

## GCSE (9-1) Astronomy

# 11.6 Optical telescopes 2

### Pupil Worksheet



Week **20** Topic **11.6**



Spec. refs **11.19, 11.20, 11.21, 11.22, 11.23**

1. A telescope's 'light grasp' is proportional to the

- A** aperture of the objective element
- B** diameter of the objective element
- C** square root of the aperture of the objective element
- D** square of the diameter of the objective element

(1)

2. A telescope has a field of view of 0.75 degrees. What is its FOV in arcmin?

.....

(1)

3. When purchasing a telescope, one of the main factors to consider is the diameter of the telescope's objective element. What advantages does a large diameter give?

Tick all the boxes that you think are correct and leave the others blank.

- brighter images
- higher resolution
- larger magnification
- smaller weight

(2)

4. Which combination of objective and eyepiece would give the **largest magnification**?

		<u>focal length of objective</u>	<u>focal length of eyepiece</u>
<input checked="" type="checkbox"/>	<b>A</b>	75 cm	20 mm
<input checked="" type="checkbox"/>	<b>B</b>	75 cm	15 mm
<input checked="" type="checkbox"/>	<b>C</b>	100 cm	20 mm
<input checked="" type="checkbox"/>	<b>D</b>	100 cm	15 mm

(1)

5. Calculate the magnification of telescope **B** in the previous question.

.....

(1)

6. Which pupil is correct?

**Matt:** The smaller the focal length of a telescope's eyepiece, the larger the field of view.

**Rose:** The smaller the focal length of a telescope's eyepiece, the smaller the field of view.

Your answer: .....

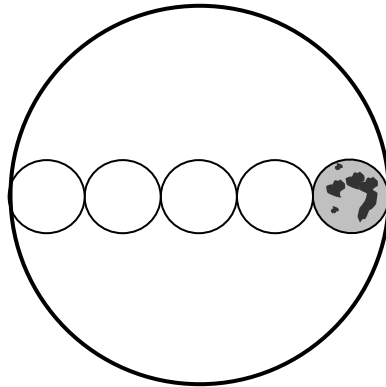
(1)

7. The resolution of a telescope is proportional to the

- A** area of the objective element
- B** diameter of the objective element
- C** square of the diameter of the objective element
- D** square of the light grasp of the objective element

(1)

Questions 8 - 10. Using a 25-mm eyepiece, the field-of-view of Selena's telescope is 5 Moon-widths.



8. What is the field-of-view of Selena's telescope using this eyepiece?

- A 25 arcmin
- B  $2.5^\circ$
- C 50 arcmin
- D  $5.0^\circ$

(1)

9. Selena could increase the field of view of her telescope by using

- A a 20-mm eyepiece
- B a 40-mm eyepiece
- C an objective element with a shorter focal length
- D a Barlow lens

(1)

10. Selena replaces her 25-mm eyepiece with a 50-mm eyepiece.

What is the new field of view of Selena's telescope? Give your answer in Moon-widths.

Your answer: .....

(1)

11. The image shows a small inexpensive telescope.



What is the name of this type of telescope?

Choose from:

<b>Newtonian reflector</b>	<b>Cassegrain reflector</b>	<b>Keplerian refractor</b>
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Your answer: .....

**(1)**

12. Converging lenses do not refract different colours of light to exactly the same focus.

What is the name of this optical defect?

Your answer: .....

**(1)**

13. Reflecting telescopes have many advantages over refractors. Which of the following are possible advantages?

Tick all the boxes that you think are correct and leave the others blank.

- higher magnifications
- lack of chromatic aberration
- larger objective diameters
- shorter physical lengths
- wider fields of view

**(3)**

## Solutions

1. **D** (1)
2. 45 arcmin (1)
3. brighter images (1) and higher resolution (1). Deduct (1 mark) for each extra box ticked. Maximum 2 marks.
4. **D** (1)
5. 50 (1)
6. Rose (1)
7. **B** (1)
8. **B** (1)
9. **B** (1)
10. 10 Moon-widths (1)
11. Keplerian refractor (1)
12. chromatic aberration (1)
13. lack of chromatic aberration (1), larger objective diameters (1) and shorter physical lengths (1). Deduct (1 mark) for each extra box ticked. Maximum 3 marks.

**Your score:**

**/ 16**