Grade 10 Numeracy Assessment
Sample B Assessment Key

Question	Key	Claim	Cognitive Level
1	(A)	Interpret	1
2	(B, A, E, C)	Apply	1
3	(C)	Apply	2
4	(70) *OR* (71)	Solve	2
5	(66 *AND* 220)	Solve	2
6	(A, A) *OR* (B, B)	Analyze	2
7	(B:A:B)	Interpret	1
8	(B *AND* C)	Interpret	1
9	(A *AND* D)	Apply	2
10	(4)	Solve	2
11	(50 *TO* 56)	Solve	2
12	(C:B:A)	Analyze	2
13	***Written Response***	All Claims	3
14	(B *AND* G)	Interpret	1
15	(B *AND* E)	Apply	1
16	(A, D, B, A) *OR* (B, D, A, A)	Apply	2
17	(8)	Solve	2
18	(B)	Solve	2
19	(A, C, C)	Analyze	2
20	(C *AND* D)	Interpret	1
21	(D)	Apply	1
22	(C:B:D:A)	Apply	2
23	(2, 1) *OR* (4, 2) *OR* (6, 3) *OR* (8, 4)	Solve	2
24	(291) *OR* (292)	Solve	2
25	(B *AND* D *AND* E)	Analyze	2
26	***Written Response***	All Claims	3

Fish Traps (Plan and Design)

This marking guide describes the features of a solution demonstrating a good understanding of the situation. It does not attempt to address all possible methods of solving. The relative importance of the components shown below will vary depending on the type and nature of the task.

COHERENT PROCESS (Interpretation of the problem and application of logic)

- Recognizes and uses the given relationships between the dimensions of the desired fish and the trap to calculate
  - trap length
  - trap diameter
- Recognizes and use the relationship between circle diameter and circumference to calculate trap circumference.
- Recognizes that the number of support rings would be 1 more than the calculated number of 8 cm intervals

COMPONENTS OF A CORRECT SOLUTION (Mathematical analysis and problem solving)

- Trap length: ***L* = 4 × fish length** e.g., 4 × 30 cm = **120 cm**
- Trap diameter: $\boldsymbol{D = \frac{\textbf{fish length}}{5} \times 6}$ e.g., $\frac{30\text{ cm}}{5} \times 6 =$ **36 cm**
- Trap circumference: $C = \pi D$ e.g., $\pi(36) \approx$ **113.1 cm**
- Number of 2 cm branches with 3 cm gap: $\frac{113.1}{5} \approx$ **22.6**
- Number of support rings = $\frac{120\text{ cm}}{8\text{ cm}} + 1 =$ **16**

COMMUNICATION (Explanation and justification)

- Identifies the trap length, diameter, and circumference based on fish length and body depth
- When determining the number of branches, answer is rounded to **22** or **23** and includes justification for the choice
- When calculating the number of support rings identifies that 1 additional ring is required for a final number of **16** rings
- Clear, detailed and organized final solution

Stopping Distances (Reasoned Estimates)

This marking guide describes the features of a solution demonstrating a good understanding of the situation. It does not attempt to address all possible methods of solving. The relative importance of the components shown below will vary depending on the type and nature of the task.

COHERENT PROCESS (Interpretation of the problem and application of logic)

- Extrapolates graphs based on their shapes **OR** extends the patterns based the increments shown in tables
- Reaction distance, braking distance, and total stopping distance are determined for both wet and dry conditions. Reaction distances increase by the same amount for wet and dry roads; stopping distances increase by a larger amount for wet roads
- Compares total stopping distances for wet and dry conditions

COMPONENTS OF A CORRECT SOLUTION (Mathematical analysis and problem solving)

- **Table**: <u>reaction distances -</u> increments of 4 m for each 10 km/h, for a total increase of 8 m

  45 m + 8 m = **53 m**

  DRY <u>braking distances</u> - increments of 11-13 m for each 10 km/h, for a total increase of 22-26 m

  67 m + 22 m = **89 m**
  (Range**: 89-93 m)**

  WET <u>braking distances</u> - increments of 17-22 m for a total increase of 35-44 m

  97 m + 35 m = **132 m**
  (Range**: 132-141 m)**

  TOTAL DRY stopping distance = 53 m + 89 m = 142 m (Range 142-146 m)
  TOTAL WET stopping distance = 53 m + 132 m = 185 m (Range 185- 194 m)

  DIFFERENCE = 185 – 142 = *approx.* **43 m (30%) to** *approx.* **194 – 146 = 48 m (33%)**

- **Graph**: <u>reaction distance</u> **53 m** DRY <u>braking distances</u> **94 m**
  WET <u>braking distances</u> **136 m**

  TOTAL DRY stopping distance = 53 + 94 = 147 m
  TOTAL WET stopping distance = 53 + 136 = 189 m

  DIFFERENCE = 189 – 147 = 42 m *approx.* **(29% further)**

COMMUNICATION (Explanation and justification)

- Showed how each of the three distances for wet and dry conditions was determined
- Calculated difference between the two total stopping distances, expressed as a distance or a percentage
- Mathematical or written descriptions of the logic and their assumptions

Hare and Lynx (Model)

This marking guide describes the features of a solution demonstrating a good understanding of the situation. It does not attempt to address all possible methods of solving. The relative importance of the components shown below will vary depending on the type and nature of the task.

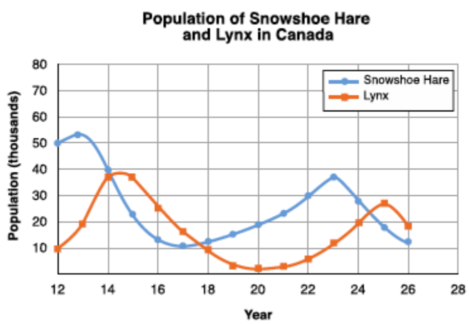
COHERENT PROCESS (Interpretation of the problem and application of logic)

- Recognize ten-year cycle length for both hare and lynx
- Recognize approximately two-year lag time between the peaks of hare and lynx populations
- Recognize that the populations are decreasing from the peak years (hare in year 13; lynx in year 15)
- Determine the percentage drop in peak populations

COMPONENTS OF A CORRECT SOLUTION (Mathematical analysis and problem solving)

- 2 year lag time between peak of hares and peak of lynx
- hare peak in year 23 (accept year 22-24); numbers 35 000-42 000
- lynx peak year 25 (accept year 24-26); numbers 25 000-29 000
- evidence of using % decrease rather than constant amount (27-30% decline)

Hare declines by (14 850-16 500); lynx decline by (10 530-11 700)



COMMUNICATION (Explanation and justification)

- Graph drawn with title, axes labels- vertical axis population in thousands
- Graph corresponds to the predictions
- Assumptions may include:
    - other factors (such as weather or disease) can be ignored
    - predator and prey relationship stay the same
    - length of population cycle remains constant
- Explanation includes calculations or evidence of estimation from the graph

Roommates (Fair Share)

This marking guide describes the features of a solution demonstrating a good understanding of the situation. It does not attempt to address all possible methods of solving. The relative importance of the components shown below will vary depending on the type and nature of the task.

COHERENT PROCESS (Interpretation of the problem and application of logic)

- Select and communicate a strategy for dividing the rent and utilities in a way that considers the equity of the living situation.
- Divide the costs of the rent ($1200) and utilities ($240) based on the information provided, considering the relative amounts of shared and personal space used by each roommate, and time spent in the apartment.

COMPONENTS OF A CORRECT SOLUTION (Mathematical analysis and problem solving)

Rent: Divide rent ($1200) by area. Assume each renter uses 1/3 of shared area, plus their bedroom.

Shared area in apartment: (118.96 – 9.81–16.56 – 14.01 – 6.76 = 71.82 m^2) → (71.82)/3 = 23.94 m^2 each

You: (share + BR 1): (23.94 + 9.81)/118.96 = 0.2837 → 0.2837 × $1200 = **$340.44**
Taylor: (share + BR 2): (23.94 + 16.56)/118.96 = 0.3404 → 0.3404 × $1200 = **$408.48**
Pat: (share + BR 3 + Den): (23.94 + 14.01 + 6.76)/118.96 = 0.3758 → 0.3758 × $1200 = **$450.96**

Utilities: $240/month. An "equal" share is $80 each. A "fair" share would consider roommate area.

For Taylor's absence for 3/7 of the next 6 months, reduce their share to 4/7 of $80 = **$45.71**.

You and Pat would pay ($240 – $45.71)/2 = **$97.15** each.

Share of $1440: **You: 340.44 + 97.15 = $437.59 → $438**
Taylor: 408.48 + 45.71 =$454.19 → $454
Pat: 450.96 + 97.15 = $548.11 → $548

(Note: Would be appropriate for the six-month period during which Taylor will be partly absent. Otherwise, the utilities share should be $80 each, or divided based on each roommate's area.)

COMMUNICATION (Explanation and justification)

- Solution must identify which aspects of the living arrangement are not distributed equally (area usage and time spent in apartment)
- Applies a method of adjusting the rent and utilities reflecting a fair distribution of costs. Rent and utilities could be considered separately or together, but the logic should be explained and determined mathematically.
- Monthly shares of the roommates must total $1440.