Arithmetic or geometric?

Sequences and series. Give exact answers, or 3 significant figures where the answer is not a whole number.

Name _____

Date _____

Part A: one of each

Each question tells you which type of sequence it is.

1 **ARITHMETIC: A TERM**

$7,\ 11,\ 15,\ \ldots$ Find u_{20}.

Answer: _____

2 **ARITHMETIC: A SUM**

$7,\ 11,\ 15,\ \ldots$ Find S_{20}.

Answer: _____

3 **GEOMETRIC: A TERM**

$3,\ 6,\ 12,\ \ldots$ Find u_8.

Answer: _____

4 **GEOMETRIC: A SUM**

$3,\ 6,\ 12,\ \ldots$ Find S_8.

Answer: _____

Part B: you decide

Arithmetic: add the same amount each time (common difference d).

$u_n = u_1 + (n-1)d \qquad S_n = \frac{n}{2}(2u_1 + (n-1)d)$

Geometric: multiply by the same amount each time (common ratio r).

$u_n = u_1 r^{n-1} \qquad S_n = \frac{u_1(r^n - 1)}{r - 1}$

For each question, decide whether the sequence is arithmetic or geometric, then work out the answer. Each answer matches a letter in the code table. The letters from questions 1 to 8, in order, spell a word.

1

$5,\ 12,\ 19,\ \ldots$ Find u_{15}.

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

2

$2,\ 6,\ 18,\ \ldots$ Find u_9.

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

3

$4,\ 9,\ 14,\ \ldots$ Find the sum of the first 20 terms.

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

4

$80,\ 60,\ 45,\ \ldots$ Find u_7.

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

5

$5,\ 10,\ 20,\ \ldots$ Find the sum of the first 10 terms.

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

6

$48,\ 32,\ 16,\ \ldots$ Find u_{10}. (Check the ratio and the difference.)

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

7

A salary starts at 28 000 a year and rises by 4% each year. Find the salary in year 6, to 3 significant figures.

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

8

A theatre has 24 rows. The first row has 18 seats and each row has 2 more seats than the row in front. How many seats are there?

Which method? ☐ Arithmetic ☐ Geometric

Answer: _____ Letter: ___

−96	−40	1.25	14.2	64	99	103	110
L	**Z**	**I**	**M**	**X**	**T**	**F**	**S**
984	1030	2560	5115	13 122	33 600	34 100	39 366
E	**R**	**P**	**U**	**O**	**Y**	**A**	**H**

1	2	3	4	5	6	7	8

Answers

Part A

1. $d = 4$. $u_{20} = 7 + 19 \times 4 = 83$

2. $S_{20} = \frac{20}{2}(2 \times 7 + 19 \times 4) = 900$

3. $r = 2$. $u_8 = 3 \times 2^7 = 384$

4. $S_8 = \dfrac{3(2^8 - 1)}{2 - 1} = 765$

Part B

1. Arithmetic. $d = 7$. $u_{15} = 5 + 14 \times 7 = 103$ → **F**

2. Geometric. $r = 3$. $u_9 = 2 \times 3^8 = 13122$ → **O**

3. Arithmetic. $S_{20} = 10\,(2 \times 4 + 19 \times 5) = 1030$ → **R**

4. Geometric. $r = \frac{60}{80} = 0.75$. $u_7 = 80 \times 0.75^6 = 14.2$ → **M**

5. Geometric. $S_{10} = \dfrac{5(2^{10} - 1)}{2 - 1} = 5115$ → **U**

6. Arithmetic. The difference is -16 each time, so it is arithmetic (the ratios $\frac{32}{48}$ and $\frac{16}{32}$ are not equal). $u_{10} = 48 + 9 \times (-16) = -96$ → **L**

7. Geometric. $r = 1.04$. $u_6 = 28\,000 \times 1.04^5 = 34066.3 \approx 34\,100$ → **A**

8. Arithmetic. $S_{24} = 12\,(2 \times 18 + 23 \times 2) = 984$ → **E**

The word is **FORMULAE**. Some of the other letters come from common slips: using n instead of $n - 1$, finding a term when the question asks for a sum, or treating question 6 as geometric because the terms seem to halve.