TSSM
Creating VCE Success

THIS BOX IS FOR ILLUSTRATIVE PURPOSES ONLY

'2017 Examination Package' -
Trial Examination 7 of 9

STUDENT NUMBER

									Letter
Figures									
Words									

PHYSICS

Units 3 & 4 – Written examination

(*TSSM's *2014 trial exams updated for the current study design)

Reading time: 15 minutes
Writing time: 2 hour and 30 minutes

QUESTION & ANSWER BOOK

Structure of Book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	20	20	20
B			110
			Total 130

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, and rulers, up to 4 pages (A4) of prewritten notes and an approved calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out or liquid/tape.

Materials supplied

- Question and answer book of 34 pages (including a multiple choice answer sheet).

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.
- Write your answers in the spaces provided.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the examination room.

SECTION A – Multiple Choice

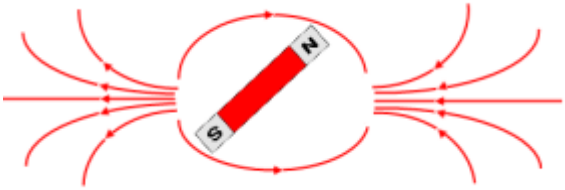
Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple choice questions.
Choose the response that is **correct** and that **best answers** the question.
A correct answer **scores** 1; an incorrect answer scores 0.
Marks will not be deducted for incorrect answers.
Unless indicated the diagrams in this book are **not** drawn to scale.
Take the value of g to be 9.8 m s^{-2}

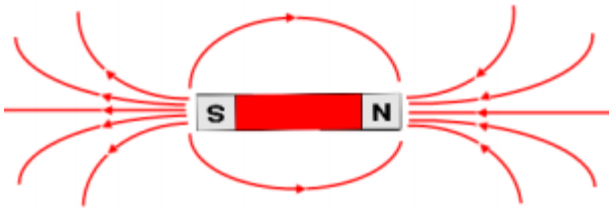
Question 1

Which of the following magnetic fields is correct for a single bar magnet?

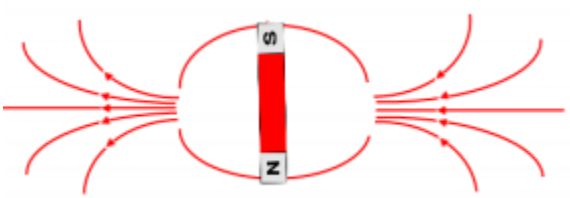
A



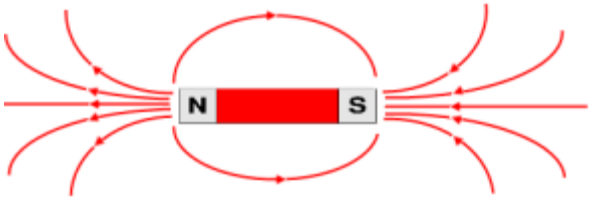
B



C



D



Question 2

An electric current flows into the page as shown in **Figure 1**.

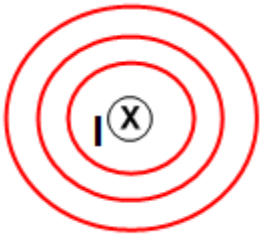


Figure 1

What is the direction of the magnetic field?

A. To the bottom of the page.

B. To the top of the page.

C. Clockwise.

D. Counter-clockwise.

SECTION A – continued

Figure 2 shows a simplified diagram of the electron gun in the Australian Synchrotron.

The potential difference between the plates is 125 kV and the plate separation, **d**, is 25 cm.

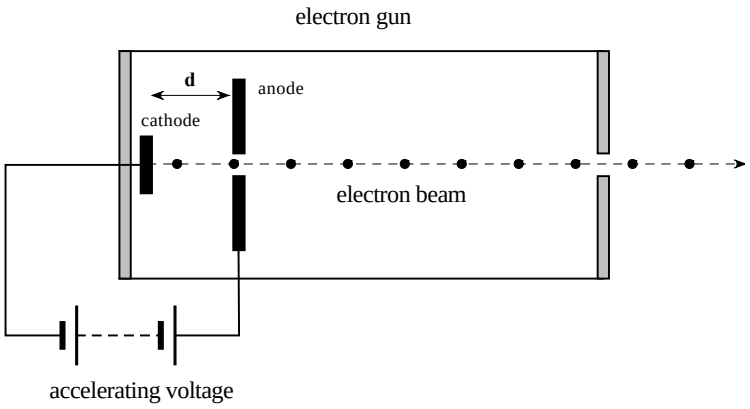


Figure 2

Question 3

Which one of the following choices, **A** – **D**, best gives the size of the electric field between the plates?

A. 5.0 V m^{-1}

B. 5.0×10^{5} V m^{-1}

C. 500 V m^{-1}

D. 5.0×10^{3} V m^{-1}

Question 4

Which one of the following choices, **A** – **D**, best gives the magnitude of the force acting on a single electron while it is between the charged plates?

A. 8.0×10^{-14} N

B. 3.2×10^{-25} N

C. 8.0×10^{14} N

D. 3.2×10^{13} N

SECTION A – continued
TURN OVER

The electron gun's accelerating voltage was adjusted so that the exiting electrons were travelling at a speed of 2.5×10^7 m s^{-1}.

The path taken by the electrons as they entered a magnetic field had a radius of 25 m as shown in Figure 3.

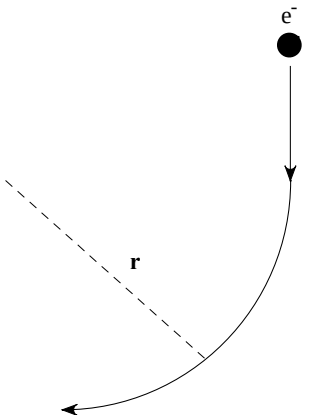


Figure 3

Question 5

In which direction is the magnetic field that causes the electrons to follow the path shown directed?

A. up the page

B. down the page

C. into the page

D. out of the page

Question 6

An electron in the booster ring has a momentum of 2.05×10^{-18} kg m s^{-1}. It moves in a circle of radius 20.7 m. The magnetic field produced by the bending magnets in the booster ring is closest to:

A. 0.32 T

B. 0.64 T

C. 0.96 T

D. 1.28 T

SECTION A – continued

The following information relates to Questions 7 and 8

Figure 4 shows a CRO output, where the vertical scale is 2 V cm^{-1} and the horizontal scale is 10 ms cm^{-1}. The grid shown is 1 cm square.

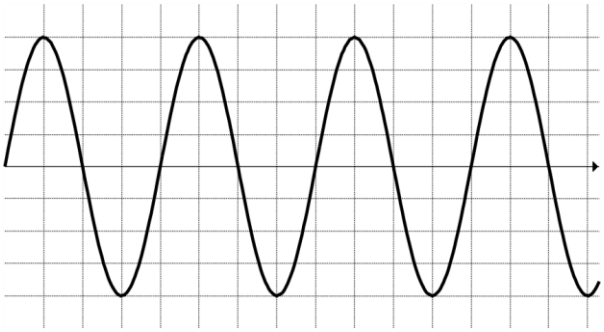


Figure 4

Question 7

Which of the following is the best estimate for frequency of the output?

A. 250 Hz
B. 8 Hz
C. 40 Hz
D. 25 Hz

Question 8

Which of the following is the best estimate for rms voltage of the output?

A. 4 V
B. 8 V
C. 2.8 V
D. 5.7 V

Question 9

When a certain force is applied to an object with a mass of 2 kg, its acceleration is 10.0 m s^{-2}. When the same force is applied to a different object, its acceleration is 4.0 m s^{-2}. The mass of second object is

A. 10 kg
B. 8.0 kg
C. 5.0 kg
D. 2.5 kg

SECTION A – continued
TURN OVER

Question 10

A 3.0 kg block slides on a frictionless 20° inclined plane. A force of 16 N acting parallel to the incline and up the incline is applied to the block. What is the acceleration of the block?

A. 1.98 m s^{-2} down the incline.
B. 8.69 m s^{-2} up the incline.
C. 1.98 m s^{-2} up the incline.
D. 8.69 m s^{-2} down the incline.

Question 11

The diagram in Figure 1 shows an interstellar UFO travelling at a speed of 0.65c.

The astronaut in the diagram is an observer. ***All*** diagrams of the interstellar UFO are drawn to the scale as the one shown in Figure 5.

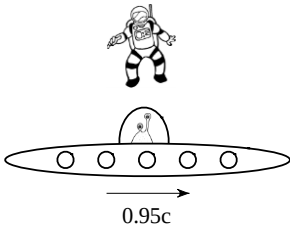
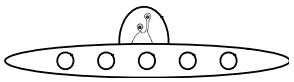


Figure 5

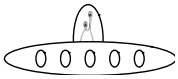
Which of the following diagrams best illustrates how the UFO would appear to a *stationary* observer?

A.

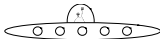


B.

C.



D.



Question 12

A fast moving car is sounding its horn as it moves by you. What will you observe just as the car passes you by?

A. The pitch gets lower.
B. The pitch gets higher.
C. The pitches alternates between high and low repeatedly.
D. The pitch is unchanged.

Question 13

For a critical angle of 60 degree and the refractive index of the first medium is 1.732, the refractive index of the second medium is

A. 1
B. 1.5
C. 2
D. 1.66

SECTION A – continued

Question 14
Consider the candle shown in Figure 6, which is positioned in front of a speaker.
For orientation purposes, the axes are X (left-right), Y (up-down) and Z (into-out of page)

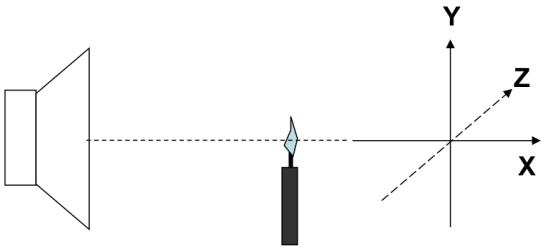


Figure 6

Which of the following best describes the motion of the candle flame when the speaker is operating at a frequency of 60 Hz?

A. Towards and away from the speaker in line with the X-axis, as the sound is a transverse compression wave.
B. Towards and away from the speaker in line with the X-axis, as the sound is a longitudinal compression wave.
C. Towards and away from the speaker in line with the Y-axis, as the sound is a longitudinal compression wave.
D. Towards and away from the speaker in line with the Z-axis, as the sound is a transverse compression wave.

Question 15
The principle of Laser is

A. spontaneous absorption
B. simulated emission
C. induced emission
D. both b and c

Question 16
Which one of the following statements best describes the production of light in an incandescent light bulb?

A. Stimulated emission of photons by electrons in the electric current.
B. Transition of excited valence electrons back to lower energy states.
C. Acceleration of electrons in random thermal collisions.
D. Emission of electromagnetic radiation (light) by electrons accelerated by the applied voltage.

SECTION A – continued
TURN OVER

Question 17
Consider a sound source projected through a narrow gap towards two measuring points, P & Q, which are equidistant from the gap, as shown in Figure 3. The frequency of the source is 17 kHz and the gap is 0.2 m wide. Take the speed of sound as 340 m s^{-1}.

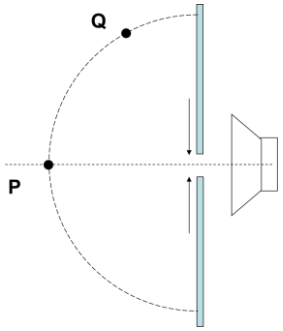


Figure 3

Which of the following is the best explains the relative loudness measured at **P** & **Q**?

A. The sound will be louder at P than Q due to the inverse square law for intensity reduction.
B. The sound will be louder at P than Q due to minimal diffraction effects.
C. The sound will be the same at Q and P due to extensive diffraction effects.
D. The sound will be louder at Q than P due to minimal diffraction effects.

Question 18
Bohr's Model of the atom included the idea(s) that:

A. The electron can have only certain energies, including a lowest-level ground state.
B. Electrons absorb energy by moving to higher energy orbits.
C. Electrons emit energy as light when they move to lower energy orbits.
D. A, B, and C are correct.

Question 19
An electron has a kinetic energy of 5.4 eV. The energy of a photon that has the same de Broglie wavelength as the electron is closest to:
A. 2.5 keV
B. 2.3 keV
C. 2.7 keV
D. 2.2 keV

Question 20
An experiment that tests only one factor at a time by using a comparison of a control group and an experimental group is:

A. An independent variable.
B. A dependent variable.
C. A controlled experiment.
D. An uncontrolled experiment.

END OF SECTION A

SECTION B – Short answer

Instructions for Section B

Answer **all** questions in the spaces provided. Write using blue or black pen
Where an answer box is provided, write your full answer in the box.
If an answer box has a unit provided in it, give your answer in that unit.
In questions where more than one mark is available, appropriate working **must** be shown.
Unless indicated the diagrams in this book are **not** drawn to scale
Take the value of g to be 9.8 ms^{-2}

Question 1 (4 marks)

There is a negative charged particle of 0.32 C in free space.

a. What are the magnitude and direction of the electric field 2.0 m away from the particle?

2 marks

Vm^{-1}

b. What are the magnitude and direction of the electric force when an electron is placed 2.0 m away from this particle?

2 marks

N

SECTION B – continued
TURN OVER

Question 2 (2 marks)
Draw the electric field produce by the charges shown in Figure 1. 2 marks

Figure 1

Question 3 (2 marks)

A bar magnet and solenoid are arranged as shown in Figure 11. Sketch three field lines that would intersect the dashed square area between the two components. 2 marks

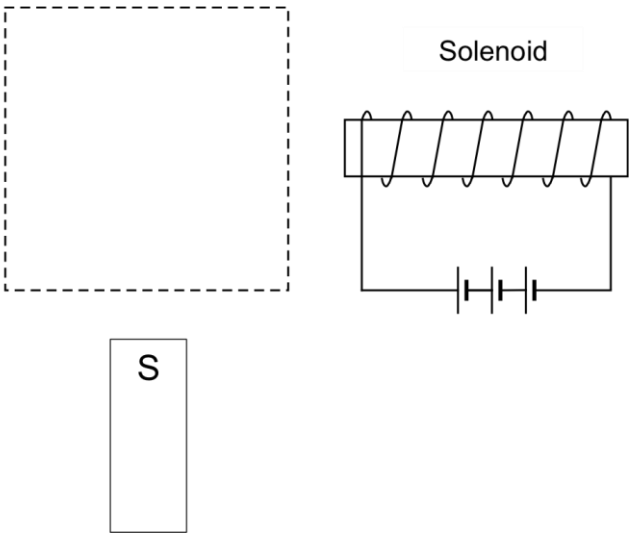
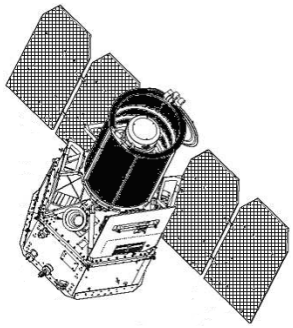


Figure 2

SECTION B – continued

Question 4 (5 marks)



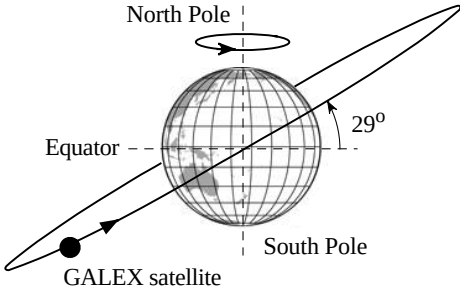


Figure 3

Figure 3 shows the orbital path around the Earth of the space telescope Galaxy Evolution Explorer (GALEX). The telescope has a mass of 280 kg and it orbits the Earth in a circular path at an altitude of 700 km.

Mass of Earth	$M_E = 5.97 \times 10^{24}$ kg
Radius of Earth	$R_E = 6.37 \times 10^{6}$ m
Universal gravitational constant	$G = 6.67 \times 10^{-11}$ Nm^2 kg^{-2}

a. Use the supplied information to calculate the how long it takes the GALEX telescope to complete one orbit around the Earth. 3 marks

s

b. With what speed does GALEX orbit the Earth? 2 marks

km h^{-1}

SECTION B – continued
TURN OVER

Question 5 (6 marks)

A basic motor is shown below in Figure 4. The coil in the magnetic field has three turns and a current of 0.6 A.

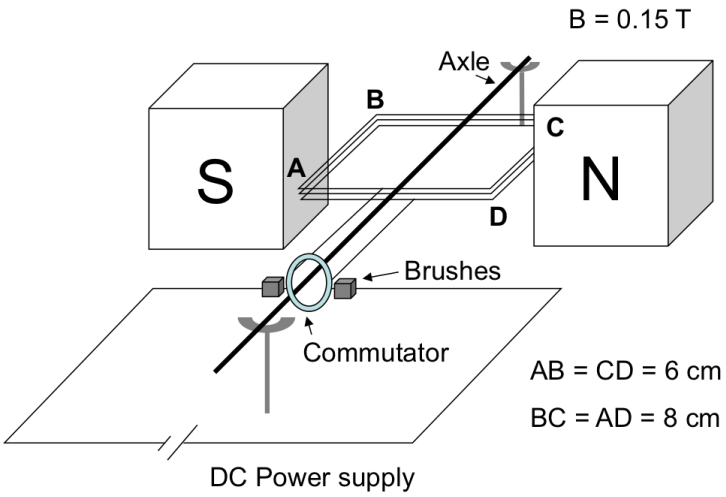


Figure 4

a. Determine the size and direction of the force on side AB.

3 marks

N
Direction:

b. Explain the role of the commutator in ensuring rotation is continuous.

3 marks

SECTION B – continued

Question 6 (4 marks)

Figure 5 shows a solenoid which is brought towards a copper loop.

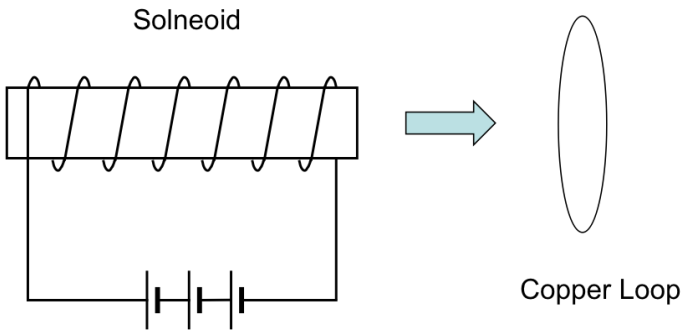


Figure 5

a. Determine the initial direction that the induced current would flow in the copper loop (when looking from the side of the solenoid). Explain your answer.

2 marks

b. Once it is very close the loop, the solenoid is held stationary.
Explain what would occur after the solenoid stops moving.

2 marks

SECTION B – continued
TURN OVER

Question 7 (8 marks)

The magnetic flux through a wire coil of 30 turns is graphed as a function of time in the graph shown in Figure 6.

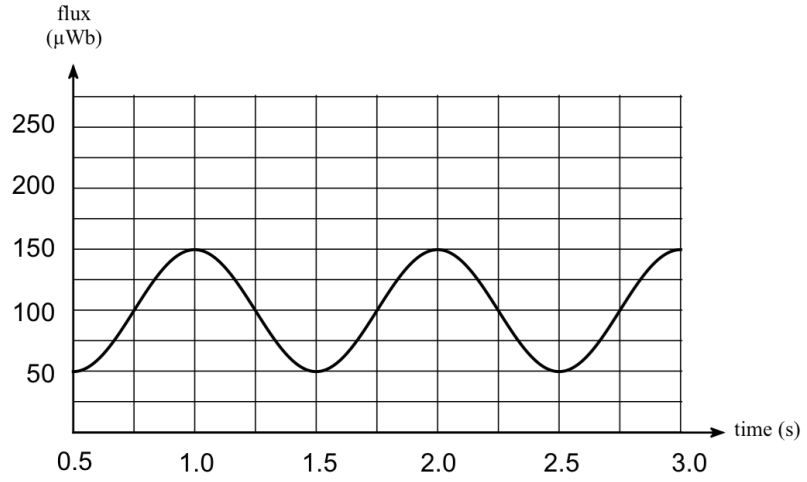


Figure 6

a. The magnitude of the average current that flows through the wire coil from time $t = 1.0$ s to $t = 1.5$ s is 15 mA
Calculate the total resistance of the coil.

3 marks

Ω

b. Complete the table below, which identifies the time at which maximum positive, maximum negative or zero emf is induced in the coil.
List all possible answers over the time interval of $t = 0.5$ s to $t = 3.0$ s.

3 marks

emf	Time(s)
Maximum positive	
Zero	
Maximum negative	

SECTION B – Question 7 - continued

c. The rate of change of flux in the coil is now doubled. Explain the effect on the emf in the coil.

2 marks

Question 8 (11 marks)

A family is experimenting with a camp generator and lights to illuminate an outdoor stage. To reduce noise, the generator is placed a significant distance from the lights, resulting in transmission lines with significant resistance.

Their initial setup is shown in Figure 7.

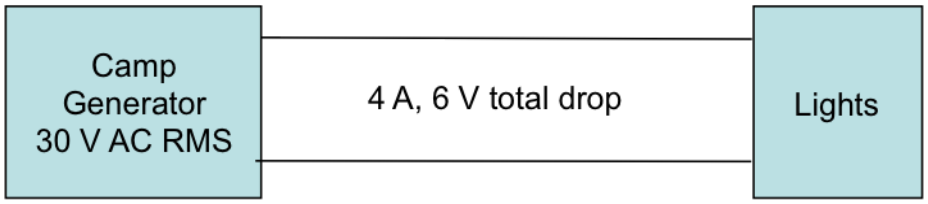


Figure 7

a. Determine the resistance of the transmission lines.

2 marks

Ω

b. Determine the percentage losses in the system: $\%_{losses} = \frac{P_{loss}}{P_{in}} \times 100\%$

2 marks

%

SECTION B – Question 8 - continued
TURN OVER

Not satisfied with the performance of the system, the family consults a local physics student who proposes the setup shown in Figure 8. Note that the resistance of the transmission lines and current at the lights remains the same.

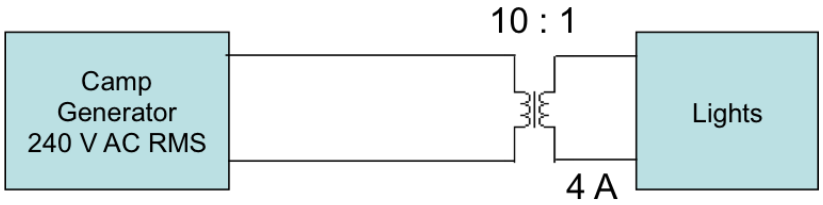


Figure 8

c. Determine the new percentage losses.

3 marks

%

d. Determine the voltage available at the lights under the new system.

2 marks

V

e. Additional lights are now added to the new system, increasing the current from 4 A to 8 A. Explain the effect of the voltage at the lights.

3 marks

SECTION B – continued

Question 9 (9 marks)

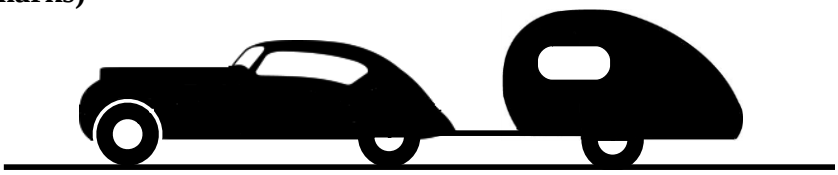


Figure 9a

Figure 9a shows a car of mass 2600 kg towing a caravan of mass 1400 kg.

The driver changes the power output of the car's engine in order to maintain a constant speed of 90 km h^{-1} on a straight road.

The total resistive force on the car is 1800 N and on the caravan 1200 N.

a. Calculate the driving force exerted by the car at this speed. 2 marks

N

To overtake a slow moving truck the driver accelerates at a constant rate of 0.80 m s^{-2} from 90 km h^{-1} until reaching 108 km $h^{-1.}$

b. Calculate the distance travelled by the car and caravan during this acceleration.

2 marks

m

SECTION B – Question 9 - continued
TURN OVER

c. Calculate the tension in the coupling between the car and caravan whilst they are accelerating to overtake the truck. (You may assume the same resistive forces of 1800 N and 1200 N respectively.)

2 marks

N

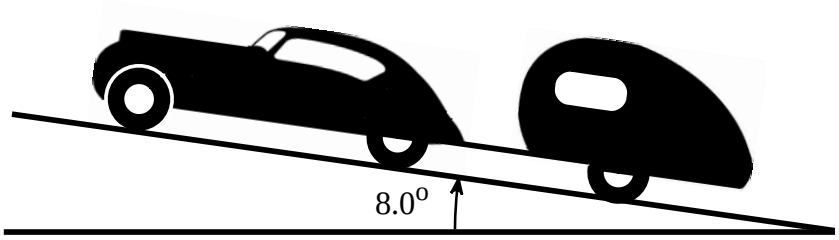


Figure 9b

Figure 9b shows the car and caravan sometime later as they were travelling at a constant speed of 90 km h^{-1} up a hill. (You may assume the same resistive forces of 1800 N and 1200 N are acting on the car and caravan respectively.)

d. Calculate the driving force exerted by the car at this speed. 3 marks

N

SECTION B – continued

Question 10 (6 marks)

Figure 10 shows Lou Zeland the human cannonball being fired out of a cannon at a carnival. A safety net is placed a distance **R** from the cannon and its net is at the same height above the ground as the end of the cannon's barrel. Unless otherwise stated you may ignore the effects of air resistance.

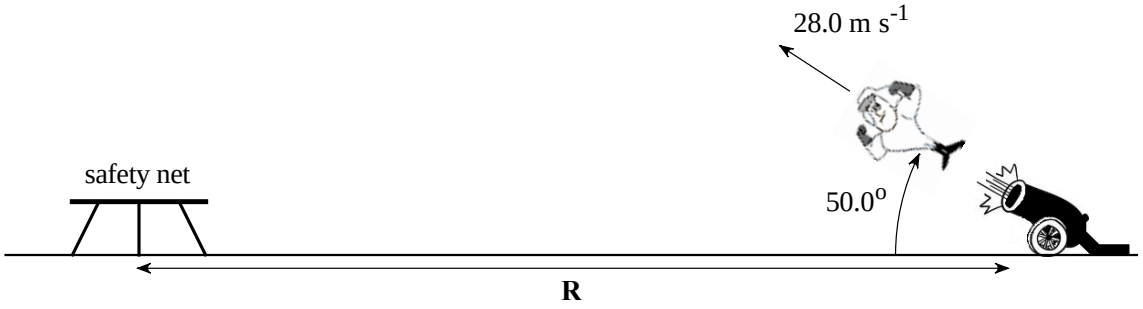


Figure 10

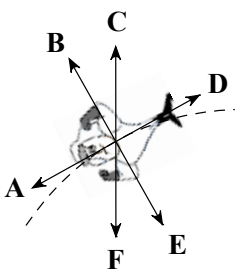
a. From the information provided determine the time it took Lou to reach the safety net after being fired from the cannon. 3 marks

s

b. From the information provided determine the distance **R** from the cannon to the centre of the safety net. 2 marks

m

c. If air resistance cannot be ignored, which one of the arrows **(A – F)** in the accompanying diagram best represents the resultant force acting on Lou at a point on the downward part of his flight? 1 mark



SECTION B – continued
TURN OVER

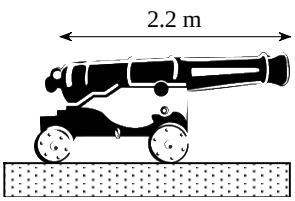
Question 11 (5 marks)

The infamous pirate Blackbeard sailed in a ship called the 'Queen Anne's Revenge'.

The cannons on the Queen Anne's Revenge were 2.2 m long, had a mass of 720 kg and fired cannon balls of mass 3.6 kg.

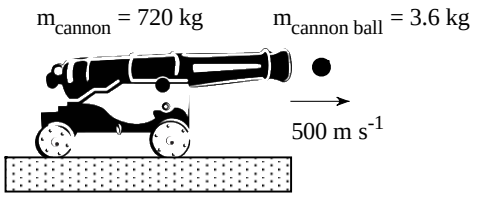
When fired, the cannon ball left the cannon with an initial speed of 500 m s^{-1}.

The cannon was stationary at the instant that it was fired.



Before firing

Figure 11a



Just after firing

Figure 11b

a. For the situation shown in Figures 11a and 11b, determine the magnitude and direction of the canon's velocity just after the cannon ball leaves the barrel of the cannon. 3 marks

m s^{-1}	Direction:

b. What is the magnitude of the average force with which the cannon ball pushes against the cannon if it is inside the barrel of the cannon for 8.8 ms? 2 marks

N

SECTION B – continued

Question 12 (4 marks)

Figures 12a and 12b show a cyclist as he rides around a circular corner of radius 25.0 m on a banked track. He is riding at a constant speed such that there are no sideways forces between the track and the wheels of his bicycle.

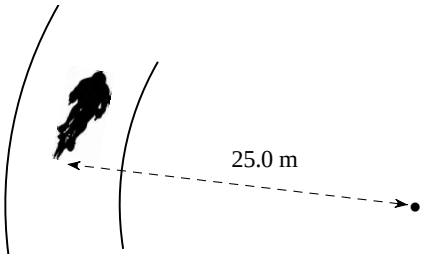


Figure 12a

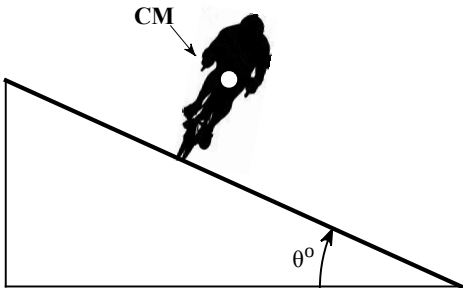


Figure 12b

a. On Figure 12b draw and label arrows from the cyclist's centre of mass, **CM**, to represent the external forces acting on him and his bike that cause his circular motion. 2 marks

b. Determine the angle of elevation (θ^o) of the banked track if the cyclist is travelling at a constant speed of 14.5 m s^{-1}. Show the steps of your working. 2 marks

o

SECTION B – continued
TURN OVER

Question 13 (4 marks)

Figure 13 shows a motorcycle and its rider with a combined mass of 250 kg being driven around a vertical circular track of radius 6.0 m.

Once the motorcyclist enters the loop at point **P** he closes the throttle so that there is no driving force being applied by the motorcycle's engine.

Ignore all resistive forces acting against the motorcycle's motion.

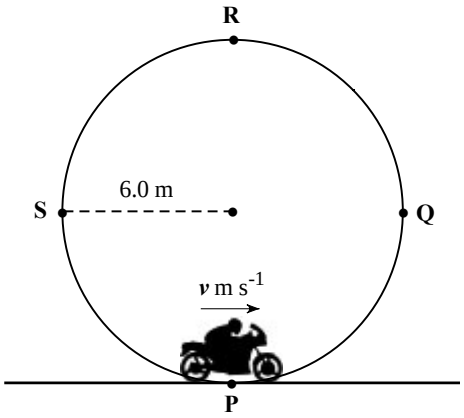


Figure 13

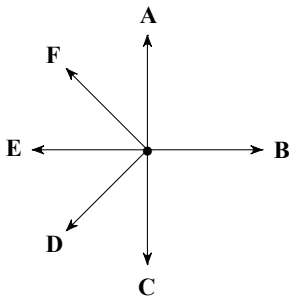
a. Determine the minimum speed that the motorcycle and its rider must have at point **P** if they are to safely make it all the way around the vertical circular track.

3 marks

m s^{-1}

b. Which of the directions, **A – F**, shown in the accompanying diagram best shows the direction of the net force acting on the motorcycle and its rider when it is at point **Q**?

1 mark



SECTION B – continued

Question 14 (5 marks)

In pinball machine the plunger is pulled to compress a spring. When it is released, the spring projects the steel ball, which has a mass of 80 g.

A diagram representing this is shown in Figure 14a.

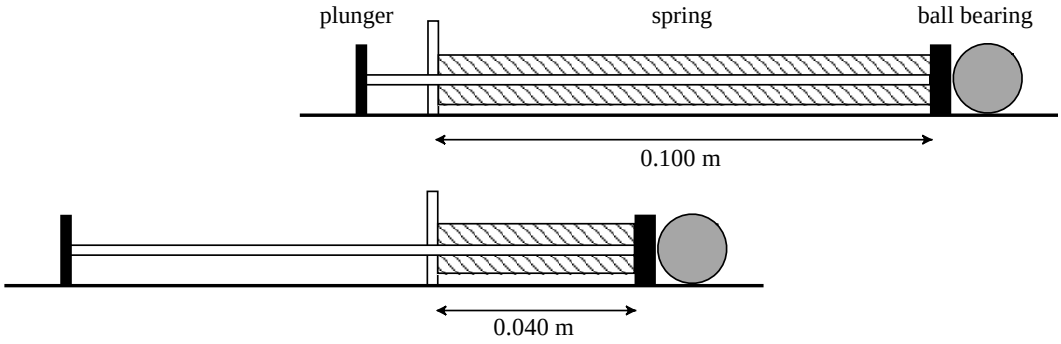


Figure 14a

The graph in Figure 14b shows a graph of compressive force **F** applied to the spring against the distance **d** that it's compressed.

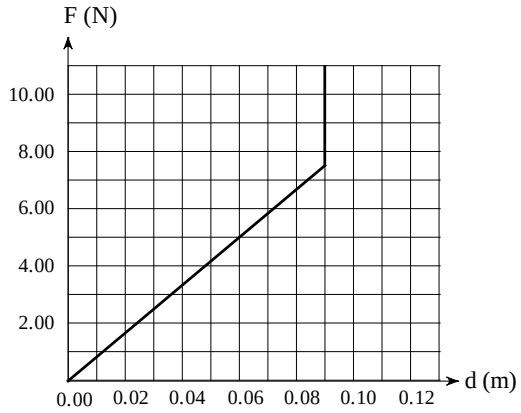


Figure 14b

a. How much work is done in compressing the spring as shown in Figure 14a?

2 marks

J

b. If only 70% of the energy stored in the spring when it is compressed as shown in Figure 7a is transferred to the steel ball, with what speed will the steel ball leave the plunger?

3 marks

m s^{-1}

SECTION B – continued
TURN OVER

Question 15 (6 marks)
A UFO is travelling at a speed of 0.65c relative to, and heading directly towards, a distant star.

a. Find the speed of light emitted from the star as measured by the occupant of the UFO.

2 marks

m s^{-1}

b. If the star were at a distance of 10.5 light years from the UFO how long would it take the UFO travelling at a speed of 0.65c to reach it as observed by the stationary observer?

2 marks

c. If the star were at a distance of 10.5 light years from the UFO how long would it take the UFO travelling at a speed of 0.65c to reach it as recorded by a clock on board the UFO?

2 marks

SECTION B – continued

Question 16 (9 marks)

In order to complete their Extended Practical Investigation a group of physics students plan to investigate the phenomena of refraction, Snell's Law and to find the refractive index of Perspex.

They set up their apparatus as shown in Figure 15

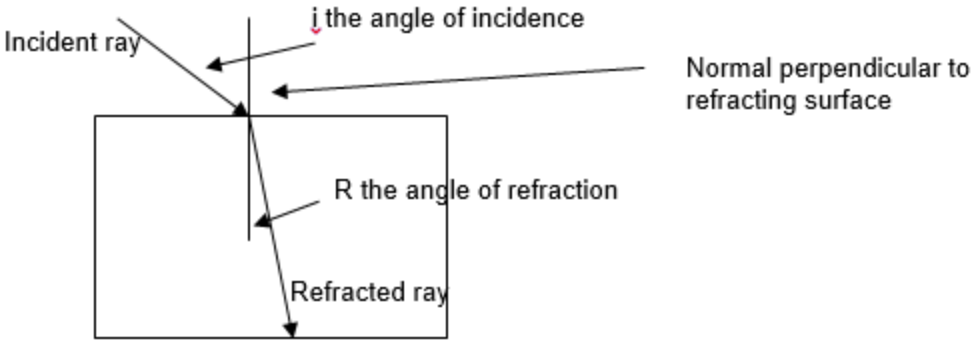


Figure 15

a. Construct a suitable aim to assist them in their experiment. 2 marks

Table 1 shows the results they have obtained.

θ_i	θ_r	$sin\ \theta_i$	$sin\ \theta_r$
5°	3°		
10°	6°		
15°	9°		
20°	12°		
25°	16°		
30°	19°		
35°	22°		

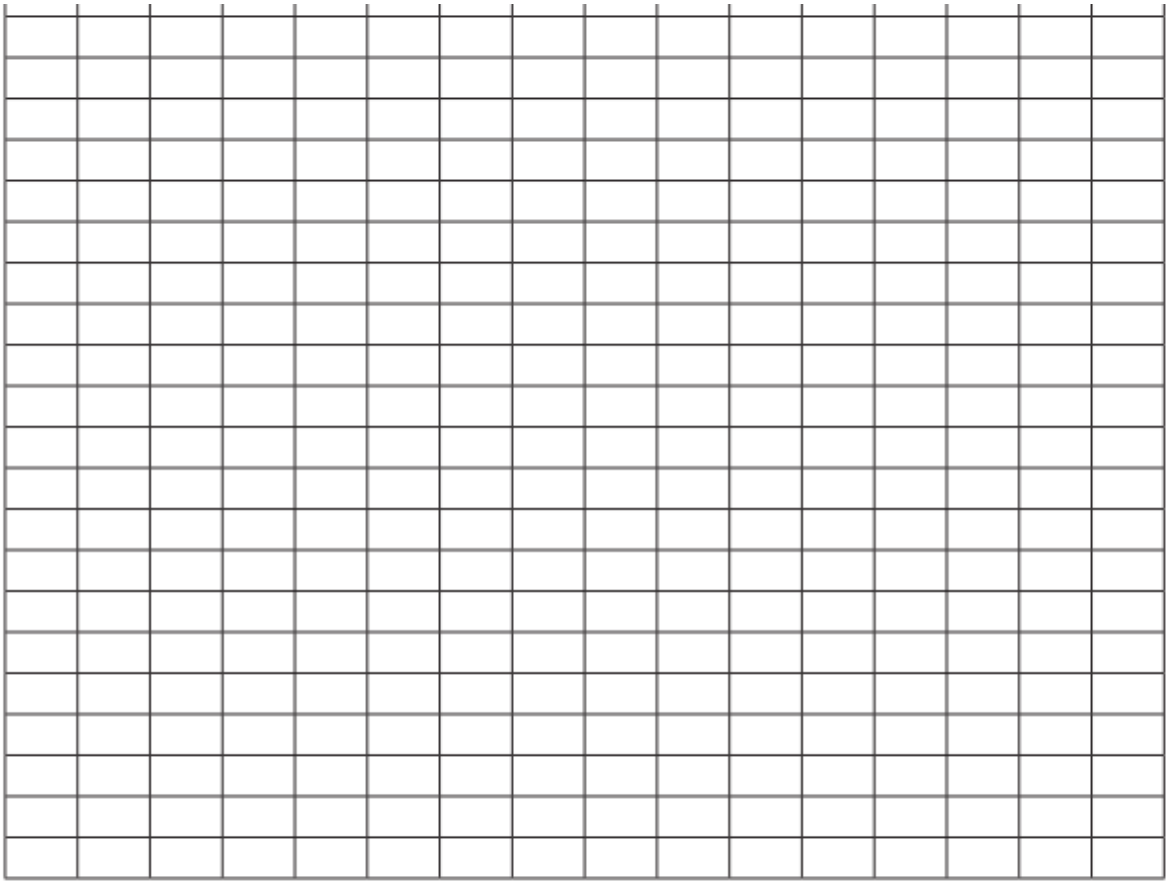
Table 1

b. Complete Table 1 above. 2 marks

SECTION B – Question 16 - continued
TURN OVER

c. Using the information plot a graph that will enable the refractive index of Perspex to be calculated and calculate the refractive index

3 marks



d. The theorectical value for the refractive index of Perpex is 1.48. Explain the discrepancy within the results in regards to systematic or random errors. 2 marks

SECTION B – continued

Question 17 (7 marks)

Figure 16 shows the energy level diagram for an unknown atom.

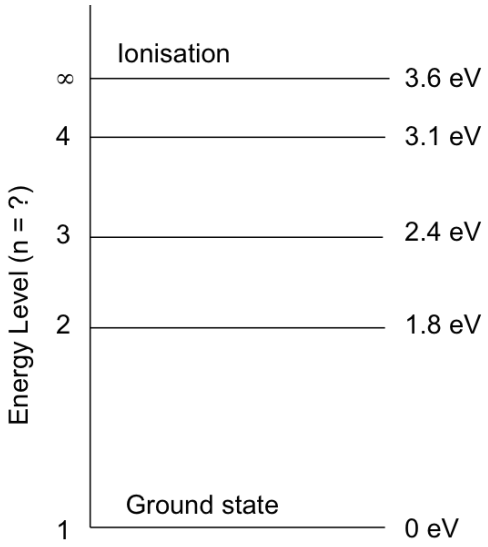


Figure 16

a. An atom starts in the energy level corresponding to n = 3.
Explain, with the aid of a calculation, why the emission spectrum for the atom will show a spectral line at 2070 nm.

2 marks

b. Using your understanding of the nature of electrons in the atom, sketch a standing wave approximation for the atom at n = 3.

2 marks

SECTION B – Question 17 - continued
TURN OVER

c. Explain how the wavelike nature of electrons in the atom supports the discrete energy level diagram shown in Figure 16.

3 marks

Question 18 (5 marks)

In an experiment designed to investigate the photoelectric effect a group of physics students allowed light of various frequencies to fall on a metal plate coated in lithium inside a photocell. Figure 17 below shows the electric circuit used by the students to collect their data.

The students used a monochromatic light source that emitted light with a wavelength of 470 nm.

The work function of the lithium has previously been established as 2.1 eV.

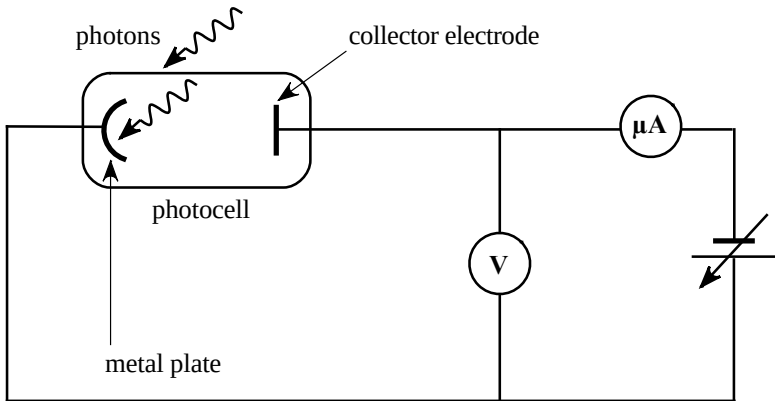


Figure 17

a. Calculate the expected stopping voltage for the photocell.

3 marks

V

SECTION B – Question 18 - continued

b. Determine the threshold frequency and explain its significance in terms the appropriate model for light that is indicated by the photoelectric effect.

2 marks

Hz

Question 19 (5 marks)

The basic apparatus and result of a replication of Young's double-slit experiment is shown in Figure 18a and 18b.

Point **C** is at the centre of the pattern and Point **Y** is in the middle of the third bright band from the centre of the pattern.

Take the speed of light to be 3.0 x10^{8} m s^{-1}.

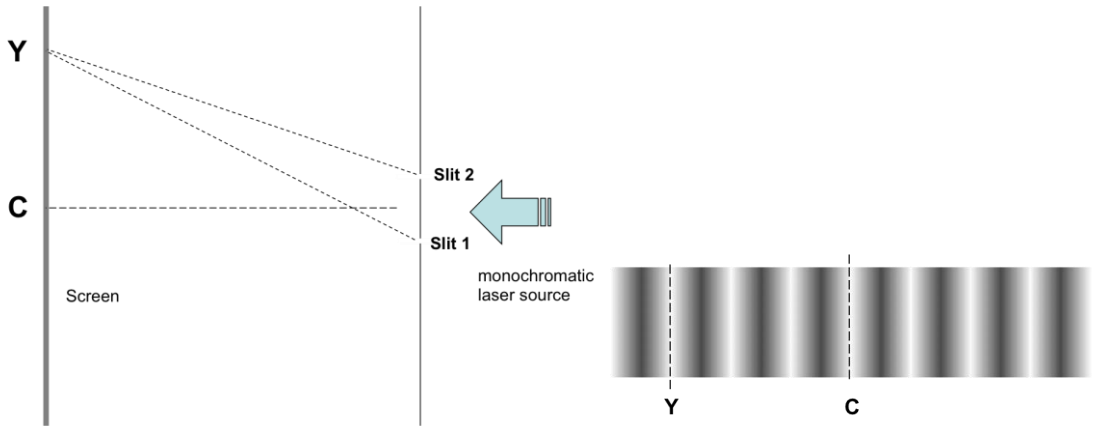


Figure 18a **Figure 18b**

a. Explain, referring specifically to path difference and the wave model for light, how a point well away from the centre of the pattern (at **Y**) can be a bright spot.

3 marks

SECTION B – Question 19 - continued
TURN OVER

b. If the path difference from the slits to **Y** is 1530 nm, determine the path difference to the first dark band adjacent to the centre.

2 marks

nm

END OF QUESTION AND ANSWER BOOK

Data Sheet

1	Velocity, acceleration	$v = \frac{\Delta x}{\Delta t}\ a = \frac{\Delta v}{\Delta t}$
2	Equations for constant acceleration	$v = u + at$ $x = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ $x = \frac{1}{2}(u + v)t$
3	Newton's second law	$F = ma$
4	Circular motion	$a = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2}$
5	Hooke's law	$F = -kx$
6	Elastic potential energy	$\frac{1}{2}kx^2$
7	Gravitational potential energy near the surface of the earth	mgh
8	Kinetic energy	$\frac{1}{2}mv^2$
9	Lorentz factor	$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$
10	Time dilation	$t = t_0\gamma$
11	Length contraction	$L = L_0 / \gamma$
12	Relativistic mass	$m = m_0\gamma$
13	Newton's law of universal gravitation	$F = \frac{GM_1M_2}{r^2}$
14	Gravitational field	$g = \frac{GM}{r^2}$
15	Transformer action	$\frac{V_1}{V_2} = \frac{N_1}{N_2}$
16	AC voltage and current	$V_{\text{RMS}} = \frac{1}{\sqrt{2}}V_{\text{peak}}$ $\quad$ $I_{\text{RMS}} = \frac{1}{\sqrt{2}}I_{\text{peak}}$
17	Voltage, power	$V = IR,\ P = VI$
18	magnetic force	$F = IlB$

19	electromagnetic induction	emf : $\varepsilon = -N\frac{\Delta\phi}{\Delta t}$ flux : $\phi = BA$
20	transmission losses	$V_{\text{drop}} = I_{\text{line}}R_{\text{line}}$ $P_{\text{loss}} = I_{\text{line}}^2 R_{\text{line}}$
21	Snell's Law	$n_1 \sin i = n_2 \sin r$
22	photoelectric effect	$E_{\text{k max}} = hf - W$
23	photon energy	$E = hf$
24	photon momentum	$p = \frac{h}{\lambda}$
25	de Broglie wavelength	$\lambda = \frac{h}{p}$
26	Planck's constant	$h = 6.63\times10^{-34}$ J s $h = 4.14\times10^{-15}$ eV s
27	Universal gravitational constant	G = 6.67 x 10^{-11} N m^2 kg^{-2}
28	Mass of Earth	$M_E = 5.98 \times 10^{24}$ kg
29	Radius of Earth	$R_E = 6.37 \times 10^6$ m
30	Mass of the electron	$m_e = 9.1 \times 10^{-31}$ kg
31	Charge on the electron	q = -1.6×10^{-19} C
32	Speed of light	c = 3.0×10^8 m s^{-1}
33	energy transformations for electrons in an electron gun (<100 keV)	$\frac{1}{2}mv^2 = eV$
34	radius of electron beam	$r = \frac{p}{qB}$
35	force applied to an electron beam	$F = qvB$
36	electric field between charged plates	$E = \frac{V}{d}$

Prefix/Units

p = pico = 10^{-12}

n = nano = 10^{-9}

μ = micro = 10^{-6}

m = milli = 10^{-3}

k = kilo = 10^{3}

M = mega = 10^{6}

G = giga = 10^{9}

t = tonne = 10^{3} kg

SECTION A MULTIPLE CHOICE ANSWER SHEET

Answers – Circle ONE of A-D for each of the 20 multiple choice questions.

Question	Answer			
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D