9 An object is placed 6.5 cm from a lens of focal length 3.9 cm. An image is formed 9.8 cm behind the lens.

Which of the following expressions is equal to the magnification?

☒ **A** $\frac{3.9}{6.5}$

☒ **B** $\frac{6.5}{9.8}$

☒ **C** $\frac{6.5}{3.9}$

☒ **D** $\frac{9.8}{6.5}$

(Total for Question 9 = 1 mark)

10 A monochromatic beam of light of wavelength λ from a laser is directed at a diffraction grating of line spacing d.

A student calculates the value of d/λ in order to determine the expected number of visible maxima.

The calculated value of d/λ is 4.7

How many maxima are visible?

☒ **A** 4

☒ **B** 5

☒ **C** 9

☒ **D** 11

(Total for Question 10 = 1 mark)

6 When monochromatic light is incident on the surface of a metal, electrons are emitted by the photoelectric effect.

If other conditions are unchanged, the maximum kinetic energy of the electrons will be increased by

☒ **A** increasing the frequency of the incident light.

☒ **B** increasing the intensity of the incident light.

☒ **C** using a metal with a higher threshold frequency.

☒ **D** using a metal with a higher work function.

(Total for Question 6 = 1 mark)

4 For total internal reflection to take place, the angle of incidence must be

☒ **A** greater than or equal to the critical angle.

☒ **B** greater than the critical angle.

☒ **C** less than or equal to the critical angle.

☒ **D** less than the critical angle.

(Total for Question 4 = 1 mark)

Answer ALL questions.

All multiple choice questions must be answered with a cross ☒ in the box for the correct answer from A to D. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 A system of lenses consists of a converging lens and a diverging lens in contact.

The magnitude of the power of the converging lens is 9.4 D and the magnitude of the power of the diverging lens is 4.2 D.

Which of the following is the power of this system of lenses?

☒ **A** 13.6 D

☒ **B** 5.2 D

☒ **C** −5.2 D

☒ **D** −13.6 D

(Total for Question 1 = 1 mark)

4 A student carried out an experiment to determine the focal length of a converging lens.

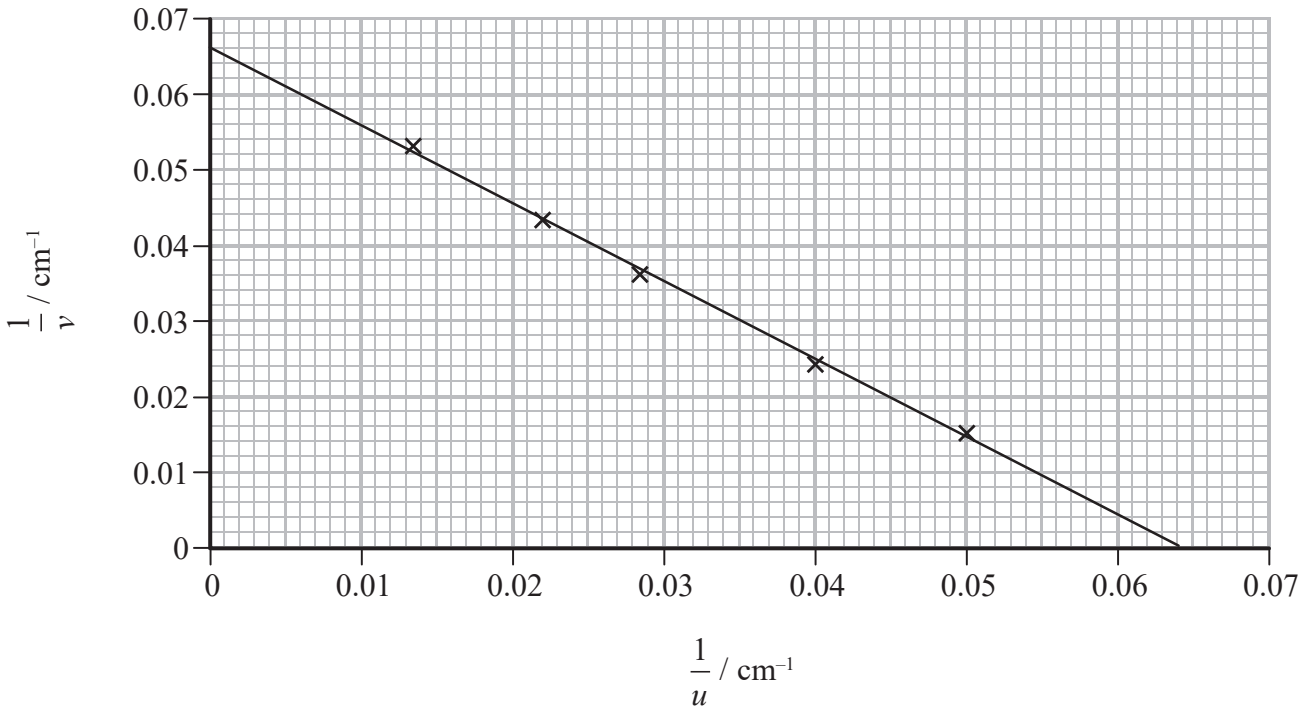
He placed the lens a distance u from an illuminated object. He placed a screen on the other side of the lens and moved the screen until a sharp image of the object was produced. He measured the corresponding image distance v.

The student repeated the procedure for four more values of u.

In his lab report he wrote:

"I made an initial determination of the focal length of the lens and concluded that it was about 15 cm. When I plotted a graph it confirmed my initial determination of the lens focal length."

The student's graph is shown.



Comment on whether the student's data is consistent with his initial determination of the focal length of the lens.

(5)

(Total for Question 4 = 5 marks)