

The Rooftop Garden Project

A Grade 7 Performance Task

Name:		Date:	
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ACT 1 · Notice & Wonder — The Situation

Your school has been granted permission to transform a 240 m² rooftop space into a community garden. Before doing any calculations, take a moment to think about what you already know and what you are curious about.

What I NOTICE...	What I WONDER...
<i>(Write down anything you observe about this situation — numbers, words, relationships)</i>	<i>(Write down any questions you have — mathematical or otherwise)</i>
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Talk with your partner: Share your most interesting 'Notice' and 'Wonder' with a partner. Together, agree on ONE mathematical question you think this task will ask you to answer.

What We Know — The Garden Plan

The rooftop ($20\text{ m} \times 12\text{ m} = 240\text{ m}^2$) will be divided into four sections:

Vegetables	Herbs	Pollinator Garden	Seating & Paths
3/8 of total	1/4 of total	1/5 of total	Remaining fraction

Your job as a member of the student planning committee is to use mathematics to design the garden, analyse survey data, communicate your plan, and manage the project budget.

Our Learning Goal for This Task

We are learning to apply our understanding of fractions, decimals, percentages, proportional reasoning, area, algebra, and data to solve a real-world design challenge — and to communicate our mathematical thinking clearly and precisely.


UNDERSTAND	PLAN	DO	CHECK & REFLECT
What do I know? What do I need to find?	What strategy will I use? What representation will help?	Show all steps. Label everything. Use math vocabulary.	Does my answer make sense? Which 'I can' can I tick off?

ACTIVATE · Warm-Up — Skills You Will Need Today

Complete these independently before starting the task. They use skills you already know.

<p>W1. Convert $\frac{2}{5}$ to a decimal and a percentage.</p> <div style="border: 1px solid #ccc; height: 100px; width: 100%;"></div>	<p>W2. Find 25% of 120. Show your method.</p> <div style="border: 1px solid #ccc; height: 100px; width: 100%;"></div>
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W3. Solve for w: $1.5 \times w = 54$	W4. What fraction of 240 is 90? Write in simplest form.
_____ _____ _____	_____ _____ _____

 **Talk with your partner:** Check W1–W4 with your partner. Where do you agree? Where do you disagree? Talk through any differences before moving on.

PART A · Knowledge and Understanding **/18**
marks

- I can** convert a fraction to an equivalent decimal and percentage.
- I can** determine a missing fraction when given all others, and verify the parts total 1.
- I can** calculate the area of each section from a fraction of 240 m².
- I can** write an algebraic expression for an unknown dimension and solve for its value.

Demonstrate your knowledge of fractions, decimals, percentages, area, and algebraic reasoning.

Question 1 **6 marks**

The rooftop is divided into sections. Convert each fraction into a decimal and a percentage. *The first row is done for you as a model. Study it carefully before completing the rest.*

Section	Fraction of total	Decimal	Percentage
Vegetables	3/8	0.375 ✓	37.5% ✓
Herbs	1/4		

Pollinator Garden	$\frac{1}{5}$		
Seating & Paths	?		
TOTAL	<i>1 whole</i>	1.0	100%


★ *The Seating & Paths row is missing. Work out the fraction, then complete the row.*


Show your work for the missing fraction:

Question 2

6 marks

Calculate the actual area in m^2 for each section. Use your fractions from Question 1.

 **Before you begin:** What do I know? Total area = $240 m^2$. What operation connects a fraction to a part of a whole? Think: fraction \times total = section area.

 **Representation tip:** Try two representations: first write a multiplication equation (fraction $\times 240 = ?$), then draw a quick bar model to check your answer visually.


Show all four area calculations here. Label each one clearly.

CHECK: Do your four areas add up to 240 m²? Write your check calculation here.


Question 3**6 marks**

The vegetable section is rectangular. Its **length is 1.5 times its width**.

- (a) Using w to represent the width, write an algebraic expression for the length.
- (b) Use the area formula (length \times width = area) and your answer from Q2 to write and solve an equation for w .
- (c) State the dimensions of the vegetable section, rounded to the nearest tenth of a metre. Does your answer make sense? Explain how you know.

 **Before you begin:** What do I know? Area = length \times width. I can write length in terms of width (length = $1.5w$). Now I have one unknown — and I know what the area equals.

Show all algebraic work for (a), (b), and (c):

 **Talk with your partner:** Compare your equation with a partner. Did you write the same equation? Did you solve it the same way? If you got different answers, work through it together.

**PART B · Thinking
marks****/18**

- I can** use fraction addition and subtraction to find missing values in a data table, and explain my strategy.
- I can** interpret survey data as evidence and propose a revised garden design that totals exactly 1.
- I can** test a mathematical claim using independent calculations and clearly state whether it is true or false.
- I can** choose and explain an appropriate problem-solving strategy.


Apply problem-solving strategies, mathematical reasoning, and critical thinking.

Question 4**8 marks**


The committee surveyed 30 classmates about their favourite section. The table below is incomplete.

Section	Tally	Frequency	Fraction of 30
Vegetables	IIII IIII II	12	
Herbs	IIII III		
Pollinator Garden		7	$\frac{7}{30}$
Seating & Paths	III		
TOTAL		30	1

- (a) Complete all missing values. For missing tally marks, explain how you determined the number.
- (b) Using this survey data as your evidence, propose new fractions for each section so the design better reflects what students want. Your fractions **MUST** total exactly 1. Justify each proposed fraction.

 **Before you begin:** What do I know? The total is 30. What do I need? The missing values. Strategy: find the sum of what I know, then subtract from the total. Check: do all frequencies add to 30?

Show your work for (a) and your proposed new fractions with justification for (b):


 **Talk with your partner:** Is your proposed design fair to all student preferences? How did the survey data shape your thinking? Share your proposal with a partner and compare.


Question 5

10 marks

The herb section uses a grid of square planting trays. Each tray has a side length of 45 cm.

- How many whole trays fit in the herb section? Show a systematic method.
- What percentage of the herb section is unused (cannot fit a whole tray)? Round to the nearest whole percent.
- A classmate claims: **"With 50 cm trays, only 4 more trays would fit."** Prove or disprove this claim using calculations. Show your reasoning clearly.

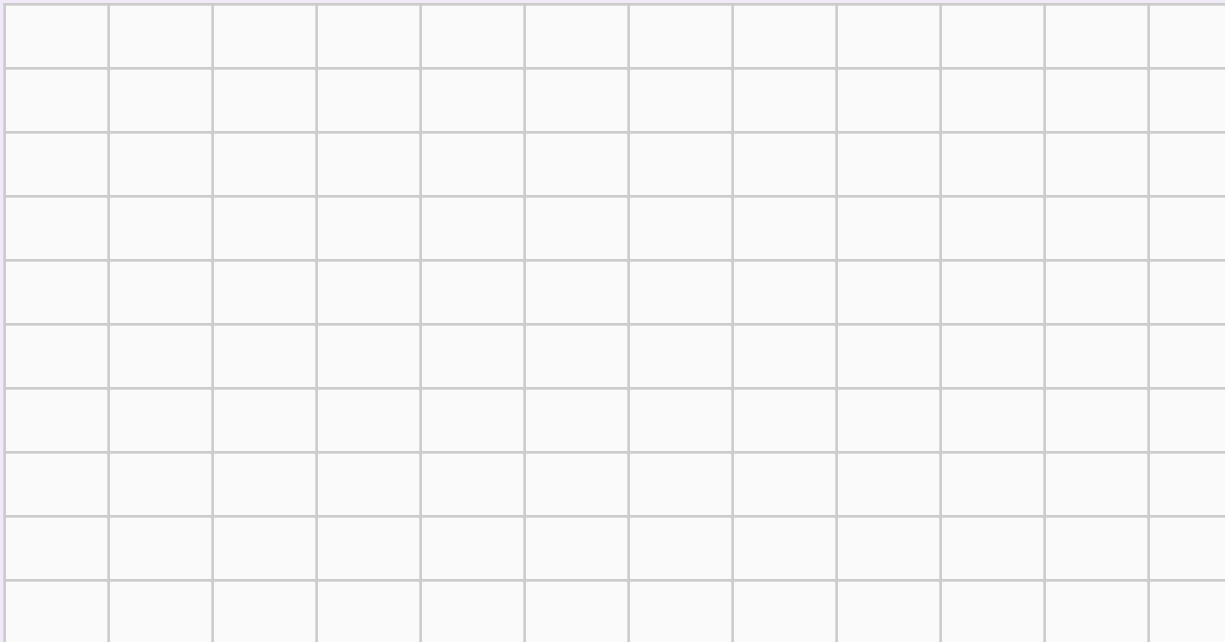
 **Before you begin:** For (c) — what do I know? I have a claim to test. Strategy: calculate independently (don't assume the claim is true). Find the number of 50 cm trays, find the number of 45 cm trays, then compare the difference.

 **Representation tip:** Drawing a sketch of the herb section with tray rows and columns can help you see the structure of this problem before you calculate.

Design your rooftop garden layout on the grid below.

Each small square = 2 m × 2 m (area of each square = 4 m²).

Sketch the four sections using the areas you calculated in Part A Q2. Label each section with: its name · its area in m² · its fraction of the total. Use colour-coding or patterns to distinguish sections.



Scale: each square = 2 m × 2 m | Total grid = 24 m × 20 m = 480 m² | Use only half the grid (240 m²)

Multiple Representations — Complete at least TWO of the following to check your diagram:

Fraction bar model

Draw a horizontal bar divided into your four fractions.

Percentage circle

Sketch a pie chart showing the four percentages.

Ratio statement

Write the ratio of all four sections (e.g., 3:2:?:?).

Draw your chosen representation(s) here:

Question 7

8 marks

Write a mathematical explanation (4–6 sentences) of how you determined the layout for your diagram.

Use at least FIVE terms from the Word Bank below. Underline or circle each term when you use it.



Word Bank

fraction · decimal · percentage · proportion · ratio · area · equivalent · denominator · numerator · perimeter · variable · equation · expression · integer · unit rate · simplest form · algebraic

Write your mathematical explanation here (underline/circle each Word Bank term you use):



Talk with your partner: Read your explanation to your partner. Can they understand your diagram from your words alone? Ask them: 'Is there a step where my reasoning isn't clear?' Revise if needed.

PART D · Application
/18 marks

- I can apply unit-rate reasoning to calculate costs for soil, seeds, plants, and fencing.
- I can determine whether a budget is met and express the difference as a percentage of the total budget.
- I can express equal shares as a fraction, a decimal, and a mixed number, and simplify fractions to lowest terms.
- I can connect the mathematics of equal sharing to a real-world situation and explain the link.

Apply mathematical knowledge and skills to real-world financial and proportional contexts.


Question 8

10 marks

The committee has a budget of \$1,440. Use the price list below to calculate costs.

Item	Unit Cost	Note
Premium Soil	\$12.50 per m ²	Required for all planted sections
Vegetable Seeds (kit)	\$24.00 per kit	1 kit covers 15 m ²
Herb Starter Plants	\$3.75 each	1 plant per 0.5 m ²
Perimeter Fencing	\$18.00 per metre	Outer edge of entire rooftop only
Pollinator Seed Mix	\$9.00 per m ²	Wildflower blend

- (a) Calculate the total soil cost for all three planted sections (vegetables, herbs, pollinator).
- (b) Calculate the cost of seeds and plants for the vegetable and herb sections.
- (c) Calculate the fencing cost. The rooftop perimeter is: $(2 \times 20 \text{ m}) + (2 \times 12 \text{ m})$.
- (d) Did the committee stay within the \$1,440 budget? By how much? Express the difference as a percentage of the total budget. Round to one decimal place.

 **Before you begin:** For each cost: identify the unit rate and the quantity. The structure is always: unit rate \times quantity = total cost. Write this equation first, then substitute numbers.

Show all calculations for (a) through (d). Organize your work clearly — label each part.

Part A Knowledge & Understanding	Part B Thinking	Part C Communication	Part D Application
<ul style="list-style-type: none"> <input type="checkbox"/> convert fractions, decimals, percentages <input type="checkbox"/> find missing fractions; verify total = 1 <input type="checkbox"/> calculate section areas <input type="checkbox"/> write and solve an algebraic expression 	<ul style="list-style-type: none"> <input type="checkbox"/> complete frequency table using fractions <input type="checkbox"/> propose design from survey evidence <input type="checkbox"/> prove or disprove a mathematical claim <input type="checkbox"/> name and justify my strategy 	<ul style="list-style-type: none"> <input type="checkbox"/> draw an accurate, scaled diagram <input type="checkbox"/> label all sections fully <input type="checkbox"/> use 5+ vocabulary terms accurately <input type="checkbox"/> organize my written explanation clearly 	<ul style="list-style-type: none"> <input type="checkbox"/> calculate all costs using unit rates <input type="checkbox"/> determine budget outcome as a % <input type="checkbox"/> express shares in three forms <input type="checkbox"/> connect math to real-world sharing

Metacognitive Reflection

Which 'I can' statement are you most proud of in this task? What did you do to achieve it?


Which question was most challenging? What strategy helped you most — and why did you choose it?

Where did you get stuck? What did you do when you were stuck? (Think: how did your self-talk help?)

Where does the mathematics from this task show up in the real world? Give a specific example beyond the garden.

Rate Your Confidence — Circle one number for each category:

Knowledge & Understanding	Thinking	Communication	Application
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1 = I need support 2 = Getting there 3 = Got it 4 = I can teach it			

 **Talk with your partner:** Before you hand in your task, find a partner. Take turns explaining the strategy you used for your HARDEST question. Did they use a different approach? What can you learn from each other?

Evaluation Summary — Teacher Use

Category	Mark	/ Out of	Level	Comments
Knowledge & Understanding (Part A)		18		
Thinking (Part B)		18		
Communication (Part C)		18		
Application (Part D)		18		
TOTAL		72		

Ontario Curriculum Connections — Grade 7 Mathematics (2020)
Number: B1–B3 (fractions, decimals, percentages, ratios, proportional reasoning) | **Algebra:** C1–C3 (patterns, equations, expressions) | **Data:** D1–D2 (collection, analysis) | **Spatial Sense:** E1–E2 (area, measurement) | **Financial Literacy:** F1–F2 (budgeting, unit cost)