Telecommunications - Homework 1

1. $(2 \times 10^3) \div 10^4$ is **equal** to

   A 2
   B 0.2
   C 0.8
   D 2×10^7

2. What is **value** of $10^5 \div (2 \times 10^{-3})$?

   A 5×10^7
   B 5×10^8
   C 50
   D 500

3. 3.5 minutes is, in seconds,

   A 180.
   B 210.
   C 230.
   D 350.

4. If **speed = distance ÷ time**,

   A distance = speed ÷ time.
   B distance = speed x time.
   C time = speed x distance.
   D distance = time ÷ speed.

5. The **distance** run at an average speed of 4 m/s in 40 seconds is

   A 0.1 m
   B 10 m
   C 44 m
   D 160 m

6. The sound wave emitted by a tuning fork has a wavelength of 50 cm in air where the speed of sound is 340 m/s. What is its **frequency** in hertz?

   A 68
   B 680
   C 170
   D 17,000

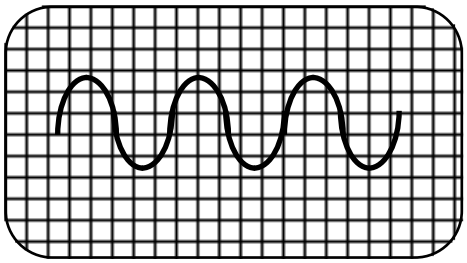
7. Sound waves travel at 340 m/s through air. What is the **wavelength** of a sound of frequency 1360 hertz?

   A 0.25 m
   B 4 m
   C 1020 m
   D 1360 m

8. How are the **pitch** and **loudness** of a sound related to properties of the sound wave?

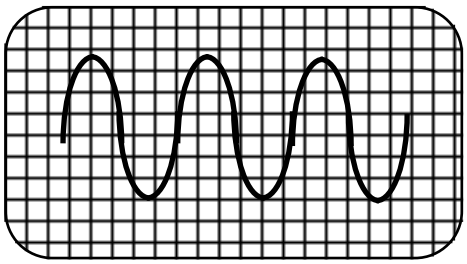
	pitch	*loudness*
A	amplitude	frequency
B	frequency	amplitude
C	frequency	speed
D	speed	amplitude

9. The sketch shows the display on the screen of a CRO for a musical note.

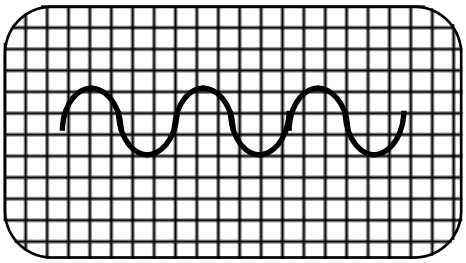


Which of these displays is for a **louder** note with a **lower pitch**?
(Assume that the controls of the CRO have not been altered).

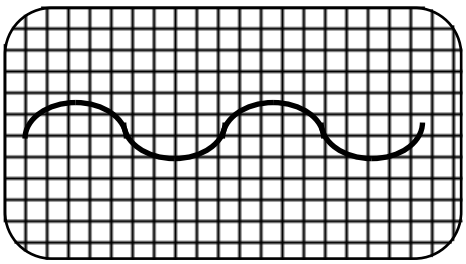
A



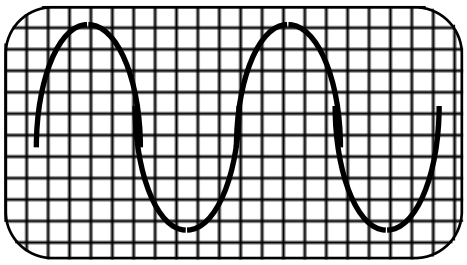
B



C



D



10. What **energy change** happens when a microphone is used? (1)

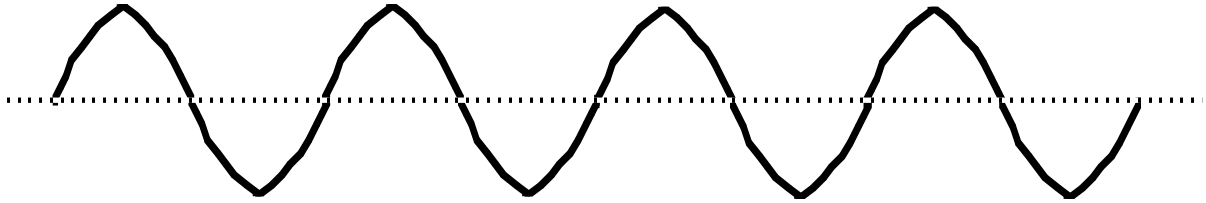
11. The musical note 'middle C' on a piano has a frequency of 256 Hz.

(a) How **many times** would a piano string making the note 'middle C' vibrate back and forth if the note lasted for 5 seconds? (1)

(b) What would be the **wavelength** of the sound in the air where the speed of sound is 340m/s? (2)

12. A water wave is travelling across the surface of the sea at a speed of 2.5 m/s. How **long** would it take to travel a distance of 2 km? (2)

13. Measure the **wavelength** and **amplitude** of this 'side-on' view of a transverse wave. Express your answers in **centimetres**. (2)



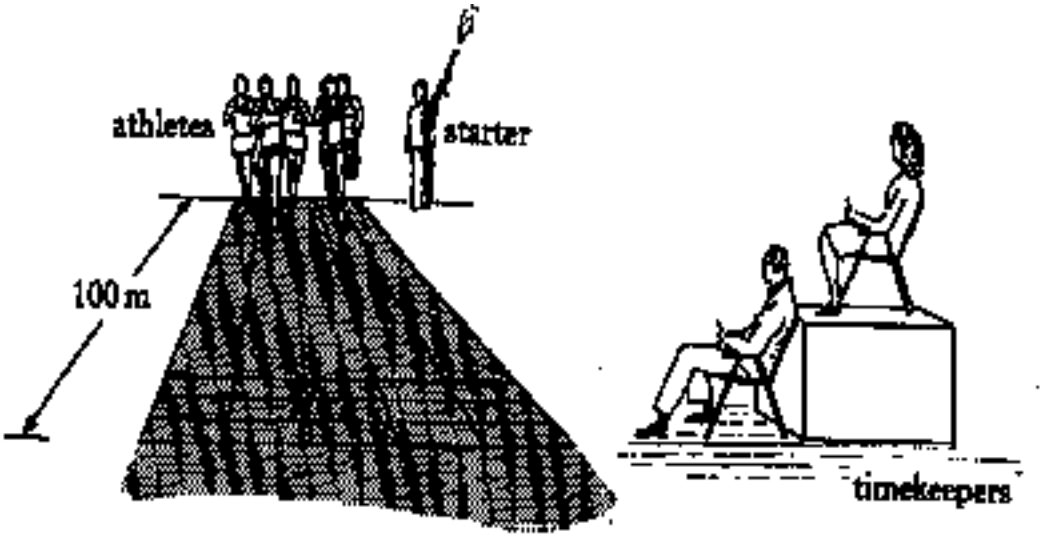
14. The **period** of a vibrating bar making waves in a ripple tank is 0.2 s.

(a) Calculate the **frequency** of the waves made by the vibrating bar. (2)

One wave front takes 3.0 s to travel the 30 cm length of the tank.

(b) Calculate the **speed** of the wave and hence its **wavelength**. (3)

15. (a) Two timekeepers, Smith and Jones, are timing a 100m sprint.



Smith starts her stopwatch when she sees the smoke from the starter's gun. Jones starts his watch when he hears the bang from the gun. Both stop their watches at the instant that the winner reaches the finishing line. Both timekeepers are 100m from the starter.

(a) Which timekeeper records the **shorter** time for the winner? Explain your answer. (1)

(b) The reading on Jones' watch is 11.3s. What is the reading on Smith's watch? (2)

Total = 25

Telecommunications – Homework 2

1. Which part of a radio receiver **selects** a certain radio **wavelength**?

   A tuner
   B amplifier
   C aerial
   D decoder

2. Which part of a radio receiver **supplies** the **energy** needed to produce the sounds which you hear?

   A amplifier
   B loudspeaker
   C battery
   D aerial

3. What do the letters '**AM**' mean in radio transmission?

   A before noon
   B amplitude modification
   C amplifier module
   D amplitude modulation

4. Which correctly describes how the **picture** on a modern television screen is built up?

   A 25 pictures per second, each of 405 lines.
   B 25 pictures per second, each of 625 lines.
   C 405 pictures per second, each of 25 lines.
   D 625 pictures per second, each of 25 lines.

5. On a colour T.V. screen, which colours of dots would be lit up in a **yellow** part of the picture?

   A red and blue
   B red and green
   C blue and green
   D red, blue and green

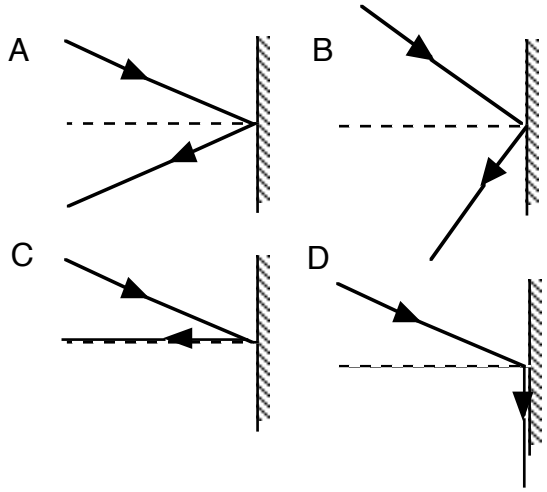
6. The **frequency**, in hertz, of a **radio** wave of wavelength 265 m in air is calculated from

   A $265 \div 340$.
   B $265 \div (3 \times 10^8)$.
   C $340 \div 265$.
   D $(3 \times 10^8) \div 265$.

7. A radio station broadcasts on a frequency of 200 kHz. If the speed of radio waves is 3×10^8 m/s, their **wavelength** is

   A 1.5 m.
   B 1500 m.
   C 15000 m.
   D 1.5×10^6 m.

8. Which diagram shows how a ray of light is **reflected** from a plane mirror?



9. Which statement is the **law of reflection** for light reflecting from a surface?

   A incident angle = reflected angle
   B incident angle = reflected angle x 2
   C incident angle = reflected angle ÷ 2
   D incident angle + reflected angle = 90^o

10. Which of these statements about radio waves is **true**?

    A The longer their wavelength, the faster their speed.
    B The higher their frequency, the faster their speed.
    C Waves with different frequencies all travel at the same speed.
    D The bigger their amplitude, the faster their speed.

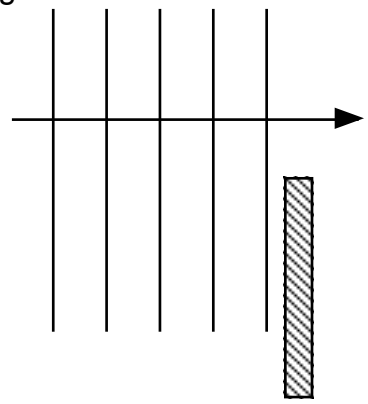
11. (a) Calculate the **frequency**, in hertz, of a radio station which broadcasts on the Medium Wave with a wavelength of 1500 m. (2)

(b) Express the frequency in **kilohertz (kHz)**. (1)

12. A radio station broadcasts on 250 m,1200 kHz. Use these figures to **show** that the radio wave travels through the air at 3×10^8 m/s. (1)

13. Extra Low Frequency (ELF) waves are used to communicate with submarines. Calculate the **wavelength** in air of an ELF wave of frequency 1.5 kHz. Answer in **kilometres**. (2)

14. (a) Copy and complete the diagram to show what happens to water waves passing a barrier. (2)



(b) What **name** is used for the wave property in your diagram? (1)

15. State **two** advantages of using **fibre optics** for communications instead of copper wires. (2)

16. While on holiday in the Highlands with her family, Kirsty notices that a radio and television transmitter is situated on the other side of the hill from the cottage where she is staying.

(a) On checking the local paper, Kirsty finds that the radio programme she wishes to listen to is transmitted at a frequency of 1089 kHz and that the television programme she wishes to see is transmitted at a frequency of 623 MHz.

Which of these two transmissions has the **longer** wavelength? (1)

(b) Kirsty notices that, although she can good reception on her radio, the television reception is very poor.

Use your answer to part *(a)* to explain this difference in reception. (2)

(c) Kirsty tries playing a video cassette and finds that she gets a perfect picture on the television screen.

Explain why this can happen when the television reception is so poor. (1)

Total = 25

Health Physics - Homework 1

1. $(3 \times 10^8) \div 2 \times 10^4$ is **equal** to

   A 1.5
   B 6×10^{12}
   C 15000
   D 150

2. What is **value** of $1600 \div 2 \times 10^6$?

   A 0.0008
   B 4800
   C 806
   D 0.000025

3. The normal human body **temperature** is approximately

   A 20°C
   B 37°C
   C 42°C
   D 98°C

4. The **speed** of sound through the air is approximately

   A 186,000 miles per second.
   B 300 million metres per second.
   C 340 metres per second.
   D the same as the speed of the wind.

5. Sound can **not** travel through

   A gases.
   B liquids.
   C a vacuum.
   D solids.

6. Which is **most likely** to be the range of sound frequencies which a young person can hear?

   A 2 - 200 hertz
   B 20 - 200 hertz
   C 20 - 2000 hertz
   D 20 - 20000 hertz

7. Which sound level is the '**threshold of hearing**'?

   A 0 dB
   B 1 dB
   C 100 dB
   D 140 dB

8. If $\mathbf{v = f\lambda}$, then

   A $\mathbf{\lambda = vf}$
   B $\mathbf{\lambda = v/f}$
   C $\mathbf{\lambda = f/v}$
   D $\mathbf{\lambda = v - f}$

9. If **speed = distance ÷ time**,

   A distance = speed ÷ time.
   B distance = speed x time.
   C time = speed x distance.
   D distance = time ÷ speed.

10. The speed of ultrasound though body tissue is 1500 m/s. How **long** would a pulse of ultrasound take to travel a distance of 30 cm through the body?

    A 0.0002 s
    B 0.02 s
    C 50 s
    D 5000 s

11. How **far** would sound travel though air in 10 seconds at a speed of 340 m/s?

    A 34 m
    B 340 m
    C 3400 m
    D 34000 m

12. $(2 \div {}^1/_2)$ is the **same** as

    A 0.5
    B 1
    C 1.5
    D 4

13. $\frac{40}{0.5}$ is the **same** as

    A 0.0125
    B 8
    C 35
    D 80

14. The speed of sound through the air is 340 m/s. How **long** would the sound from a singer take to reach from the stage to the back of a concert hall which is 55 m long ? (2)

15. Why is the temperature **range** on a clinical thermometer is much smaller than on a laboratory thermometer? (1)

16. Give **one** example of 'noise pollution'. (1)

17. Ultrasound pulses travel through the body at 1500 m/s. **How long** would a pulse take to travel **to and from** a probe on a pregnant woman's abdomen to her baby's head if it is 3 cm below the surface of the abdomen. (2)

18. A loudspeaker makes a sound with a frequency of 3 kHz.
Explain what this **means** in terms of the **vibrations** of the loudspeaker's cone. (1)

19. Images which have been produced by ultrasound are sometimes used by doctors.

(a) The ultrasound is transmitted through the patient's skin from a probe as shown.

(i) What is **meant** by the term ultrasound? (1)

(ii) The ultrasonic waves have a frequency of 8.0MHz.
Calculate the **wavelength** of the ultrasound in muscle.

[speed of sound in muscle = 1600m/s] (2)

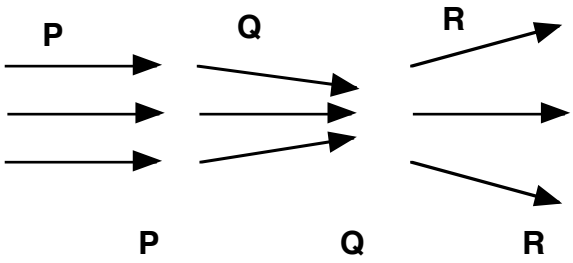
(b) Give **one** example of the use of ultrasound in medicine. (1)

(c) Why is ultrasound **safer** than X-rays for some medical investigations? (1)

Total = 25

Health Physics - Homework 2

1. Which entry describes the **rays** in diagrams **P**, **Q** and **R** below?



	P	Q	R
A	converging	diverging	parallel
B	parallel	diverging	converging
C	parallel	converging	diverging
D	diverging	parallel	converging

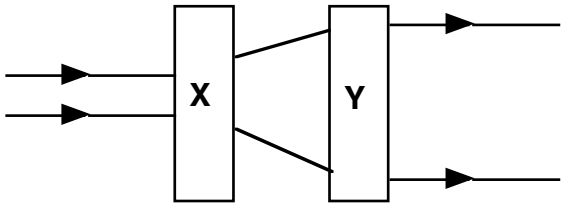
2. Which **term** is used when light slows down on entering a transparent material such as glass from the air?

A reflection
B refraction
C diffraction
D interference

3. What is the **power** of a converging lens with a focal length of 2.5 cm?

A +0.25 D
B +0.4 D
C +2.5 D
D +40 D

4. Which **types** of **lenses** are hidden at **X** and **Y**?



	X	*Y*
A	weak diverging	strong diverging
B	weak converging	strong converging
C	diverging	converging
D	converging	diverging

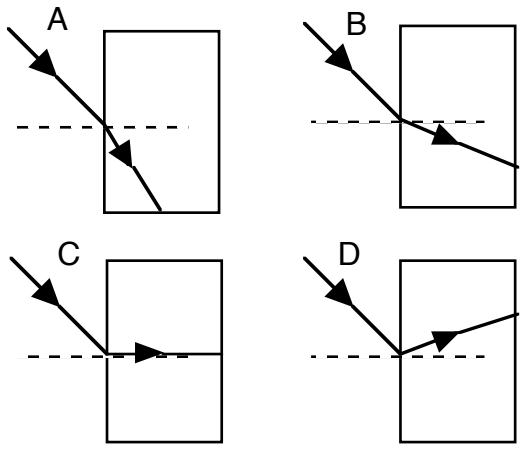
5. The power of a converging lens is +20 D. What is the **focal length** of the lens, in centimetres?

A 0.05
B 0.2
C 5
D 20

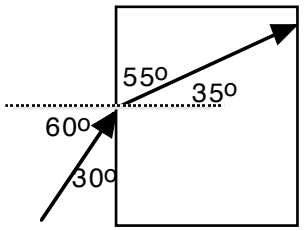
6. Which happens to light's speed when it moves form glass in to the air?

A Stays the same
B Increases
C Decreases
D Increases or decreases depending on the type of glass

7. Which diagram correctly shows a **ray of light** travelling from air into a block of glass ?



8. A ray of light is incident on a glass block.



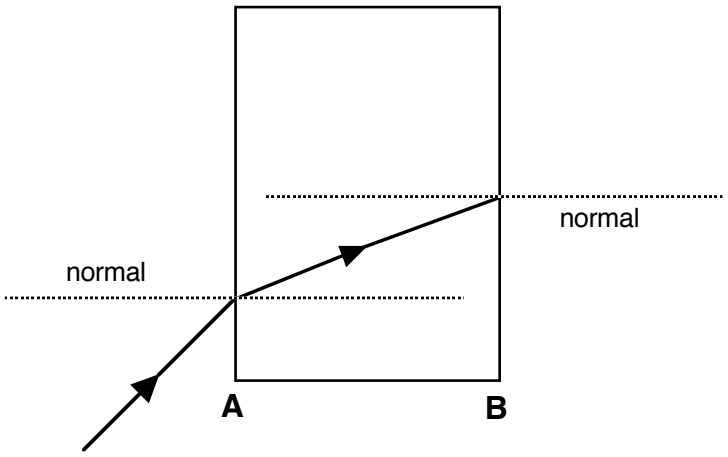
Which entry correctly states the **angles** of **incidence** and **refraction** of the ray ?

	incidence	*refraction*
A	60º	35º
B	30º	55º
C	60º	55º
D	30º	35º

9. Which type of wave is **not** a member of the **electromagnetic spectrum** ?

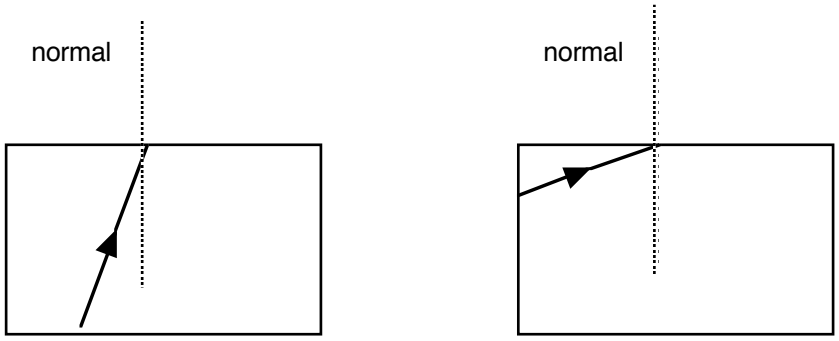
A Gamma rays
B Ultra-violet
C Sound
D Infrared

10. The diagram shows a ray of light incident on a transparent block of material.



Copy and complete the diagram to show the position of the **reflected ray** at surface **A** and the **refracted ray** at surface **B**. (3)

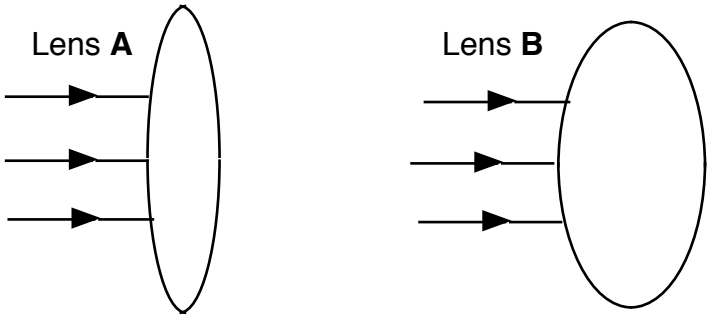
11. In each diagram, a ray of light is shown travelling through glass and meeting the boundary with air. The **critical angle** at the boundary is 42º. Copy and complete each diagram to show what happens to the ray of light.



(4)

12. What **name** is used for the behaviour of light travelling through glass and meeting its boundary with air at an angle *greater* than the **critical angle**? (1)

13. The diagrams show three parallel rays of light incident on two converging lenses with different optical **powers.** Copy and complete the diagrams to show how each lens brings the rays of light to a **focus**.



(2)

14. Calculate the **focal lengths**, in centimetres, of these converging lenses:
(a) + 20 D (b) + 2.5 D (c) + 10 D (d) + 14 D (e) + 2 D (6)

Total = 25

Using Electricity - Homework 1

1. The **relationship** between charge (**Q**), current (I) and time (**t**) is given by

   A $Q = It$
   B $I = Qt$
   C $Q = I/t$
   D $t = IQ$

2. 200 C of charge pass through the element of an electric fire in 5s. What is the **current** in the element?

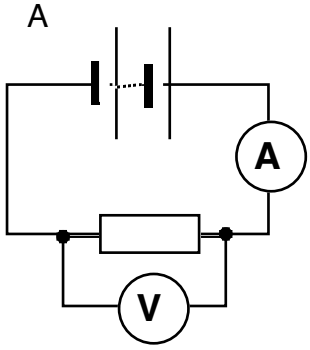
   A 0.25 A
   B 40 A
   C 200 A
   D 1000 A

3. How **long** would it take 100 C of charge to pass through a point in a circuit which has a steady current of 5 A?

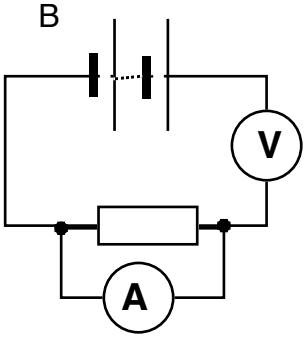
   A 0.05 s
   B 5 s
   C 20 s
   D 500 s

4. Which circuit **correctly** shows how meters must be connected to measure the **current** through and **voltage** across the resistor?

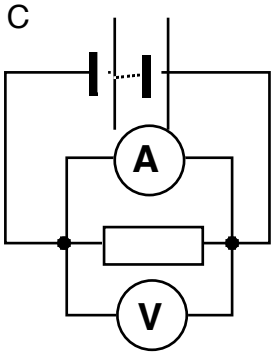
A



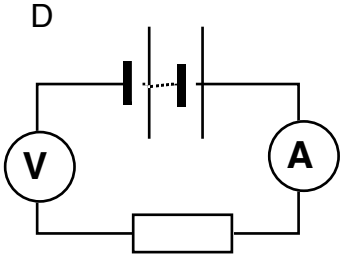
B



C



D



5. What is the purpose of the **fuse** fitted to a plug?

   A It protects the appliance's cable if too much current flows in it.
   B It keeps the current steady.
   C It 'blows' if the mains voltage changes.
   D It makes the whole mains circuit cut out when too much current goes through it.

6. What is the purpose of the **earth wire** which is attached to certain mains appliances?

   A Causes plug fuse to 'blow' if appliance casing becomes live.
   B Takes electric current back to power station.
   C Prevents wiring overheating.
   D Causes fuse to 'blow' if too much current passes through appliance.

7. Which is the correct **wiring** code for appliance cables with 3 wires for connection to a **3-pin plug**?

	live	*neutral*	*earth*
A	blue	brown	green/yellow
B	brown	blue	green/yellow
C	green/yellow	blue	brown
D	green/yellow	brown	blue

8. Certain mains appliances have this symbol marked on their casings:

   Which statement(s) is/are **correct** for appliances with this symbol ?

   I They are double-insulated.
   II Their cases are made of metal.
   III Their power ratings are always less than 500 W.

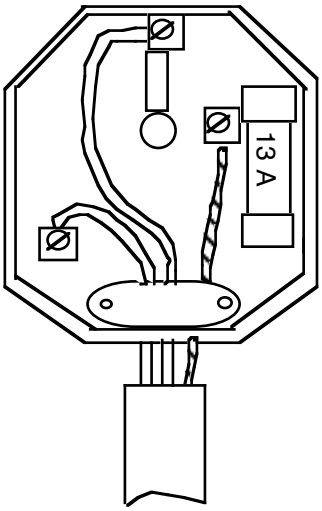
   A I only
   B II only
   C III only
   D I and II only

9. Which statement(s) is/are correct about the **cartridge fuse** fitted to a 13 A plug?

I It is connected to the live terminal.
II Its value is just less than the current drawn by the plug's appliance.
III It is made of thin wire.

A I only
B II only
C I and II only
D I and III only

10. The plug for a **600 watt hair drier** is shown. Mistakes have been made.

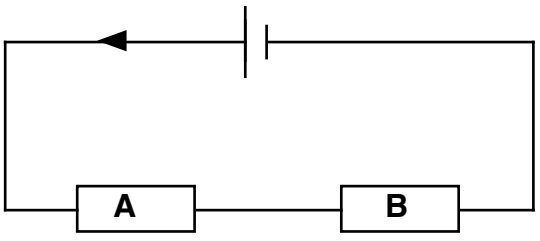


Which are **mistakes** ?

I The earth wire is connected to the live terminal.
II The cable is not gripped.
III The fuse value is too high.

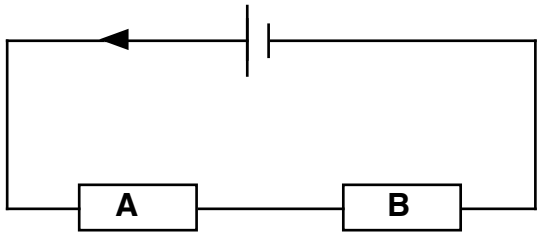
A I only
B II only
C I and II only
D I, II and III

11. Copy and complete the circuit diagram to show how an **ammeter** should be connected to measure the current between resistors A and B.



(1)

12. Copy and complete the circuit diagram to show how a **voltmeter** should be connected to measure the voltage across resistor A.



(1)

13. What **happens** to a fuse when *too much* current flows through it? (Avoid stating that the fuse '*blows*'). (1)

14. An appliance with a plastic case is **double insulated**. State which **wire** is 'missing' from its flex and **explain** why is in not required? (2)

15. In some houses, the mains electricity is earthed by strapping a thick wire to the cold water pipe. Lately, these pipes are often made of plastic.
Why would this be **unsuitable** for connecting the earth wire? (2)

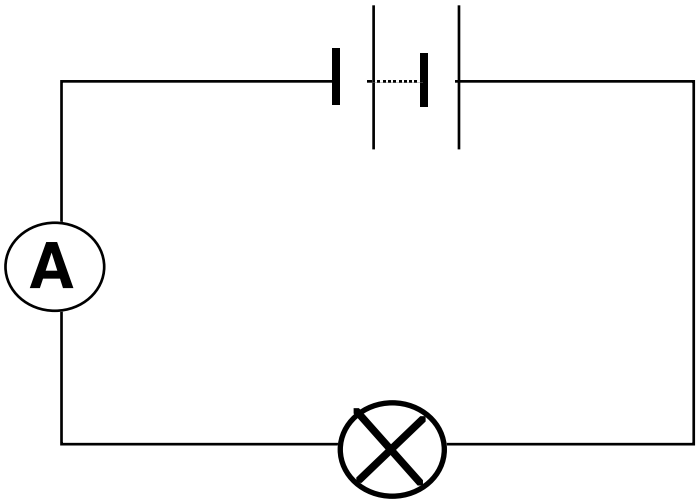
16. If the metal casing of a mains appliance becomes *live* due to a fault, why would it be **dangerous** if the appliance was *not* earthed? (1)

17. What should the earth wire **cause to happen** if a metal appliance's casing becomes 'live' due to a fault? (1)

18. A car headlamp bulb draws 2 A from the battery. How much **charge** flows through the bulb in 5 minutes? (2)

19. What **current** flows through a point in a circuit if 40 coulombs of charge passes the point in 8 seconds? (2)

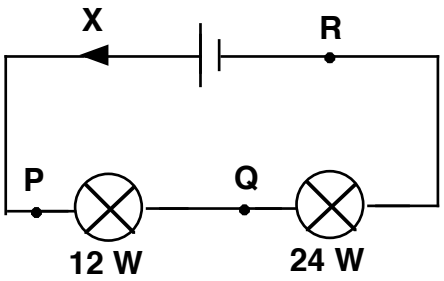
20. How **long** would it take 30 coulombs of charge to pass through the lamp in this circuit if the reading on the ammeter is 2 amps?



Total = 25

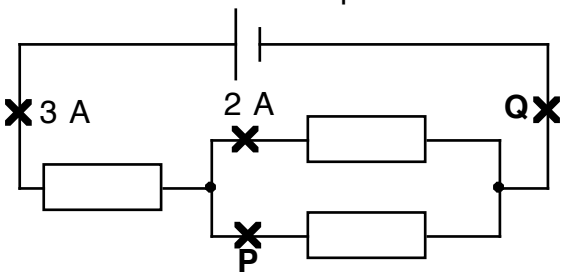
Using Electricity - Homework 2

1. In the circuit below, the current at point **X** is 2 A. What are the **currents** at points **P**, **Q** and **R**?



	P	*Q*	*R*
A	2 A	4 A	2 A
B	2 A	2 A	2 A
C	4 A	4 A	2 A
D	2 A	1 A	2 A

2. In the circuit shown, what are the **current** values at the points **P** and **Q**?



	P	*Q*
A	1 A	3 A
B	2 A	3 A
C	1 A	-3 A
D	3 A	1 A

3. Two components of a circuit are connected in **series**. One component's resistance is *double* that of the other. The current through *one* of the components is 4 amps. What could the **current** through the *other* component be?

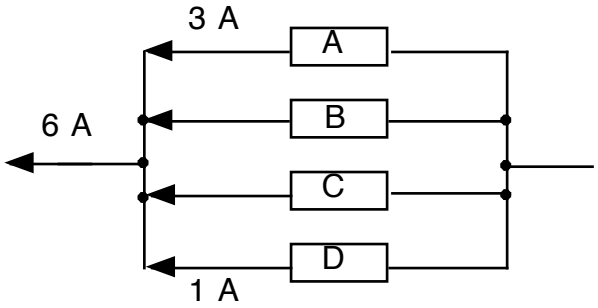
A 2 amps or 8 amps
B 2 amps
C 8 amps
D 4 amps

4. Which statement(s) about an **ammeter** is/are **correct**?

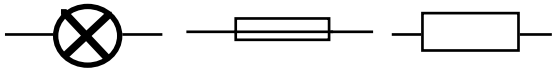
I It measures the voltage across a part of a circuit.
II It is connected in series with a circuit component.
III It should have a very low resistance.

A I only
B III only
C I and II only
D II and III only

5. Which **resistor** has the **smallest** resistance?

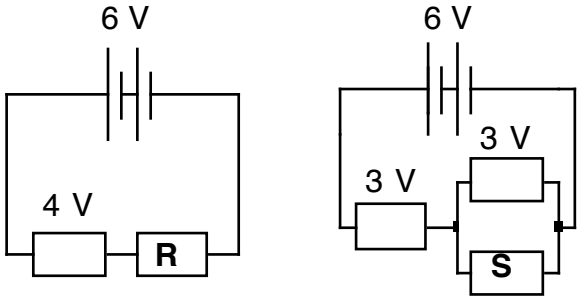


6. Which **circuit components** are represented by these **symbols**?



A	lamp	resistor	rheostat
B	fuse	resistor	thermistor
C	lamp	fuse	resistor
D	ammeter	fuse	resistor

7. What are the **voltages** across resistors **R** and **S**?



	R	*S*
A	2 V	3 V
B	2 V	0 V
C	4 V	3 V
D	6 V	6 V

8. What is the **relationship** between the voltage (**V**) across a conductor, the current (**I**) through it and and its resistance (**R**)?

A $\mathbf{R = V/I}$

B $\mathbf{V = R/I}$

C $\mathbf{I = R/V}$

D $\mathbf{I = VR}$

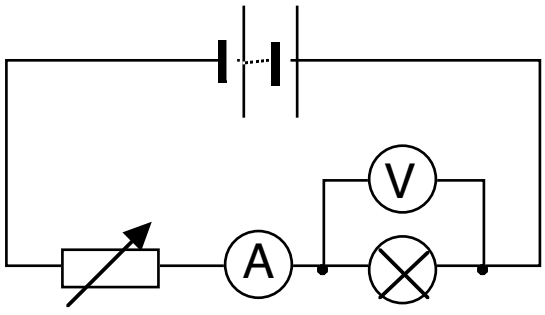
9. The voltage across a resistor is 20V and the current through it is 2A. What is the **resistance** of the resistor?

A 0.1 Ω
B 5 Ω
C 10 Ω
D 40 Ω

10. What is the value of a resistance of 2200Ω expressed in **kilohms** (kΩ)?

A 0.22
B 2.2
C 2200
D 2,200,000

11. In the circuit below, the resistance of the variable resistor is gradually increased.



What happens to the **readings** on the **ammeter** and **voltmeter**?

	ammeter	***voltmeter***
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

12. The filament of lamp **X** passes 20 C of charge in 10 seconds. Lamp **Y** passes *double* the charge in *half* the time.

What are the **currents** in the lamps?

	Lamp X	*Lamp Y*
A	2 A	8 A
B	2 A	4 A
C	2 A	2 A
D	2 A	1 A

13. What is true of the **size** of the **resistances** of 'good' **ammeters** and **voltmeters**?

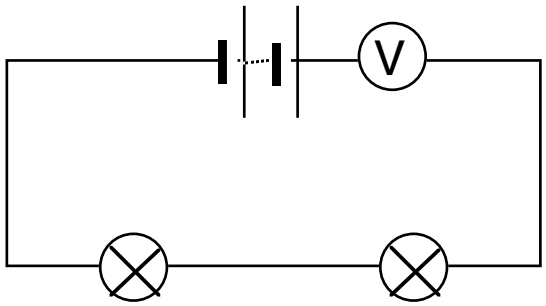
	ammeters	***voltmeters***
A	very small	very small
B	very large	very large
C	very small	very large
D	very large	very small

14. A steady current of 2A flows round a series circuit. How much **charge** passes any point in the circuit in 10s?

A 2 C
B 5 C
C 10 C
D 20 C

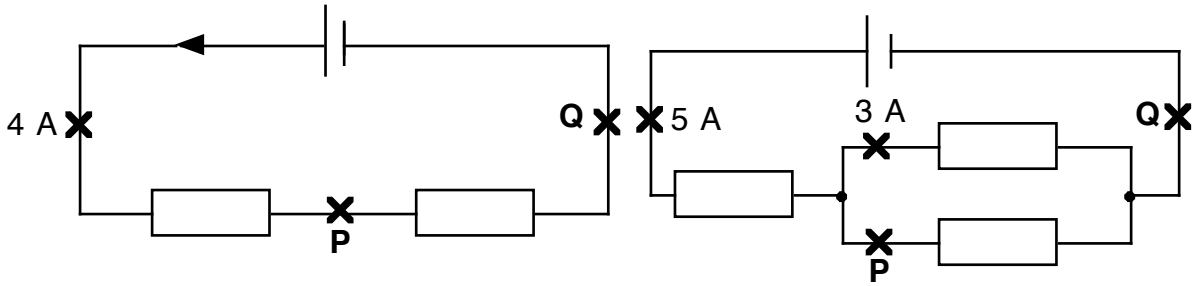
(Using Electricity Homework 2 continued on next page).

15. A boy has set up this circuit to measure the voltage of the battery. There is a reading on the voltmeter but he notices that the lamps have not lit up. What has he done wrong? (1)

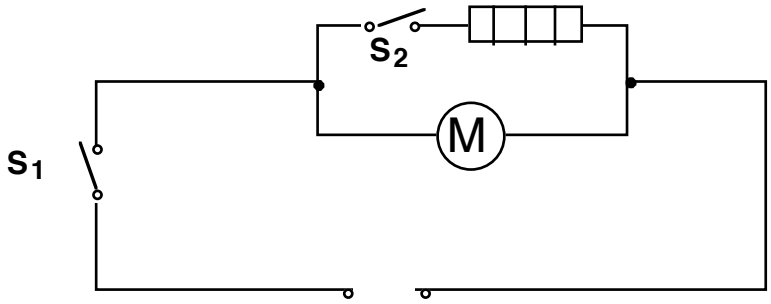


16. In each circuit, state the **current** at positions **P** and **Q**. (2)

(a) (b)



17. The circuit below is for a simple fan heater.



(a) Which switch or switches would be closed if the **motor** was to be **on** but not the heat? (1)

(b) Which switch or switches would be closed if the **motor** was to be **on** to blow hot air from the heater? (1)

(c) **Explain** whether it is possible to have the heater **on** without the motor being on? (1)

18. Draw a **circuit diagram** for the following circuit, using the usual circuit symbols: a 9V **battery** connected to a **switch**, on its positive side, which controls two **lamps** wired in parallel. One of the two lamps has its *own* switch so that it can be switched on and off without the other lamp being affected. (2)

19. Draw a **circuit diagram** for the following circuit, using the usual circuit symbols: a 20V **power supply** in series with a single **resistor** followed by two **resistors** connected in parallel. An **ammeter** measures the current drawn from the supply and a **voltmeter** measures the voltage across the parallel resistors. (3)

Total = 25

Using Electricity - Homework 3

1. The formula for calculating the **total resistance**, R_t, of two resistors R_1 and R_2 connected in *series* is

   A $R_t = R_1 + R_2$

   B $R_t = (R_1 + R_2) \div 2$

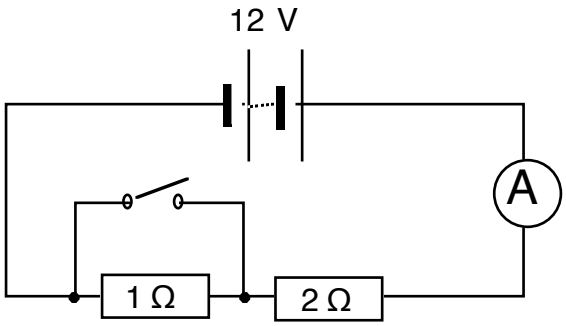
   C $R_t = (R_1 - R_2) \div 2$

   D $\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$

2. Two resistors, of values 3Ω and 6Ω are connected in **series**. What is the **total resistance** of the resistors?

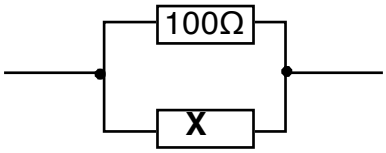
   A 2 Ω
   B 3 Ω
   C 9 Ω
   D 18 Ω

3. What are the **readings** on the ammeter with the switch **open** and **closed** ?



	open	*closed*
A	4 A	6 A
B	6 A	4 A
C	4 A	4 A
D	6 A	6 A

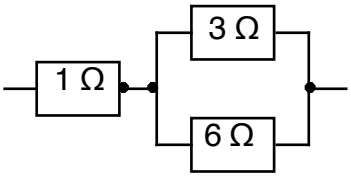
4. Resistor **X** is connected in parallel to a 100 Ω resistor.



   Which **cannot** be the total resistance of the two resistors?

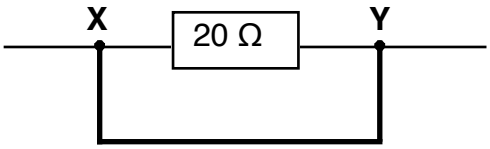
   A 20 Ω
   B 50 Ω
   C 90 Ω
   D 120 Ω

5. What is the **total resistance** of this combination of resistors?



   A 2 Ω
   B 3 Ω
   C 4 Ω
   D 10 Ω

6. A section of thick conducting wire is connected across the ends of a 20Ω resistor.



   The **resistance** between **X** and **Y** is

   A 0 Ω.
   B 1 Ω.
   C 20 Ω.
   D very large

7. Ohmmeters are connected across an **open switch** and a **closed switch**.

   open **closed**

   What are the **readings** on the ohmmeters likely to suggest about the value of the resistance in each situation?

	open	***closed***
A	zero	zero
B	zero	very large
C	very large	zero
D	very large	very large

8. The power rating of a 12V lamp is 24W. What **current** flows through the lamp when it is operating properly?

   A 2 A
   B 6 A
   C 12 A
   D 24 A

9. A lamp whose filament resistance is 3Ω at its normal operating temperature carries a current of 4A. How is the **power rating** of the lamp, in watts, calculated?

A 4 x 3
B 4 x 4 x 3
C 3 x 3 x 4
D (4 x 4) ÷ 3

10. A lamp, operating from a 10 volt power supply, uses up 1800 joules in one minute. What **current** flows through the lamp?

A 0.3 A
B 3 A
C 18 A
D 180 A

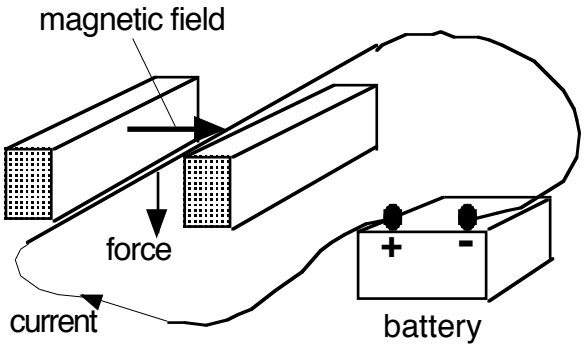
11. A 12V water heater carries a current of 3A in normal operation. The heater's **resistance** and **power** are

A 36Ω and 4W.
B 4Ω and 36W.
C 4Ω and 96W.
D 0.25Ω and 36W.

12. Which **part** of a d.c. electric motor **reverses** the direction of the **current** at every half turn?

A armature
B field coils
C commutator
D brushes

13. A long current-carrying conductor is at 90º to a uniform magnetic field. It experiences a force at 90º to both itself and the field.



Which **change(s)** will **increase** the size of the force?

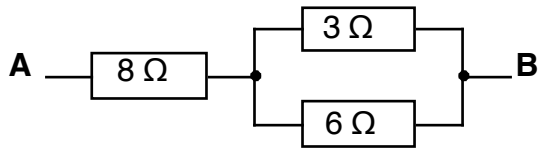
I Increase the strength of the field.
II Increase the size of the current.
III Loop the conductor so that it passes through the field twice.

A I only
B II only
C I and II only
D I, II and III

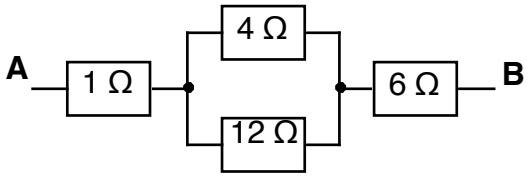
(Using Electricity Homework 3 continued on next page).

14. In each case, calculate the **combined** resistance between **A** and **B**. (2)

(a)



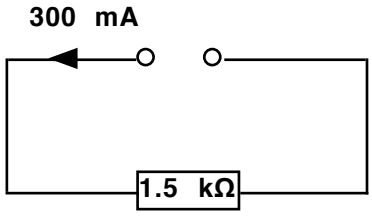
(b)



15. In part of an electric circuit, the voltage across a 12Ω resistor is 18V. Calculate the **current** through the resistor? (2)

16. An immersion heater is marked 230 volt; 1 kilowatt.
Calculate the **current** in the heater element. (2)

17. In this circuit, calculate the **power** dissipated in the resistor:
[Remember to change the current into 'amps' and the resistance into 'ohms' before calculating the power].

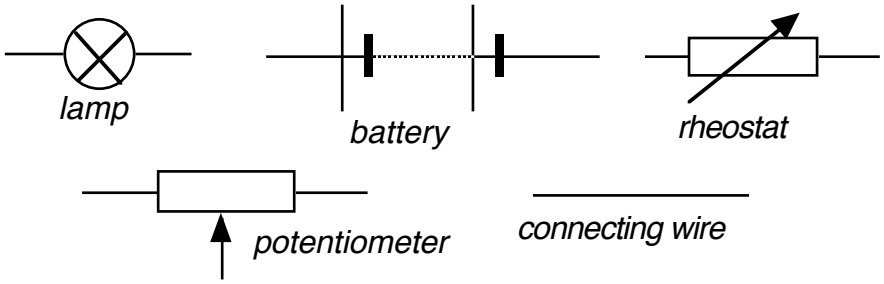


(2)

18. In a real motor, state what are the '**brushes**' usually made of and suggest **one** reason why this material is used. (2)

19. Draw circuit diagrams showing how a **variable resistor** could be used to vary the brightness of a lamp in ***two*** different ways. (2)

Use these circuit symbols:



Total = 25

Transport - Homework 1

1. The **distance** run at an average speed of 4 m/s in 40 seconds is

   A 0.1 m
   B 10 m
   C 44 m
   D 160 m

2. How **long** would it take a car, travelling at 30 miles per hour, to travel a distance of 240 miles?

   A 0.125 hours
   B 8 hours
   C 210 hours
   D 9200 hours

3. The **average speed**, in m/s, of a car, which travels 6 km in a time of 5 minutes is

   A 1.2.
   B 20.
   C 30.
   D 1200.

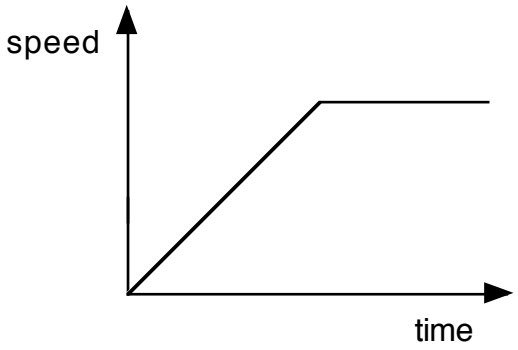
4. Which of these is **not** a unit for the measurement of speed?

   A metre per second
   B kilometre per hour
   C light year
   D mile per hour

5. Which **quantity** is calculated from the **area** under a speed-time graph?

   A distance
   B time
   C acceleration
   D speed

6. Look at the **speed-time graph** for a moving object.



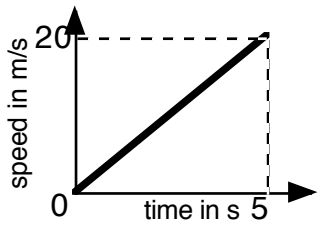
   The graph shows that the object is

   A moving with a constant acceleration and then stopping.
   B moving with a constant speed and then stopping.
   C moving with a constant acceleration and then a constant speed.
   D moving with a constant speed and then accelerating.

7. To measure the **average speed** of a moving object between two points, X and Y,

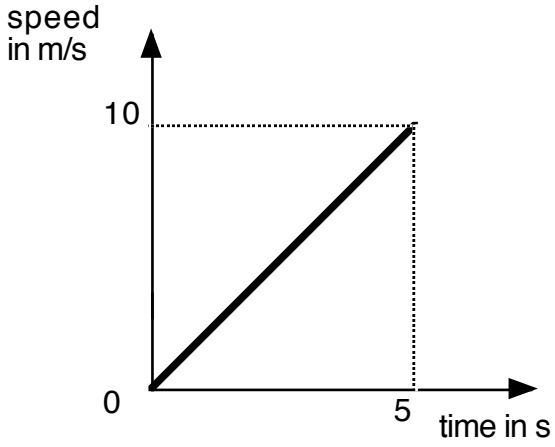
   A the speed at X is subtracted from the speed at Y.
   B the speed at Y is subtracted from the speed at X.
   C the speed at the half way point is measured.
   D the distance XY is divided by the time to move from X to Y.

8. What **distance** is travelled over 5 s by the object with this speed-time motion?



   A 4 m
   B 20 m
   C 50 m
   D 100 m

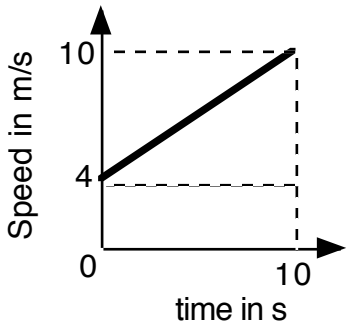
9. This is the speed- time graph of a moving object.



Which correctly describes the object's **motion**?

A Constant acceleration of 0.5 m/s^2
B Constant acceleration of 2 m/s^2
C Constant acceleration of 10 m/s^2
D Constant acceleration of 50 m/s^2

10. What is the value of the uniform **acceleration**, calculated from this speed-time graph?

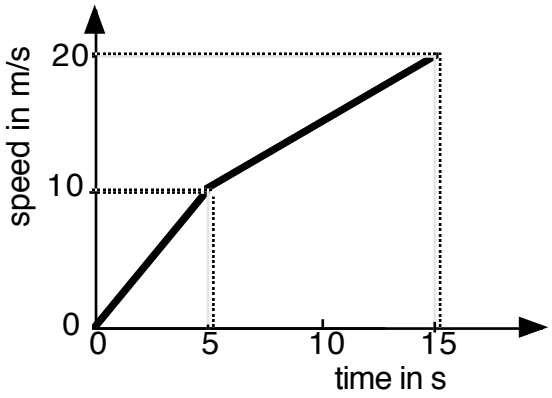


A 0.4 m/s^2
B 0.6 m/s^2
C 1.0 m/s^2
D 1.4 m/s^2

11. An object, travelling at 3 m/s, accelerates uniformly for 4 s at a rate of 2 m/s^2 in a straight line. Its **speed**, in m/s, becomes

A 8.
B 11.
C 12.
D 14.

12. This speed-time graph shows **two** accelerations.



The size of the **smaller** acceleration is

A 1 m/s^2 .
B 1.33 m/s^2 .
C 2 m/s^2 .
D 10 m/s^2 .

(Transport homework 1 continued on next page).

13. A car starts from rest and reaches a speed of 40 m/s in a time of 8 seconds. Calculate its average **acceleration**. (2)

14. How **long** would it take a train, travelling at 35 m/s, to stop with a uniform deceleration of 2.5 m/s^2? (2)

15. A car, travelling along a straight section of road, accelerates at a uniform rate of 2 m/s^2 for 5 seconds.

    (a) Calculate its **change of speed.** (2)

    (b) Why can't the ***final*** speed of the car be stated? (1)

16. A cyclist in a long distance race decides to put on a spurt to break away from the pack, which is moving along a straight road at 14 m/s. He accelerates uniformly for 3 seconds at 1 m/s^2.
    What **speed** does the cyclist reach? (2)

17. (a) Draw a **speed-time** graph for the motion of a car described thus: the car starts from rest and accelerates uniformly to a top speed of 15 m/s in 5 s. It remains at this speed for 10 s before decelerating uniformly to rest in 10 s.
    [You **must** use graph paper for this question]. (2)

    (b) Use the graph to calculate the **total distance** travelled by the car. (2)

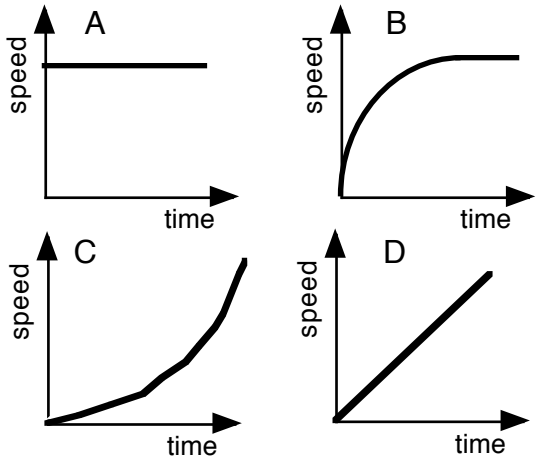
Total = 25

Transport - Homework 2

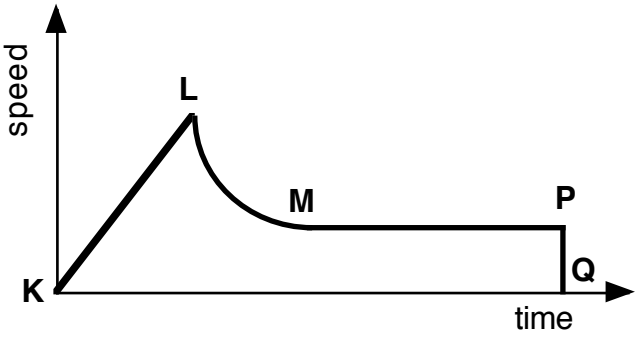
1. When the forces acting on an object are **balanced**, which of the following **could** describe its motion?

   A It moves with a constant acceleration.
   B It moves with a constant deceleration.
   C It moves with an increasing speed.
   D It moves with a constant speed.

2. Which **speed-time graph *best*** represents the motion of a stone dropped from rest from the **surface** of a deep lake?



3. A stone was dropped from rest above a lake and its speed was recorded till it reached the bottom. The speed time graph was as shown.



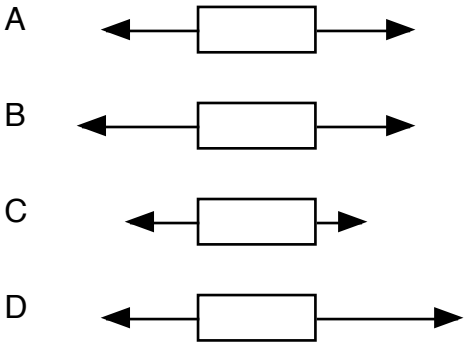
   Which **section** of the graph represents a part of the stone's motion where it was acted on by **balanced forces**?

   A **KL**
   B **LM**
   C **MP**
   D **PQ**

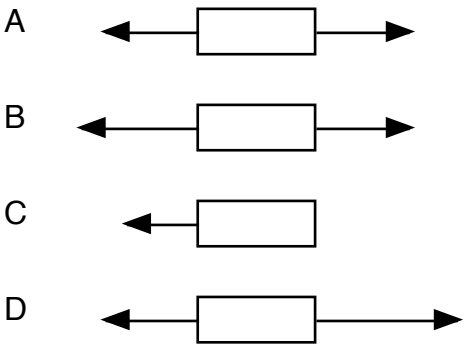
4. An object *has* an **unbalanced force** acting on it. Which motion is **not** possible?

   A Stays at rest.
   B Moves sideways with a uniform acceleration.
   C Moves up with an increasing acceleration.
   D Moves up with a uniform downward acceleration.

5. In which situation will the forces cause the object to **accelerate** to the ***right***?



6. In which situation could the object, acted on by forces as shown, be moving left with a **constant speed**?



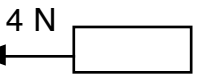
7. Which list has situations which **all** need **friction** to be **large**?

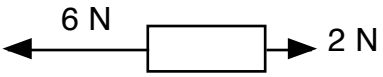
   A wheel bearings, shoe soles and bicycle brakes.
   B shoe soles, bicycle brakes and tug-of-war ropes.
   C shoe soles, skis and tug-of-war ropes.
   D wheel bearings, skis and car gears.

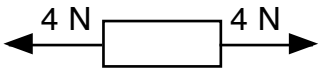
8. Which statement *best* describes the use of **seat belts** in cars?

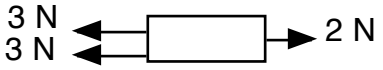
   A Seat belts make people weigh less during a crash.
   B Seat belts make people stop more quickly during a crash.
   C Seat belts stop people moving during a crash.
   D Seat belts reduce the force on people during a crash.

9. In which situation is the **unbalanced force** on the object **not** 4 newtons to the ***left***?

   A 

   B 

   C 

   D 

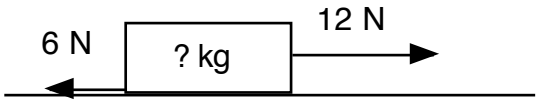
10. Newton's 2nd Law of Motion may be expressed as **F = ma**. Which of these alternative **expressions** is correct?

    A **a = Fm**
    B **a = $^{F}/_{m}$**
    C **a = $^{m}/_{F}$**
    D **a = mF**

11. What is the **mass** of an object which accelerates at 3 m/s^2 when an unbalanced force of 12 N acts on it?

    A 3 kg
    B 4 kg
    C 12 kg
    D 36 kg

12. An object on a horizontal surface is acted on by two forces and it accelerates to the *right* at 2 m/s^2.



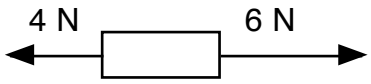
The **mass** of the object must be

    A 3 kg.
    B 6 kg.
    C 9 kg.
    D 12 kg.

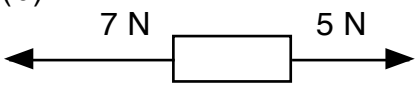
(Transport Homework 2 continued on next page).

13. In each example, state the **size** and **direction** of the **unbalanced force** acting on the object.

(a)

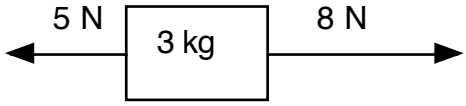


(b)



(2)

14. Use the formula **F = ma** to calculate the **size** and **direction** of the **acceleration** of the object, by firstly finding the **unbalanced force** acting on it.

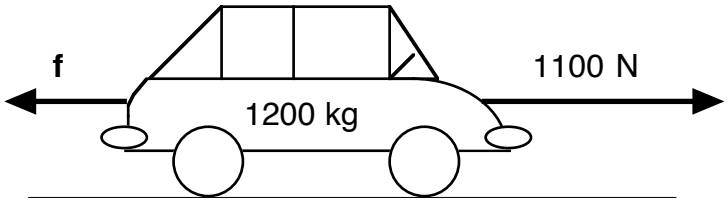


(2)

15. What **unbalanced force** acts on a 80 kg mass if it accelerates at a rate of 1.6 metres per second per second? (2)

16. What is the **acceleration** of a 12.5 kg mass which has **no** unbalanced force acting on it? (1)

17. The car in the drawing is travelling along a straight, horizontal road.



The car's mass is 1200 kg and it is accelerating forward at 0.5 m/s^2. Calculate the **unbalanced force** acting on the car and the size of **'f'**, the **friction** force. (3)

18. An astronaut in her spacesuit has a mass of 90 kg before launch on Earth. What would be her **mass** and **weight** on the surface of the Moon where the gravitational field strength is 1.6 N/kg? (3)

Total = 25

Transport - Homework 3

1. An unbalanced force causes an object of mass 2 kg to accelerate at a rate of 9 m/s^2. The *same* force would cause a **4 kg** object to **accelerate** at

   A 3 m/s^2.

   B 4.5 m/s^2.

   C 9 m/s^2.

   D 18 m/s^2.

2. A spaceship of mass 6000 kg is in **deep space**. Its rocket engine is pushing with a thrust of 12000 N. The engine cuts out when the rocket is moving at 4000 m/s. What is the spaceship's **speed** 100 s later?

   A 2000 m/s
   B 3800 m/s
   C 4000 m/s
   D 4200 m/s

3. What is the **weight** of a 3 kg mass near the Earth's surface, where 'g' is 10 N/kg ?

   A 3 kg
   B 0.3 N
   C 3 N
   D 30 N

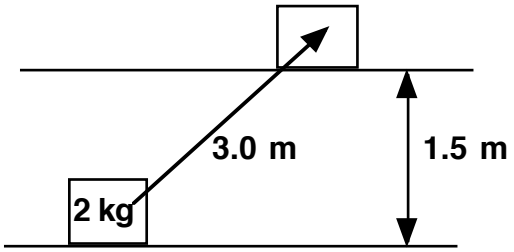
4. The **gravitational field strength** at the surface of a planet where a 2 kg object weighs 10 N is

   A 2 N/kg.
   B 5 N/kg.
   C 10 N/kg.
   D 20 N/kg.

5. A force of 6 N pulls a 2 kg mass in its *own direction* for a total distance of 3 m. The **work** done by the force is

   A 2 joules.
   B 6 joules.
   C 18 joules.
   D 36 joules.

6. A 2 kg box, weighing 20 N, is lifted as shown from floor to table, through a distance of 3 m.



   The **work done** in lifting the box, in joules, is

   A 3.
   B 6.
   C 30.
   D 60.

7. The formula for calculating the **potential energy** of a mass 'm' raised through a height 'h' is

   A E = mg.
   B E = mgh.
   C E = mh.
   D E = $^1/_2$mgh.

8. The **kinetic energy** of a mass 'm' moving at a speed 'v' is calculated using the formula

   A E = $^1/_2$mv.

   B E = $^1/_2$mv^2.

   C E = 2mv^2.

   D E = mv^2.

9. What is the **kinetic energy**, in joules, of a 4 kg mass moving with a speed of 3 m/s ?

   A 6
   B 18
   C 36
   D 72

10. The **kinetic energy** of a 1000 kg car, 3 s after accelerating from rest at 2 m/s^2, is

    A 2 kJ.
    B 18 kJ.
    C 36 kJ.
    D 180 kJ.

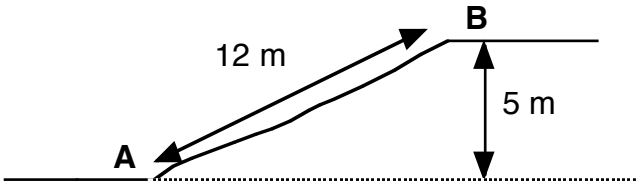
11. The correct expression relating **power** to **energy** is

    A power = time ÷ energy.
    B power = energy x time.
    C power = energy.
    D power = energy ÷ time.

12. What is the **output power** of a machine which can do 30 kJ of work in one minute?

    A 0.5 watts
    B 500 watts
    C 1800 watts
    D 30 kilowatts

13. A boy of mass 65 kg runs up a rough slope from **A** to **B** in 6.5 s.



    What **average power** do the boy's legs develop in overcoming gravity?

    A 50 W
    B 120 W
    C 500 W
    D 1200 W

(Transport homework 3 continued on next page).

14. The wandering albatross can fly at speeds of up to 32 m/s (the speed limit on Motorways!). One albatross was found to have flown 16250 km in 10 days.

Calculate *its* **average speed** in metres per second. (2)

15. How **high** is a table if 480 J of work is done in lifting a 60 kg box from the floor to the table? (2)

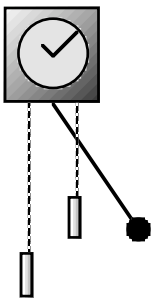
16. A 50 kg girl ran up a flight of stairs in 5 s. The stairs were 4 m high. Calculate:

(a) the **potential energy** gained by the girl and (2)

(b) the average **power** developed by her legs against the force of gravity. (2)

17. Calculate the **kinetic energy** of a mass of 2 kg moving with a speed of 3 m/s. (2)

18.



To supply energy to work the mechanism of an old-fashioned pendulum clock, weights on the end of chains had to be lifted up to the top and allowed to fall down. The potential energy stored by the weights was released a bit at a time to keep the clock working. If one of these weights had a mass of 3 kg, how much **energy** did it release in falling through 90 cm?

(2)

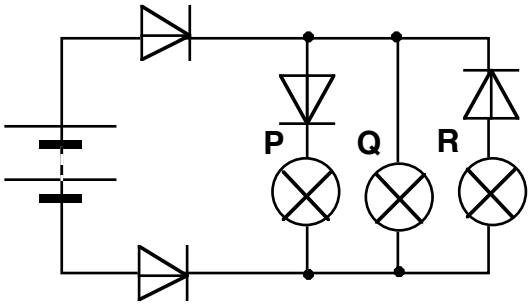
Total: 25

Electronics - Homework 1

1. Which of these materials is a type of **semiconductor**?

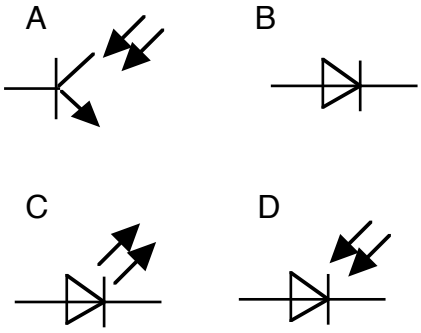
   A copper
   B silicon
   C mercury
   D glass

2. Which of the **lamps**, if any, might **light up** in this circuit?

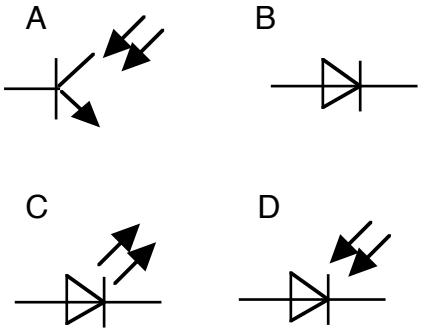


   A None
   B **Q** only
   C **P** and **Q** only
   D **Q** and **R** only

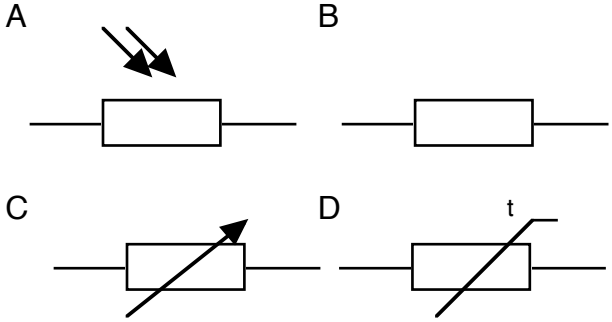
3. Which is the circuit symbol for a **photo diode**?



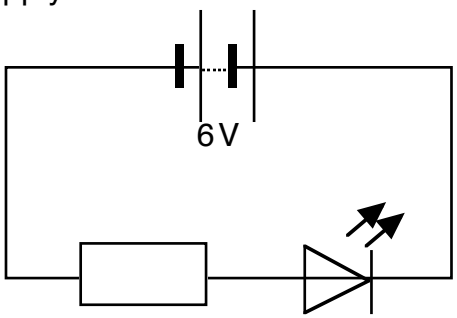
4. Which is the circuit symbol for a **light emitting diode (LED)**?



5. Which is the circuit symbol for a **thermistor**?



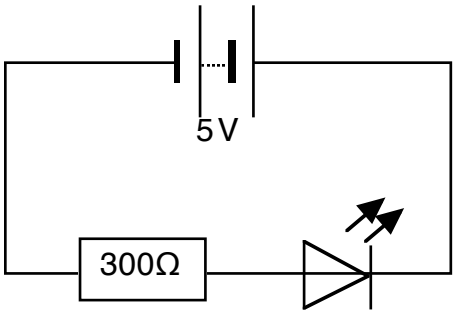
6. A 2 V LED whose forward current is 10 mA is to be operated from a 6 V supply.



   For the LED to operate as rated, the value of the 'protecting' **resistor R** should be

   A 200Ω.
   B 400Ω.
   C any value above 400Ω.
   D 600Ω.

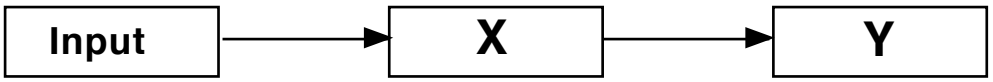
7. A girl sets up the circuit shown to observe the operation of an LED rated at 2V;10mA. The LED fails to light up but is **not** faulty.



   Why does the LED fail to light?

   A The resistor value is too small.
   B The resistor value is too large.
   C The battery is the wrong way round.
   D The battery voltage should be 2V.

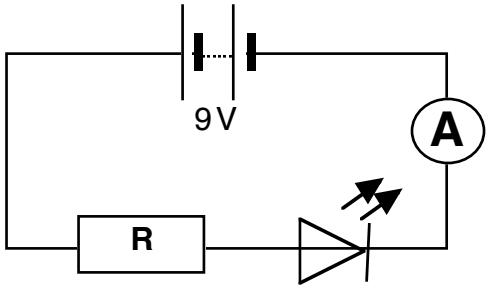
8. The block diagram of an electronic system has two terms missing . What are the **missing terms** '**X**' and '**Y**'? (2)



9. (a) From the following list, identify which **four** items could be used as **input devices** of an electronic system:
thermistor, LED, filament lamp, microphone, motor
LDR, pressure switch, transistor, battery, buzzer, LCD (2)

(b) In which part of an electronic system would a **transistor** be found? (1)

10. In the circuit below, the ammeter reads 10mA and the value of the resistor '**R**' is 700Ω.



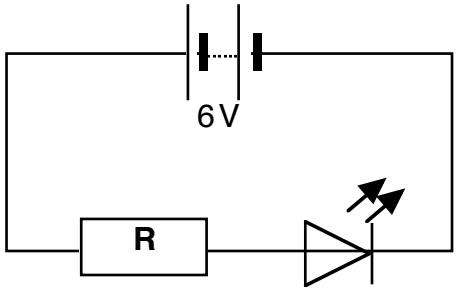
(a) Calculate the **voltage** across the resistor. (2)

(b) Calculate the **voltage** across the LED. (2)

(c) What is the value of the **current** through the LED? (1)

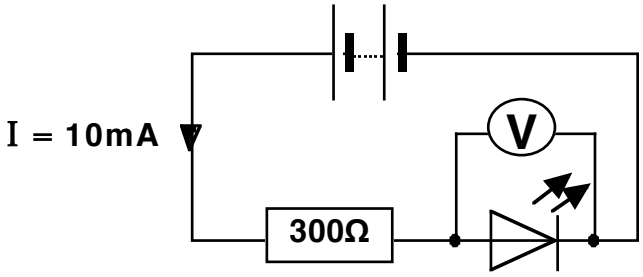
(d) Calculate the **resistance** of the LED when it is lit. (2)

11. A LED is to be operated from a 6V supply at its rated voltage of 2 volts. Its forward current is 10mA. (That is the current when it is lit).



Calculate the value of the 'protecting' resistor '**R**' needed to limit the current through the LED to 10mA. (3)

12. From the information given in the circuit diagram below, calculate the value of the **supply voltage**. The voltmeter reads 2.0V. (3)



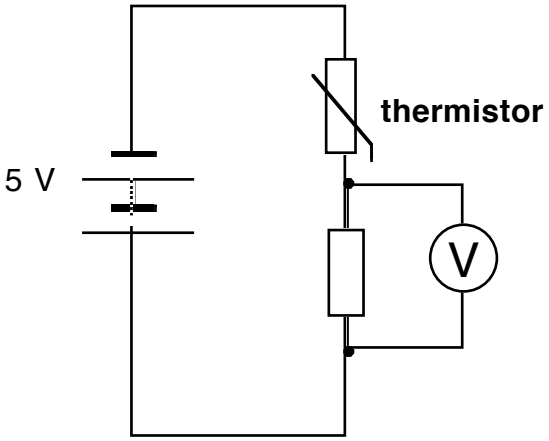
Total = 25

Electronics - Homework 2

1. For a public address (PA) system, which parts represent the **input**, **process** and **output** stages?

	input	*process*	*output*
A	microphone	loudspeaker	amplifier
B	microphone	amplifier	loudspeaker
C	battery	amplifier	loudspeaker
D	microphone	battery	loudspeaker

2. In this circuit, the reading on the voltmeter is 3.2V when the temperature is 20ºC.

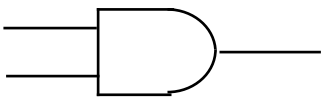


What **might** the **reading** be if the temperature rose to 25ºC?

(The thermistor's resistance decreases as it gets hotter).

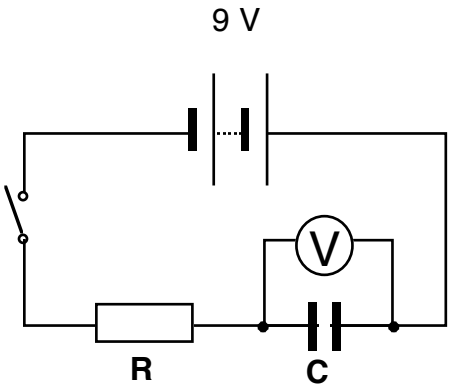
A 2.5 V
B 3.2 V
C 4.3 V
D 5.5 V

3. What kind of **logic gate** is this?



A NOT gate
B AND gate
C OR gate
D NAND gate

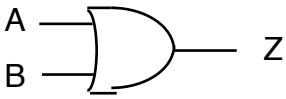
4. A capacitor and resistor can be used as part of a time delay circuit.



Assuming that the capacitor is uncharged at first, which is the **best** description of what happens to the **voltmeter reading** after the switch is closed?

A It rises slowly from 0V to 4.5V.
B It rises slowly from 0V to 9V
C It becomes 9V immediately.
D It slowly falls from 9V to 0V.

5. The diagram shows a logic gate and its incomplete **truth table**.



inputs		output
A	B	Z
0	0	**a**
0	1	**b**
1	0	**c**
1	1	**d**

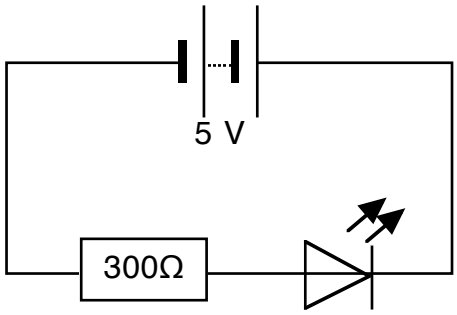
What **numbers** should replace **a**, **b**, **c** and **d**?

	a	***b***	***c***	***d***
A	0	1	1	1
B	1	0	0	0
C	1	1	1	0
D	0	1	1	0

6. What kind of **logic gate** is in Q5?

A OR gate
B NOR gate
C NOT gate
D AND gate

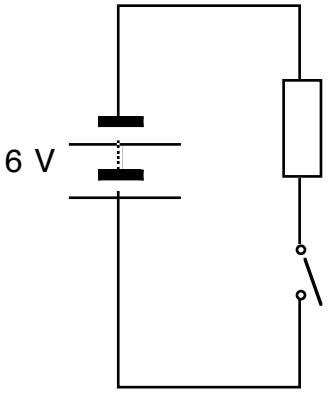
7. A girl sets up the circuit shown to observe the operation of an LED.
The LED fails to light up.



What is **wrong** with her circuit? (None of the components is faulty). (1)

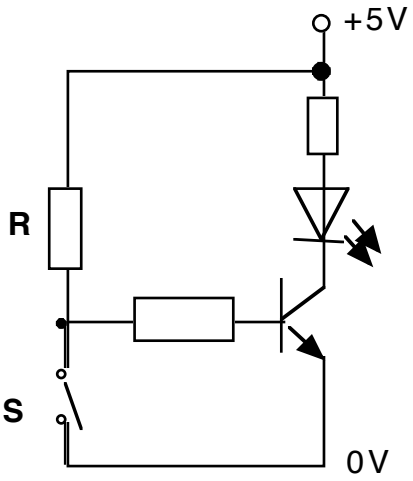
8. (a) In the circuit shown, what is the **voltage** across (i) the resistor and (ii) the switch when the switch is **open**? (2)

(b) What is the **voltage** across (i) the resistor and (ii) the switch when the switch is **closed**?



(2)

9. In this circuit, the transistor acts as a switch.



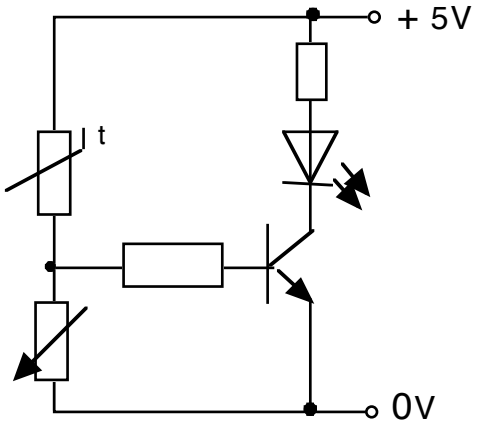
(a) Is the transistor switched **on** or **off** when the switch is **open**? (1)

(b) Is the LED **on** or **off**? (1)

(c) What happens when the switch is **closed**? (1)

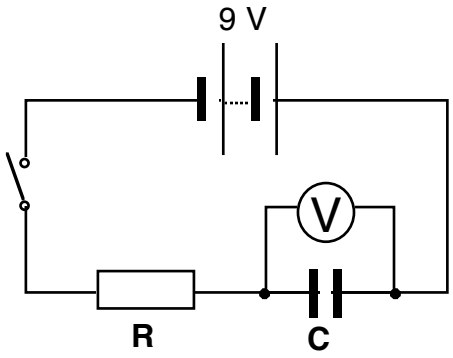
10. Redesign the circuit in Q9, using the same components so that the LED is **on** when the switch is **closed**. (1)

11. The circuit below is designed to switch **on** the LED when the temperature falls **below** a certain value.



Explain whether or not it would operate as **planned**. (2)

12. A capacitor and resistor can be used as part of a time delay circuit.

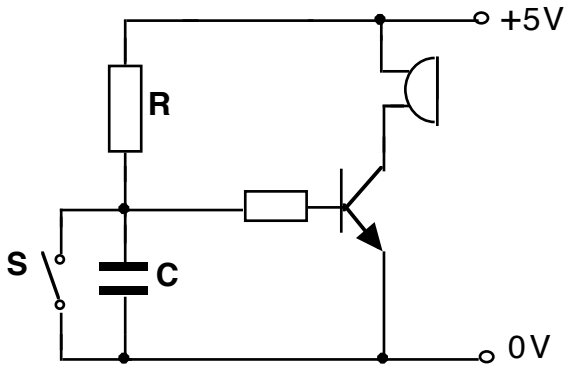


In the circuit shown above, the capacitor charges when the switch is closed. The **time** it takes to charge to a certain voltage depends on **two factors** other than the battery voltage.

(a) What are the **two** factors which affect the time to charge the capacitor? (2)

(b) State **two** changes which could be made to circuit components, each of which would **increase** the charging time. (2)

13. The circuit below is designed to switch **on** the buzzer a certain time after the switch is opened.



(a) Explain **how** the circuit operates, in terms of the voltage across the capacitor. (3)

(b) If the buzzer is found to sound too *quickly*, suggest **one** change which could be made to circuit components, each of which would **increase** the time taken for the buzzer to sound. (1)

Total = 25

Energy Matters - Homework 1

1. Which is a **renewable** energy source?

   A wind
   B coal
   C oil
   D nuclear

2. Which is a **non-renewable** energy source?

   A waves
   B hydroelectric
   C solar
   D gas

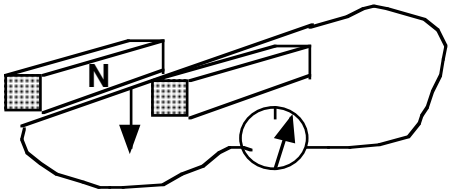
3. A solar cell makes 5 joules of electricity for every 50 joules of light that shine on it. What is its **efficiency** in turning light energy into electrical energy?

   A 5%
   B 10%
   C 45%
   D 250%

4. In the **core** of the reactor of a nuclear power station, which sub-atomic particles cause **chain reactions** to take place?

   A nuclei
   B electrons
   C protons
   D neutrons

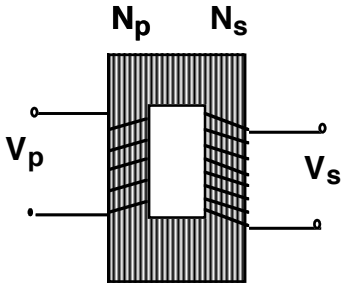
5. A wire is pushed downwards through a magnetic field and a current is **induced** in the wire.



Which **action** would **not** increase the size of this current?

   A Moving the wire faster.
   B Using stronger magnets.
   C Moving the wire up more slowly.
   D Making two loops of wire pass through the magnetic field.

6. For a transformer, which formula gives the **relationship** between the primary and secondary **voltages** and **turns**?



   A $\frac{V_s}{V_p} = \frac{N_p}{N_s}$

   B $\frac{V_s}{V_p} = \frac{N_s}{N_p}$

   C $\frac{V_s}{N_p} = \frac{V_p}{N_s}$

   D $N_p V_p = N_s V_s$

7. Which statement(s) about *real* **transformers** is/are correct ?

   I They work with a d.c. supply.
   II The coils are wound on a soft iron core.
   III They have no energy losses.

   A I only
   B II only
   C II and III only
   D I, II and III

8. A **step-down** transformer has a turns ratio of 29:1. What **voltage** appears across its secondary coil if the voltage across its primary is 230V a.c.?

   A 8V
   B 29V
   C 201V
   D 6670V

9. A toy steam engine burns solid paraffin to make heat which is used to boil water into steam. The steam operates a piston which turns the driving wheels.

(a) If 18 J of useful mechanical energy is produced when 300 J of chemical energy is extracted from the paraffin, calculate the **efficiency** of the steam engine. (2)

(b) How many **joules** out of every hundred are **wasted**? (1)

10. A model hydroelectric power station produces just enough electric power to light a 6W lamp. If the model is found to be **80%** efficient at converting the potential energy of the water into electricity, what is the **input power** of the water running through the pipes? (2)

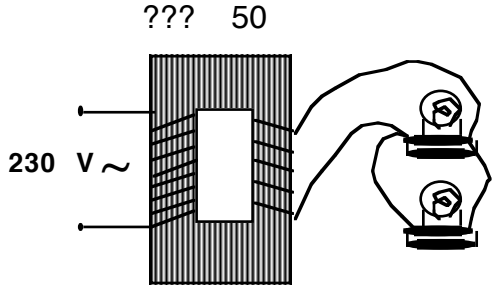
11. A **step-down** transformer has a turns ratio of 30:1. It has 6000 turns in the primary coil. Calculate the **number** of turns in its secondary coil. (2)

12. (a) In a very well constructed transformer which has very few energy losses, how does the **secondary output power** compare with the **primary input power**? (1)

(b) Assuming that a transformer is 100% efficient, how much **power** would need to be supplied to the primary if a 12 volt, 24 watt lamp was lit at its rated voltage from the secondary? (1)

(c) Calculate the **current** drawn from the 230V a.c. mains by the primary winding of a transformer which supplies 23 watts of power to a lamp across the secondary winding.
(Assume the transformer does not lose any energy). (2)

13. In the circuit shown, a mains step-down transformer supplies power to two 12 V, 24 W lamps, wired in parallel. Assume the transformer is 100 % efficient.



(a) What total **power** is delivered to the lamps? (1)

(b) Calculate the **current** in the transformer's secondary winding. (2)

(c) Calculate the **current** in the primary winding. (2)

(d) How many **turns** are in the primary winding? (1)

Total = 25

Energy Matters - Homework 2

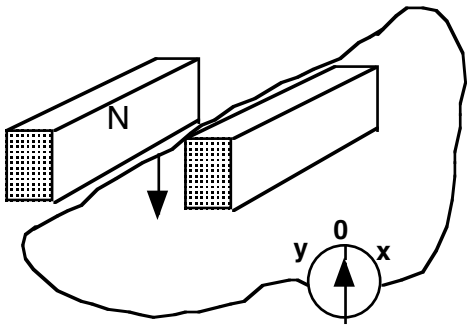
1. Electricity is generated at 11 kV but is transmitted for large distances across country at very high voltages (132 kV or 400 kV). What is the **reason** for using such high voltages?

   A It stops people going too near.
   B It increases the total amount of power generated.
   C It reduces the power cables' resistance.
   D It reduces the amount of energy lost through heating of the cables.

2. 20,000W of electric power is to be transmitted at 200 volts through long power cables with a total resistance of 0.5Ω. How much **power** would be **wasted** in heating the cables?

   A 0.005 W
   B 0.05 W
   C 50 W
   D 5000 W

3. When the conducting wire is moved **down** and then **up**, once only between the two magnets, a **current** is induced which causes a deflection on the meter pointer.



   How is the pointer's **deflection** described?

   A It moves to **x** and back to **0**.
   B It moves to **x** and back to **0**, then to **x** and back to **0**.
   C It moves to **x** and then to **y** and back to **0**.
   D It moves to **y** and back to **0**.

4. When 8000 J of heat is added to 2 kg of a substance, its increase in temperature is 10 celsius degrees. The **specific heat capacity** of the substance is given by

   A $8000 \times 10 \times 2$.
   B $\frac{8000 \times 10}{2}$.
   C $\frac{8000 \times 2}{10}$.
   D $\frac{8000}{2 \times 10}$.

5. The specific heat capacity of water is 4200 J/kgK. By how much would the **temperature** of 500 g of water increase if 42000 J was added to it?

   A $0.02C^o$
   B $2C^o$
   C $5C^o$
   D $20C^o$

6. A 2 kg lump of metal, which has a specific heat capacity of 400 J/kgK, has heat added to it for 4 minutes at the rate of 50 W. Assuming that no heat is lost from the metal, its **temperature rise**, in celsius degrees is calculated from

   A $\frac{400 \times 2}{50 \times 4 \times 60}$.
   B $\frac{400 \times 2}{50 \times 4}$.
   C $\frac{50 \times 4 \times 60}{400 \times 2}$.
   D $\frac{50 \times 4}{400 \times 2}$.

7. The specific latent heat of fusion of ice is 334,000 J/kg. The **heat** needed to melt 50 g of ice at its melting point (0^oC) is

   A 50 x 334,000 J.
   B 0.05 x 334,000 J.
   C 50 x 0 x 334,000 J
   D 50.05 x 0 x 334,000 J.

8. It takes 3200 joules of heat to **melt** 5 grams of gold at its melting point. What is the **specific latent heat of fusion** of gold in J/kg?

A 160
B 640
C 16000
D 64000

9. The **total heat**, in joules, needed to melt a 2 kg block of ice, removed from a freezer at -18ºC, into 2 kg of water at 0ºC s found from

A 2100 x 2 x 18
B 2 x (334,000 + 2100)
C (4200 x 2 x 0) + (2 x 334,000)
D (2100 x 2 x 18) + (2 x 334,000)

(specific heat capacity of ice = 2100 J/kgK)
(specific heat capacity of water = 4200 J/kgK)
(specific latent heat of ice = 334,000 J/kg)

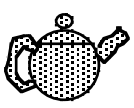
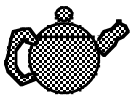
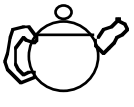
10. The **heat** from the Sun reaches the Earth across space by

A conduction only.
B convection only.
C radiation only.
D conduction, convection and radiation.

11. **Convection currents** can occur in

A solids only.
B liquids only.
C gases only.
D liquids and gases only.

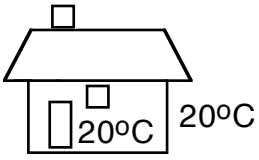
12. Which teapot is likely to lose its heat **fastest** by radiation ?

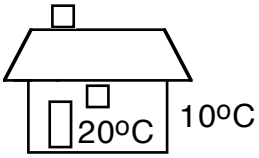
A 
B 
C 
D 

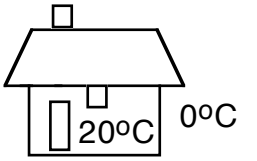
13. Glass fibre, woolly jumpers and expanded polystyrene granules are all used as insulators. The **factor** which *most* makes them good insulators is that

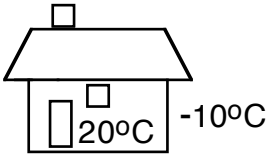
A they are all non-metals.
B they are all bulky.
C they all contain trapped air.
D they are all waterproof.

14. All the houses are identical in *every* way, including insulation. The inside and outside air temperatures are shown. Which house loses **heat fastest**?

A 

B 

C 

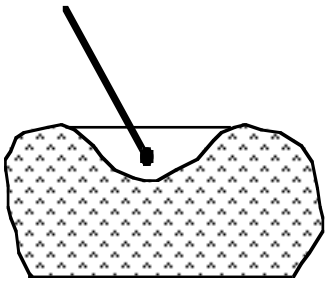
D 

(Energy Matters homework 2 continued on next page).

Note: (1) specific latent heat of fusion of ice at 0°C = 3.34×10^5 J/kg
(2) specific latent heat of vaporisation of water at 100°C = 2.26×10^6 J/kg

15. Calculate the **specific heat capacity** of a 3 kg piece of metal which experiences a temperature rise of 25 C° when heat is supplied to it at a rate of 60 watts for 10 minutes, if a total of 3000 joules **escapes** to the surroundings. (4)

16. A block of ice sitting in a room with an air temperature of 10°C has a concave dent in its top surface which fills with melt water from the block.

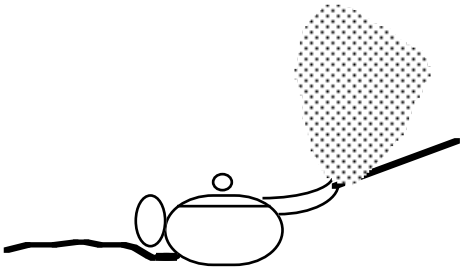


The temperature of the water is measured.

(a) What would be the **temperature** of the water? (1)

(b) Explain. (1)

17.



The temperature of the water in a boiling kettle is measured and found to be 100°C.
The thermometer is now held inside the **spout** to measure the temperature of the **steam**. What would its **temperature** be? (1)

18. Which requires **more heat**:

1: boiling 20 grams of water at 100°C into 20 g of steam at 100°C or

2: melting 135 g of ice at 0°C into 135 g of water at 0°C ?

You **must** show working. (4)

Total = 25