Practice Question Set For A-Level
Subject : Physics
Paper-3 Topic: Section A(Practical Skills Set-1)

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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

(a) State what is meant by normal adjustment when applied to an astronomical refracting telescope.

_____

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(1)

(b) Which combination of lenses gives the largest angular magnification when used as an astronomical telescope in normal adjustment?

Tick ✓ **one** box.

Objective lens		**Eyepiece lens**		
Focal length / cm	**Type**	**Focal length / cm**	**Type**	
5	diverging	100	converging	☐
5	converging	100	converging	☐
100	diverging	5	converging	☐
100	converging	5	converging	☐

(1)

V1031 and WASP-82 are two stars in the constellation Orion.
V1031 appears 40 times brighter than WASP-82 when viewed from Earth.
The apparent magnitude of V1031 is 6.0

(c) Calculate the apparent magnitude of WASP-82.

apparent magnitude = _____

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(2)

(d) V1031 is just visible to the naked eye of an astronomer when her pupil diameter is 7 mm.

Suggest whether she can observe WASP-82 using a telescope with an objective diameter of 60 mm.
Support your answer with a calculation.

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(2)

(e) CCDs are often connected to telescopes.

Explain **two** reasons why this improves the ability of astronomers to observe dim stars.

1 _____

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2 _____

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(3)
(Total 9 marks)

Q2.

M40 A and M40 B are two stars that appear very close to each other when viewed from Earth.
There are two possible reasons for this:

- they are an orbiting binary system
- they are distant from each other and only appear in the same line of sight.

In an orbiting binary system, the difference between the apparent magnitude and the absolute magnitude for each star is similar.

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The table below shows data about these two stars.

	Temperature / K	Radius of star / m	Apparent magnitude
M40 A	6000	6.3×10^{9}	9.7
M40 B	4700	1.1×10^{10}	10.1

Discuss the appearance of the two stars to an astronomer on the Earth. In your answer you should:

- compare the colour of the stars
- compare the brightness of the stars
- deduce, with a calculation, whether the stars form an orbiting binary system.

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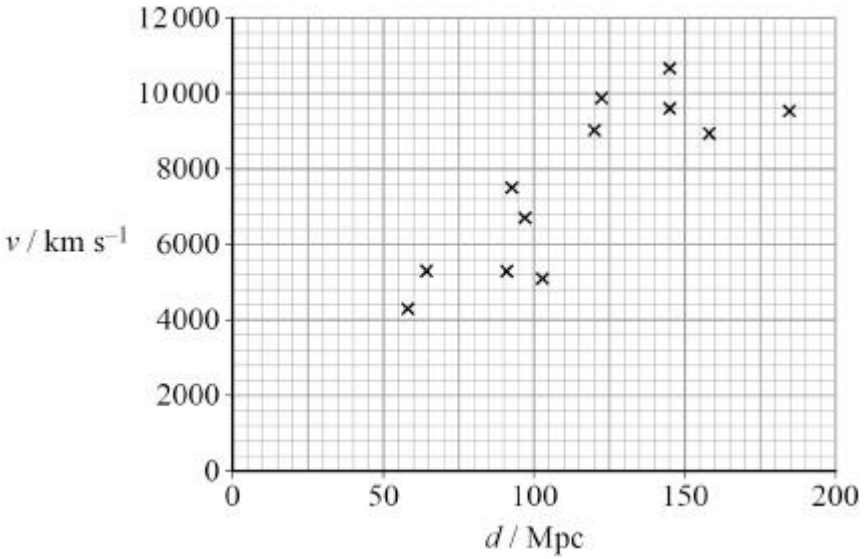
(Total 6 marks)

Q3

The graph below shows, for some galaxies, how their recession speed v varies with distance d from the Earth.



(a) Estimate, using the graph above, the age in seconds of the Universe.

age of Universe = _____ s

(3)

(b) The estimate in part (a) assumes that the Universe has expanded at a constant rate. Measurements involving type 1a supernovae that are at large distances from Earth caused astronomers to make a modification to this assumption.

State:

- the modification
- the explanation that was proposed to account for this modification.

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(2)
(Total 5 marks)

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