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Please write clearly in block capitals.			
Centre number	Candidate number		
Surname			
Forename(s)			
Candidate signature			

## A-level PHYSICS

Paper 3 Section B Astrophysics

Thursday 29 June 2017

Morning

### Materials

For this paper you must have:

- a pencil and a ruler
- a scientific calculator
- a Data and Formulae booklet.

#### Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- Show all your working.

#### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 35.
- You are expected to use a scientific calculator where appropriate.
- A Data and Formulae Booklet is provided as a loose insert.

Time allowed: The total time for both sections of this paper is 2 hours. You are advised to spend approximately 50 minutes on this section.

For Examiner's Use		
Question	Mark	
1		
2		
3		
4		
5		
TOTAL		





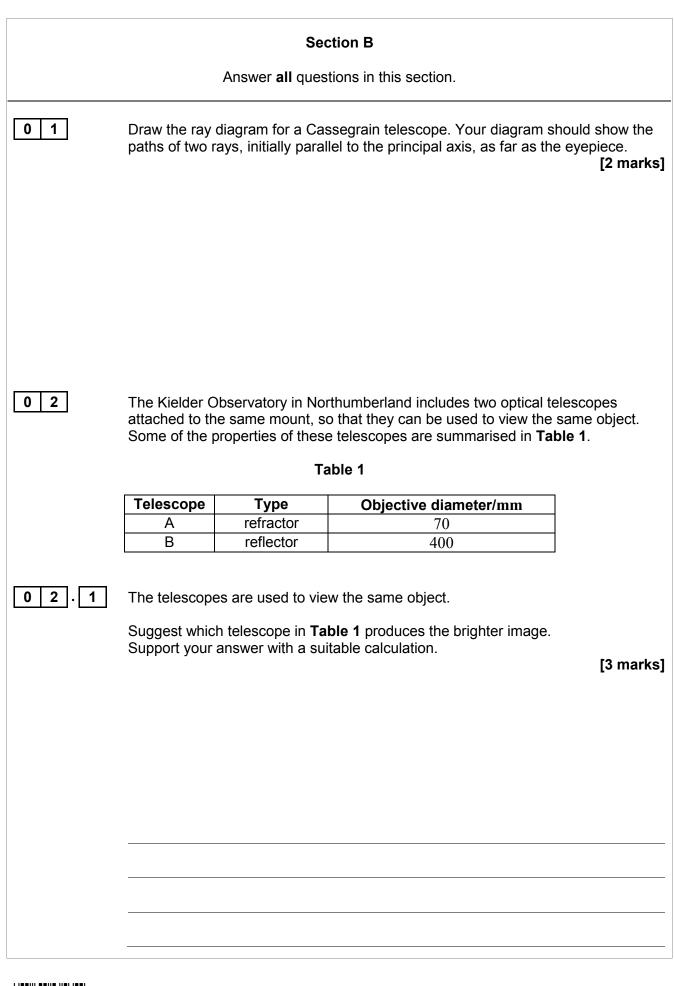
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7

0       2       ?       The minimum angular resolution of a telescope can be determined using the Rayleigh criterion.         Explain what is meant by the Rayleigh criterion.       [2 marks]		
[2 marks]     [2 marks]	02.2	The minimum angular resolution of a telescope can be determined using the Rayleigh criterion.
0       2       · 3         Discuss which of the two telescopes in Table 1 would be better at resolving the images of two objects that are close together.       [2 marks]		Explain what is meant by the Rayleigh criterion.
images of two objects that are close together. [2 marks]		[2 marks]
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]		
images of two objects that are close together. [2 marks]	02.3	Discuss which of the two telescopes in <b>Table 1</b> would be better at resolving the
		images of two objects that are close together.
Turn over for the next question		
Turn over for the next question		
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Turn over for the next question		
		Turn over for the next question



0 3		nmarises some	of the properties	of four stars in the constel	llation
	nercules.	Hercules. Table 2			
	Star	Dictoroo/na	Spectral class	Apparent magnitude	
		Distance/pc		Apparent magnitude	
	Kornephoros	43	G	2.8	
	Rasalgethi	110	М	3.0	
	Rutilicus	11	G	2.8	
	Sarin	23	A	3.1	
03.1	Define the p	oarsec. You ma	ay use a diagram a	as part of your answer.	[2 marks]
03.2	Deduce wh	ich star is large	r, Kornephoros or	Rutilicus.	[3 marks]



One of the four stars has the peak in its black-body radiation curve at a wavelength of $1.0\ \mu m.$		
Calculate the corresponding temperature for this curve.	[2 marks]	
temperature =	K	Find Personal Tut
Explain which star produced the black-body radiation curve described in question <b>03.3</b> .	[2 marks]	Find Personal Tutor from www.wisesprout.co.uk
Which star has the brightest absolute magnitude? Tick (✓) the correct box.		o.uk  找名校导师,用小草线上辅导(微信小程序同名)
Kornephoros	[1 mark]	,草线上辅导(微信
Rasalgethi		<b>言小程序同名</b> )
Rutilicus		
Sarin		

Question 3 continues on the next page



3.3

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3

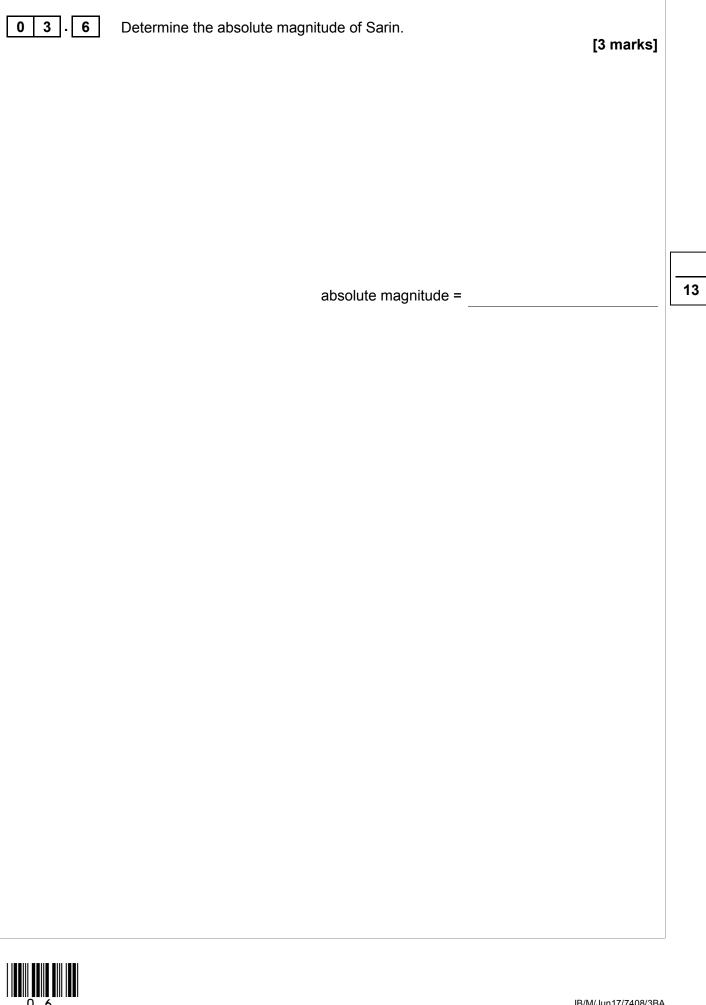
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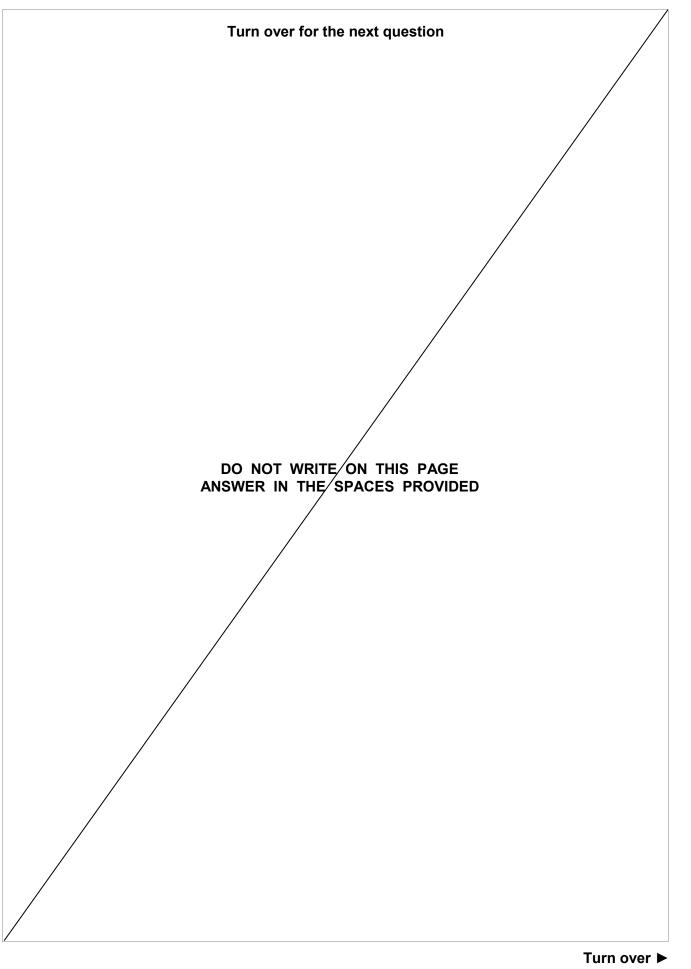
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3.

4









0 4 . 1	Sketch, on the axes in <b>Figure 1</b> , the light curve for a typical type 1a super- Label the axes with suitable scales.	nova. 3 marks]
	Figure 1	
absolute magnitud		
magnitud		
	time/days	5
0 4 2	Type 1a supernovae can be used as standard candles.	
	Explain what is meant by a standard candle.	[1 mark]
		[ i iliai kj



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04.3	Measurements of type 1a supernovae in 1999 led to a controversy concerning the behaviour of the Universe.	
	Describe this controversy and how the measurements led to it. [3 mark]	
		7
	Turn over for the next question	

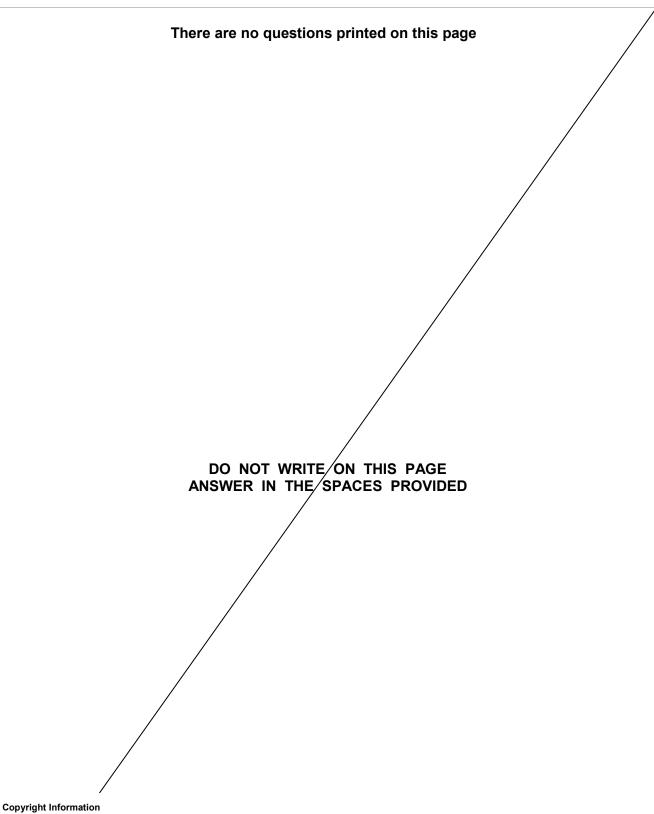
Turn over 🕨

0 5	According to NASA nearly 2000 exoplanets had been discovered by 2016, and the search continues. One aim of this search is to find an Earth-like planet orbiting a Sun-like star. Discuss the difficulties associated with the detection of an Earth-like planet orbiting a Sun-like star. In your answer you should compare the methods that are used in the search and suggest which may be the most successful. [6 marks]









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