Why Division by Zero Is Undefined

A calculator says ERROR for 12 ÷ 0 because no number times 0 gives 12. It is not infinity either.

Name: Date: Score: ____ / 17

A. Fill in the blanks

1. a ÷ b = c means c × b = ____.

2. For a ≠ 0, a ÷ 0 is ____.

3. For 0 ÷ 0, every number works, so there is no ____ answer.

4. Infinity is not a ____.

B. True or False

5. 5 ÷ 0 = 0. True / False

6. 0 ÷ 5 = 0. True / False

7. 0 ÷ 0 = 1. True / False

8. 12/x becomes very large as x gets close to 0. True / False

C. Assertion and reason

9. Assertion (A): 9 ÷ 0 is undefined.
Reason (R): No number multiplied by 0 gives 9.

(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): 0 ÷ 0 = 0.
Reason (R): Any number times 0 is 0.

(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. 0 ÷ 7 equals:

(a) 7
(b) 0
(c) undefined
(d) 1

Answer: _____

12. 7 ÷ 0 is:

(a) 0
(b) 7
(c) infinity
(d) undefined

Answer: _____

13. Why is 0 ÷ 0 undefined?

(a) no number works

(b) every number works, so no unique answer

(c) it equals 1

(d) it is infinity

Answer: _____

14. Division is defined as the reverse of:

(a) addition

(b) subtraction

(c) multiplication

(d) powers

Answer: _____

E. Short answer questions

15. Explain using multiplication why 8 ÷ 0 is undefined.

16. Why can't we say 8 ÷ 0 = infinity?

F. Match the columns

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

Column A	Column B	Your answer
1. 0 ÷ 5	(a) Undefined (no answer)	1 → ____
2. 5 ÷ 0	(b) Undefined (every answer)	2 → ____
3. 0 ÷ 0	(c) Reverse of multiplication	3 → ____
4. Division	(d) 0	4 → ____

Detailed solutions

1. a

2. undefined

3. single

4. number

5. False. 0×0 is 0, not 5; no number works.

6. True. $0 \times 5 = 0$.

7. False. Any number c satisfies $c \times 0 = 0$, so no single answer.

8. True. But it is $+\infty$ on one side and $-\infty$ on the other.

9. (a) R shows why no answer exists.

10. (d) A is false (every number works, so no unique answer); R is true.

11. (b) 0. $0 \times 7 = 0$.

12. (d) undefined. No number times 0 gives 7.

13. (b) every number works, so no unique answer. No single value.

14. (c) multiplication. $a \div b = c \Leftrightarrow c \times b = a$.

15. $8 \div 0 = c$ would need $c \times 0 = 8$. But $c \times 0 = 0$ for every c, so no c exists.

16. Infinity is not a number; also $8/x$ goes to $+\infty$ from one side and $-\infty$ from the other, so no single value.

17. 1 → (d), 2 → (a), 3 → (b), 4 → (c). Check every division by turning it into multiplication.