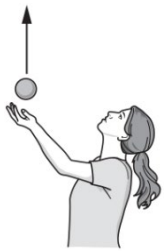
Work Done (H)

1. A ball is thrown vertically into the air.



Energy is transferred from a chemical store.

Where is the useful energy transferred to?

A A gravitational store and a thermal store only.
B A gravitational store only.
C A gravitational store and a chemical store only.
D A thermal store and a chemical store only.

Your answer ☐ **[1]**

2. A car has a mass of 1000 kg and a kinetic energy of 12 500 J.

Calculate its speed.

Use the equation: kinetic energy = 0.5 × mass × $(\text{speed})^2$

A 3.5 m / s
B 5.0 m / s
C 6.3 m / s
D 25.0 m / s

Your answer ☐ **[1]**

3. A pump lifts 500 kg of water to a water tank at the top of a building.

The water gains 240 000 J of gravitational potential energy.

The gravitational field strength is 10 N/kg.

Use the equation: Potential energy = Mass × Height × Gravitational field strength

Calculate the height of the water tank.

A 4.8 m
B 48 m
C 240 m
D 480 m

Your answer ☐ **[1]**

4. A car on a roller coaster is stationary at the top of a slope.

It has a weight of 6 500 N and a potential energy of 217 000 J.

Calculate how high above the ground it is.

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answer: ..... m

[2]

5. Alex has two radiators in her home. They are filled with 10 kg of different liquids.

The radiators have different power ratings.

oil-filled radiator	water-filled radiator
 Heater contains 10 kg of oil 400 W heater Specific heat capacity for oil is 1680 J/kg^{0}C	 Heater contains 10 kg of water 1000 W heater Specific heat capacity for water is 4200 J/kg^{0}C

The heaters are turned on and the temperature of each rises by 40 °C in 1 680 seconds.

Use the data to show that the heaters take the same time to heat up.

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[4]

6. Josh says his ball is an amazing bouncer.

He says if you drop it from **200** cm it will bounce to a height of **250** cm.

Explain why this is not possible.

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[2]

7. A scientist uses different drivers to test the stopping distances of the same car.

Look at the results.

Driver	Speed (m/s)	Thinking distance (m)	Braking distance (m)
A	8	6	6
B	16	13	24
C	32	24	96
D	16	12	22
E	8	5	6
F	32	30	120

Driver **C** travels at 32 m/s on the road and then stops. The car has a mass of 1200 kg.

i. Show that the **kinetic energy** stored by the car at 32 m/s is 614 000 J.

[3]

ii. Describe what happens to the kinetic energy of the car as it brakes and stops.

---

[2]

iii. The braking distance of the car is 96 m.

Calculate the **braking force** on the car.

Give your answer to **4** significant figures.

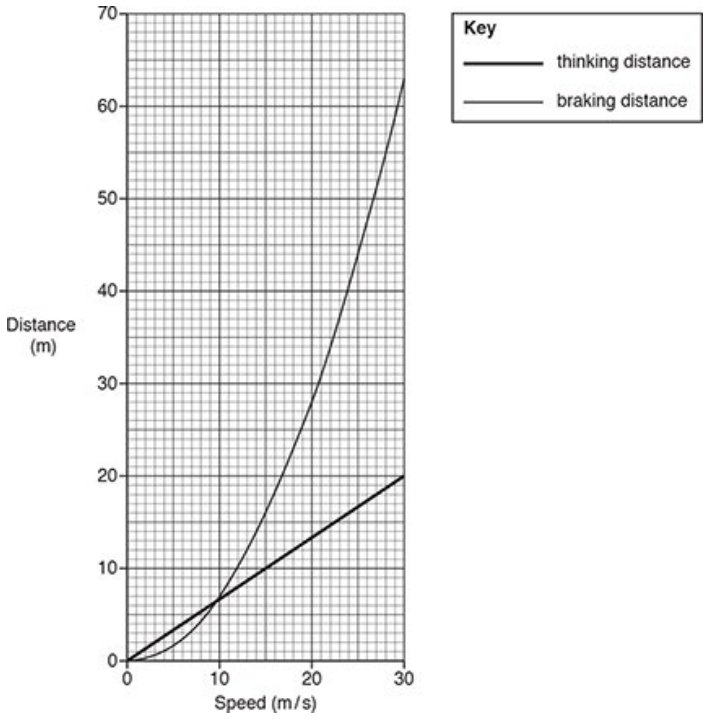
Answer = _____ N **[3]**

8. A TV has a power rating of 0.2 kW.

Calculate the energy transferred, in kWh, if the TV is switched on for 4 hours.

Energy transferred = ... kWh **[3]**

9. The graph shows thinking and braking distances for a car at different speeds.



How does the speed affect the **kinetic energy** and **braking distance** of the car?

Use the graph in your answer.

_____

_____

_____

_____

_____ **[3]**

10.

This question is about an electric kettle.

i. An electric kettle is filled with water, connected to the mains and switched on. The electricity for the kettle is generated in a coal-fired power station. Describe the energy transfer that occurs when the kettle is switched on. Include ideas about energy stores in your answer.

_____

_____

_____ **[2]**

ii. The mains supply has a potential difference of 230 V.

The kettle has a current of 5.0 A. The kettle is switched on for 2.0 minutes.

Calculate the total energy transferred to the kettle in 2.0 minutes.

Total energy transferred = ... J **[4]**

11. In the brakes of a car there are brake pads and a brake disc, as shown in **Fig. 21.2**.

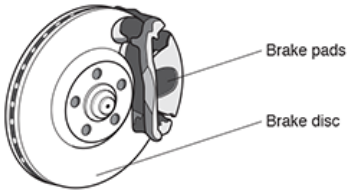


Fig. 21.2

When a car stops, energy transfers between stores.

The brake pads squeeze the brake disc and cause a friction force.

i. Explain how braking stops the car.

Include ideas about **energy stores** in your answer.

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[2]

ii. High speed cars have ventilated brakes with air holes in the disc, as shown in **Fig. 21.3.**

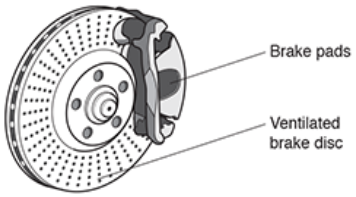

Fig. 21.3

The air holes allow more air to circulate around the disc.

Suggest how these brakes can reduce braking distances.

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[1]

END OF QUESTION PAPER