

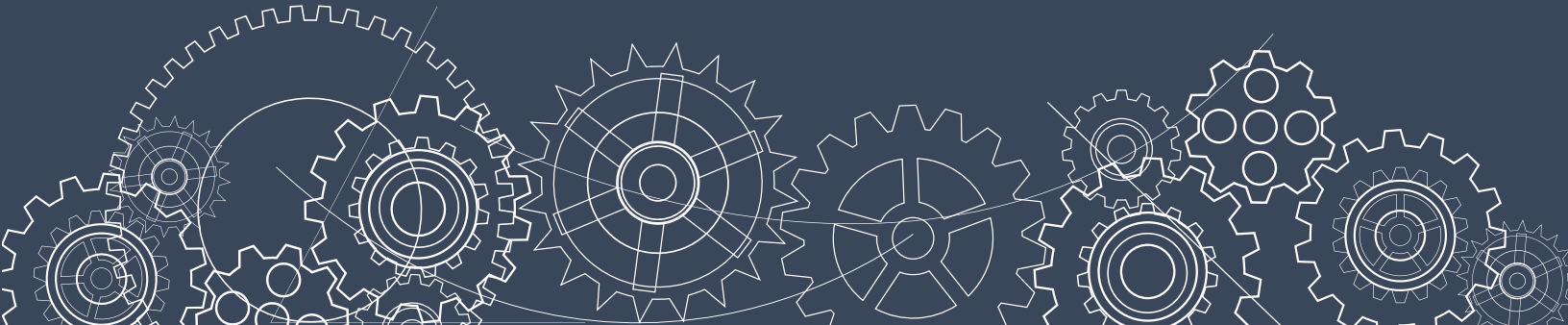


Graduation Numeracy Assessment 2019 SAMPLE ASSESSMENT B



BRITISH
COLUMBIA

Ministry of
Education



Common Component



Questions on computer,
responses completed on computer

In this part you will:

- read 2 tasks
- complete 6 questions for each task

Value: 30%

Suggested Time: 40 minutes

Plan and Design: Fish Traps

Task 1: Fish Traps

1. What is the most critical piece of information to know before building a cone-shaped fish trap?

☐ size of fish in the river

☐ spread of the current in the river

☐ number of fish traps in the river

☐ height of willow trees near the river

2. Match the descriptions to the dimensions in the diagram.

Radius of trap opening

Diameter of trap opening

Distance between support rings

Length of branches used for sides of the trap

Reasoned Estimates: Stopping Distances

Task 2: Vehicle Stopping Distances

BRITISH TRAINING HANDBOOK

Stopping Distances

The **THINKING DISTANCE** is the distance your car travels from the time the driver notices that they need to stop to the time the vehicle is brought to a stop.

The **THINKING DISTANCE** depends on how long it takes the driver to notice that they need to stop, and how long it takes them to apply the brakes.

The **THINKING DISTANCE** depends on many factors such as driver age, experience, whether the driver is tired, and the condition of the road.

The **BRAKING DISTANCE** is the distance your car travels from the time the driver applies the brakes to the time the vehicle comes to a stop.

The **BRAKING DISTANCE** depends on the speed of the car, the condition of the road, and the condition of the brakes.

7. Classify the following relationships.

Drag and drop the terms **Linear** or **Non-linear** into the spaces provided.

Thinking Distance versus Speed	Reaction Distance versus Speed	Total Stopping Distance versus Speed

8. Which of the following occurs as a vehicle approaches 75 km/h?

Select all that apply.

☐ Reaction Distance exceeds 40 m.

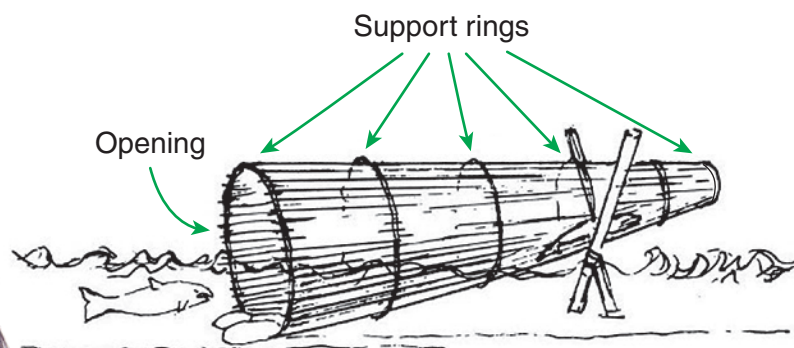
☐ Total Stopping Distance exceeds 60 m.

☐ Braking Distance begins to exceed Reaction Distance.

☐ Reaction Distance is approximately equal to Total Stopping Distance.

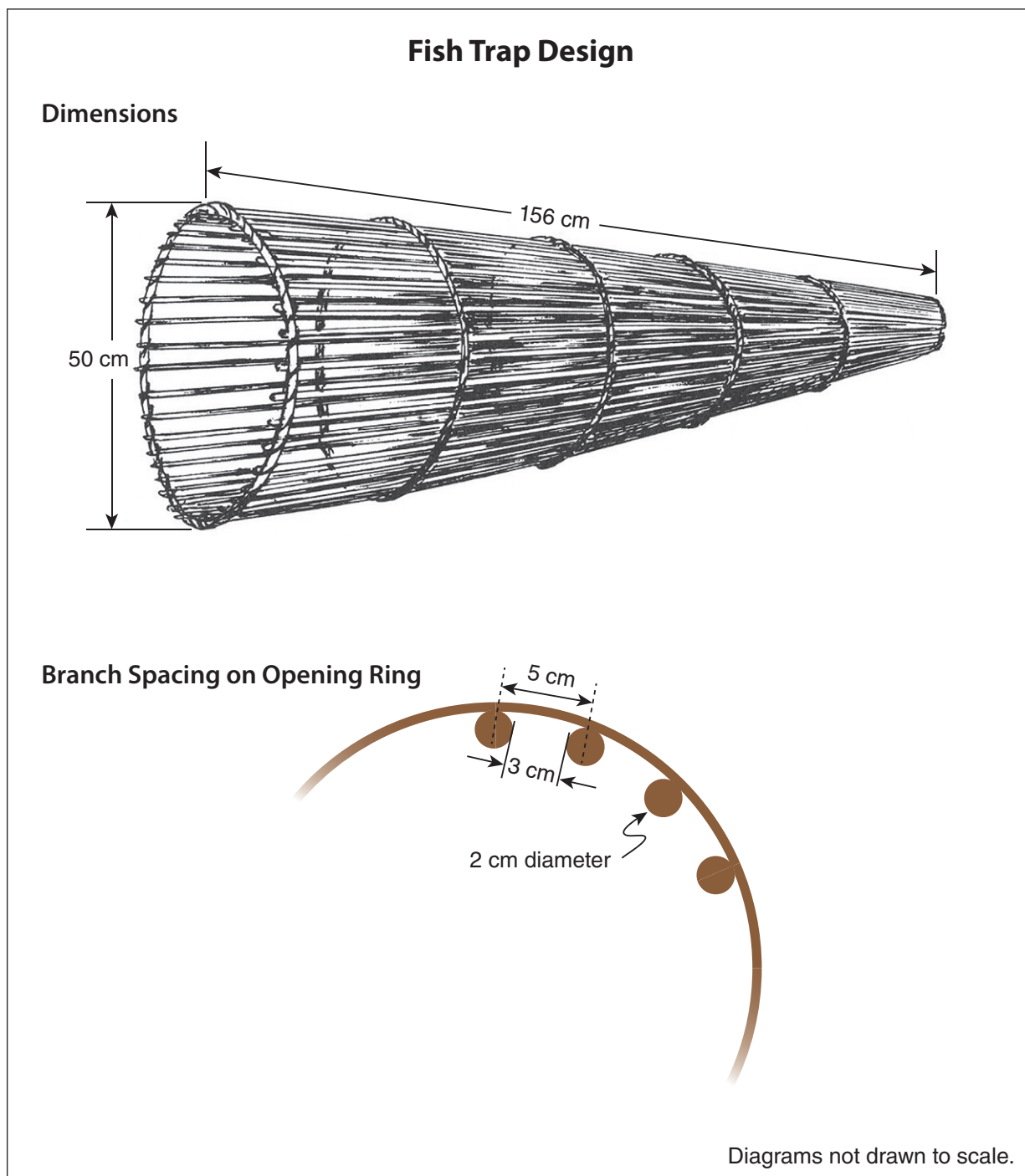
TRADITIONAL FISH TRAPS

For thousands of years, First Nations people in British Columbia used a variety of fish traps in rivers and along the coast to catch fish. One common fishing method was the basket or cone-shaped trap with a circular opening. This trap is made of branches from red willow trees. The size of the trap would depend on the size and species of fish that people were trying to catch.



Opening of trap weighted with rocks; end propped up.

You decide to build your own fish trap using the following design:



1. Which of the following factors would be most important in designing a cone-shaped fish trap?

- ☐ size of fish in the river
- ☐ speed of the current in the river
- ☐ number of fish traps in the river
- ☐ height of willow trees near the river

2. Match the descriptions to the dimensions in the diagram.

Drag and drop the letters to the boxes below.

Radius of trap opening



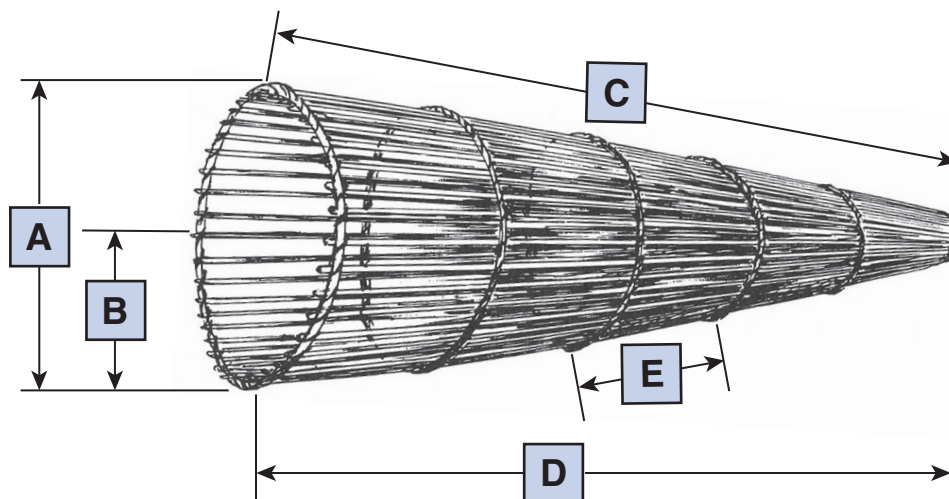
Diameter of trap opening



Distance between support rings



Length of branches used for sides of the trap



3. In order to build the fish trap shown in the design, you need branches for the length of the sides of the trap and 6 additional branches for the support rings.

Which of the following expressions will calculate the number of branches required to build this trap, if d = diameter of fish trap opening?

☐ $\frac{\pi d}{2} + 6$

☐ $\frac{\pi d}{3} + 6$

☐ $\frac{\pi d}{5} + 6$

☐ $\frac{\pi d + 6}{3}$

4. You consider building another, larger fish trap.

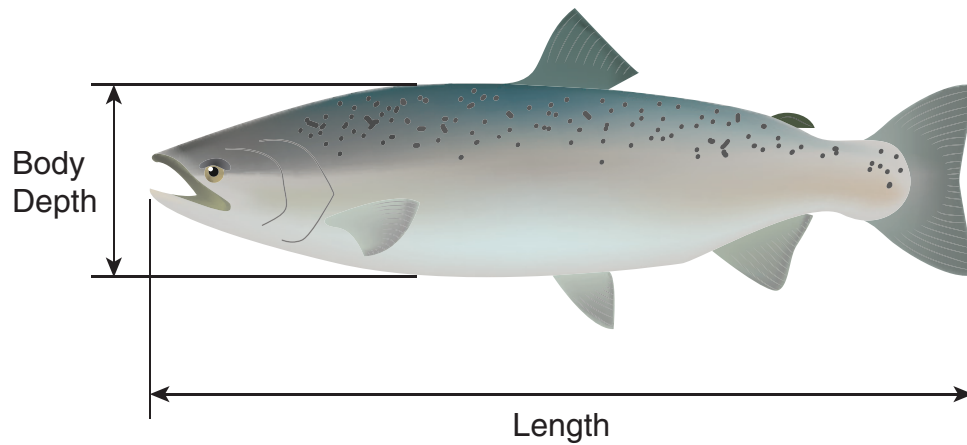
If you want to double the area of the opening of the original fish trap design, what is the required diameter?

Record your answer, rounded to the nearest centimetre.

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 cm

5. The diameter of your fish trap opening should be 6 times the body depth of the fish; the length of the fish trap should be 4 times the length of the fish. The fish you intend to catch have a length to body depth ratio of 5:1, and a typical length of 55 cm.



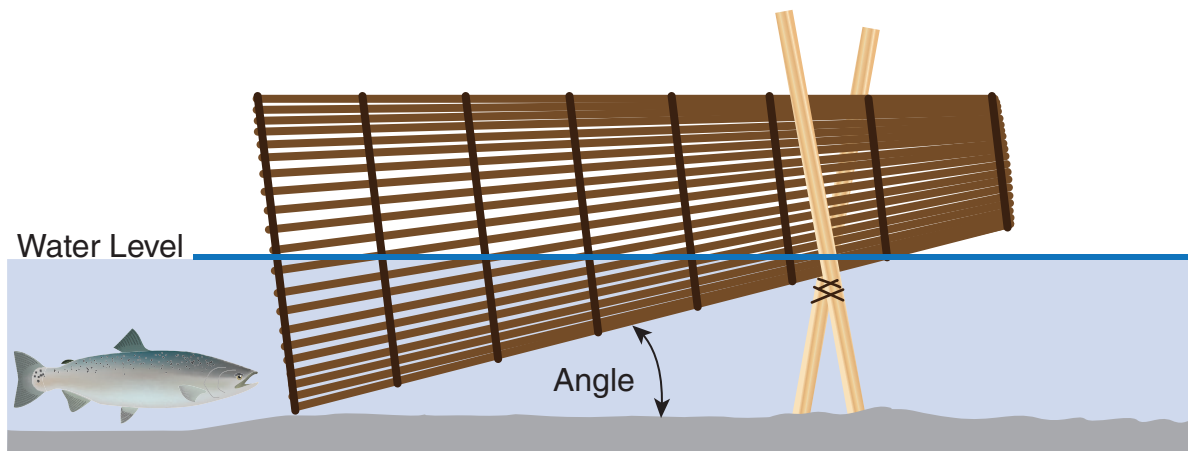
Determine the diameter of the fish trap opening and the length needed.

Record your answers, rounded to the nearest centimetre.

Fish Trap Opening Diameter cm

Fish Trap Length cm

6. When the fish trap is propped up, fish enter, get stuck above the water level, and are unable to escape.



Complete the sentence considering the angle between the fish trap and the river bottom.

▼

Decreasing
Increasing

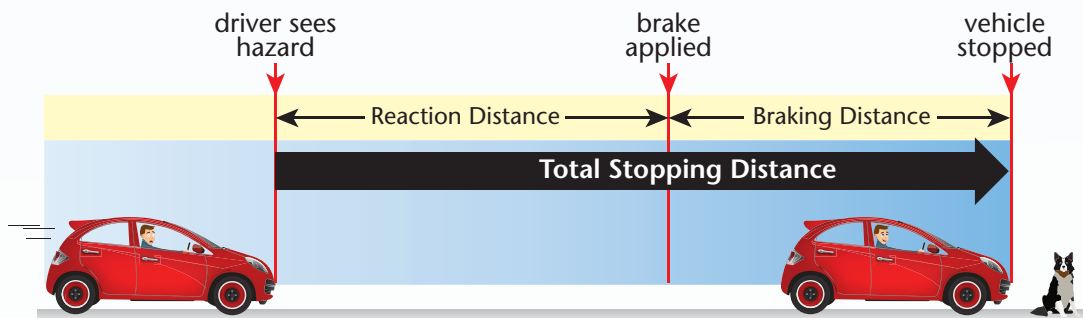
the angle will

▼

decrease
increase

the part of the fish trap that is above the water level on which fish can get trapped.

Stopping Distances



TOTAL STOPPING DISTANCE: distance a vehicle travels from the time the driver sees a hazard to the time vehicle is fully stopped.

REACTION TIME: time from when the driver sees a hazard to the time when they apply the brakes.

- typically between 1 and 2 seconds
- depends on factors such as driver's age, experience, and whether the driver is tired, distracted or impaired (by alcohol, medication or drugs)

REACTION DISTANCE: distance vehicle travels during the reaction time.

BRAKING DISTANCE: distance vehicle travels from when the brakes are applied until the vehicle is fully stopped.

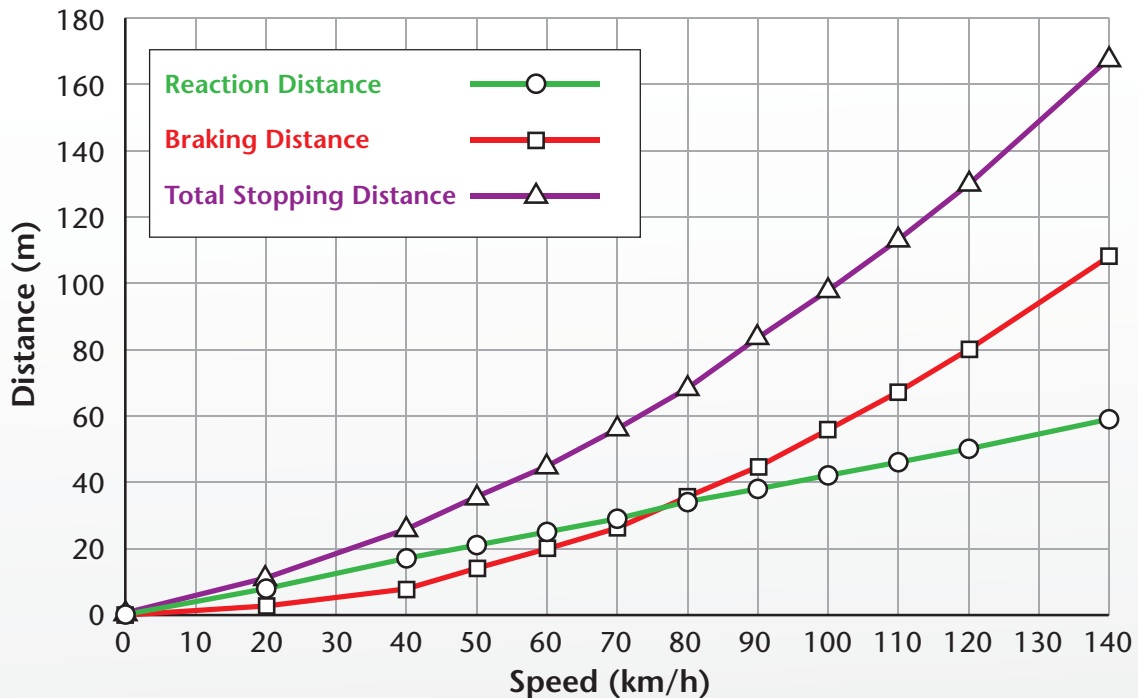
- affected by factors such as friction between the tires and road surface, condition of braking system, and condition of tires

Stopping Distances

Reaction, Braking and Total Stopping Distances on a Dry Road for a Typical Car

Speed (km/h)	Reaction Distance (m)	Braking Distance (m)	Total Stopping Distance (m)
0	0	0	0
20	8	2	11
40	17	9	26
50	21	14	35
60	25	20	45
70	29	27	57
80	34	36	69
90	38	45	83
100	42	56	98
110	46	67	113
120	50	80	130
140	59	109	168

Numbers may not add up due to rounding.



NOTE TO AWIS: Please have a tool for students to be able to draw a vertical line or place a ruler on the graph.

7. Classify the following relationships.

Drag and drop the terms Linear or Non-linear into the spaces provided.

Linear		Non-linear
Braking Distance versus Speed	Reaction Distance versus Speed	Total Stopping Distance versus Speed

8. Which of the following occurs as a vehicle approaches 75 km/h?

Select all that apply.

- ☐ Reaction distance exceeds 40 m.
- ☐ Total stopping distance exceeds 60 m.
- ☐ Braking distance begins to exceed reaction distance.
- ☐ Reaction distance is approximately equal to total stopping distance.

9. Which steps could you use to estimate the total stopping distance if you are driving at 120 km/h?

Select all that apply.

- ☐ Extend the total stopping distance graph to 120 km/h.
- ☐ Add the total stopping distances at 80 km/h and 40 km/h.
- ☐ Multiply the sum of the braking and reaction distances at 40 km/h by 3.
- ☐ Extend the braking and reaction distance graphs to 120 km/h and add the values.
- ☐ Extend the braking distance graph to 120 km/h and subtract the reaction distance at 120 km/h.

10. If the car's speed is doubled, how much longer is the braking distance?

Record your answer, rounded to the nearest whole number.

times longer

11. Estimate the reaction distance for a car traveling at 130 km/h.

Record your answer, rounded to the nearest metre.

m

12. Your friend's car has old tires. Her driving instructor tells her that older tires have a lower braking performance than newer tires. Your friend says:

"So, my total stopping time is longer because my braking distance *increases* and my reaction time *increases*."

Complete the driving instructor's response to your friend.



I think my total stopping time *increases* because my braking distance *increases* and my reaction time *increases*.

It's actually the stopping distance that is affected. Your braking distance

your reaction distance

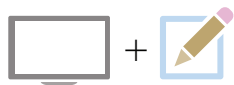
so your total stopping distance is

decreases,
stays the same,
increases,

decreases,
stays the same,
increases,

longer.
shorter.

Student-Choice Component



Questions on computer,
responses completed on pink response sheet

In this part you will:

- choose the task for which you would like to complete an extensive constructed response question
- complete the extensive constructed response question

Value: 20% Suggested Time: 20 minutes

Think carefully; once you make your choice you must complete this question.

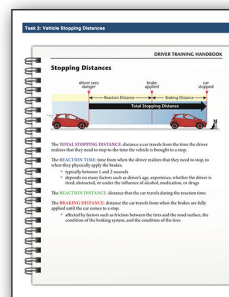
Plan and Design: Fish Traps



Design and draw a fish trap using given criteria.

OR

Reasoned Estimates: Stopping Distances



Use data to estimate the stopping distance for a vehicle under certain conditions.

You have chosen:

Fish Traps



Design and draw a fish trap using given criteria.

13. Answer this question on the pink sheet.

You would like to build a cone-shaped fish trap, and have noted the following criteria.

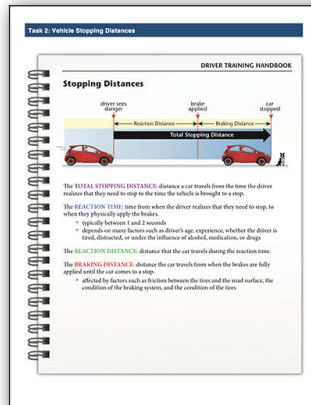
- The fish you wish to trap can be up to 30 cm long.
- The trap should be 4 times longer than the fish you wish to trap.
- The ratio of length to body depth of these fish is typically 5:1.
- The diameter of the trap opening should be 6 times the body depth of the fish you wish to trap.
- The branches that form the length of the trap are 2 cm in diameter and have a 3 cm gap between them at the trap opening.
- Support rings are required every 8 cm along the length of the trap.

Design a fish trap with these criteria in mind. Draw your design, including dimensions, and identify the number of branches you would need for each part of the trap.

Explain and justify your solution. Be sure to include any calculations, estimations, and any assumptions you made.

You have chosen:

Stopping Distances



Use data to estimate the
stopping distance for a vehicle
under certain conditions.

Reasoned Estimates: Stopping Distances

13. Answer this question on the pink sheet.

Using the tables, estimate the reaction distance, braking distance, and total stopping distance, in wet and dry conditions, for cars travelling at 130 km/h.

How much further would the car travel while stopping in wet conditions?

Explain and justify your solution. Be sure to include any calculations, estimations, and assumptions you made.

**Reaction, Braking and Total Stopping
Distances on a Dry Road for a Typical Car**

Speed (km/h)	Reaction Distance (m)	Braking Distance (m)	Total Stopping Distance (m)
40	17	9	26
50	21	14	35
60	25	20	45
70	29	27	56
80	33	36	69
90	37	45	83
100	41	56	98
110	45	67	113

**Reaction, Braking and Total Stopping
Distances on a Wet Road for a Typical Car**

Speed (km/h)	Reaction Distance (m)	Braking Distance (m)	Total Stopping Distance (m)
40	17	13	30
50	21	20	41
60	25	29	54
70	29	40	69
80	33	52	85
90	37	65	103
100	41	80	122
110	45	97	143

Common Component



Questions on computer,
responses completed on computer

In this part you will:

- read 2 tasks
- complete 6 questions for each task

Value: 30%

Suggested Time: 40 minutes

Model: Snowshoe Hare and Lynx

Task 3: Snowshoe Hare and Lynx

YUKON NEWS
Lynx sightings increasing

Approximate population of snowshoe hares and lynxes in the Yukon Territory from 1980 to 1995. The population of snowshoe hares is shown in blue and the population of lynxes is shown in orange. The population of hares peaks every 10 years, and the population of lynxes peaks about 5 years after the peak of the hares.

Population of Snowshoe Hares (in thousands)

Year	Population (thousands)
1980	1.0
1981	1.5
1982	2.0
1983	2.5
1984	3.0
1985	3.5
1986	4.0
1987	4.5
1988	5.0
1989	5.5
1990	6.0
1991	6.5
1992	7.0
1993	7.5
1994	8.0
1995	8.5

Population of Lynxes (in thousands)

Year	Population (thousands)
1980	0.1
1981	0.2
1982	0.3
1983	0.4
1984	0.5
1985	0.6
1986	0.7
1987	0.8
1988	0.9
1989	1.0
1990	1.1
1991	1.2
1992	1.3
1993	1.4
1994	1.5
1995	1.6

20. In which of the following years did the snowshoe hare population peak?
Highlight all that apply.

1981 1983 1985 1987 1989 1991 1993 1995

21. Which of the following statements are true?
Select all that apply.

☐ In 1983 there were 20 lynx.

☐ The snowshoe hare population has approximately a ten-year cycle.

☐ The snowshoe hare population is always greater than the lynx population.

☐ The lynx population peaks about 5 years after the peak of the snowshoe hare population.

☐ There are times when there are approximately equal numbers of snowshoe hare and lynx.

Fair Share: Roommates

Task 1: Roommates

You are planning to move into a 3-bedroom apartment with two roommates. The floor plan for the apartment is below.

Floor Plan:

- Living Room: 4.50 m x 3.66 m
- Dining Room: 3.66 m x 3.66 m
- Kitchen: 2.40 m x 2.40 m
- Bedroom 1: 4.50 m x 3.66 m
- Bedroom 2: 4.50 m x 3.66 m
- Bedroom 3: 3.66 m x 3.66 m
- Bathroom: 2.40 m x 2.40 m
- Hallway: 2.40 m x 2.40 m
- Entry: 2.40 m x 2.40 m

Total Apartment Area: 118.08 m²

You and your roommates agree that all space in the apartment other than bedrooms will be Common Area, to be shared by all.

14. What information do you need in order to divide the monthly expenses so that each roommate pays an equal amount?
Select all that apply.

☐ size of bedrooms

☐ size of each month

☐ number of roommates

☐ total cost of shared expenses

15. The first month's rent includes a damage deposit. The damage deposit is equal to a half of one month's rent. This deposit is returned to the tenant at the end of the rental agreement if the apartment is in good condition.

If costs are shared equally, each of the following represents the cost of rent and utilities for each roommate for the entire first year?

☐ $\frac{1200 \times 12}{3}$

☐ $\frac{1200 \times 12 \times 12}{3}$

☐ $\frac{1200 \times 12 \times 12 \times 12}{3}$

☐ $\frac{1200 \times 12 \times 12 \times 12 \times 12}{3}$

YUKON NEWS

Lynx sightings increasing

Lynx rely almost entirely on snowshoe hare as their main food source. Each lynx eats approximately 2 snowshoe hare every 3 days. Over the years, both populations have risen and fallen. The relationship between the snowshoe hare population and the lynx population has been documented for over 200 years.

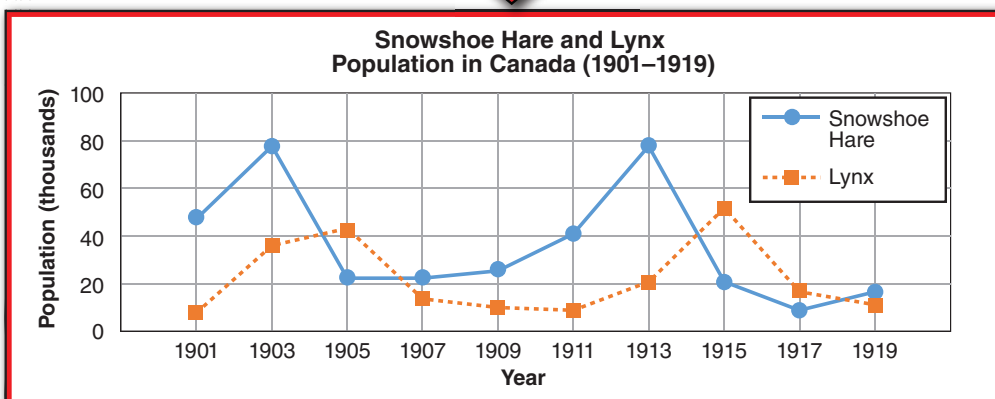
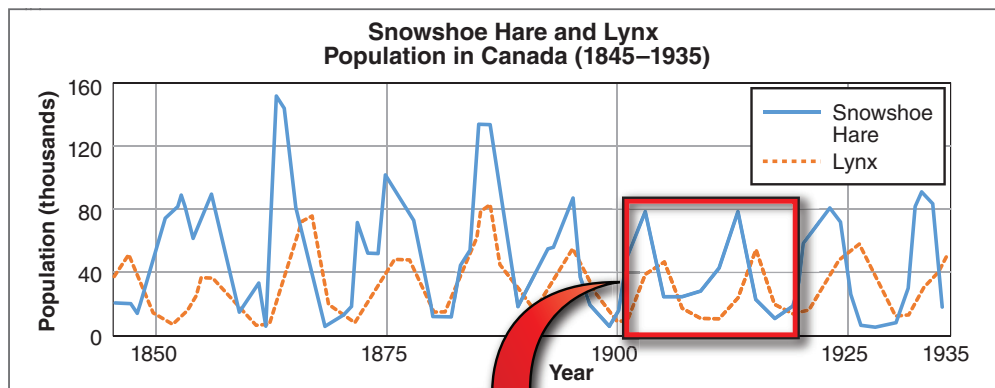


Snowshoe Hare

Year	Snowshoe Hare Population (x 1000)	Lynx Population (x 1000)
1901	47	6
1903	77	35
1905	21	42
1907	21	13
1909	25	9
1911	40	8
1913	77	20
1915	20	51
1917	8	16
1919	16	10



Lynx



14. In which of the following years did the snowshoe hare population peak?

Highlight all that apply.

1901	1903	1905	1907	1909
1911	1913	1915	1917	1919

15. Which of the following statements are true?

Select all that apply.

- ☐ In 1913 there were 20 lynx.
- ☐ The snowshoe hare population has approximately a ten-year cycle.
- ☐ The snowshoe hare population is always greater than the lynx population.
- ☐ The lynx population peaks about 5 years after the peak of the snowshoe hare population.
- ☐ There are times when there are approximately equal numbers of snowshoe hare and lynx.

16. A biologist started tracking the number of lynx in the Yukon. They recorded the population every 3 years as follows:

Year	Number of Lynx
0	11 000
3	28 000
6	42 000
9	5 000
12	18 000
15	40 000

Create an equation to calculate the percent decline in the lynx population between years 6 and 9.

Drag and drop the operations and numbers into the boxes below.

42 000 5000 + − × ÷

$$\% \text{ decline} = \frac{\boxed{} \boxed{} \boxed{}}{\boxed{}} \times 100$$

17. From 1901 to 1919, what was the highest ratio of snowshoe hare to lynx that occurred?

Answer to the nearest whole number.

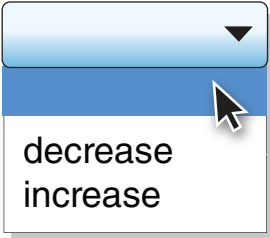
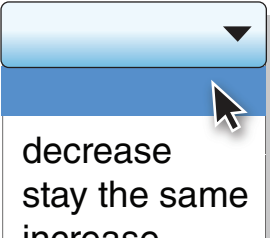
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18. Approximately how many snowshoe hare does one lynx eat in a year?

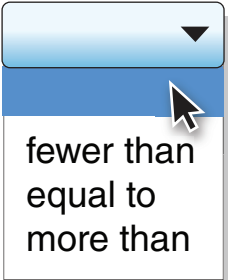
- ☐ 120
- ☐ 240
- ☐ 550
- ☐ 730

19. Assume the trends shown in the graph from 1901 to 1919 continue.

Complete the following statements for the years 1919 to 1921.

The number of lynx will . The number of snowshoe hare will .

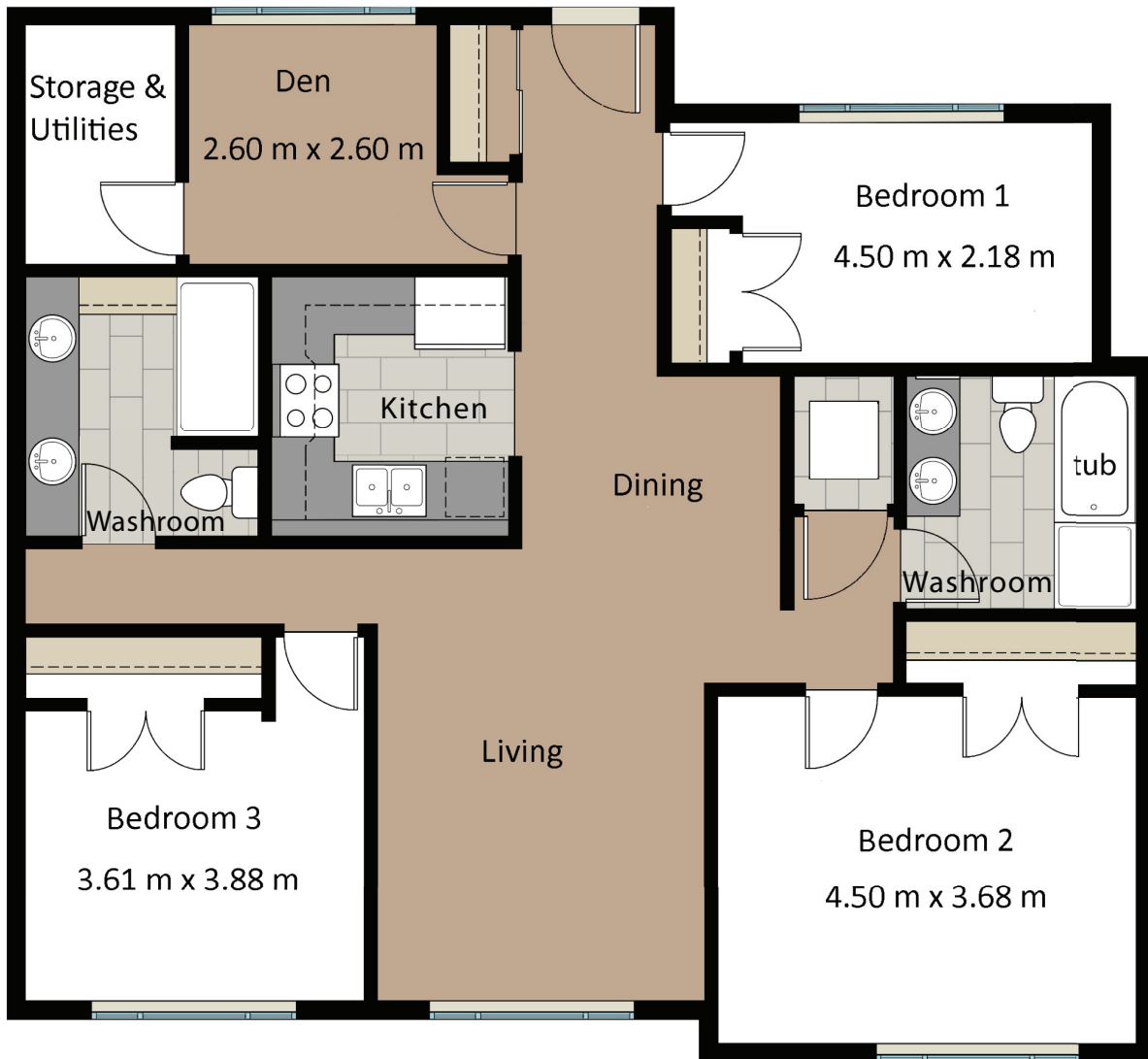
The first dropdown menu contains the options: decrease, increase. The second dropdown menu contains the options: decrease, stay the same, increase.

The number of snowshoe hare will be  the number of lynx.

The dropdown menu contains the options: fewer than, equal to, more than.

Fair Share: Roommates

You are planning to move into a 3-bedroom apartment with two roommates. The floor plan for the apartment is below.



Total Apartment Area: 118.96 m²

You and your roommates agree that all space in the apartment other than bedrooms will be common area shared by all.

In this apartment, the cost of utilities (electricity, internet) is paid by the renters. You and your roommates decide to divide the rent and utilities. Food costs will be handled individually.

You create a spreadsheet to help in budget planning and calculating the size of each of the bedrooms:

	A	B	C	D	E
1		Budget Planning			
2	Expense	Cost per Month (\$)	Cost per Person (\$)		
3	Rent	1200			
4	Electricity	110			
5	Internet	130			
6	Total	1440			
7					
8					
9		Size of Bedrooms			
10		Length (m)	Width (m)	Area (m²)	
11	Bedroom 1	4.50	2.18	9.81	
12	Bedroom 2	4.50	3.68	16.56	
13	Bedroom 3	3.88	3.61	14.01	
14					

20. What information do you need in order to divide the monthly expenses so that each roommate pays an equal amount?

Select all that apply.

- ☐ size of bedrooms
- ☐ days in each month
- ☐ number of roommates
- ☐ total cost of shared expenses

21. The first month's rent includes a damage deposit. The damage deposit is equal to half of one month's rent. This deposit is returned to the renters at the end of the rental agreement if the apartment is in good condition.

If costs are shared equally, which of the following represents the cost of rent and utilities for each roommate for the entire first year?

- ☐ $\frac{1200 \times 12}{3} + 600$
- ☐ $\frac{(1200 \times 1.5) \times 12}{3}$
- ☐ $\frac{(1200 \times 1.5 + 110 + 130) \times 12}{3}$
- ☐ $\frac{[(1200 + 110 + 130) \times 12] + 600}{3}$

22. There are several ways of comparing the areas of the largest and smallest bedrooms.

Drag and drop each term to the expression it best describes.

$\frac{16.56}{9.81}$		Difference
$\frac{16.56 - 9.81}{16.56} \times 100$		Percentage Difference
$\frac{16.56}{9.81} \times 100$		Ratio
$16.56 - 9.81$		Percentage

23. Using only whole numbers, approximate the ratio of common area to total bedroom area in the apartment.

 :

24. It is decided that you will have Bedroom 1.

If the monthly rent of \$1200 was divided based on bedroom area, what would be your share of the rent?

Record your answer, rounded to the nearest dollar.

\$

25. Which of the following would be valid reasons for having some roommates pay a larger share of the costs than others?

Select all that apply.

- ☐ No one uses the storage room.
- ☐ The bedrooms are different sizes.
- ☐ One roommate spends more money on food.
- ☐ One roommate works from home and has taken over the den for their office space.
- ☐ Roommate in Bedroom 3 has taken over the bathroom near their bedroom for their own personal use.

Student-Choice Component



Questions on computer,
responses completed on yellow response sheet

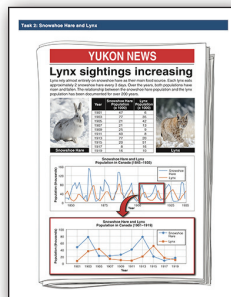
In this part you will:

- choose the task for which you would like to complete an extensive constructed response question
- complete the extensive constructed response question

Value: 20% Suggested Time: 20 minutes

Think carefully; once you make your choice you must complete this question.

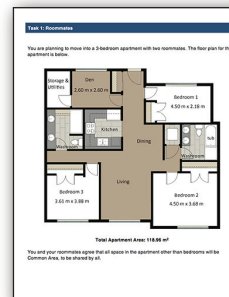
**Model:
Snowshoe Hare and Lynx**



Use a graph to predict
the peak hare and lynx
populations.

OR

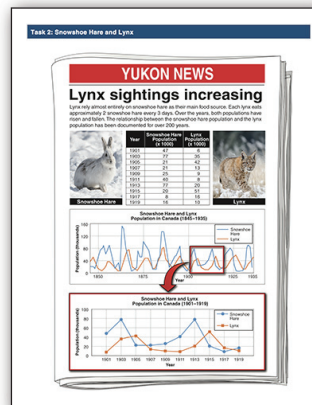
**Fair Share:
Roommates**



Propose a fair way to
divide the rent and utilities
among roommates.

You have chosen:

Snowshoe Hare and Lynx

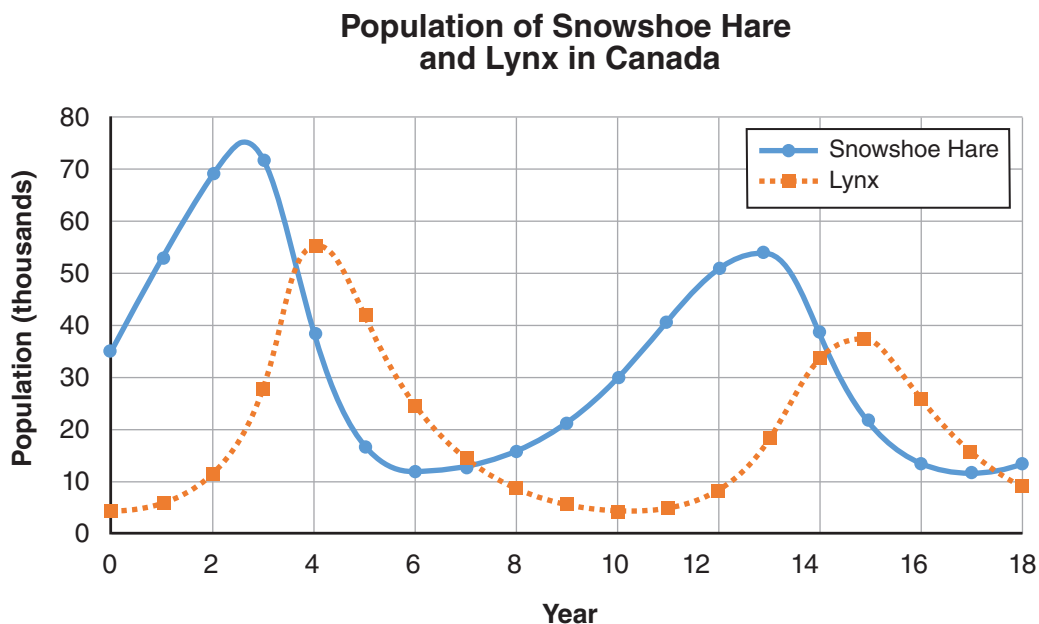


Use a graph to predict the peak hare and lynx populations.

26. Answer this question on the yellow sheet.

The relationship between the numbers of snowshoe hare and lynx is tightly linked, as the snowshoe hare make up over 95% of the diet of the lynx. The graph shows the cyclical nature of this relationship.

Biologists have noted a recent decline in the numbers of snowshoe hare and lynx at the peak of their cycles. They are estimating a similar percentage decrease in the next cycle as well.

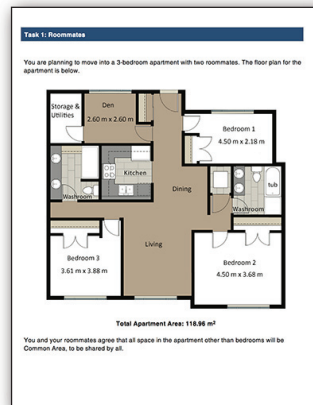


Using the information in the graph above, predict the peak populations of each species in their next cycle. Create a graph starting at year 16 showing population numbers and the time (year) when these peaks will occur.

Explain and justify your solution. Be sure to include any calculations, estimations, and assumptions you made.

You have chosen:

Roommates



Propose a fair way to
divide the rent and utilities
among roommates.

26. Answer this question on the yellow sheet.

You have Bedroom 1, Taylor has Bedroom 2, and Pat has Bedroom 3. Pat requests to use the den as an office space. Taylor will only be home 4 days a week for the next 6 months.

Considering this, propose a fair way to divide the monthly rent and utilities of this apartment for the 6 months.

Explain and justify your solution. Be sure to include any calculations, estimations, and any assumptions you made.