Write your name here

Surname

Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number

Candidate Number

Combined Science
Paper 5: Physics 1

Foundation Tier

Wednesday 23 May 2018 – Afternoon
Time: 1 hour 10 minutes

Paper Reference
1SC0/1PF

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name,
  centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at
  the **end of your solution**.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an asterisk (*), marks will be awarded for your
  ability to structure your answer logically showing how the points that you
  make are related or follow on from each other where appropriate.
- A list of equations is included at the end of this exam paper.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Pearson

Answer ALL questions. Write your answers in the spaces provided.

**Some questions must be answered with a cross in a box ⊠.
If you change your mind about an answer, put a line through the box ⧅ and then
mark your new answer with a cross ⊠.**

1 (a) Which of these speeds would be normal for a person walking?

(1)

⊠ **A** 0.1 m/s

⊠ **B** 1.0 m/s

⊠ **C** 10 m/s

⊠ **D** 100 m/s

(b) Figure 1 shows a block hanging from a spring balance.

spring balance
showing 3.8 N
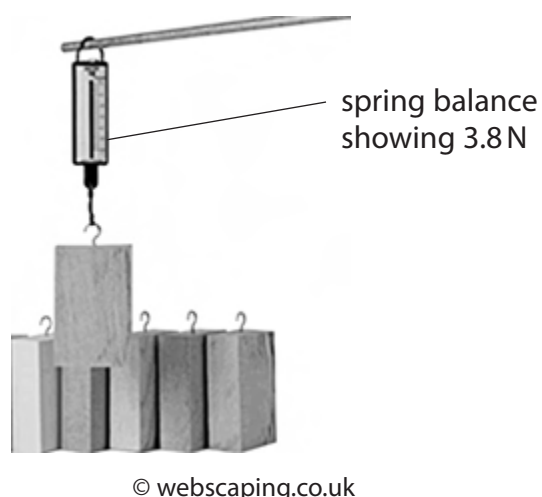
© webscaping.co.uk

Figure 1

Use a word from the box to complete the sentence below.

density	mass	volume	weight

The quantity measured by the spring balance in Figure 1 is

(1)

....

(c) A toy car has a mass of 0.10 kg.
The toy car accelerates at 2.0 m/s².

Calculate the force producing this acceleration.
State the unit.

Use the equation

$F = m \times a$

(3)

force = ... unit = ...

(d) Use words from the box to complete the sentences below.

direction	energy	mass	size

(2)

Vectors have size and ....

Scalars have only ....

(Total for Question 1 = 7 marks)

P 6 0 4 6 9 R A 0 3 2 0

2 (a) A sound wave in air travels a distance of 220 m in a time of 0.70 s.

(i) State the equation linking speed, distance and time.

(1)

(ii) Calculate the speed of the sound wave in air.

(2)

wave speed = ... m/s

(b) Figure 2 shows water waves spreading out from a source.

A student measures the wavelength of the waves.

He uses a ruler to measure the distance from one crest to the next crest.
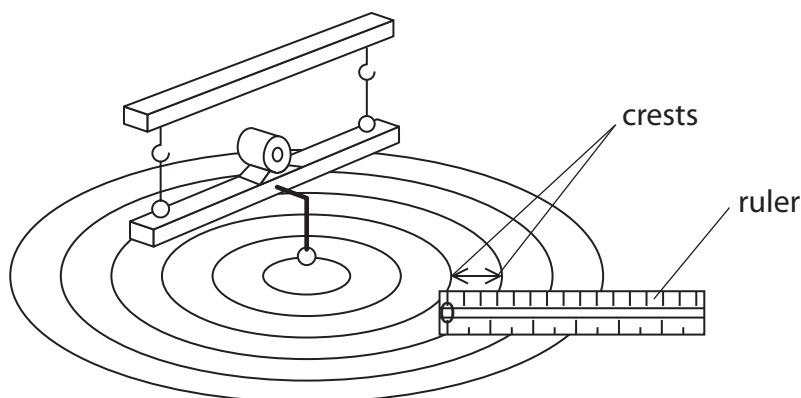
Figure 2

Explain how to improve the student's method for measuring the wavelength.

(2)

....

....

....

....

(c) Sound waves are longitudinal waves.

Water waves are transverse waves.

Describe the difference between longitudinal waves and transverse waves.

(3)

....

....

....

....

....

....

(Total for Question 2 = 8 marks)

P 6 0 4 6 9 R A 0 5 2 0

3 (a) Figure 3 shows a spinning flywheel.
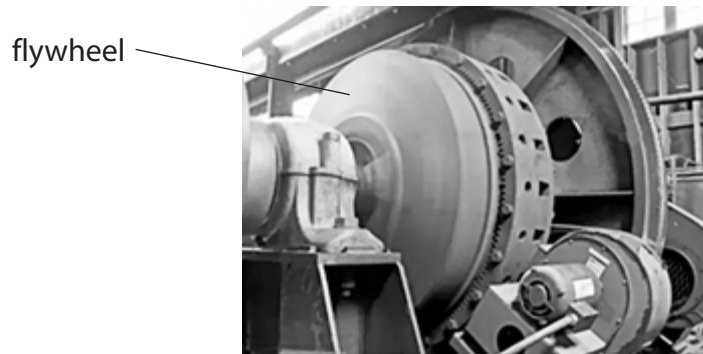
flywheel

© coasterphotos.com

Figure 3

(i) State how energy is stored in a spinning flywheel.

(1)

....

(ii) State **one** way to increase the amount of energy stored in the flywheel.

(1)

....

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(b) Figure 4 shows a skier going down a hill.
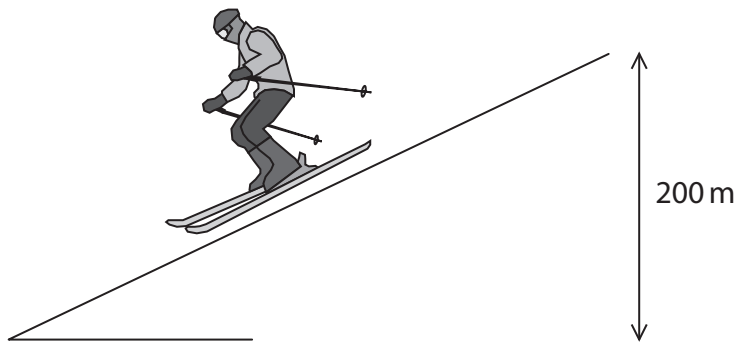
Figure 4

She descends through a vertical height of 200 m.

The skier's mass is 65 kg.

(i) Calculate the change in gravitational potential energy.

Use the equation

$$\Delta GPE = m \times g \times \Delta h$$

Take the gravitational field strength, *g*, as 10 N / kg.

(2)

change in gravitational potential energy = ... J

(ii) At the bottom of the slope her speed was 36 m/s.

Calculate her kinetic energy at the bottom of the slope.

Use the equation

$$KE = \frac{1}{2} \times m \times v^2$$

(3)

kinetic energy = ... J

(c) Describe how her speed at the bottom of the slope could be determined.

(3)

....

....

....

....

....

....

(Total for Question 3 = 10 marks)

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4 (a) State **two** non-renewable energy sources.

(2)

1 ....

2 ....

(b) Figure 5 shows the renewable energy sources used in the UK in 2015.

Figure 5 is to scale.
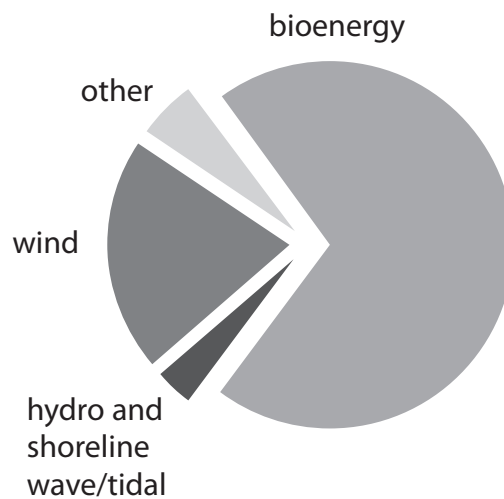
Figure 5

(i) State the energy source that gave the greatest amount of renewable energy for the UK in 2015.

(1)

....

(ii) Justify your choice of energy source in part (i).

(1)

....

....

(iii) State which of these energy sources gave about 20% of the energy from renewable sources for the UK in 2015.

(1)

....

(c) Figure 6 shows all the energy sources used in Canada in 2014 and a prediction for 2040.

2014   **2040**
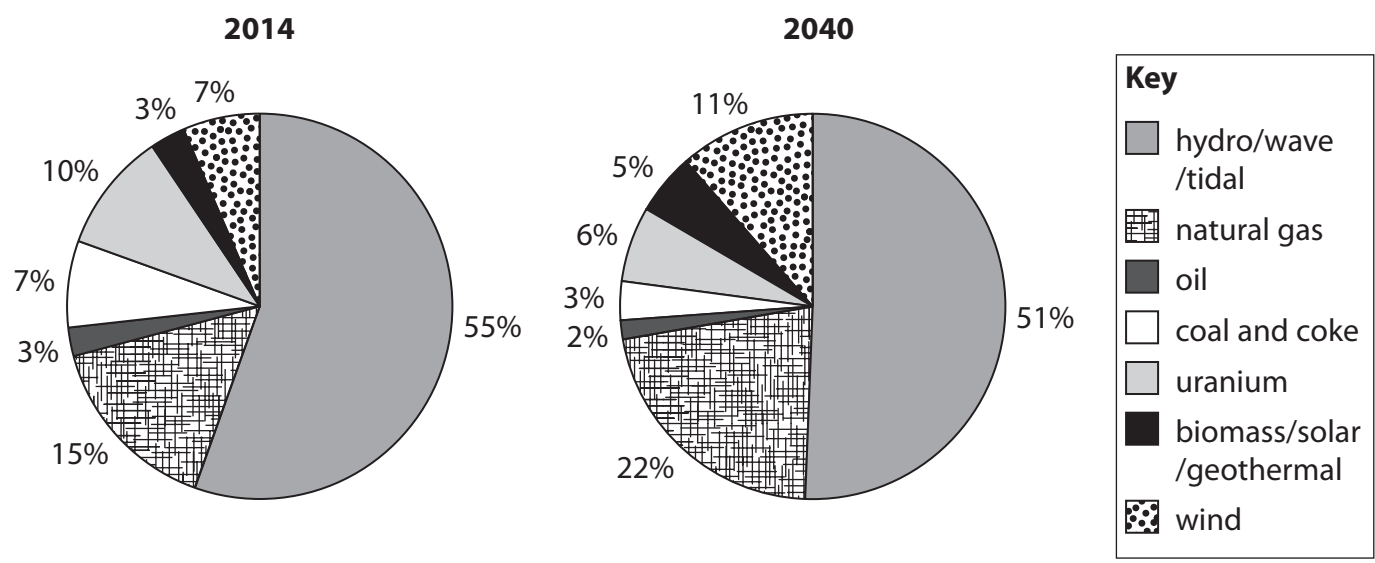
Figure 6

Discuss the effects on the environment of **two** predicted changes between 2014 and 2040.

(4)

change 1 ....

....

effect on the environment ....

....

change 2 ....

....

effect on the environment ....

....

(d) Figure 7 shows a wind turbine.

rotor blade

gearbox

generator

tower
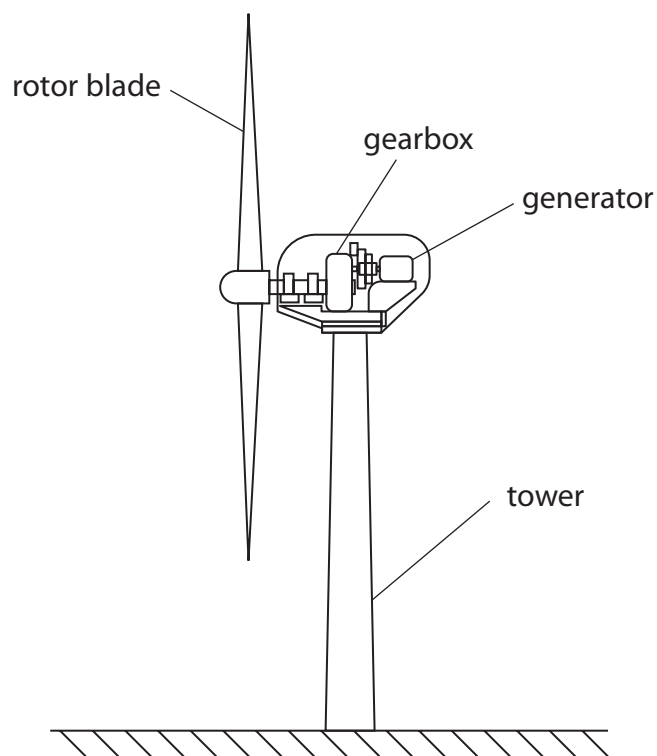
Figure 7

Explain how unwanted energy transfers could be reduced in the gear box.

(2)

....

....

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....

(Total for Question 4 = 11 marks)

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P 6 0 4 6 9 R A 0 1 3 2 0

5 (a) A student investigates what happens when light travels from air to glass.

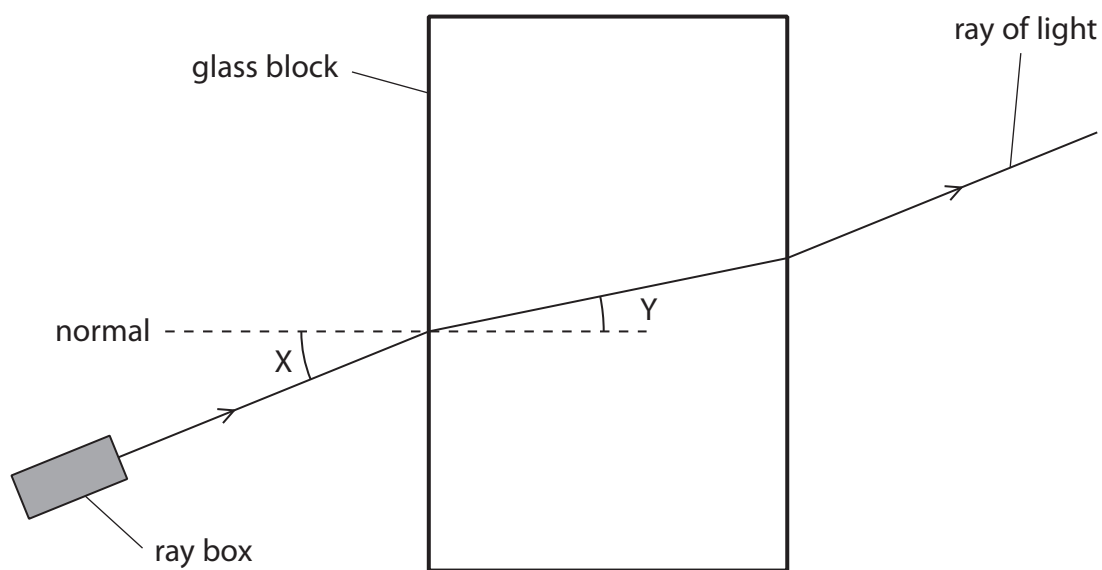Figure 8 shows some of the apparatus used in the investigation.

Figure 8

(i) In Figure 8, angle Y is the angle of

(1)

☒ **A** deflection

☒ **B** incidence

☒ **C** reflection

☒ **D** refraction

(ii) Figure 9 is a graph of the student's results.
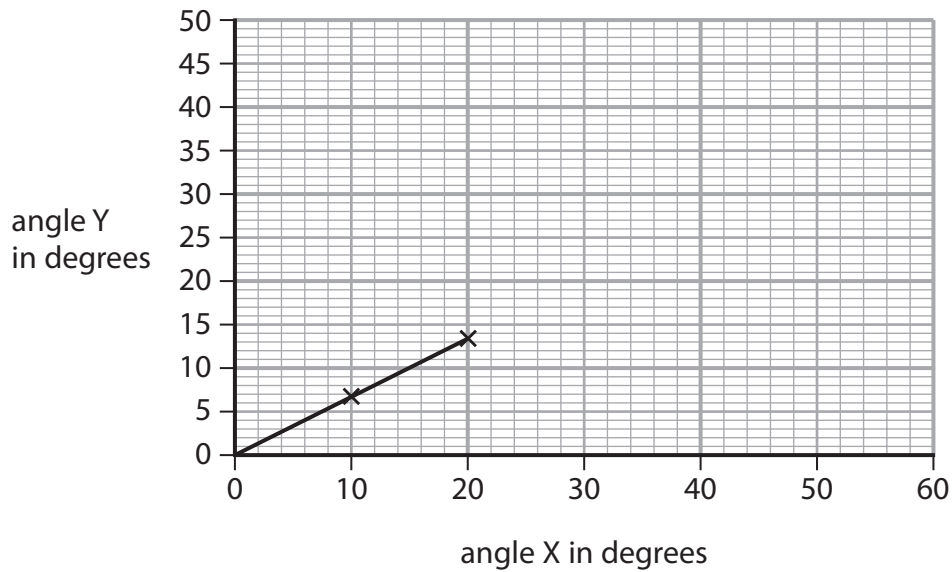
Figure 9

Use the graph to calculate a value for

$$\frac{\text{angle Y}}{\text{angle X}}$$

(2)

$$\frac{\text{angle Y}}{\text{angle X}} = \text{...}$$

(iii) The student concludes that angle Y is directly proportional to angle X.

Explain what the student must do to test this conclusion in more detail.

(3)

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....

(b) The speed of light is 3.0×10^8 m/s.

The wavelength of yellow light is 5.8×10^{-7} m.

Calculate the frequency of yellow light.

State the unit.

Use the equation

$$frequency = \frac{speed}{wavelength}$$

(3)

frequency = ... unit ....

(c) (i) Give **one** colour of light that has a longer wavelength than yellow light.

(1)

....

(ii) Give **one** colour of light that has a higher frequency than yellow light.

(1)

....

(Total for Question 5 = 11 marks)

6 Figure 10 shows a Geiger-Müller (GM) tube used for measuring radioactivity.
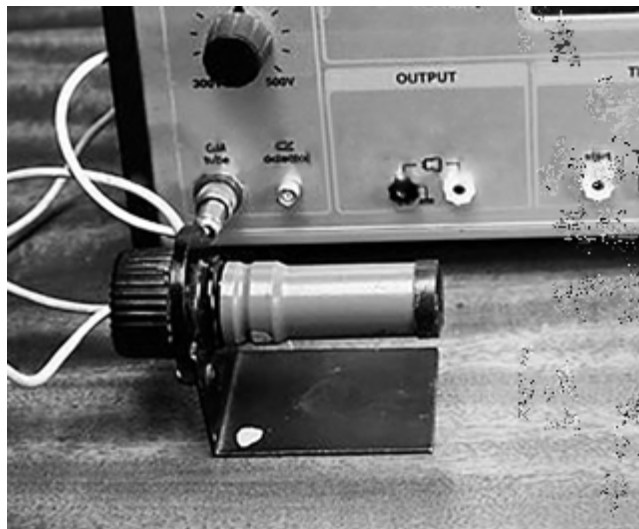
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Figure 10

(a) Describe how a teacher should use a Geiger-Müller (GM) tube to compare the count-rates from two different radioactive rocks.

(4)

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(b) A hospital uses a radioactive isotope with a half-life of 6 hours.

A technician measures a count rate of 80 counts per minute (cpm) from this isotope.
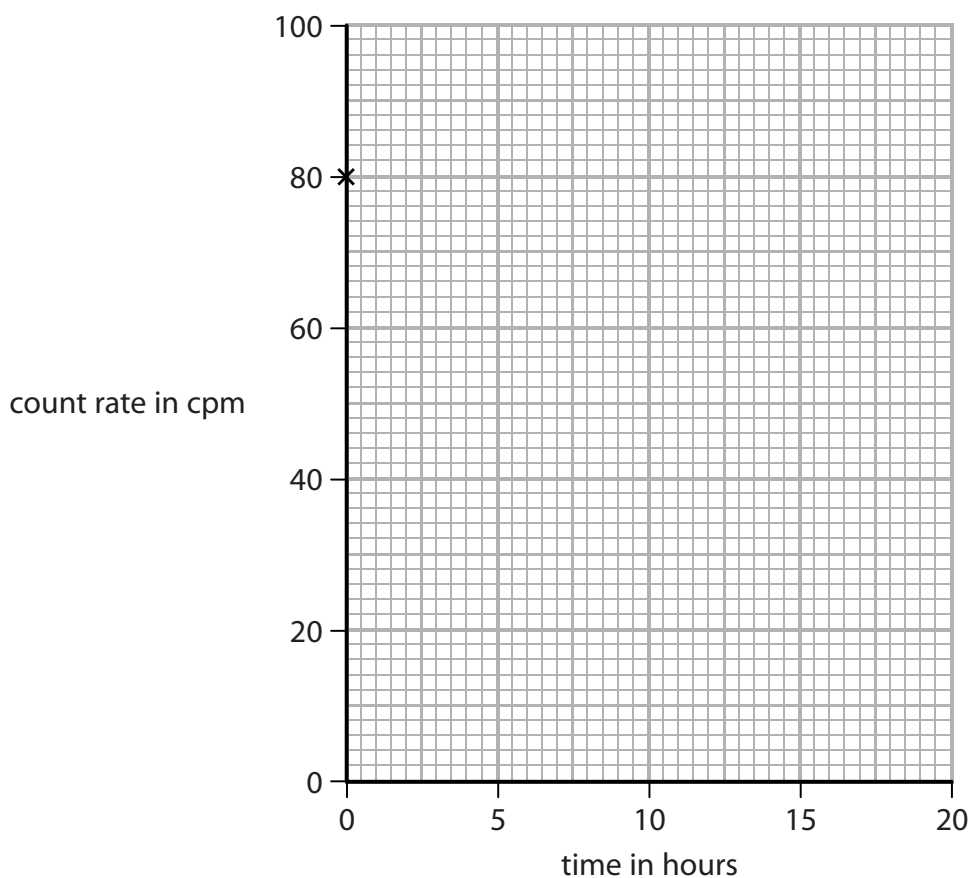

Figure 11

Complete the graph on Figure 11, as accurately as possible, to show how the count-rate from this isotope will change from the time of the first measurement.

The first point is already drawn in Figure 11.

(3)

*(c) A radioactive rock is placed near to the front of a Geiger-Müller (GM) tube.
A radioactivity count-rate is first made in air.

The count-rate is measured again with each of three different absorbers between the rock and the GM tube.

Figure 12 shows the count-rates measured.

absorber	count-rate in counts per minute
3 cm of air	1272
thin sheet of paper	931
3 mm thick sheet of aluminium	328
2 cm thick sheet of lead	21

Figure 12

A scientist has an idea that the rock emits three different types of radiation.

Explain how the data in this table supports the scientist's idea.

(6)

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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

Equations

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance $v^2 - u^2 = 2 \times a \times x$
energy transferred = current × potential difference × time $E = I \times V \times t$
potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil $V_p \times I_p = V_s \times I_s$
change in thermal energy = mass × specific heat capacity × change in temperature $\Delta Q = m \times c \times \Delta\theta$
thermal energy for a change of state = mass × specific latent heat $Q = m \times L$
$P_1 V_1 = P_2 V_2$ to calculate pressure or volume for gases of fixed mass at constant temperature
energy transferred in stretching = 0.5 × spring constant × (extension)^2 $E = \frac{1}{2} \times k \times x^2$