Why the Sky is Blue and Sunsets are Red

Air scatters blue light far more than red. Blue fills the sky by day; at sunset the long path through the air removes the blue, and red and orange reach you.

Name: Date: Score: ____ / 18

A. Fill in the blanks

1. Scattering by tiny air molecules is called ____ scattering.

2. Rayleigh scattering is proportional to 1/____.

3. ____ light scatters about 5-6 times more than red.

4. On the Moon the sky looks ____ because there is no atmosphere.

B. True or False

5. Red light scatters more than blue light. True / False

6. At sunset, sunlight travels through more air. True / False

7. Without an atmosphere the sky would be black. True / False

8. The sky is blue because it reflects the ocean. True / False

C. Assertion and reason

9. Assertion (A): The sky looks blue.
Reason (R): Air molecules scatter short wavelengths most.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

10. Assertion (A): Sunsets look red because red light is scattered most.
Reason (R): At sunset light travels a long path through air.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

D. Choose the correct option

11. The sky appears blue because blue light:

(a) is absorbed
(b) is scattered most
(c) is reflected by clouds
(d) travels fastest

Answer: _____

12. Sunsets look red because:

(a) the Sun cools
(b) blue is scattered out over a long path
(c) red is scattered most
(d) clouds are red

Answer: _____

13. Rayleigh scattering depends on wavelength as:

(a) λ (b) $1/\lambda$

(c) $1/\lambda^2$ (d) $1/\lambda^4$

Answer: _____

14. The sky on the Moon is:

(a) blue (b) red

(c) black (d) white

Answer: _____

E. Numerical problems

15. Using scattering $\propto 1/\lambda^4$, how many times more is blue light (450 nm) scattered than red light (700 nm)?

F. Short answer questions

16. Why is the sky blue?

17. Why are sunrises and sunsets red?

G. Match the columns

18. Match each item in Column A with the correct item in Column B.

Column A	Column B	Your answer
1. $1/\lambda^4$	(a) Short wavelengths scatter most	1 → ____
2. Blue sky	(b) Long path through air	2 → ____
3. Red sunset	(c) No atmosphere	3 → ____
4. Black sky	(d) Rayleigh scattering	4 → ____

Detailed solutions

1. Rayleigh

2. λ^4

3. Blue

4. black

5. False. Shorter wavelengths (blue) scatter more.

6. True. The blue is scattered out on the way.

7. True. Nothing to scatter light.

8. False. It is due to scattering by air molecules.

9. (a) R explains A.

10. (d) A is false (blue is scattered out, red remains); R is true.

11. (b) is scattered most. Short wavelength.

12. (b) blue is scattered out over a long path. Longer path through air.

13. (d) $1/\lambda^4$. Strongly favours short waves.

14. (c) black. No air.

15. Ratio = $(700/450)^4$; $700/450 \approx 1.556$; $1.556^2 \approx 2.42$; $2.42^2 \approx 5.86$. **Answer: About 5.9 times**

16. Air molecules scatter sunlight; scattering $\propto 1/\lambda^4$, so blue (short wavelength) scatters much more and fills the sky.

17. Near the horizon sunlight crosses much more air; most blue is scattered away, leaving red and orange to reach us.

18. 1 → (d), 2 → (a), 3 → (b), 4 → (c). Wavelength and path length decide the sky's colour.