The SI System: Seven Base Units

In 1999 NASA lost the Mars Climate Orbiter because one team used pound-force and another newtons. Why the world uses one system, the SI, built on seven base units.

Name: Date: Score: ____ / 19

A. Fill in the blanks

1. The SI has ____ base units.

2. The SI unit of electric current is the ____.

3. The SI unit of amount of substance is the ____.

4. The SI unit of luminous intensity is the ____.

5. 1 newton = 1 kg m s^____.

B. True or False

6. The kilogram is a base unit. True / False

7. The newton is a base unit. True / False

8. Degree Celsius is the SI base unit of temperature. True / False

9. 1 J = 1 N m. True / False

C. Assertion and reason

10. Assertion (A): Every unit in mechanics can be written using kg, m and s.
Reason (R): Mechanical units are derived from mass, length and time.

(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: _____

11. Assertion (A): The SI is used worldwide in science.
Reason (R): One common system avoids costly unit errors.

(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

12. Which is NOT an SI base unit?

(a) metre
(b) kelvin
(c) newton
(d) candela

Answer: _____

13. The SI unit of power, watt, in base units is:

(a) kg m^2 s^{-3} (b) kg m s^{-2}

(c) kg m^2 s^{-2} (d) kg s^{-1}

Answer: _____

14. The Mars Climate Orbiter was lost because of:

(a) a meteor (b) a unit mismatch

(c) a fuel leak (d) a solar flare

Answer: _____

15. 1 coulomb equals:

(a) 1 A s (b) 1 A/s

(c) 1 V A (d) 1 J/s

Answer: _____

E. Numerical problems

16. Express the joule in base units.

17. Express the pascal (N/m^2) in base units.

F. Short answer questions

18. Name the seven SI base quantities with their units and symbols.

G. Match the columns

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

Column A	Column B	Your answer
1. metre	(a) luminous intensity	1 → ____
2. kelvin	(b) temperature	2 → ____
3. mole	(c) length	3 → ____
4. candela	(d) amount of substance	4 → ____

Detailed solutions

1. seven

2. ampere

3. mole

4. candela

5. -2

6. True. Mass is a base quantity; its unit is the kilogram.

7. False. It is derived: kg m s^{-2}.

8. False. The base unit is the kelvin.

9. True. Work = force × distance.

10. (a) R explains A.

11. (a) R explains A.

12. (c) newton. The newton is derived.

13. (a) kg m^2 s^{-3}. W = J/s = kg m^2 s^{-3}.

14. (b) a unit mismatch. Pound-force seconds vs newton seconds.

15. (a) 1 A s. Charge = current × time.

16. J = N m = (kg m s^{-2})(m). **Answer: kg m^2 s^{-2}**

17. Pa = N / m^2 = kg m s^{-2} / m^2. **Answer: kg m^{-1} s^{-2}**

18. Length metre m; mass kilogram kg; time second s; electric current ampere A; temperature kelvin K; amount of substance mole mol; luminous intensity candela cd.

19. 1 → (c), 2 → (b), 3 → (d), 4 → (a). Each unit matches its base quantity.