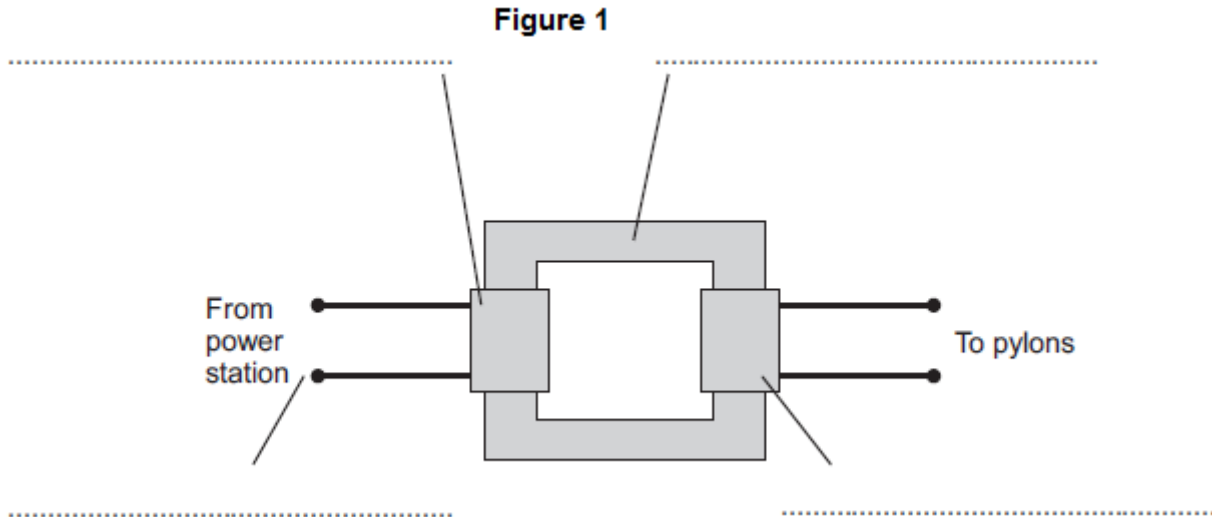


June 2015 Questions A

Q1. Transformers are used to change potential differences (p.d.) in the National Grid.

Figure 1 shows a step-up transformer that is used at a power station.



(a) (i) Use words from the box to label **Figure 1**.

Input p.d.	Iron core	Output p.d.
Primary coil	Secondary coil	

(4)

(ii) One of the coils in **Figure 1** has a p.d. of 25 kV across it and has 1000 turns.

The other coil has a p.d. of 400 kV across it.

Calculate the number of turns on this other coil.

Use the correct equation from **Section C** of the Physics Equations Sheet.

.....

.....

.....

.....

Number of turns =

(2)

(iii) Explain why a step-up transformer is used at a power station.

.....

.....

.....

.....

.....

.....

(3)

(b) **Figure 2** shows a mobile phone charger.

Figure 2



The charger contains a step-down transformer. A switch mode transformer is used rather than a traditional transformer.

Describe the advantages of using a switch mode transformer in the charger rather than a traditional transformer.

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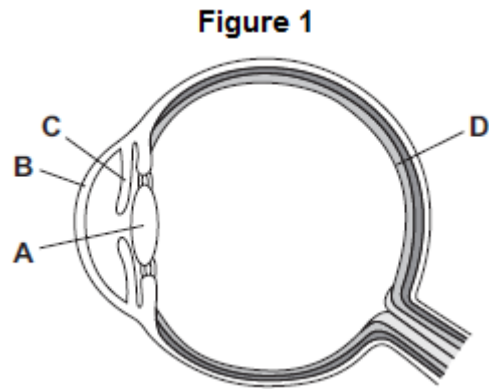
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(3)
(Total 12 marks)

Q2.(a) **Figure 1** shows a section through a human eye.



Write the correct letter, **A**, **B**, **C** or **D**, in each empty box to identify the parts of the eye labelled in **Figure 1**.

Part of the eye	A, B, C or D
Cornea	
Lens	
Retina	

(3)

(b) The table shows how the mass of 1 cm³ of different materials varies with refractive index.

Material	Refractive index	Mass in g
Water	1.33	1.00
Glass X	1.52	2.54
Glass Y	1.70	2.93
Glass Z	1.81	3.37

(i) Describe the pattern shown in above table.

.....

(1)

- (ii) Lenses used for correcting visual defects often have a low refractive index. State **one** advantage and **one** disadvantage of using lenses with a high refractive index for correcting visual defects.

Advantage

Disadvantage

(2)

- (iii) The eyesight of a person can change throughout their lifetime. Scientists have designed cheap spectacles that allow the wearer to change the focal length of the lenses as their eyesight changes.

Two designs are:

- using water-filled lenses where water is pumped in or out of the lens to change its shape
- using a pair of specially shaped lenses for each eye that are able to slide across each other.

Figure 2 shows these two designs.

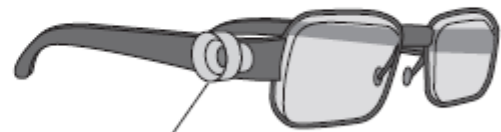
Figure 2

Spectacles with water-filled lenses



Water store and pump

Spectacles with sliding lenses made from glass Z



Knob to adjust position of sliding lens

Suggest **one** advantage and **one** disadvantage of each design.

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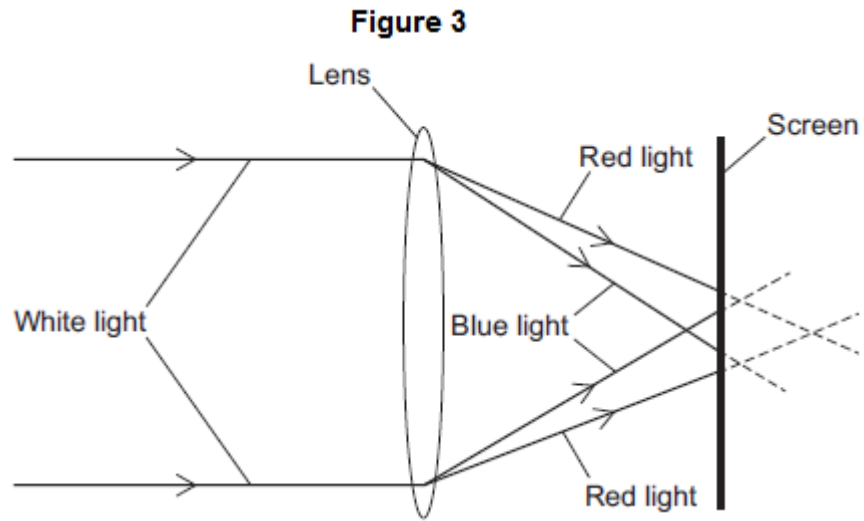
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.....

(4)

- (c) **Figure 3** shows parallel rays of white light from a distant point being refracted towards a screen by a lens.

The lens is made from a glass with a much greater refractive index than glass normally used for correcting visual defects.



What would you notice about the image on the screen?

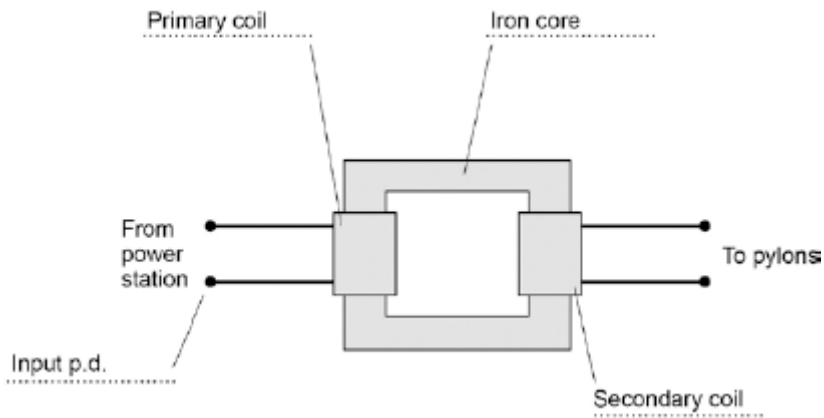
State **two** observations.

- 1
-
- 2
-

(2)
(Total 12 marks)

June 2015 Answers A

M1.(a) (i)



1
1
1
1

(ii) 16 000

*allow 1 mark for correct substitution
ie $400 \div 25 = n \div 1000$*

2

(iii) p.d. increased (by transformer at power station)
do not accept energy increased

1

so current decreases

1

this reduces energy / power loss (in cables)
*allow heat for energy
allow increases the efficiency
do **not** accept no energy losses*

1

(b) smaller / lighter

1

uses little power / energy

1

when left switched on with no load applied
dependent on second marking point

1

[12]

M2.(a) B

must be in correct order

1

A

1

D		1
(b)	(i) mass increases as refractive index increases <i>accept weight / density increases as refractive index increases</i>	1
	(ii) thinner <i>accept thin</i>	1
	heavier <i>accept heavy</i>	1
	(iii) maximum one advantage and one disadvantage of each design	
	water-filled advantages:	
	• lenses are light	
	• wide range of focal length	
	• allows fine adjustment	
	• allows lenses to be altered independently.	1
	disadvantages:	
	• unattractive	
	• lens might burst	
	• lens might leak	
	• uncomfortable.	1
	sliding lenses advantages:	
	• hard-wearing	
	• look like conventional glasses	
	• easy to adjust	
	• allows lenses to be altered independently.	1
	disadvantages:	
	• heavy	
	• might slide out of position	
	• might get dirt between the lenses.	1
(c)	any two from: the image is:	
	• blurred	
	• coloured	
	• inverted	
	• diminished.	
	<i>accept not focussed</i>	1

1
1