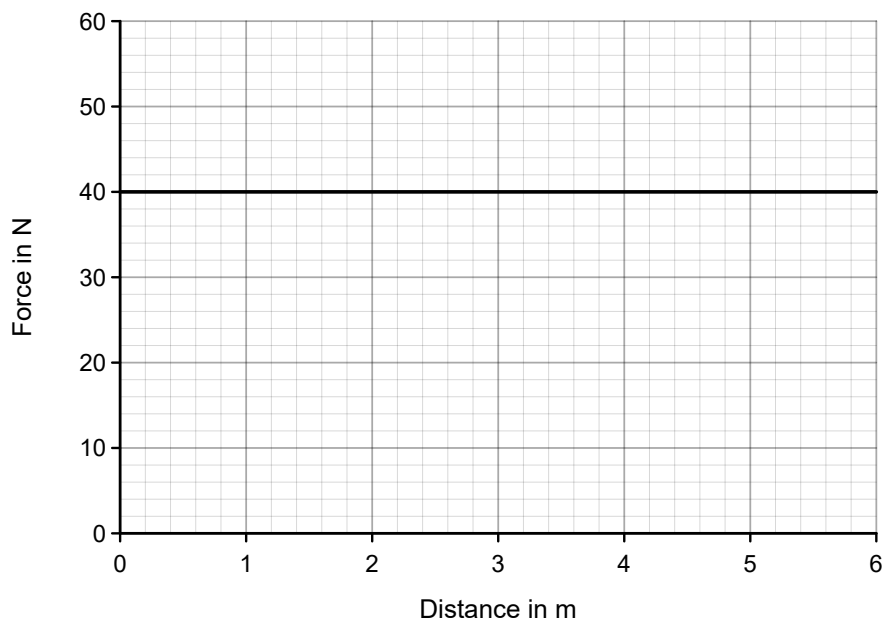
Work done = J

[3 marks]

0 6

A student pushes a shopping trolley along a level floor. Figure 1 shows the horizontal force exerted by the student against the distance the trolley moves.

Figure 1



0 6 . 1

Use Figure 1 to determine the work done in pushing the trolley 6.0 m.

.....

.....

.....

.....

Work done = J

[2 marks]

0 6 . 2

Explain why the area under a force–distance graph represents the work done.

.....

.....

[1 mark]

0 7

A cyclist does 72 kJ of work to travel 1.6 km along a level road at a steady speed.

0 7 . 1

Write down the equation that links distance (s), force (F) and work done (W).

.....
.....

[1 mark]

0 7 . 2

Calculate the average driving force.

.....
.....
.....
.....
.....

Force = N

[3 marks]

0 7 . 3

Give the work done by the cyclist in newton-metres.

.....
.....
.....

Work done = N m

[1 mark]

0 7 . 4

The driving force is equal to the resistive forces acting on the bicycle.
Explain what happens to the energy transferred by the work done against the resistive forces.

.....

.....

.....

.....

[2 marks]

0 8

Table 1 shows the force used and the distance moved for four tasks in a warehouse.

Table 1

Task	Force in N	Distance in m
A	200	3.0
B	150	5.0
C	80	9.0
D	500	1.0

0 8 . 1

Calculate the work done in Task A.

.....

.....

.....

.....

Work done = J

[2 marks]

0 8 . 2

Determine which task involves the **least** work done.
You must show your working.

.....

.....

.....

.....

[2 marks]

0 8 . 3

A student says:
‘The task with the largest force always involves the most work done.’
Use the data in Table 1 to explain why the student is wrong.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Physics · Worksheet: Work done and energy transfer · 32 marks

Question 1 (2 marks)

01.1 [2 marks]

Answer: 1200 J

- $W = 40 \times 30$ (1)
 - 1200 (J) (1)
-

Question 2 (2 marks)

02.1 [2 marks]

Answer: 1260 J

- $W = 105 \times 12$ (1)
 - 1260 (J) (1)
-

Question 3 (5 marks)

03.1 [2 marks]

Answer: 900 J

- $W = 150 \times 6.0$ (1)
 - 900 (J) (1)
-

03.2 [1 mark]

Correct: N m

03.3 [1 mark]

Answer: It increases.

- it increases / they get warmer (1)
-

03.4 [1 mark]

Answer: work

- work (1)
-

Question 4 (4 marks)

04.1 [1 mark]

Correct: Joule

04.2 [2 marks]

Correct: The object does not move; The object moves at right angles to the direction of the force

04.3 [1 mark]

Answer: $W = F s$

- $W = F s$ (1)

Notes: Allow work done = force $\times$ distance, or any correct rearrangement.

Question 5 (3 marks)

05.1 [3 marks]

Answer: 279 888 J

- weight = $840 \times 9.8 = 8232$ (N) (1)
 - $W = 8232 \times 34$ (1)
 - 279 888 (J) (1)
-

Question 6 (3 marks)

06.1 [2 marks]

Answer: 240 J

- area under the graph = 40×6.0 (1)
 - 240 (J) (1)
-

06.2 [1 mark]

Answer: Area = height $\times$ width = force $\times$ distance = work done.

- work done = force $\times$ distance, which is the same calculation as finding the area of a rectangle (height $\times$ width) under the graph (1)
-

Question 7 (7 marks)

07.1 [1 mark]

Answer: $W = F s$

- $W = F s$ / work done = force $\times$ distance (1)

07.2 [3 marks]

Answer: 45 N

- 72 kJ = 72 000 J and 1.6 km = 1600 m (1)
- 72 000 = $F \times 1600$ (1)
- $F = 45$ (N) (1)

Notes: An answer of 45 scores 3 marks. An answer of 0.045 or 45 000 scores 2 marks.

07.3 [1 mark]

Answer: 72 000 N m

- 72 000 (N m) (1)

07.4 [2 marks]

Answer: It is dissipated to the thermal energy stores of the surroundings, which warm up slightly.

- it is transferred to the thermal energy store / internal energy of the surroundings (the air, the tyres and the road) (1)
 - the energy is dissipated / wasted, causing a small rise in temperature (1)
-

Question 8 (6 marks)

08.1 [2 marks]

Answer: 600 J

- $W = 200 \times 3.0$ (1)
 - 600 (J) (1)
-

08.2 [2 marks]

Answer: Task D (500 J); A 600 J, B 750 J, C 720 J.

- work done calculated for tasks B, C and D: 750 J, 720 J and 500 J (1)
 - Task D (500 J is the smallest) (1)
-

08.3 [2 marks]

Answer: Task D has the largest force but the least work done, because work done also depends on distance and D's distance is the smallest.

- task D has the largest force (500 N) but the least work done (500 J) (1)
 - work done depends on the distance moved as well as the force (work done = force $\times$ distance), and task D has the smallest distance (1)
-