

Q1. (2018)

a)

higher

b)

low(er)

hot(ter)

c)

advantage:

- water heated continuously (by the Sun)

one disadvantage from:

- temperature of water is lower (for most of the time than water heated by immersion heater)
- water may not be hot enough
- it takes longer to heat the water

d)

$$\frac{4\,030\,000}{4\,070\,000}$$

0.99

e)

power = energy transferred /
time

f)

$$5000 = \frac{4\,070\,000}{t}$$

$$t = \frac{4\,070\,000}{5000}$$

$$t = 814$$

seconds

Q2. (2019)

a)

- Wrap N layers of newspaper around the metal can
 - Heated water in a kettle
- or**
- Using a Bunsen burner
- Put hot water in the metal can
 - Use a measuring cylinder to measure the volume of water
 - Measure initial and final temperature with the digital thermometer
 - Use a stopclock / stopwatch to measure a time of 5 minutes
 - Calculate temperature decrease
 - Repeat with different number of layers of newspaper
 - Repeat with no layers of newspaper
 - Use same initial temperature of hot water
 - Use same volume of water each time

Level 3: Workable method which includes changing the number of layers and includes at least one control variable (same volume of water or same starting temperature)

b)

the digital thermometer and the datalogger have the same resolution

only need to measure the start and end temperature

or

only need 2 readings

or

only need to calculate the temperature change

Q3. (2019)

a)

$$41 = \frac{9.8 \times h}{0.12}$$

$$h = \frac{41 \times 0.12}{9.8}$$

$$h = 0.50 \text{ (m)}$$

b)

kinetic energy = $0.5 \times \text{mass} \times (\text{speed})^2$

or

$$E_k = \frac{1}{2} mv^2$$

c)

$$270 = \frac{1}{2} \times m \times 3^2$$

$$m = \frac{270}{(\frac{1}{2} \times 3^2)}$$

or

$$m = \frac{270}{4.5}$$

$$m = 60 \text{ (kg)}$$

Q4. (2019)

a)

- males have a greater muscle power than females for most of their lives
- males have a greater muscle power than females above 9/10 years old
- males have a lower muscle power than females below 9/10 years old
- there is a similar pattern for males and females as age increases
- males have a peak muscle power at 25 years old whereas females have a peak muscle power at 20/21 years old
- at 9/10 years old males have the same muscle power as females
- peak muscle power for males (47 W/kg) is greater than peak muscle power for females (37 W/kg)
- the rate of increase of muscle power is greater for males than females (between 5 and 25 years old)
- the rate of decrease of muscle power is greater for males than females.

Ignore comments relating to strength

b)

any **1** from:

- maximum height reached is a better indicator of maximum muscle power
- maximum / peak muscle power was being investigated, not mean / average muscle power
- volunteer may not use maximum effort on the first try
- performance may improve with practise
- performance may get worse with tiredness

Q5.(2020)

a)

the friction is decreased

b)

$$E_p = 62.5 \times 9.8 \times 16.0$$

$$E_p = 9800 \text{ (J)}$$

c)

$$E_k = 0.5 \times 62.5 \times 12^2$$

$$E_k = 4500 \text{ (J)}$$

d)

Any **two** from:

- speed (at bottom of slide)
- friction (between sled and ground)
- air resistance

Q6.(2024)

a)

stretched length – original length

b)

$$E_e = 0.5 \times 800 \times 7.5^2$$

$$E_e = 22\,500 \text{ (J)}$$

c)

$$\text{kinetic energy} = 0.5 \times 240 \times 15^2$$

$$\text{kinetic energy} = 27\,000 \text{ (J)}$$

d)

$$E_p = m \times g \times h$$

e)

$$24\,000 = 240 \times 9.8 \times h$$

$$h = \frac{24\,000}{(240 \times 9.8)}$$

$$h = 10.2 \text{ (m)}$$

f)

energy is transferred to the
surroundings

work is done against air
resistance