## Unit 5: Sequences (and Making Sense of Units)– Assessment

**Name** Exemplar **PER** _____ **DATE** _____

| FIFA3 | NQA1 |
|---|---|
| | |

*Computation*

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| **Response has no recall errors, *minimal* procedural errors* and no conceptual errors**** | **Response has no recall errors, minimal procedural errors and *minimal* conceptual errors** | **Response has no recall errors, but has several procedural errors OR several conceptual errors** | **Recall errors exist OR Steps taken are not related to problem OR Response left blank** |

*Written Responses*

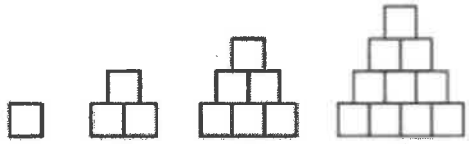
| 4 | 3 | 2 | 1 |
|---|---|---|---|
| **Response is written in a complete sentence and uses appropriate academic vocab** | **Response is written in a complete sentence, and minimal errors exist in use of academic vocab** | **Response is not written in a complete sentence OR no academic vocab** | **Concept of response is not related to problem OR Response is left blank** |

***Procedural errors** are mistakes made in the math
****Conceptual errors** are mistakes made in the steps one take

***BOX YOUR ANSWERS!!!***

**1. (FIFA3) Answer the questions below, using a complete sentence in part (b.).**

Some math students are building figures by stacking blocks in a triangular design. The first 4 figures are pictured below.




The same pattern of adding blocks to create new figures continues. Let $f(n)$ represent the total number of blocks in the $n$ th figure. So $f(1) = 1$, $f(2) = 3$, and so on.

Dear 5th period,

Regrettably, it has come to my attention that this problem does not use a constant rate of change, meaning it does not align to our practice. With that said, I only graded Q2 and Q3 for this standard.

a. Write an explicit function that can be used to determine the number of blocks for any value of n.

b. Explain why the function you wrote is explicit and NOT recursive. As part of your explanation, also write a recursive function that can be used to determine the number of blocks for any value of n.

**2. (FIFA3) Answer the question below.**

In a certain game, Kevin repeatedly rolls a standard six-sided number cube until a 6 appears. Let the sequence $a_n$ represent the probability that he needs exactly $n$ rolls, for $n \geq 1$. The first four terms of the sequence are shown below.

$n = 1, 2, 3, 4$

$$\frac{1}{6}, \frac{5}{36}, \frac{25}{216}, \frac{125}{1,296}, \cdots$$

(×5, ×5, ×5 between terms; ×6, ×6, ×6 between terms)

In the space below, write an equation of the form $a_n = AB^n$ that represents this sequence of probabilities.

$a_n = \frac{1}{6}\left(\frac{5}{6}\right)^{n-1}$

Plug in 1 → $\frac{1}{6}\left(\frac{5}{6}\right)^{1-1} = \frac{1}{6}\left(\frac{5}{6}\right)^{0} = \frac{1}{6} \cdot 1 = \frac{1}{6}$ ✓

**3. (FIFA3) Annotate the sequence below and write your answer in the space below.**

What is the recursive formula for the following arithmetic sequence?

42, 48, 54, 60…

$t(1) = 42, \quad t(n+1) = t(n) + 6$

**4. (NQA1) Show your work and box your answer for the problem below.**

It takes Gretchen 275 seconds to travel 5,500 meters in her car. What is her rate of speed in kilometers per hour?

$$\frac{5{,}500\ \text{m}}{275\ \text{sec}} \times \frac{3600\ \text{sec}}{1\ \text{hr}} \times \frac{1\ \text{km}}{1000\ \text{m}} = \frac{19800{,}000\ \text{km}}{275000\ \text{hr}}$$

$$= 72\ \frac{\text{km}}{\text{hr}}$$

**5. (NQA1) Annotate the problem below and set up the necessary ratios. Then, choose the best possible answer.**

An automobile driver uses a turn signal for the last 100 feet before a turn, traveling an average of 20 miles per hour during this time. Which expression can be used to calculate the amount of time, in seconds, the driver uses the turn signal for this turn?

A. $\frac{100 \times 60}{20 \times 5,280}$ ← not seconds

B. $\frac{20 \times 60^2}{100 \times 5,280}$ ← ft × ft

C. $\frac{100 \times 60^2}{20 \times 5,280}$ ← 3600

D. $\frac{100 \times 5,280}{20 \times 60^2}$ ← ft × ft

$100\text{ft} \times \frac{1\text{hr}}{20\text{miles}} \times \frac{1\text{mile}}{5280\text{ft}} \times \frac{3600\text{ sec}}{1\text{hr}}$

↑ given info ↑ change feet to miles ↑ change hours to seconds

**6. (NQA1) Show your work neatly in the space to the right of the table. Then, complete the table.**

Kathryn and her family moved from the United States to South America and are getting accustomed to using metric measurements in everyday life. Complete the conversion for each situation described in the table. Use the information below for your calculations, and then round any decimals to the nearest whole number for your answers.

1 kg ≈ 2.20 pounds 1 km ≈ 0.62 miles

| Situation | Conversion |
|---|---|
| buys 4 kg apples at the store | 4 kg = 9 pounds |
| sees road sign that says 29 km to the next town | 29 km = 18 miles |
| wants to drive a car at 55 miles/hr | 55 miles/hr = 89 km/hr |

$4\text{kg} \times \frac{2.2\text{lbs}}{1\text{kg}} = 8.8\text{lbs}$

$29\text{km} \times \frac{0.62\text{mi}}{1\text{km}} = 17.98\text{miles}$

$\frac{55\text{mi}}{\text{hr}} \times \frac{1\text{km}}{0.62\text{mi}} = \frac{55\text{ km}}{0.62\text{ hr}} = 88.71\frac{\text{km}}{\text{hr}}$