

Astronomy  
Paper 2: Telescopic Astronomy

Diagram Booklet

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

## INSTRUCTIONS

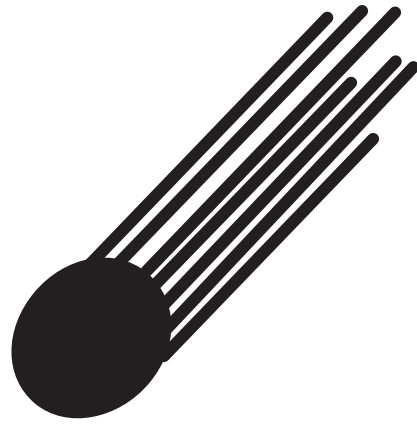
There may be spare copies of some diagrams in case you need them.

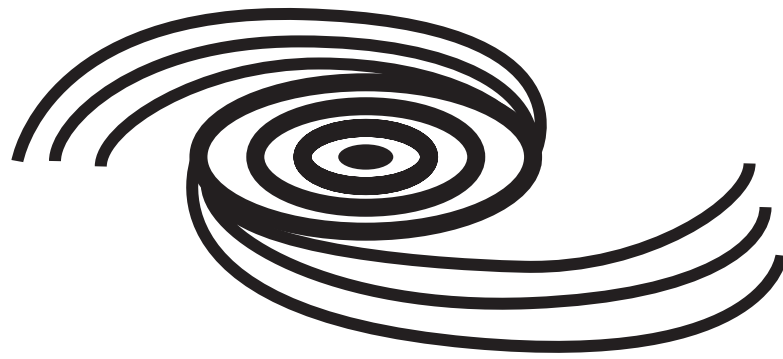
**THIS DIAGRAM BOOKLET MUST BE RETURNED WITH THE QUESTION PAPER AT THE END OF THE EXAMINATION.**

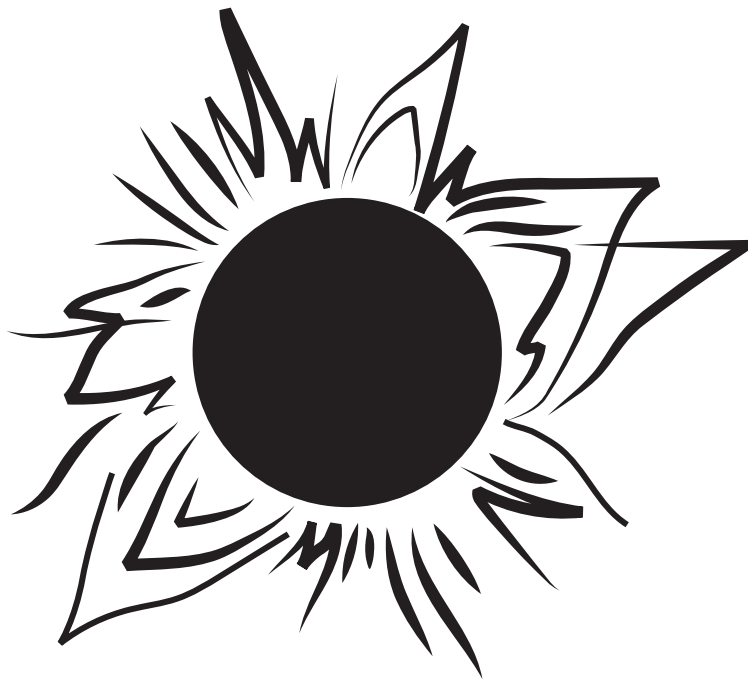
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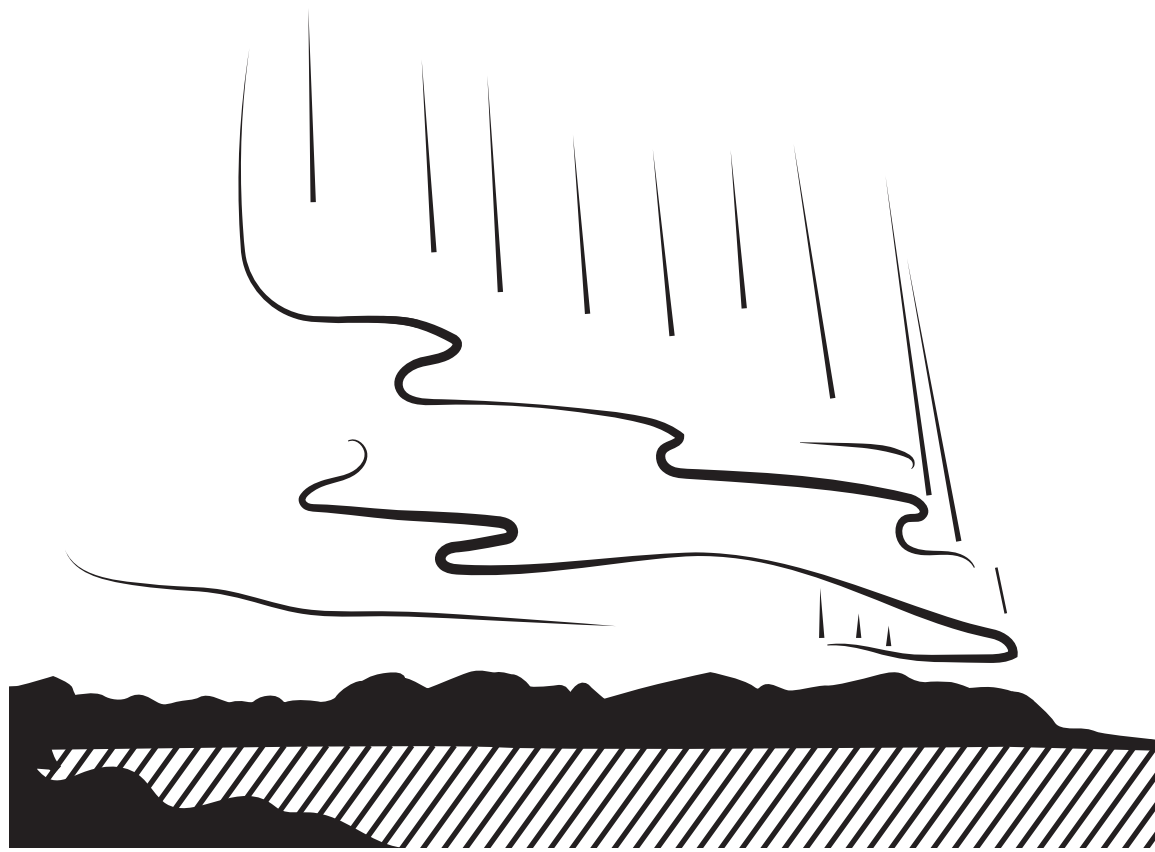
**Question 1(a)(i)**

**Question 1(a)(ii)**

**Question 1(b)(i)****FIGURE 1**

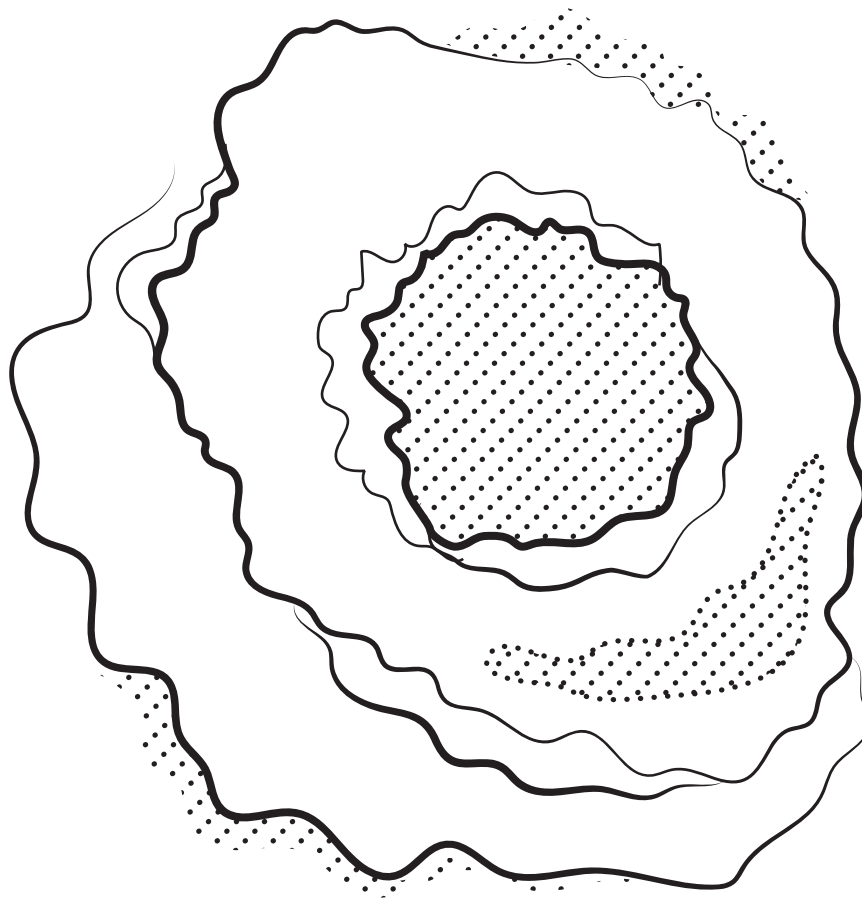
## Question 1(b)(ii)

FIGURE 2



## Question 1(b)(iii)

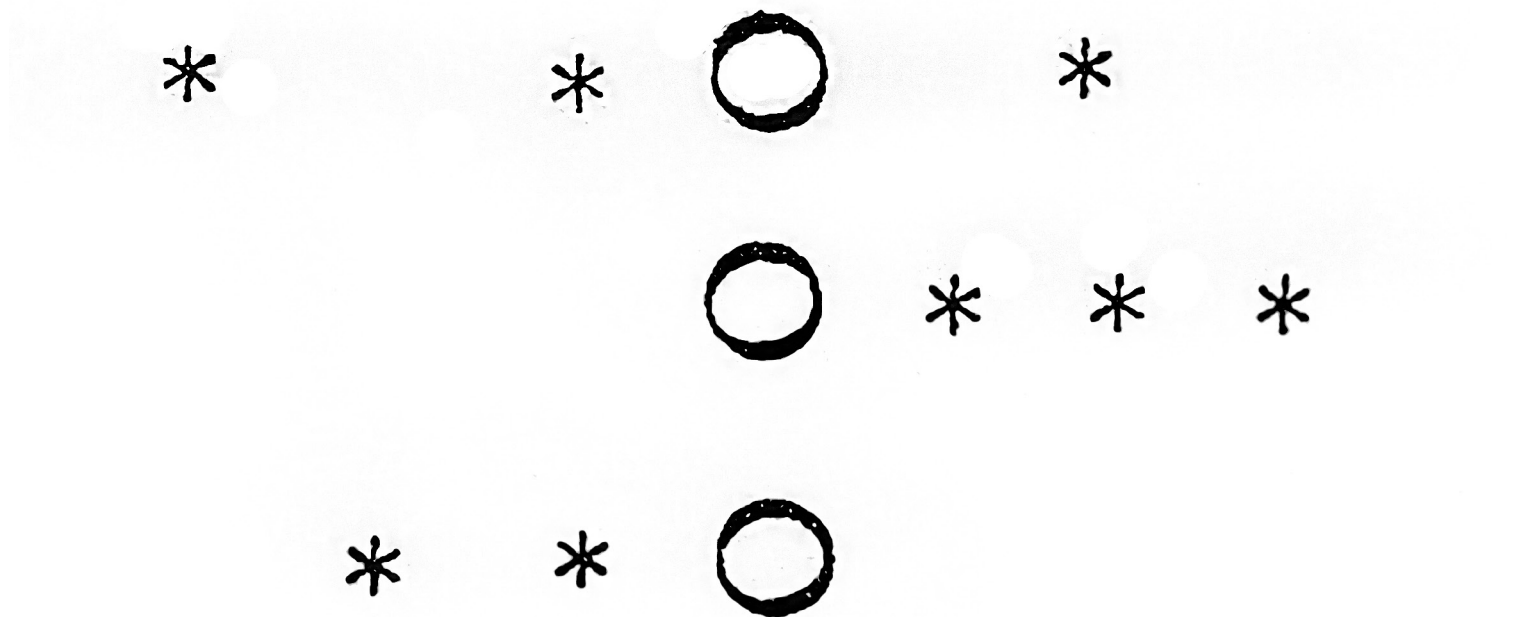
FIGURE 3





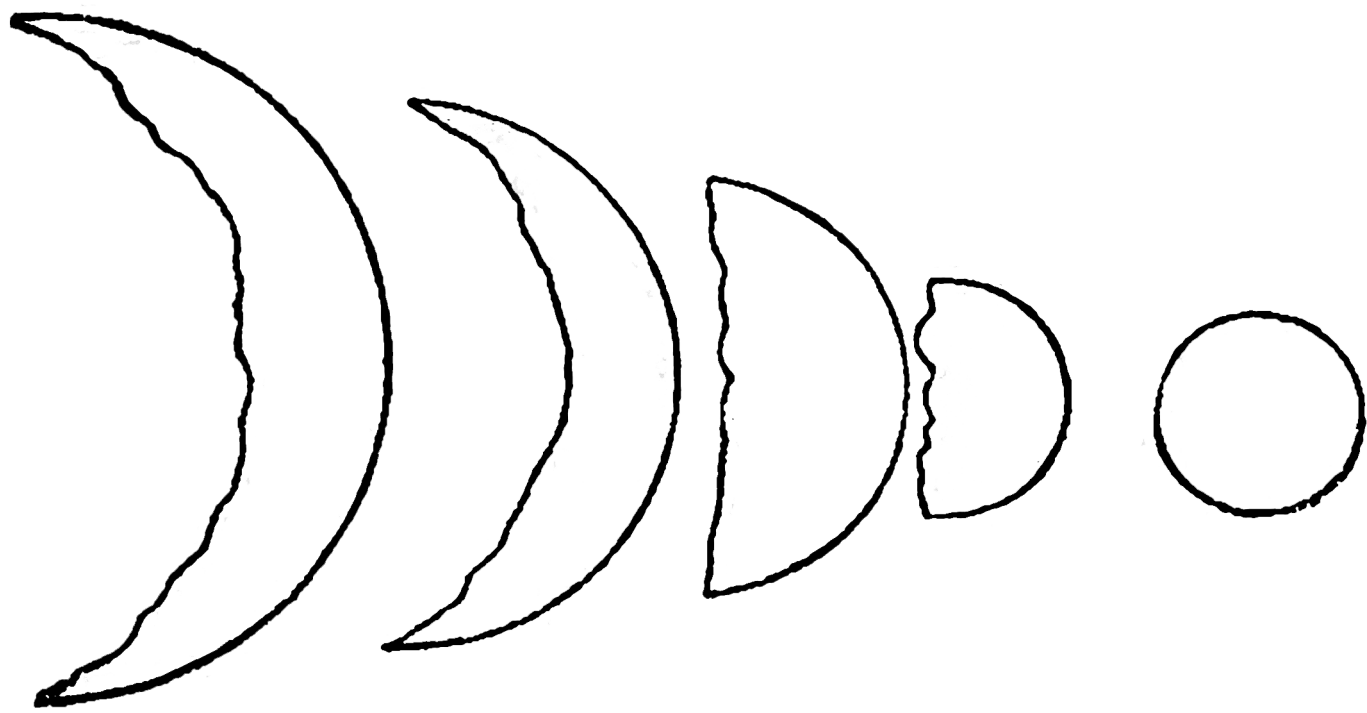
## Question 3(b)(i)

FIGURE 4



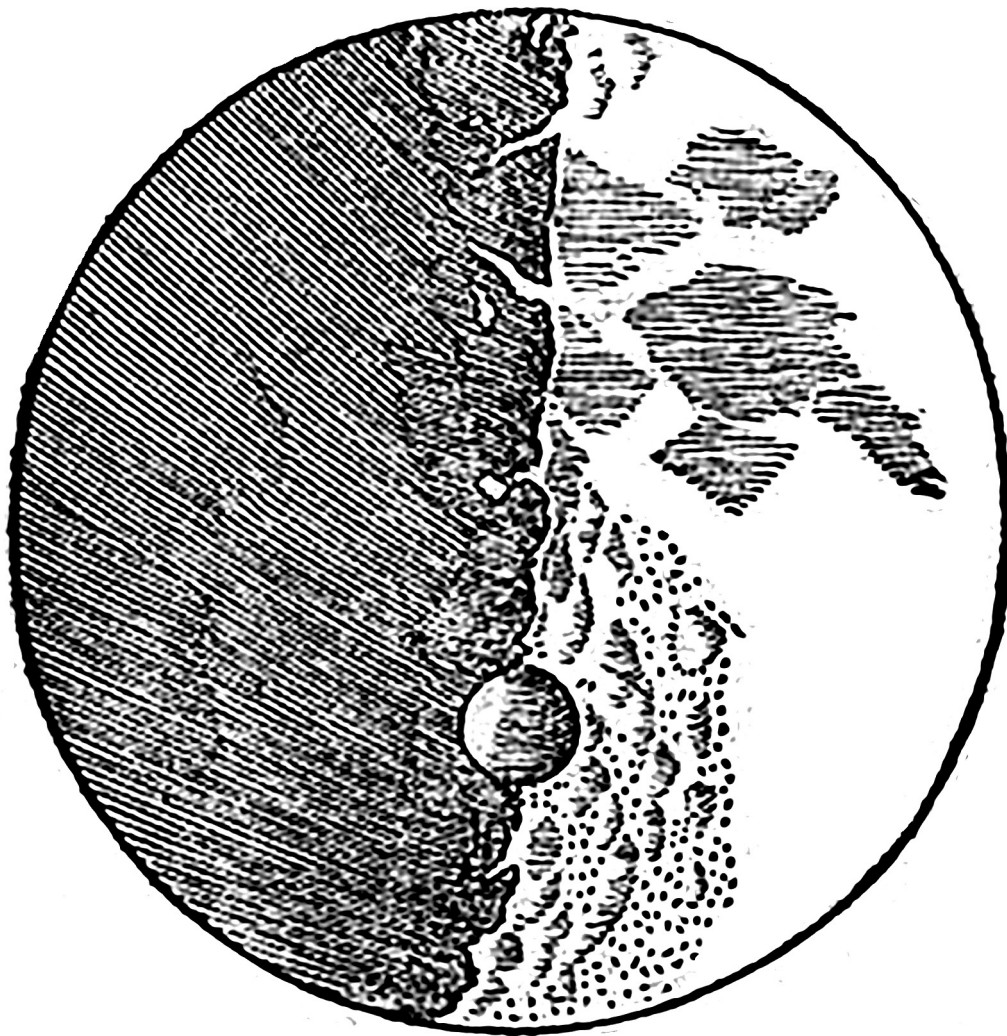
## Question 3(b)(ii)

FIGURE 5



## Question 3(b)(iii)

FIGURE 6



## Question 3(c)

TABLE 1

	<b>Galileo's telescope (1609)</b>	<b>Twenty-first century telescope</b>
<b>Aperture</b>	<b>3·5 cm</b>	<b>11 m</b>
<b>Focal length</b>	<b>98 cm</b>	<b>17·5 m</b>

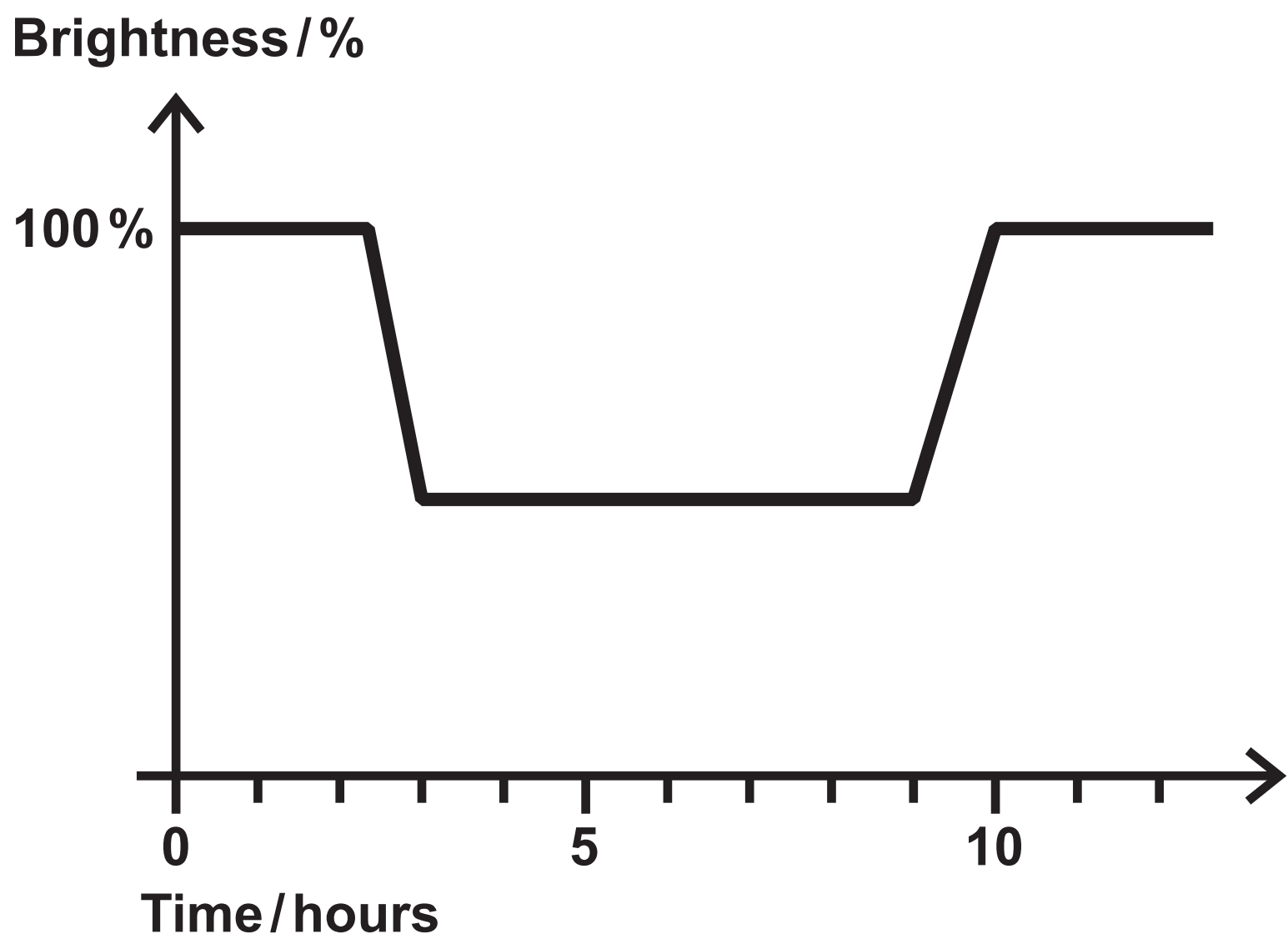
Question 4(a)

TABLE 2

Planet	Distance from star (AU)	Radius (km)	Mean surface temperature (°C)
A	0.2	4 000	210
B	0.9	13 000	20
C	7.0	150 000	−170
D	14.0	75 000	−200

## Question 4(b)

FIGURE 7



Question 5(a)

FIGURE 8

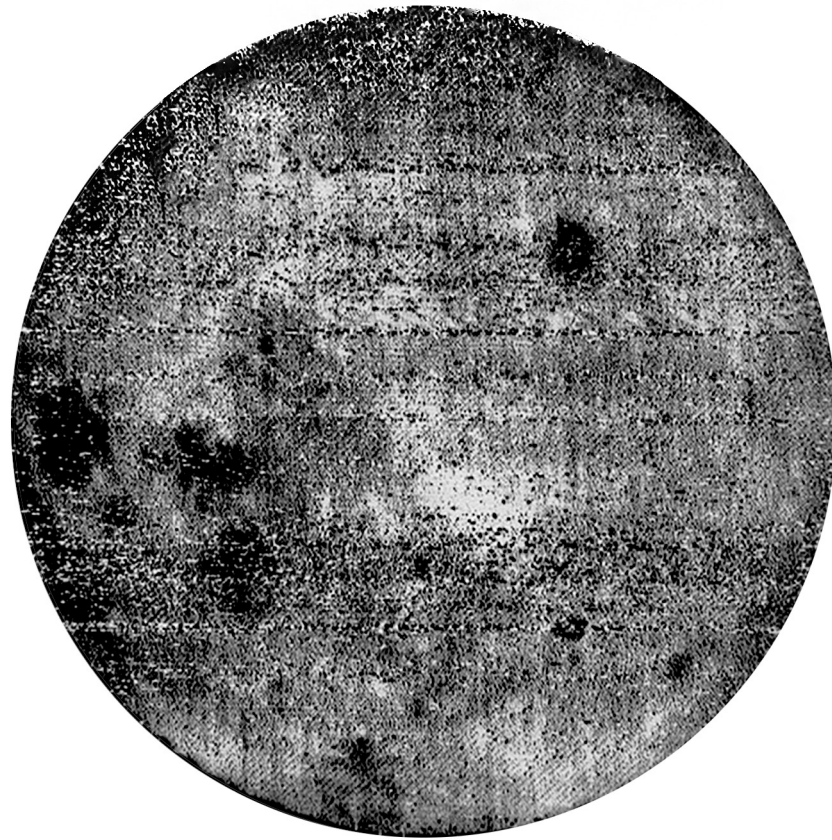
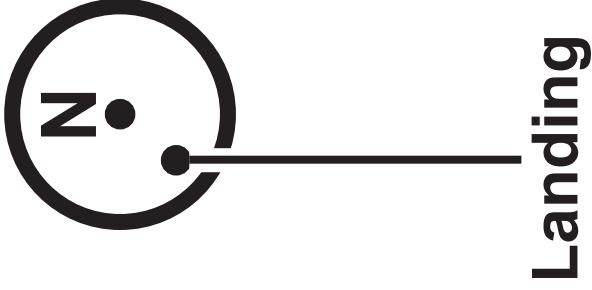
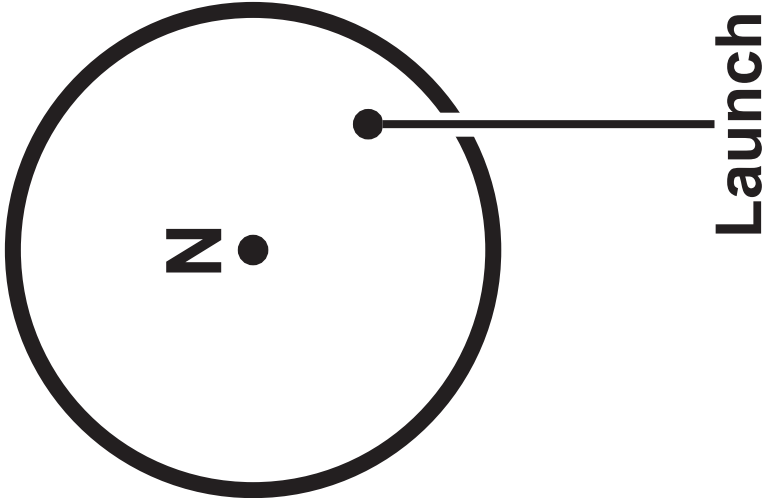


FIGURE 9

not to scale  
N = North pole

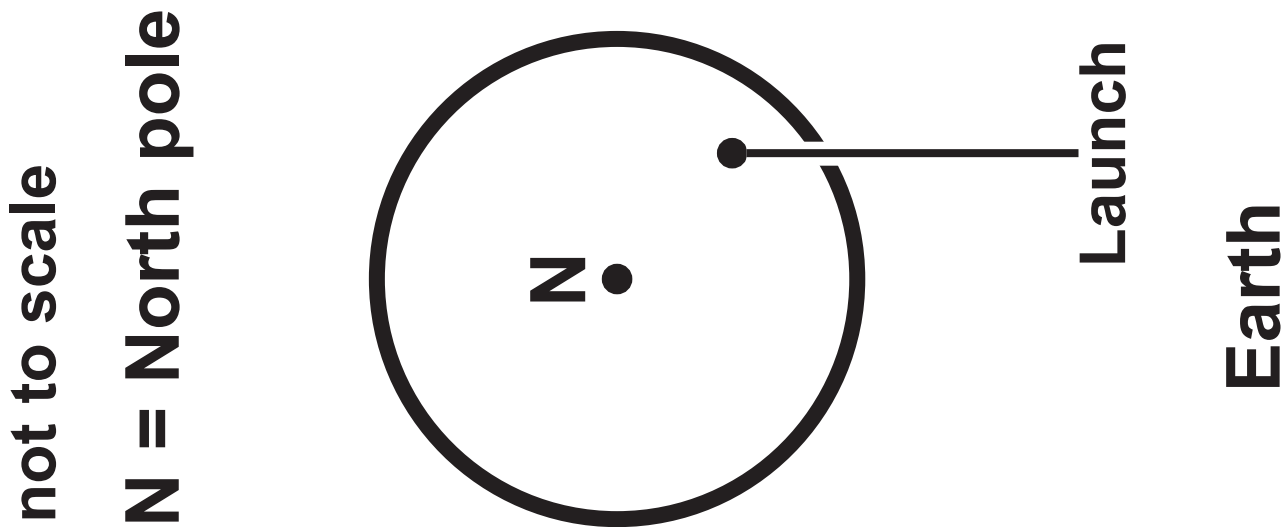


Earth

Moon

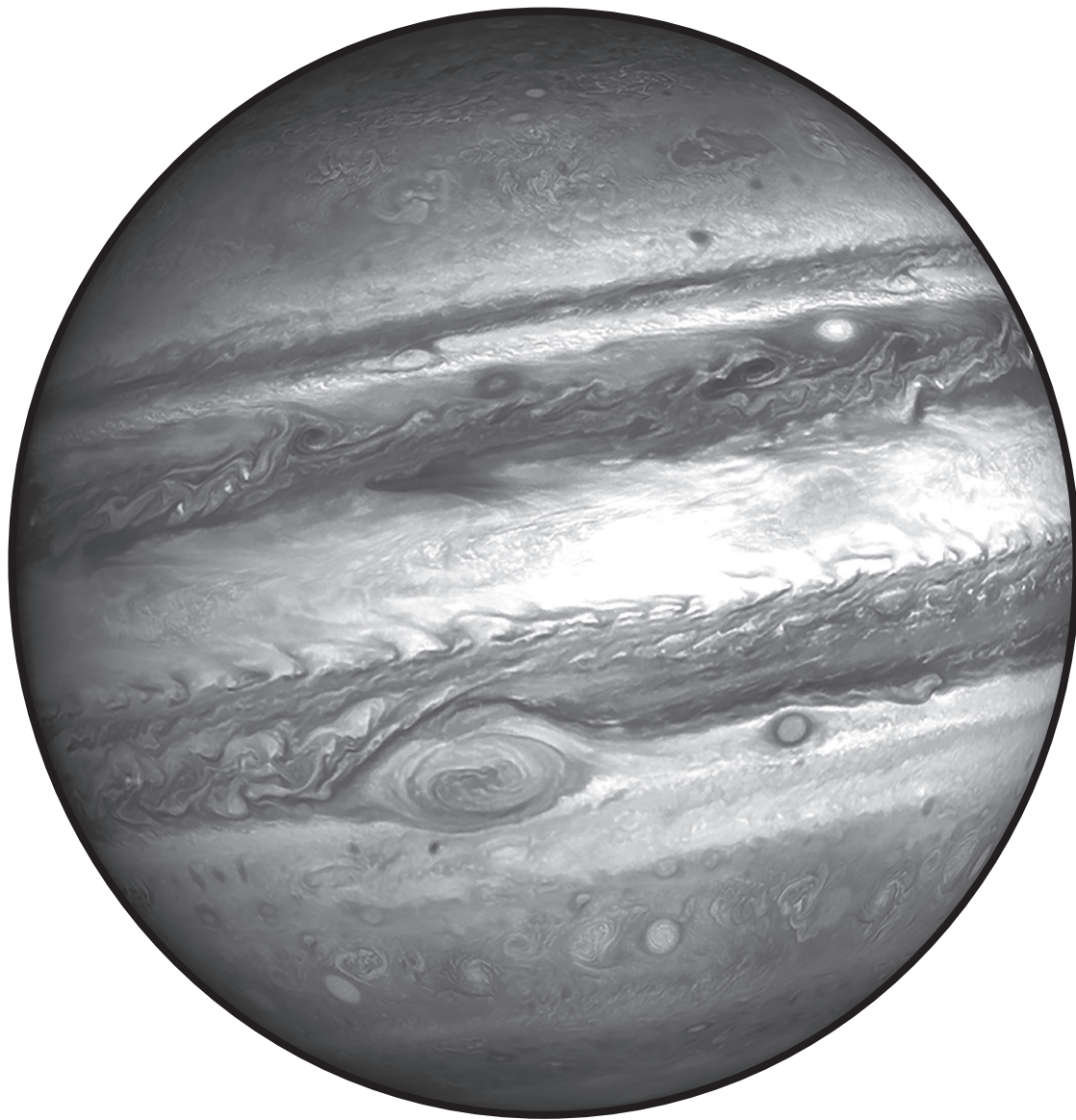


FIGURE 9



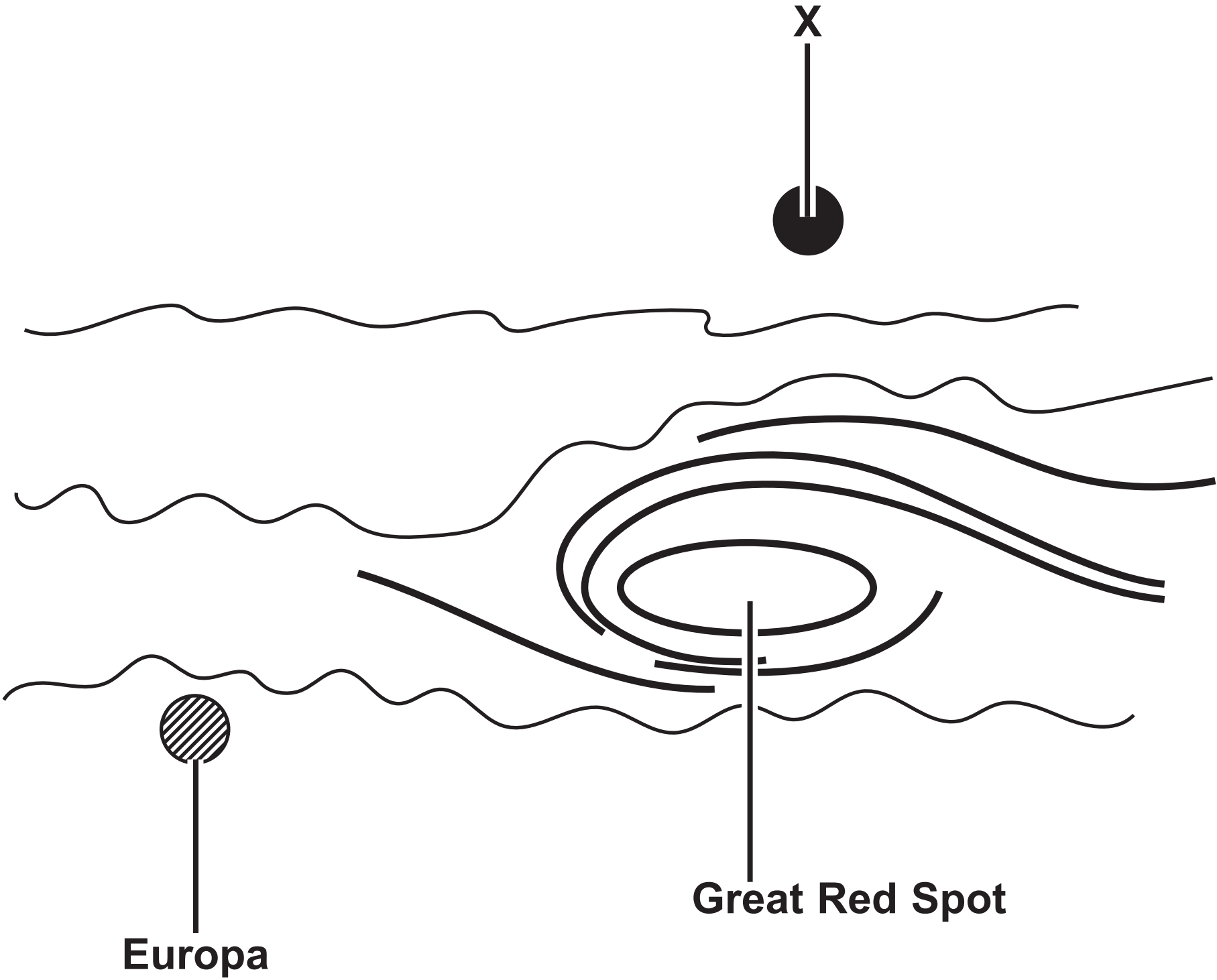
Question 6(a)

FIGURE 10



Question 6(b)

FIGURE 11



Question 7(b)

TABLE 3

Name	Bode's prediction (AU)	Actual radius of orbit (AU)	Difference (AU)
Mercury	0.4	0.38	0.02
Venus	0.7	0.72	−0.02
Earth	1.0	1.0	0
Mars	1.6	_____	_____
_____	2.8	2.8	0
Jupiter	5.2	5.2	0
Saturn	10	_____	_____
Uranus	19.6	19.1	0.5
Neptune	38.8	30.0	8.8

Question 7(b)

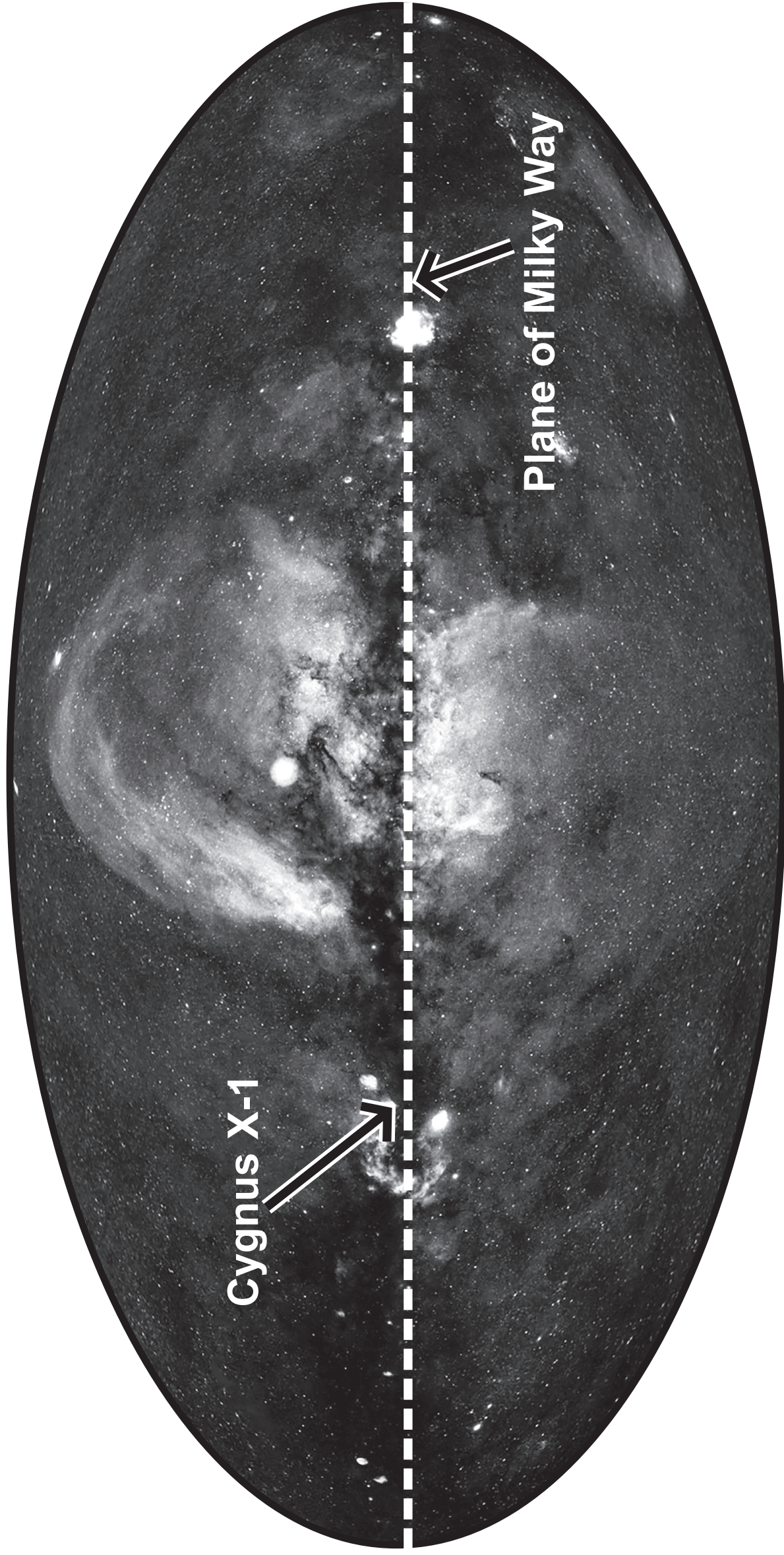
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Earth	1.0	1.0	0
Mars	1.6	_____	_____
_____	2.8	2.8	0
Jupiter	5.2	5.2	0
Saturn	10	_____	_____
Uranus	19.6	19.1	0.5
Neptune	38.8	30.0	8.8



## Question 8

FIGURE 12



## Question 9(a)

FIGURE 13



TABLE 4

<b>Aperture</b>	<b>76 mm</b>
<b>Focal length of objective mirror</b>	<b>350 mm</b>
<b>Focal length of eyepiece lens</b>	<b>20 mm</b>

## Question 9(b)

TABLE 5

Date	Number of sunspots
1st January 2014	52
2nd July 2014	42
3rd January 2015	33
1st July 2015	25
1st January 2016	18
1st July 2016	10



## **ACKNOWLEDGEMENTS**

### **Question 1**

**Figure 1 adapted from: © john finney photography/Getty Images**

**Figure 2 adapted from: © Steffen Schnur/Getty Images**

**Figure 3 adapted from: © Stocktrek/Getty Images**

### **Question 6**

**Figure 10 adapted from: © Rainer Zapka/EyeEm/Getty Images**