Sets: Chapter Introduction

A set is a well-defined collection: anyone can decide whether a thing belongs to it or not. The chapter builds the language of sets that the rest of mathematics uses.

Name: Date: Score: ____ / 21

A. Fill in the blanks

1. A set is a ____ collection of objects.

2. The objects in a set are called its ____.

3. A set with no element is the ____ set.

4. The symbol $\in$ is read as "____ to".

5. The common part of two sets is their ____.

B. True or False

6. "The best cricketers of India" is a set. True / False

7. The months whose names start with J form a set. True / False

8. The set of natural numbers is finite. True / False

9. If A = {2, 4, 6}, then $6 \in A$. True / False

C. Assertion and reason

10. Assertion (A): {a, e, i, o, u} is a finite set.
Reason (R): It has a countable, limited number of elements.

(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): "Beautiful flowers" is not a set.
Reason (R): Every collection of objects is a set.

(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 a set?

(a) good students
(b) months starting with J
(c) tall trees
(d) famous films

Answer: _____

13. If A = {1, 2, 3} and B = {2, 3, 4}, A ∪ B is:

(a) {2, 3}
(b) {1, 2, 3, 4}
(c) {1, 4}
(d) {1, 2, 3}

Answer: _____

14. If A = {1, 2, 3} and B = {2, 3, 4}, A ∩ B is:

(a) {2, 3}
(b) {1, 2, 3, 4}
(c) {1, 4}
(d) ∅

Answer: _____

15. {x : x is a natural number less than 1} is:

(a) finite with 1 element
(b) infinite
(c) empty
(d) not a set

Answer: _____

E. Numerical problems

16. Write the set of even natural numbers less than 11 in roster form and count its elements.

17. A = {1, 3, 5, 7}, B = {3, 5, 9}. Find A ∪ B and A ∩ B.

18. Write A = {x : x is a prime number less than 10} in roster form.

F. Short answer questions

19. What makes a collection well-defined? Give one example and one non-example.

20. Draw a Venn diagram idea for A ∪ B and A ∩ B in words.

G. Match the columns

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

Column A	Column B	Your answer
1. ∅	(a) Finite set	1 → ____
2. {a, e, i, o, u}	(b) Infinite set	2 → ____
3. {1, 2, 3, …}	(c) Empty set	3 → ____
4. A ∩ B	(d) Common elements	4 → ____

Detailed solutions

1. well-defined

2. elements

3. empty

4. belongs

5. intersection

6. False. "Best" depends on opinion, so it is not well-defined.

7. True. It is exactly {January, June, July}.

8. False. N = {1, 2, 3, …} never ends; it is infinite.

9. True. 6 is listed in A.

10. (a) 5 elements; R explains A.

11. (c) A is true; R is false: only well-defined collections are sets.

12. (b) months starting with J. Only this collection is well-defined.

13. (b) {1, 2, 3, 4}. Union collects every element of A or B once.

14. (a) {2, 3}. Only 2 and 3 are in both.

15. (c) empty. No natural number is less than 1.

16. Even natural numbers below 11: 2, 4, 6, 8, 10; Roster form: {2, 4, 6, 8, 10}. **Answer: {2, 4, 6, 8, 10}; 5 elements**

17. A ∪ B: all elements of A or B = {1, 3, 5, 7, 9}; A ∩ B: elements in both = {3, 5}. **Answer: A ∪ B = {1, 3, 5, 7, 9}; A ∩ B = {3, 5}**

18. Primes below 10: 2, 3, 5, 7. **Answer: {2, 3, 5, 7}**

19. We can decide for certain whether any object belongs to it. Example: months starting with J = {January, June, July}. Non-example: best cricketers (depends on opinion).

20. Two overlapping circles A and B inside a rectangle (the universal set). A ∪ B is the whole region covered by either circle; A ∩ B is only the overlapping region.

21. 1 → (c), 2 → (a), 3 → (b), 4 → (d). Each symbol or example matches one idea from the chapter introduction.