Terminating and Recurring Decimals

1/4 = 0.25 stops, but 1/3 = 0.333… never does. The remainders of long division decide: a remainder of 0 stops it, a returning remainder makes it repeat.

Name: Date: Score: ____ / 18

A. Fill in the blanks

1. If the remainder becomes 0, the decimal ____.

2. 1/3 = 0.333…, a ____ decimal.

3. In lowest form, a denominator with only factors 2 and ____ gives a terminating decimal.

4. 1/7 has a repeating block of ____ digits.

B. True or False

5. 3/8 has a terminating decimal expansion. True / False

6. 1/6 terminates. True / False

7. Every rational number is terminating or recurring. True / False

8. 0.101001000100001… is rational. True / False

C. Assertion and reason

9. Assertion (A): 7/80 has a terminating decimal.
Reason (R): $80 = 2^4 \times 5$ has only 2s and 5s.

(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): 1/12 terminates.
Reason (R): $12 = 2^2 \times 3$.

(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. Which terminates?

(a) 1/3
(b) 2/7
(c) 7/20
(d) 1/6

Answer: _____

12. 1/7 = 0.142857 repeating; the repeating block length is:

(a) 3
(b) 6
(c) 7
(d) 1

Answer: _____

13. Why must long division repeat if it never ends?

(a) digits are random

(b) remainders are less than the divisor, so one returns

(c) the divisor grows

(d) rounding

Answer: _____

14. A non-terminating, non-recurring decimal is:

(a) rational

(b) irrational

(c) an integer

(d) a fraction

Answer: _____

E. Numerical problems

15. Without long division, decide whether 17/125 and 11/24 terminate. Then write 17/125 as a decimal.

F. Short answer questions

16. How can you tell, without dividing, whether 13/40 terminates?

17. Write the decimal for 1/7 and explain why it repeats.

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. Remainder becomes 0	(a) Irrational	1 → ____
2. Remainder repeats	(b) Terminates	2 → ____
3. Denominator 2s and 5s only	(c) Recurring	3 → ____
4. Neither terminates nor repeats	(d) Terminating	4 → ____

Detailed solutions

1. terminates

2. recurring

3. 5

4. 6

5. True. $8 = 2^3$.

6. False. 6 has the factor 3, so it recurs.

7. True. Remainders must end at 0 or repeat.

8. False. It neither terminates nor repeats.

9. (a) R is the test that guarantees termination.

10. (d) A is false (factor 3 makes it recur); R is true.

11. (c) 7/20. $20 = 2^2 \times 5$.

12. (b) 6. 142857.

13. (b) remainders are less than the divisor, so one returns. Only finitely many remainders.

14. (b) irrational. By definition.

15. $125 = 5^3$ (only 5s) so 17/125 terminates; $24 = 2^3 \times 3$ (has 3) so 11/24 recurs; $17/125 = (17 \times 8)/(125 \times 8) = 136/1000 = 0.136$. **Answer: 17/125 = 0.136 (terminates); 11/24 recurs**

16. Lowest form 13/40; $40 = 2^3 \times 5$ has only 2s and 5s, so it terminates (0.325).

17. 0.142857142857… The remainders 1,3,2,6,4,5 cycle back, so the digits repeat with period 6.

18. 1 → (d), 2 → (c), 3 → (b), 4 → (a). The remainders decide the type of decimal.