[C069/SQP119]

Intermediate 2 Physics

Time: 2 hours

NATIONAL QUALIFICATIONS

Specimen Question Paper

Read Carefully

1 All questions should be attempted.

Section A (questions 1 to 20)

2 Check that the answer sheet is for Intermediate 2 Physics (Section A).

3 Answer the questions numbered 1 to 20 on the answer sheet provided.

4 Fill in the details required on the answer sheet.

5 Rough working, if required, should be done only on this question paper, or on the first two pages of the answer book provided—**not** on the answer sheet.

6 For each of the questions 1 to 20 there is only **one** correct answer and each is worth 1 mark.

7 Instructions as to how to record your answers to questions 1–20 are given on page two.

Section B (questions 21 to 33)

8 Answer questions numbered 21 to 33 in the answer book provided.

9 Fill in the details on the front of the answer book.

10 Enter the question number clearly in the margin of the answer book beside each of your answers to questions 21 to 33.

11 Care should be taken **not** to give an unreasonable number of significant figures in the final answers to calculations.

SCOTTISH QUALIFICATIONS

SECTION A

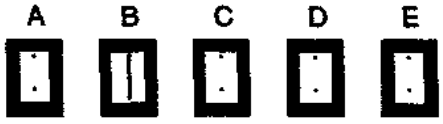
For questions 1 to 20 in this section of the paper, an answer is recorded on the answer sheet by indicating the choice A, B, C, D or E by a stroke made in ink in the appropriate box of the answer sheet – see the example below.

EXAMPLE

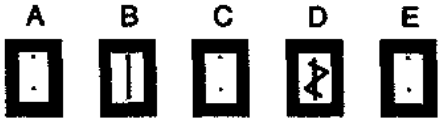
The energy unit measured by the electricity meter in your home is the

A ampere
B kilowatt-hour
C watt
D coulomb
E volt.

The correct answer to the question is B – kilowatt-hour. Record your answer by drawing a heavy vertical line joining the two dots in the appropriate box on your answer sheet in the coloumn of boxes headed B. The entry on your answer sheet would now look like this:



If after you have recorded your answer you decide that you have made an error and wish to make a change, you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus, if you want to change an answer D to an answer B, your answer sheet would look like this:



If you want to change back to an answer which has already been scored out, you should enter a (✓) to the RIGHT of the box of your choice, thus:

SECTION A

Answer questions 1–20 on the answer sheet

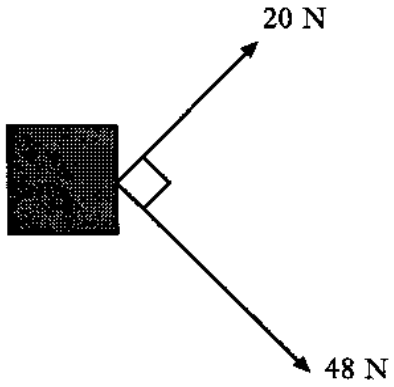
1. Which list contains only vector quantities?

   A Mass, speed, displacement
   B Distance, time, force
   C Speed, velocity, displacement
   D Displacement, velocity, force
   E Mass, distance, time

2. A vehicle, mass 800 kg, moving with velocity 20 m/s hits another car, mass 1200 kg, which is at rest on an icy road. The cars lock together. Their common velocity immediately after the collision is

   A 8 m/s
   B 10 m/s
   C 12 m/s
   D 20 m/s
   E 30 m/s.

3. The diagram shows two forces acting at right angles to each other on the same object.



   The size of the resultant of the two forces is

   A 20 N
   B 28 N
   C 48 N
   D 52 N
   E 68 N.

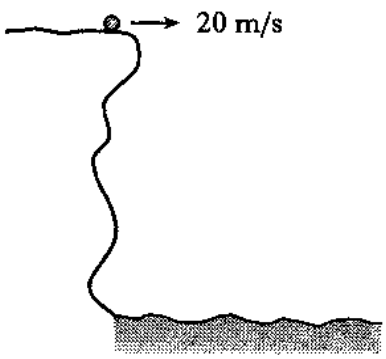
4. A stone of mass 3 kg is dropped from a height of 4 m.
   Neglecting air friction, the kinetic energy of the stone immediately before it hits the ground is

   A 12 J
   B 18 J
   C 24 J
   D 120 J
   E 240 J.

5. The gravitational field strength on Earth is 10 N/kg.
   The gravitational field strength on Mars is 4 N/kg.
   A space probe has a mass of 100 kg on Earth.
   On Mars, compared to the values on Earth, the space probe's

   A mass and weight will have decreased
   B mass will have decreased, but its weight will be the same
   C mass will have decreased, but its weight will have increased
   D mass will be the same, but its weight will have increased
   E mass will be the same, but its weight will have decreased.

6. A ball is projected horizontally from the edge of a cliff at 20 m/s.
Neglecting air friction, its horizontal speed 2 seconds after leaving the cliff will be



A 2 m/s
B 10 m/s
C 20 m/s
D 30 m/s
E 40 m/s.

7. The specific latent heat of vaporisation of a substance is $1{\cdot}6 \times 10^6$ J/kg.
The specific latent heat of fusion of the same substance is $2{\cdot}0 \times 10^5$ J/kg.

How much heat is required to melt 4 kg of the substance at constant temperature at its melting point?

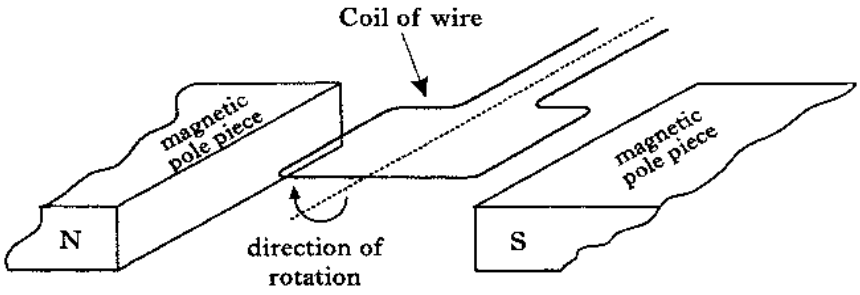
A No heat because the temperature is constant
B $5{\cdot}0 \times 10^4$ J
C $4{\cdot}0 \times 10^5$ J
D $8{\cdot}0 \times 10^5$ J
E $6{\cdot}4 \times 10^6$ J

8. During an experiment an electrical circuit is switched on for 5 minutes. The current in the circuit is 5 amperes.

What quantity of charge is transferred in the experiment?

A 1 C
B 10 C
C 25 C
D 300 C
E 1500 C

9. A voltage is induced across the ends of a coil of wire by rotating the coil in a magnetic field as shown in the diagram.

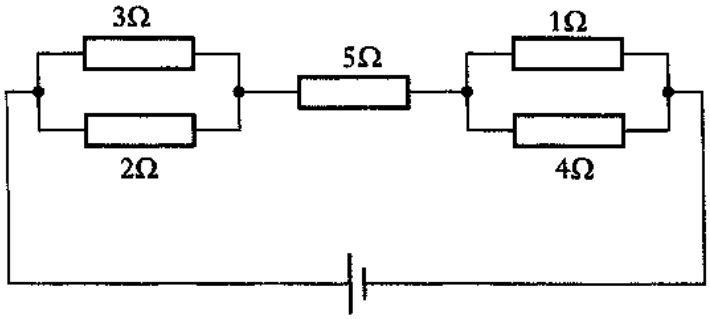


Which of the following would change the size of the induced voltage?

I Changing the number of turns of wire on the coil
II Changing the speed at which the coil is rotated
III Changing the strength of the magnetic field

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

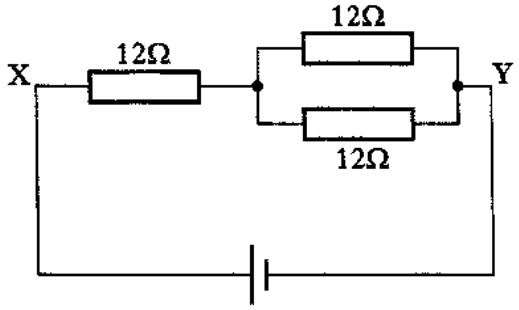
10. The circuit diagram shows a network of resistors connected to a battery.



Which resistor in the circuit carries the smallest current?

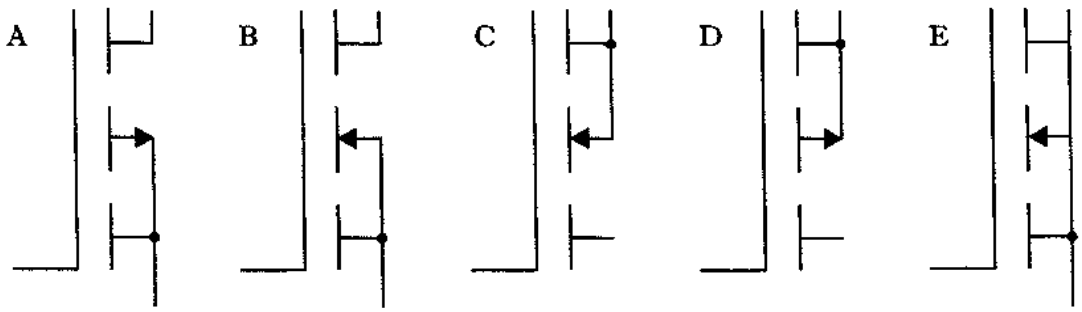
A 1Ω
B 2Ω
C 3Ω
D 4Ω
E 5Ω

11. What is the resistance between X and Y in the circuit shown?



A 4Ω
B 6Ω
C 12Ω
D 18Ω
E 36Ω

12. Which of the following is the correct circuit symbol for an n-channel enhancement MOSFET?



13. A student made the following statements about the mains electrical supply.

I The frequency of the mains supply is 230 Hz.
II The peak value of the voltage of an a.c. supply is greater than the quoted value of the supply.
III A d.c. supply will produce more power in a given resistor than an a.c. supply of the same quoted value.

Which of these statements is/are true?

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

14. An electrical appliance has an efficiency of 40%.
The appliance has an output power of 800 W. The input power must be

A $\frac{800 \times 40}{100}$ W

B $\frac{800}{100 \times 40}$ W

C $\frac{800 \times 100}{40}$ W

D $\frac{800}{40}$ W

E 40×800 W.

15. Four members of the electromagnetic spectrum are

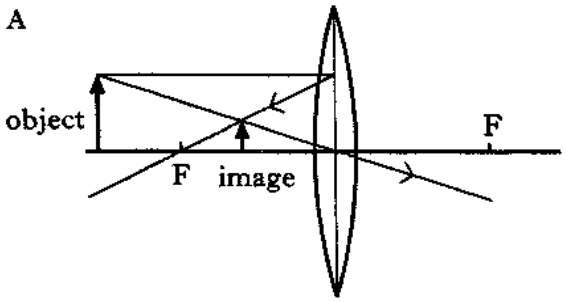
infrared, ultraviolet, microwaves and X-rays.

Which of the following gives these four in order of increasing wavelength?

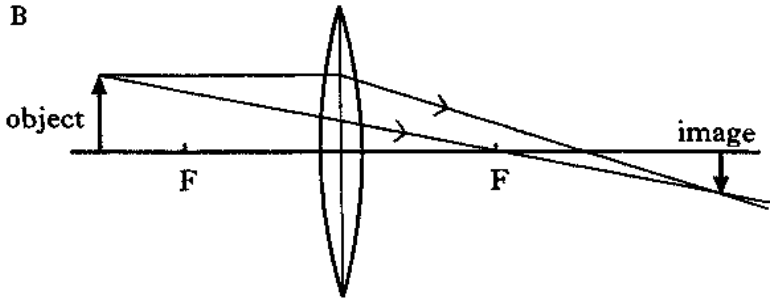
A Microwaves, infrared, ultraviolet, X-rays
B X-rays, ultraviolet, infrared, microwaves
C Ultraviolet, infrared, microwaves, X-rays
D Infrared, ultraviolet, X-rays, microwaves
E X-rays, microwaves, ultraviolet, infrared

16. An object is placed in front of a converging lens.
The diagrams all show two rays of light from the object, and the image produced.
In which diagram are the rays drawn correctly?

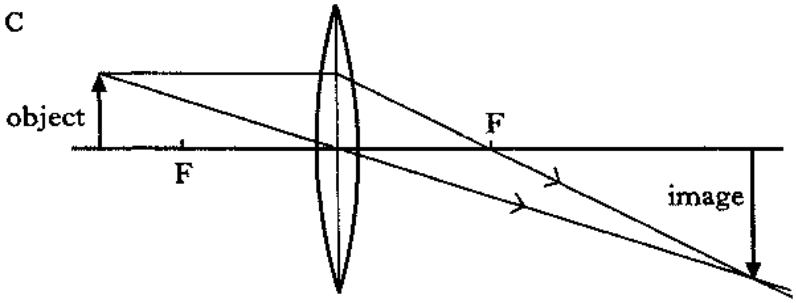
A



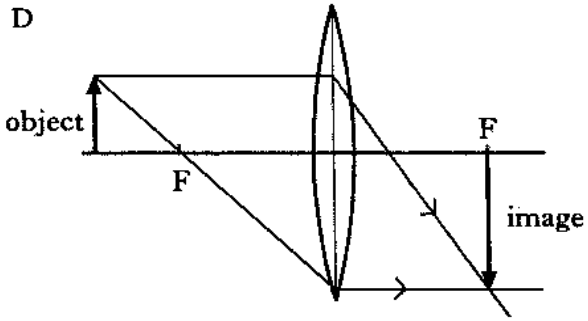
B



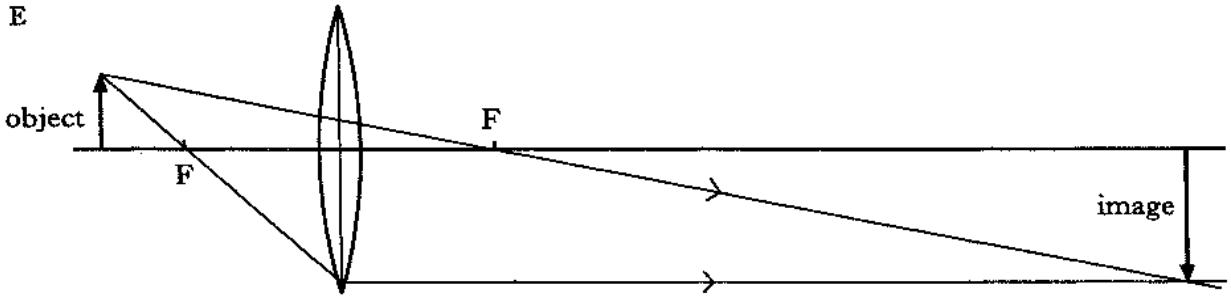
C



D



E

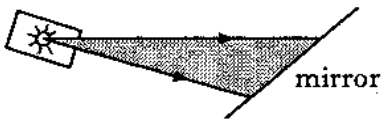


17. A ship is fitted with echo-sounding equipment.
A pulse of sound is sent downwards from the ship at a speed of 1500 m/s.
The seabed is 600 m below the ship.

How long will it take the pulse of sound to return to the ship?

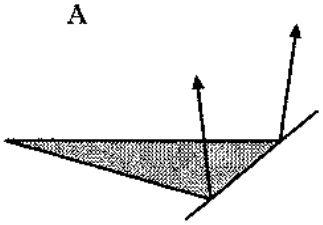
A 0·4 s
B 0·8 s
C 1·25 s
D 1·5 s
E 2·5 s

18. A beam of light from a ray box spreads out as shown in the diagram and strikes a plane mirror.

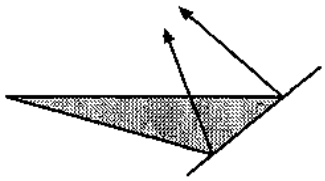


How will the rays at the edges of this beam be reflected?

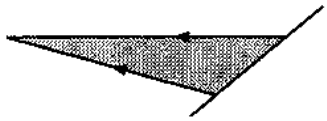
A



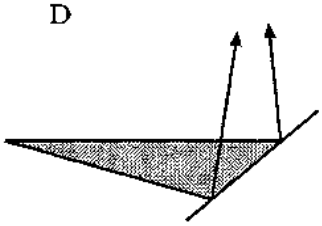
B



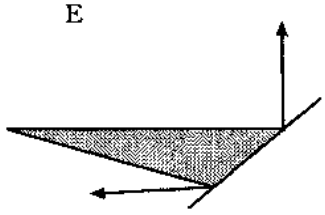
C



D



E



19. Which entry in the table gives the correct description of the nature of alpha, beta and gamma radiation?

	Alpha	*Beta*	*Gamma*
A	electromagnetic wave	helium nucleus	electron
B	helium nucleus	electron	electromagnetic wave
C	helium nucleus	electromagnetic wave	electron
D	electron	electromagnetic wave	helium nucleus
E	electron	helium nucleus	electromagnetic wave

20. A student made the following statements about nuclear radiation.

I The activity of a radioactive source is measured in sieverts.
II Gamma radiation produces greater ionisation than alpha or beta radiation.
III The risk of biological harm from exposure to radiation depends on the type of body tissue exposed.

Which of these statements is/are true?

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

Marks

SECTION B

Write your answers to questions 21–33 in the answer book

21. An experiment is set up to investigate the motion of a trolley rolling down a slope. The trolley accelerates uniformly down the slope and passes through two light gates connected to two timers as shown in figure 1.

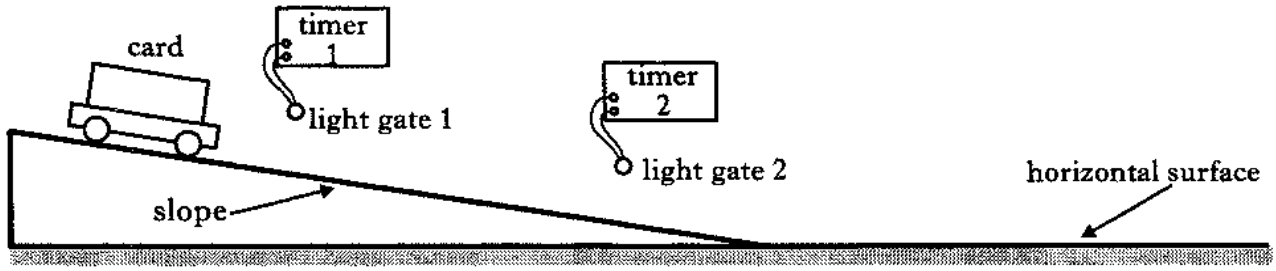


figure 1

(*a*) Describe how the speed of the trolley at each light gate could be calculated. You should list all the measurements required. **2**

(*b*) What additional information would be required to calculate the acceleration of the trolley down the slope? **1**

(*c*) The trolley moves from the slope on to a horizontal surface where it decelerates uniformly to rest. The speed-time graph of the motion of the trolley from when it passes through light gate 1 until it comes to rest is shown in figure 2.

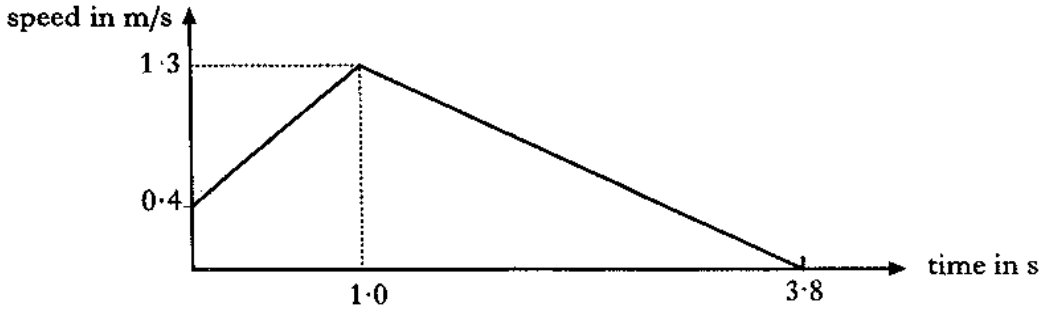


figure 2

(i) Calculate the acceleration of the trolley on the slope.

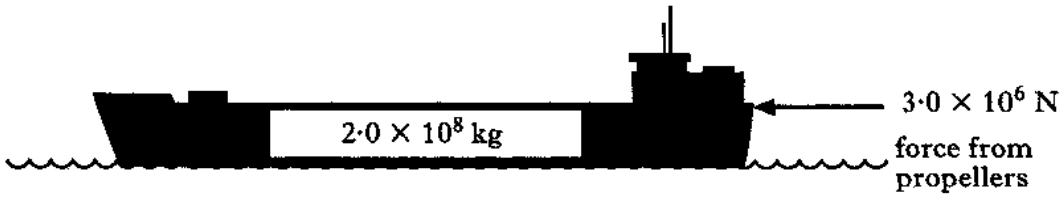
(ii) The unbalanced force acting down the slope on the trolley is 0·72 N. Calculate the mass of the trolley.

(iii) Calculate the distance travelled by the trolley along the horizontal surface. **6**

(9)

Marks

22. A fully loaded oil tanker has a mass of $2{\cdot}0 \times 10^8$ kg.



The tanker is travelling at a steady speed of 8·0 m/s. The force from the propellers acting on the tanker is $3{\cdot}0 \times 10^6$ N.

(*a*) Calculate the kinetic energy of the tanker. **2**

(*b*) What is the size of the force of friction acting on the tanker? **1**

(*c*) The engines are now stopped. The force of friction acting on the tanker remains constant.

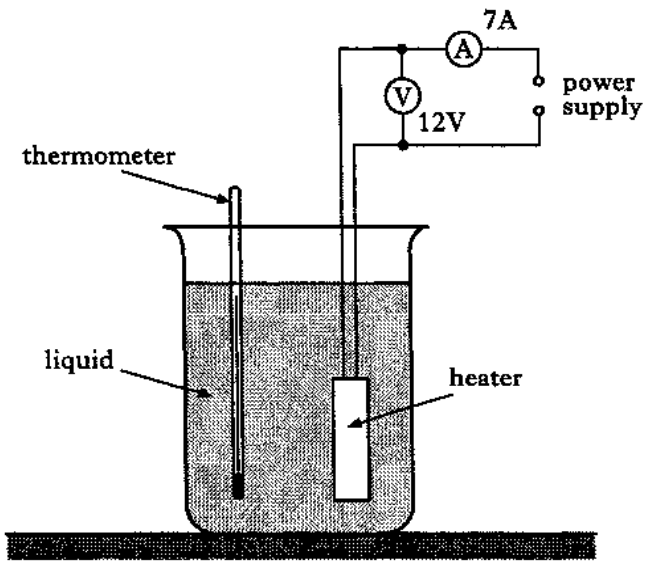
(i) Calculate the deceleration of the tanker as it comes to rest.

(ii) Calculate the distance travelled by the tanker during this time. **5**

(8)

Marks

23. A beaker containing 200 g of a liquid is heated using an immersion heater as shown in the diagram. In 5 minutes the temperature of the liquid is raised from 25 °C to 60 °C.



(*a*) (i) Show by calculation that the heat energy transferred by the heater in 5 minutes is 25 200 J.

(ii) Calculate the specific heat capacity of the liquid. **5**

(*b*) Due to heat loss, the value calculated in part (*a*)(ii) for the specific heat capacity is not the same as the value obtained from data tables. State whether the calculated value is higher or lower than the correct value obtained from data tables. Give a reason for your answer. **2**

(*c*) How could the experiment be improved to obtain a value for the specific heat capacity that is nearer to the value in the data tables? **1**

(8)

Marks

24. A tail and brake lamp on a car has two filaments in the same glass bulb as shown in figure 1. One filament has a resistance of 6Ω and the other a resistance of 24Ω. The filaments are connected in parallel. Figure 2 shows the circuit containing the two filaments.

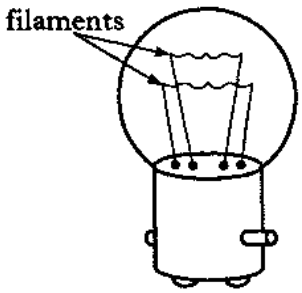


figure 1

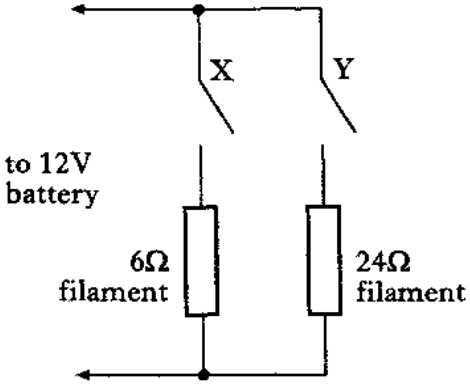


figure 2

(*a*) (i) What is the combined resistance of the two filaments when switches X and Y are closed?

(ii) What current is drawn from the battery when both switches are closed? **4**

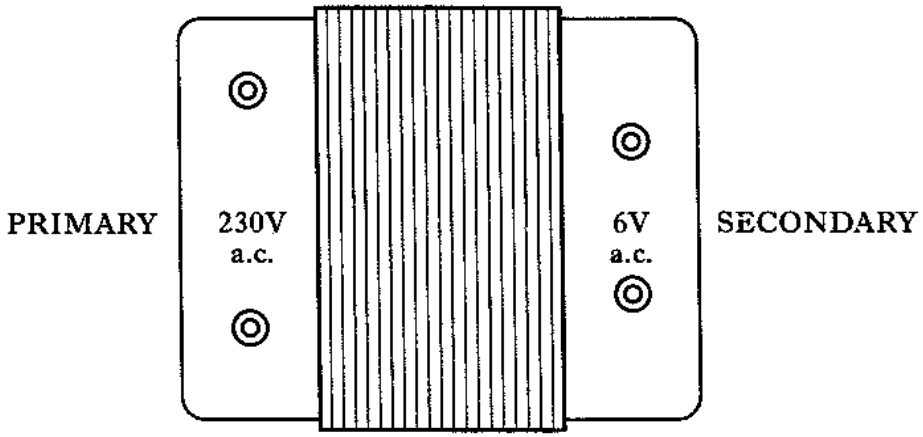
(*b*) Why is it an advantage to connect the two filaments in parallel rather than in series? **1**

(*c*) The brake light has a higher power than the tail light.
State which of the two filaments, 6Ω or 24Ω, acts as the brake light. Give a reason for your answer. **2**

(7)

Marks

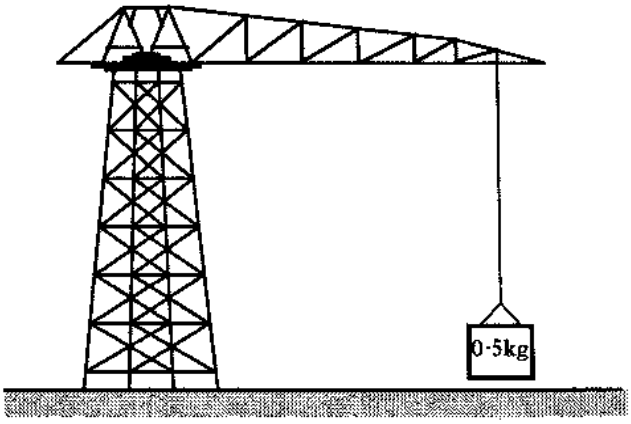
25. The secondary coil of a transformer is used to supply a 6 V a.c. voltage to operate a toy crane. The transformer is shown below.



(*a*) The primary coil of the transformer has 1000 turns.
How many turns will there be in the secondary coil to provide a voltage of 6 V?
(Give your answer to the nearest whole number.) **2**

(*b*) When the toy is operating, the current drawn from the secondary of the transformer is 0·5 A.
What is the output power of the transformer? **2**

(*c*)



The toy crane is used to lift a mass of 0·5 kg at a steady speed.
Calculate the height through which the crane will raise the mass in 2 seconds. **3**

(7)

Marks

26. (*a*) A 30 kΩ resistor is connected in series with a thermistor, an ammeter and a 5 V supply as shown in figure 1.

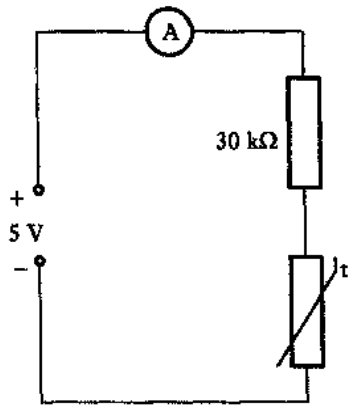


figure 1

When the thermistor is at a particular temperature, the voltage across the resistor is 3 V and the ammeter reading is 0·1 mA.

(i) Calculate the resistance of the thermistor. **3**

(ii) A graph showing how the resistance of the thermistor varies with its temperature is given in figure 2.

Use the graph to estimate the temperature of the thermistor.

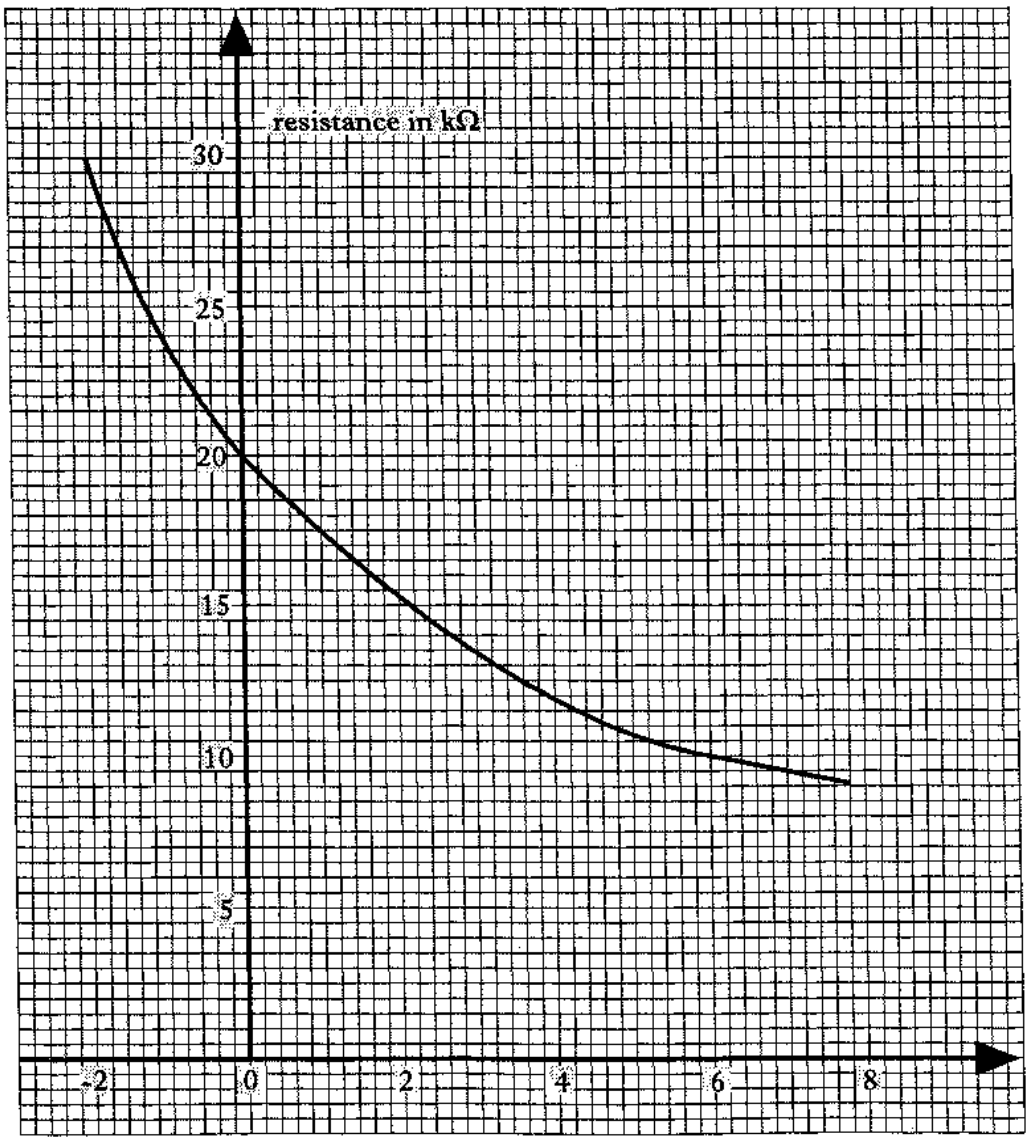


figure 2

1

Marks

26. (continued)

(*b*) Some cars are fitted with a warning device in which an LED lights to warn the driver when there is a risk of ice on the road.
A student attempts to construct such a circuit which includes the thermistor used in part (*a*) above. The student's circuit diagram is shown in figure 3.

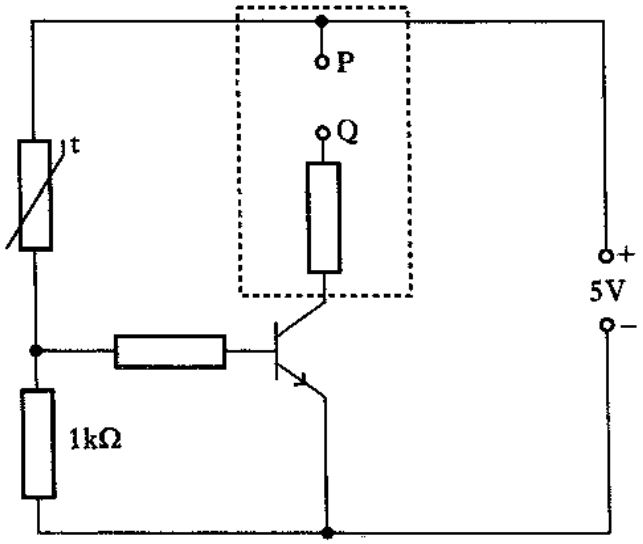


figure 3

(i) Copy the part of the circuit diagram shown within the dotted lines.
Complete it, showing an LED connected correctly between P and Q.

(ii) Unfortunately the student's circuit will **not** operate correctly.
The LED will not light when there is danger of ice.
Explain why this is so. **3**

(7)

27. The amplifier of a CD player is being tested. A signal generator is used to supply a signal of frequency 1·0 kHz to the amplifier. The input voltage is measured as 0·4 mV.

(*a*) What is the frequency of the output signal from the amplifier? **1**

(*b*) The loudspeaker at the output has a resistance of 8 Ω and the current in the output is 2 mA.
Calculate the voltage gain of the amplifier. **3**

(4)

Marks

28. In the swimming pool of a new leisure centre there is a "wave machine". This machine makes waves in the water at one end of the pool. The waves travel in the pool as shown in figure 1.

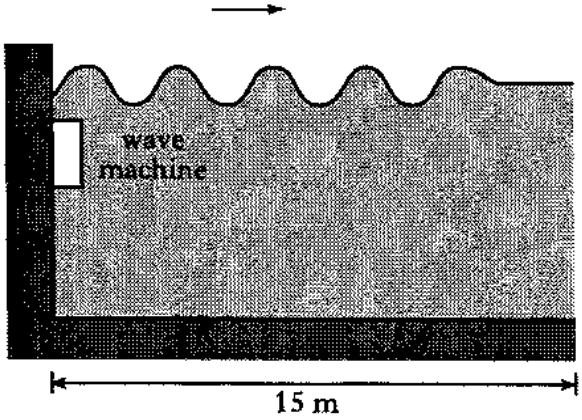


figure 1

(*a*) Figure 2 shows part of the waves.
Which of the labelled lines represent the

(i) wavelength

(ii) amplitude?

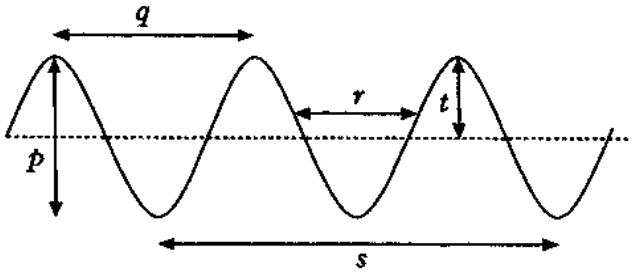


figure 2

2

(*b*) The machine makes waves of frequency 0·25 Hz. The waves take 12 s to travel 15 m along the pool.
Calculate the wavelength of the waves.

3

(5)

Marks

29. (*a*) A ray of light enters a semi-circular glass block at point A and leaves at point B, as shown in figure 1.

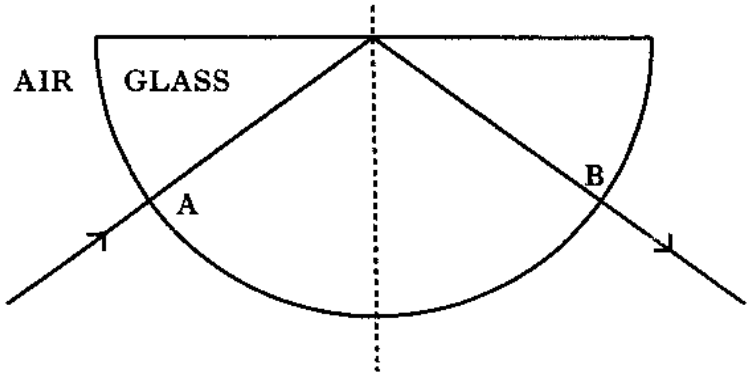


figure 1

What is the name given to this effect? **1**

(*b*) Binoculars contain prisms. Figure 2 shows a ray of light striking the face RS of a 90° glass prism. The critical angle for the glass of this prism is 42°.

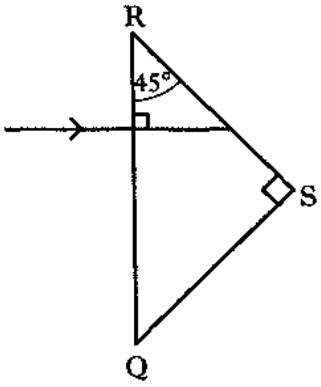


figure 2

Copy the diagram and complete it to show the path of the ray after it strikes the face RS. **2**

(3)

Marks

30. (*a*) Figure 1 shows rays of light from a distant object entering the eye of a person who is long sighted. Figure 2 shows rays of light from a near object entering the eye of the same person.

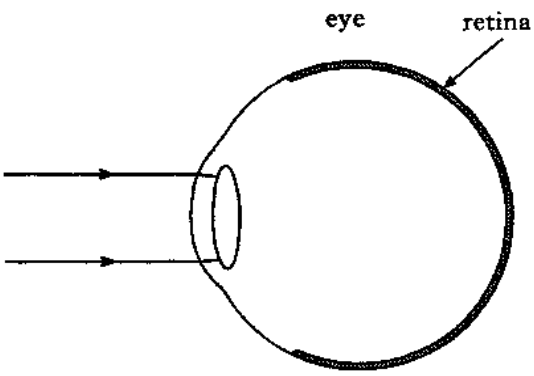


figure 1

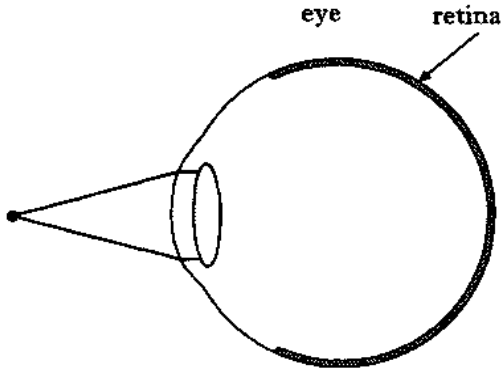


figure 2

Copy the diagrams and complete them to show the paths of the rays beyond the lens. **2**

(*b*) The person decides to go to an optician to buy spectacles.
What kind of lens is needed for the spectacles? **1**

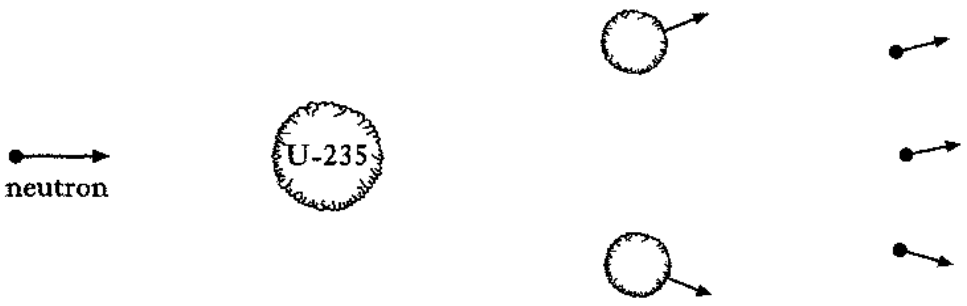
(*c*) The optician knows that the person needs lenses with a focal length of 50 cm. The tray of lenses is marked with the powers of the lenses.
Part of it is shown below.

Lens	*Power*
W	50 D
X	2 D
Y	0·5 D
Z	0·02 D

By calculation, show which lens should be selected by the optician. **3**

(6)

31. The diagram below shows a process involving uranium-235 which takes place in the core of a nuclear reactor.



(*a*) What is the name given to this process? **1**

(*b*) Describe the above process, and how it leads to a chain reaction. **3**

(4)

Marks

32. A hospital uses samples of radioactive technetium in the diagnosis of tumours. A sample of technetium is injected into the patient. The radioactive material moves to the affected part of the body. The gamma rays emitted by the technetium are detected by a camera outside the patient's body.

The label on a sample of technetium which is delivered to a hospital is shown below.

TECHNETIUM	
Date of delivery:	10.8.98
Time of delivery:	1.00 p.m.
Half-life:	6 hours
Activity on delivery:	600 MBq
Type of radiation:	gamma

(*a*) (i) What is meant by the term "half-life"?

(ii) Why is a source of gamma radiation used for this purpose? **2**

(*b*) The table below shows the minimum activity of the technetium samples which are used to investigate various parts of the body.

Part of the body to be investigated	*Minimum activity of solution*/MBq
brain	800
lungs	80
liver	200
thyroid	40

(i) Which part or parts of the body could be investigated using the sample at the time of delivery of the technetium? (1.00 p.m. on 10.8.98)

(ii) Show by calculation which part or parts of the body, if any, could be investigated at 1.00 p.m. on 11.8.98. **4**

(6)

Marks

33. A technician in the nuclear industry is allowed a maximum dose equivalent of 50 mSv above background in any one year.

(*a*) Give two sources of background radiation. **2**

(*b*) Readings on monitors show that a particular area near the technician will provide an absorbed dose in 1 hour of 1 mGy of gamma radiation and 200 μGy of slow neutrons. Calculate the total dose equivalent received by the technician in a time of one hour.

Radiation	*Quality Factor*
γ-rays	1
α-particles	20
slow neutrons	3
β-particles	1

3

(*c*) What is the greatest number of hours that a technician could work in this area and not exceed the maximum dose equivalent of 50 mSv? **1**

(6)

[*END OF QUESTION PAPER*]

FOR OFFICIAL USE

Total

Intermediate 2
Physics
Section A
Specimen Question Paper

NATIONAL QUALIFICATIONS

ANSWER SHEET

Full name of school or college

Town

First name and initials

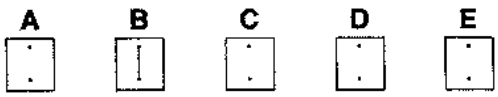
Surname

Date of birth
Day Month Year

Candidate number

Number of seat

Using ink, indicate your choice of answer by a single stroke **joining the two dots** in the box, as in the following example:



	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

	A	B	C	D	E
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

[C069/SQP119]

Intermediate 2 Physics

NATIONAL QUALIFICATIONS

Specimen Marking Instructions

SCOTTISH QUALIFICATIONS AUTHORITY

Intermediate 2
Physics

Mark Scheme

General advice to markers

The general comments given below should be considered at all times during the marking process.

1 Where a question requires a numerical response, the part marks shown in the marking scheme are for use in marking partially correct answers.

2 Unless a question requires evidence of working to be shown explicitly, full marks should be awarded for a correct answer on its own.

3 Where 1 mark is shown for the final answer to a numerical problem a half mark should be deducted for an incorrect or missing unit unless otherwise stated in the marking scheme.

4 Deduct half a mark if an answer is wrong because of an arithmetical slip.

5 No further marks should be awarded for a part-question after the application of a wrong physics principle unless specifically allowed for in the marking scheme.

6 Where a relationship is written down by the candidate in a "triangle" format and then not used or used incorrectly, the mark which is allocated by the scheme to recalling the relationship should not be awarded.

7 Full marks should be given where the response required by the question is conveyed correctly by a diagram.

8 Where a wrong numerical answer (already penalised) is carried forward to another part of the question, no further penalty is incurred provided that it is used correctly.

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

1 mark for each

21. (a) measurements required: length of card {½}
time on timer 1 {½}
time on timer 2 {½}

calculation of speed from: speed = $\frac{\text{length of card}}{\text{time on timer}}$ {½} 2

(b) time of travel from light gate 1 to light gate 2 {1} 1

(c) (i) $a = \frac{v-u}{t}$ {½} $= \frac{1.3-0.4}{1}$ {½} $= 0.9\,m/s^2$ {1} 2

(ii) $m = \frac{F}{a}$ {½} $= \frac{0.72}{0.9}$ {½} $= 0.8kg$ {1} 2

(iii) distance = area under graph {½}
$= ½(3.8 - 1.0) \times 1.3$ {½} $= 1.82\,m$ {1} 2

22. (a) $E_k = ½\,mv^2$ {½} $= ½ \times 2 \times 10^8 \times 64$ {½} $= 6.4 \times 10^9\,J$ {1} 2

(b) $3 \times 10^6\,N$ {1} 1

(c) (i) $a = \frac{F}{m}$ {½} $= \frac{3 \times 10^6}{2 \times 10^8}$ {½} $= 0.015 m/s^2$ {1} 2

(ii) work done = E_k {½}
work done = $F \times d$ {½}
$d = \frac{6.4 \times 10^9}{3 \times 10^6}$ {½} {½}
$d = 2.1 \times 10^3\,m$ {1} 3

23. (a) (i) $P = I\,V$ {½} $= 7 \times 12$ {½} $= 84$ {½}

$E = Pt$ {½} $= 84 \times 5 \times 60$ {½} $= 25\,200$ J {½} 3

or

$E = ItV$ {1} $= 7 \times 5 \times 60 \times 12$ {1} $= 25\,200$ J {1}

(ii) $c = \frac{E_H}{m\Delta T}$ {½} $= \frac{25\,200}{0.2 \times 35}$ {½} $= 3\,600$ J/kg°C {1} 2

(b) value obtained by experiment is higher than value in tables {1}
value of E_H used is greater than the value needed to bring about the recorded temperature rise {1} 2

(c) insulate the beaker **or** put a lid on the beaker {1} 1

24. (a) (i) $\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2}$ {½} $= \frac{1}{6} + \frac{1}{24}$ {½}

$R_t = 4.8\,\Omega$ {1} 2

(ii) $I = \frac{V}{R}$ {½} $= \frac{12}{4.8}$ {½} $= 2.5$A {1} 2

(b) if one filament breaks, the other will still work
or if they were in series and one filament broke, then neither would work {1} 1

(c) 6 Ω acts as brake light {1}
draws greater current {1} 2

25. (a) $Ns = \frac{Np \times Vs}{Vp}$ {½} $= \frac{1000 \times 6}{230}$ {½} $= 26$ {½} 2

(b) $P = I\,V$ {½} $= 0.5 \times 6$ {½} $= 3$ W {1} 2

(c) $Ep = m\,g\,h$ {½} $\quad m\,g\,h = Pt$ {½}

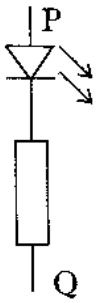
$h = \frac{3 \times 2}{0.5 \times 10}$ {½} {½} $= 1.2$m {1} 3

26. (a) (i) voltage across thermistor = 2 V {1}

$$R = \frac{V}{I}\ \{½\} = \frac{2}{0.0001}\ \{½\} = 20\,k\Omega\ \{1\}$$ 3

(ii) 0 °C {1} 1

(b) (i)



{1} or {0} 1

(ii) at 0 °C {½} the resistance of the thermistor is 20 kΩ {½}

the voltage across the 1 kΩ resistor will be less than 0.7 V **or** insufficient {½} transistor will be off {½} 2

27. (a) frequency = 1 kHz {1} 1

(b) $V = I\,R\ \{½\} = 2 \times 8\ \{½\} = 16\,mV\ \{½\}$

$$\text{voltage gain} = \frac{V_{out}}{V_{in}}\ \{½\} = \frac{16}{0.4}\ \{½\} = 40\ \{½\}$$

3

(deduct ½ if any units given)

28. (a) (i) q {1}

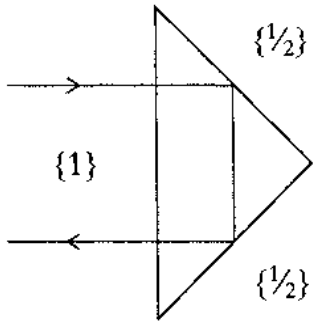
(ii) t {1} 2

(b) $v = \frac{d}{t}\ \{½\} = \frac{15}{12}\ \{½\} = 1.25\ \{½\}$

$$\lambda = \frac{v}{f}\ \{½\} = \frac{1.25}{0.25}\ \{½\} = 5m\ \{½\}$$ 3

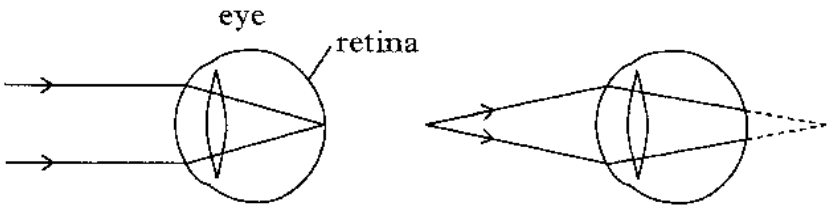
29. (a) total internal {½} reflection {½} 1

(b)



1 mark for total internal reflection
½ mark at each boundary for right angle 2

30. (a)



rays meet on retina {1} rays do not meet on retina {1} 2

(b) convex **or** converging lenses required {1} 1

(c) $P = \frac{1}{f}$ {½} $\frac{1}{0.5}$ {1} $= 2$ (D) {½} $\Rightarrow$ select lens X {1} 3

note: failure to convert 50 cm to 0.5 m loses ½ mark

note: if **no** working shown then zero marks for selecting lens X

31. (a) a fission reaction {1} 1

(b) neutron hits U-235 nucleus {1}
nucleus fissions releasing neutrons {1}
neutrons go on to cause further fissions {1} 3

32. (a) (i) the time for the activity
or count rate to fall to half its original value {1}

(ii) gamma radiation can pass through body to reach the camera {1} 2
note: accept an answer in terms of alpha and beta radiation if correct

(b) (i) lungs, liver, thyroid {1}
½ off for each wrong or missing answer

(ii) time = 24 hours {½} ⇒ 4 half lives {½}
activity = 37.5 MBq {1}
no part of the body could be investigated {1} 4
note: if **no** working shown then zero marks for saying no part of the body

33. (a) any two suitable sources {1 each} 2

(b) in 1 hour
gamma : H = D Q {½} = 1 × 1 {½} = 1 (mSv) {½}
slow neutrons : H = D Q = 200 × 3 = 600 (μSv) {½}
total = 1 + 0.6 = 1.6 mSv {1} 3

(c) number of hours $= \frac{50}{1.6} = 31.3$ {1} 1

[END OF MARKING INSTRUCTIONS]

Int 2	OUTCOME 1				OUTCOMES 2 & 3			
Question	1 a	1 b	1 c	1 d	2 a	2 b 3 d	2 c 3 e	2 d 3b 3 f
1	1							
2		1						
3		1						
4						1		
5			1					
6		1						
7						1		
8		1						
9			1					
10							1	
11		1						
12	1							
13			1					
14		1						
15			1					
16			1					
17		1						
18			1					
19				1				
20			1					
21 (a)								2
(b)								1
(c) (i)		2						
(ii)		2						
(iii)						2		
22 (a)		2						
(b)							1	
(c) (i)		2						
(ii)						3		
23 (a) (i)						3		
(ii)		2						
(b)								2
(c)								1
24 (a) (i)		2						
(ii)		2						
(b)							1	
(c)							2	
25 (a)		2						
(b)		2						
(c)						3		

Int 2	OUTCOME 1				OUTCOMES 2 & 3			
Question	1 a	1 b	1 c	1 d	2 a	2 b 3 d	2 c 3 e	2 d 3b 3 f
26 (a) (i) (ii) (b) (i) (ii)	1				1	3	2	
27 (a) (b)			1			3		
28 (a) (b)					2	3		
29 (a) (b)			1			2		
30 (a) (b) (c)			2 1			3		
31 (a) (b)				1 3				
32 (a) (i) (ii) (b) (i) (ii)	1				1	3	1	
33 (a) (b) (c)			2			3 1		
Totals	4	25	14	5	4	34	8	6
	48				52			

MARKS ANALYSIS INT 2 EXEMPLAR COURSE ASSESSMENT

	Outcome 1	**Outcomes 2 and 3**	**Total**
Mechanics and heat	15	17	32
Electricity and electronics	16	16	32
Waves and optics	8	10	18
Radioactivity	9	9	18
Totals	48	52	100

NATIONAL COURSE SPECIFICATION
PHYSICS (INTERMEDIATE 2)

Details of the instrument for external assessment

The instrument of assessment will be an externally set question paper of 2 hours duration. The question paper will sample the Content Statements of all four component units. The question paper will consist of 20 objective questions (each worth 1 mark) and questions requiring: a short answer (a few words); a response in the form of a numerical calculation; a restricted response (a few sentences or a paragraph). Candidates will be expected to answer all of the questions in the paper.

There will be a total of 100 marks for the paper.

Approximately 50 marks will be allocated to questions which require candidates to demonstrate achievement of a sample of the performance criteria associated with Outcome 1 for the four component units.

Approximately 50 marks will be allocated to questions which require candidates to:

- demonstrate achievement of a sample of the performance criteria associated with Outcome 2 and Outcome 3 for the four component units;
- integrate knowledge and understanding, problem solving and analytical skills acquired through study of the component units;
- apply knowledge and understanding to solve problems set in contexts which are less familiar than those associated with a study of the component units;
- solve problems which are less structured or are set in more complex contexts.

A summary of the breakdown of the marks allocation across the outcomes and component units is as follows:

	Outcome 1	**Outcome 2 and 3**	**Total**
Mark allocation for whole paper	50 ±4	50 ±4	100
Each component unit (40h)	17 ±4	17 ±4	34 ±4
Each component unit (20h)	8 ±3	8 ±3	16 ±4