Nov 24 Standard Math

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Question 1 (7 marks)

Knowing and understanding

In this task (questions 1 to 5), you will interact with different aspects of **form** using a variety of related concepts. This task focuses on **criterion A** (Knowing and understanding) and **criterion C** (Communication).

Match equations to their graphs.

Question 2 (9 marks)

Determine probabilities from information presented in a Venn diagram.

Question 3 (4 marks)

Compare measures of central tendency in a box-and-whisker plot.

Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

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Question 4 (9 marks)

Make calculations in a two-dimensional shape.

Question 5 (9 marks)

Find values in a parabola.

Question 6 (9 marks)

Applying mathematics in real-life contexts

In this task (questions 6 and 7), you will use **relationships** to apply mathematics within the global context of **fairness and development**. This task focuses on **criterion D** (Applying mathematics in real-life contexts) and **criterion C** (Communication).

Explore the implications of redesigning a road to include cycle paths.

Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Question 6 (9 marks)

Applying mathematics in real-life contexts

In this task (questions 6 and 7), you will use **relationships** to apply mathematics within the global context of **fairness and development**. This task focuses on **criterion D** (Applying mathematics in real-life contexts) and **criterion C** (Communication).

Explore the implications of redesigning a road to include cycle paths.

Question 7 (22 marks)

Make calculations to design a rooftop garden.

Question 8 (31 marks)

Investigating patterns

In this task (question 8), you will use **logic** to investigate shapes created by sticks. You will be assessed using **criterion B** (Investigating patterns) and **criterion C** (Communication).

Describe patterns and find general rules for shapes made by sticks.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

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Question 1 (7 marks)

Label the graphs by dragging the matching equation to the correct place.

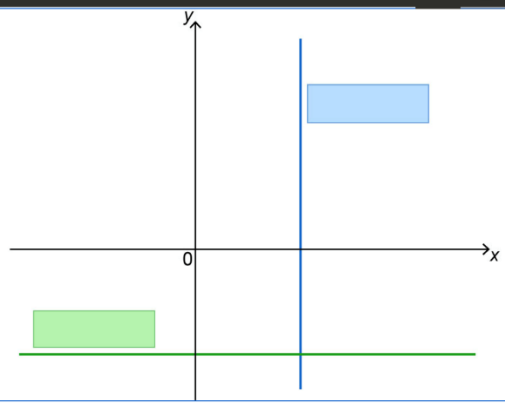
Draggable equations:

$x = 3$

$x = -3$

$y = 3$

$y = -3$



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1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

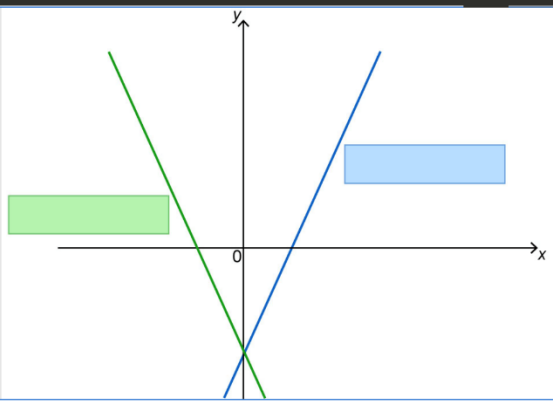
Draggable equations:

$y = 2x + 3$

$y = 2x - 3$

$y = -2x + 3$

$y = -2x - 3$



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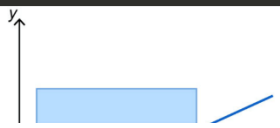
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Draggable equations:



Scroll down to continue

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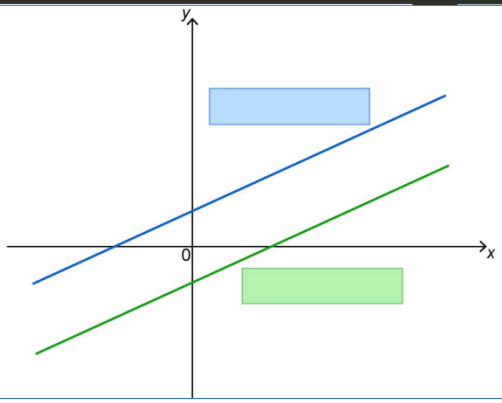
Draggable equations:

$x + 2y = 3$

$x + 2y = -3$

$x - 2y = 3$

$x - 2y = -3$



1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Draggable equations:

Scroll down to continue

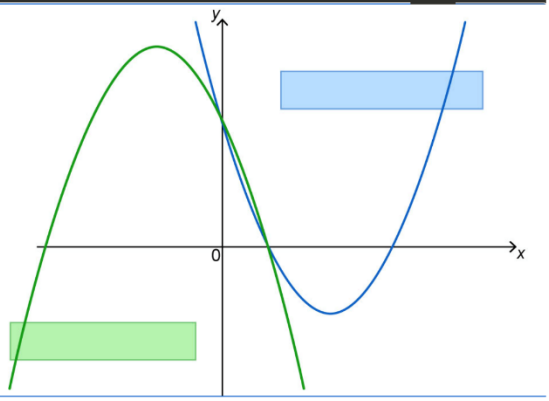
Draggable equations:

$y = (x + 1)(x + 3)$

$y = (x - 1)(x - 3)$

$y = (1 - x)(x + 3)$

$y = (x + 1)(3 - x)$



1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

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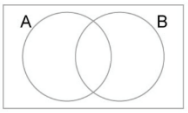
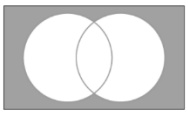
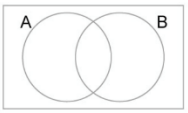
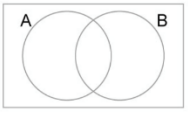
Question 2 (9 marks)

Question 2a (3 marks)

The two sets, A and B, are intersecting as seen in the Venn diagram below.

Select the shading(s) that represent the sets in the Venn diagrams below.

Set	Venn diagram	Draggable shading
(i) A'		
(ii) $A' \cap B$		
(iii) $A' \cup B$		

Scroll down to continue

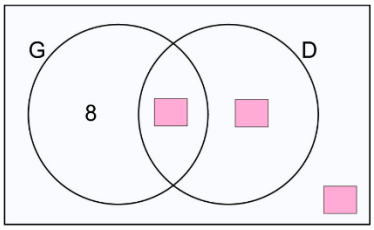
1 (7 marks)
2 (9 marks)
Question 2a
Question 2b
Question 2c
Question 2d
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Question 2b (2 marks)

There are 24 students in a class. Of these students:

- 15 play the guitar (G)
- 12 play the drums (D)
- 4 play neither.

Determine the missing values in the Venn diagram below.



Question 2c (1 mark)

A student is selected at random. **Determine** the probability that this student plays only one musical instrument.

Styles

Paste ⌘+V

Question 2d (3 marks)

Three students are selected at random. **Determine** the probability that the three students do not play any musical instruments.

1 (7 marks)
2 (9 marks)
Question 2a
Question 2b
Question 2c
Question 2d
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Scroll down to continue

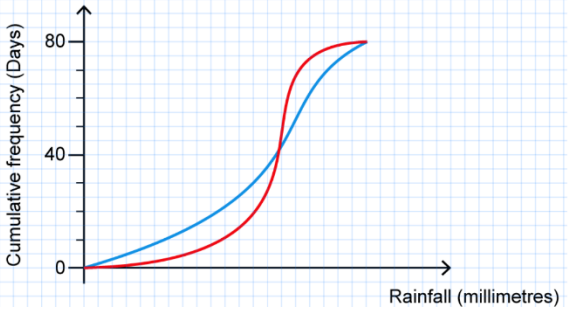
Question 3 (4 marks)

Aaron is comparing the rainfall for the first 80 days in 2021 and in 2022. The graph below shows two cumulative frequency curves for the rainfall in 2021 and in 2022.

Question 3a (2 marks)

On the canvas below, **draw** the box-and-whisker plot for 2021.

Guidelines:

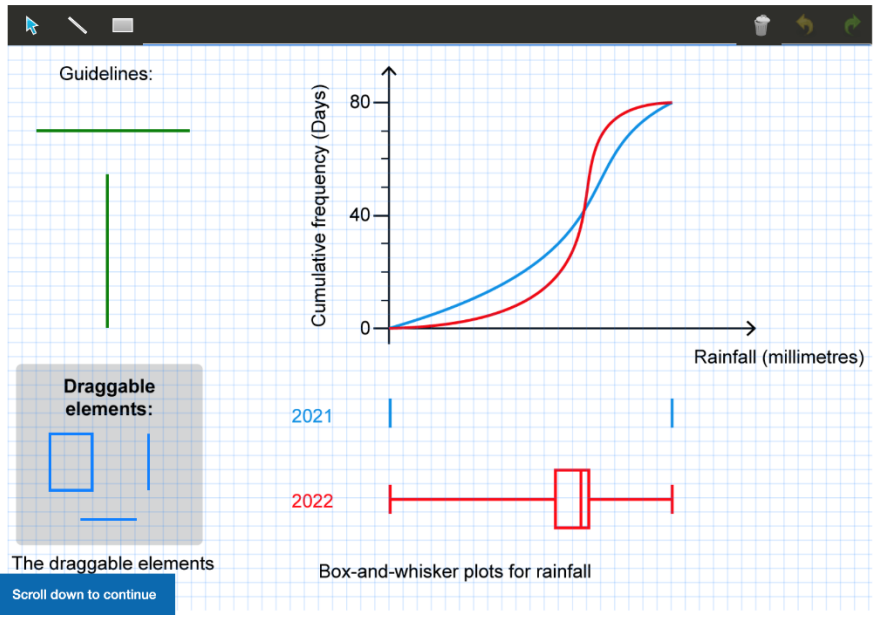


1 (7 marks)
2 (9 marks)
3 (4 marks)
Question 3a
Question 3b
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Scroll down to continue

Question 3a (2 marks)

On the canvas below, **draw** the box-and-whisker plot for 2021.



Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
Question 3a
Question 3b
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

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Question 3b (2 marks)

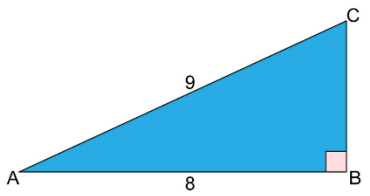
Compare the median and the interquartile range for the two distributions.

1 (7 marks)
2 (9 marks)
3 (4 marks)
Question 3a
Question 3b
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Question 4 (9 marks)

The diagram shows the right-angled triangle ABC.

Diagram not to scale



Question 4a (2 marks)

Show that BC = 4 to the nearest unit.

Question 4b (1 mark)

Hence, **determine** the area of the triangle ABC.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
Question 4a
Question 4b
Question 4c
Question 4d
Question 4e
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Scroll down to continue

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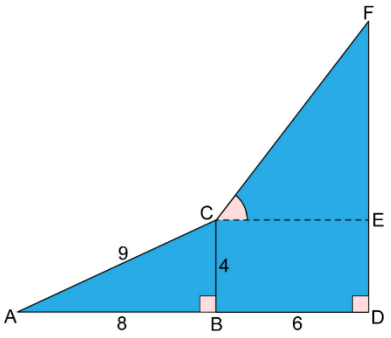
The line AB is extended and the trapezium BCFD is formed as shown in the diagram.

Diagram not to scale



Question 4c (1 mark)

The areas of trapezium BCFD and triangle ABC are in the ratio

area BCFD : area ABC

3 : 1

Determine the area of the trapezium BCFD.

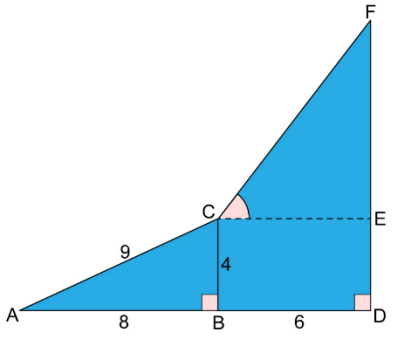
Question 4d (2 marks)

Determine FD.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
Question 4a
Question 4b
Question 4c
Question 4d
Question 4e
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Scroll down to continue

The line AB is extended and the trapezium BCFD is formed as shown in the diagram.

Diagram not to scale



Question 4d (2 marks)

Determine FD.

Question 4e (3 marks)

Find the size of the angle FCE.

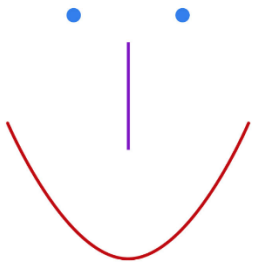
1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
Question 4a
Question 4b
Question 4c
Question 4d
Question 4e
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)

Scroll down to continue

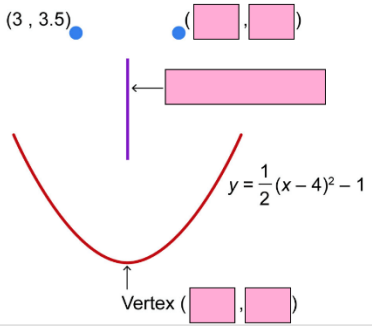
Question 5 (9 marks)

Question 5a (3 marks)

A **symmetrical** smiley face is plotted using two points, a line, and a parabola.



Determine the missing coordinates and the equation of the line.



1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
Question 5a
Question 5b
Question 5c
6 (9 marks)
7 (22 marks)
8 (31 marks)

Scroll down to continue

Question 5b (2 marks)

By expanding the brackets, **show that** $y = \frac{1}{2}(x-4)^2 - 1$ can be written as

$y = \frac{1}{2}x^2 - 4x + 7$.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
Question 5a
Question 5b
Question 5c
6 (9 marks)
7 (22 marks)
8 (31 marks)

Question 5c (4 marks)

Scroll down to continue

rdinates of the x-intercepts of the parabola

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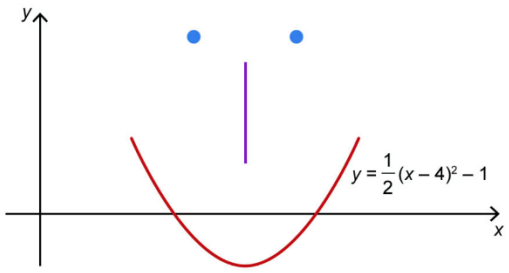
Question 5c (4 marks)

Calculate the coordinates of the x-intercepts of the parabola

$y = \frac{1}{2}(x-4)^2 - 1$.

Give your answer to the nearest one decimal place.



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Question 6 (9 marks)

The city council have decided to improve the road safety for cyclists. A survey was conducted to determine the type of cycle facility that the community would like to see built. The result is shown below.

Type of cycle facility	A shared cycle path with pedestrians	A road with cycle lanes	A road with separated cycle paths
Number of votes	40	1180	1620

Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
Question 6a
Question 6b
Question 6c
Question 6d
7 (22 marks)
8 (31 marks)

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Number of votes | 40 | 1180 | 1620

Question 6a (2 marks)

The city council will build the type of cycle facility that receives more than 55 % of the total number of votes.

Show that the city council will build "a road with separated cycle paths".

Styles

Key:

cycle path, in metres (m)

Diagram not to scale

Scroll down to continue

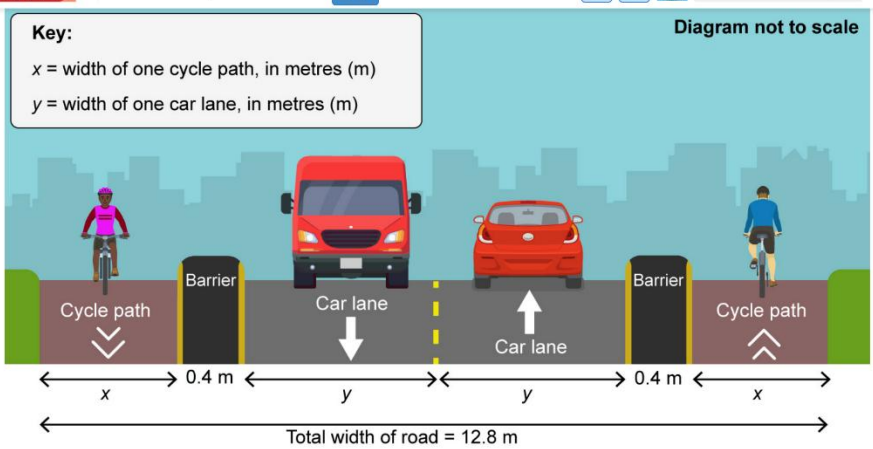
1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
Question 6a
Question 6b
Question 6c
Question 6d
7 (22 marks)
8 (31 marks)

The plan is to construct a **3 km long** road with separated cycle paths.The cost to construct each part of the road is listed in the table below.

Item	Cost
One cycle path	$0.6 million per kilometre (km)
One barrier	$115 per metre (m)
One car lane	$3.1 million per kilometre (km)

Calculate the total cost to construct the road.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
Question 6a
Question 6b
Question 6c
Question 6d
7 (22 marks)
8 (31 marks)



Question 6b (1 mark)

Using the information given in the diagram, **show that** $y = 6 - x$.

Question 6c (3 marks)

Given that $y = \frac{3}{2}x$ and $y = 6 - x$, **find** the value of x and the value of y.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
Question 6a
Question 6b
Question 6c
Question 6d
7 (22 marks)
8 (31 marks)

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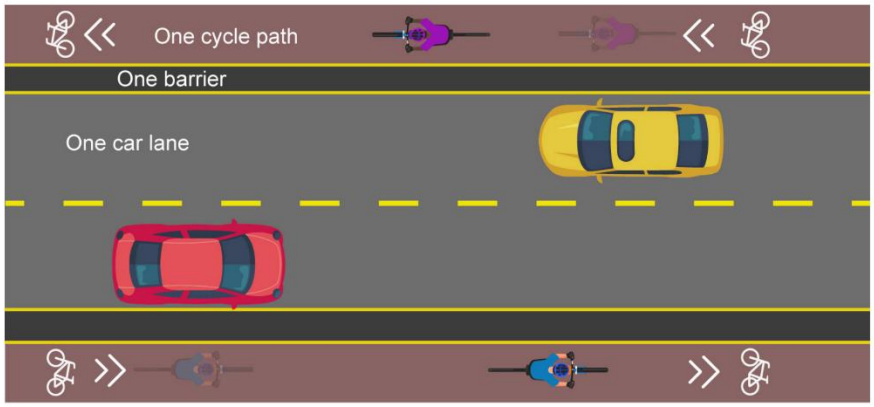
Question 6d (3 marks)



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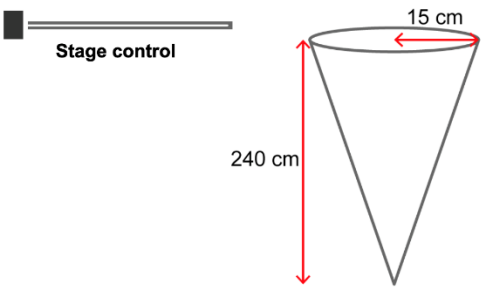
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
Question 6a
Question 6b
Question 6c
Question 6d
7 (22 marks)
8 (31 marks)

Scroll down to continue

Question 7 (22 marks)

In this question you will make calculations to help a community design a rooftop garden to grow tomato plants.
Tomato plants are grown in a pot. A pot is a truncated cone. Interact with the simulation to reveal how a pot is formed.



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5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

Scroll down to continue

Question 7a (4 marks)

Calculate the volume of the pot. Give your answer to the nearest 10 cm^3.

Cost of items	
1 tomato plant	\$6.00
1 Litre (L) soil	\$0.40
1 empty pot	\$1.50

$1\ cm^3 = 1\ mL$

Question 7b (2 marks)

Pots will be filled with soil up to 90 % of maximum capacity. **Determine** the volume in litres (L) of soil needed for one pot.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

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Cost of items	
1 tomato plant	\$6.00
1 Litre (L) soil	\$0.40
1 empty pot	\$1.50

$1\ cm^3 = 1\ mL$

Question 7c (2 marks)

Determine the total cost to grow one tomato plant in a pot.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

Video Script
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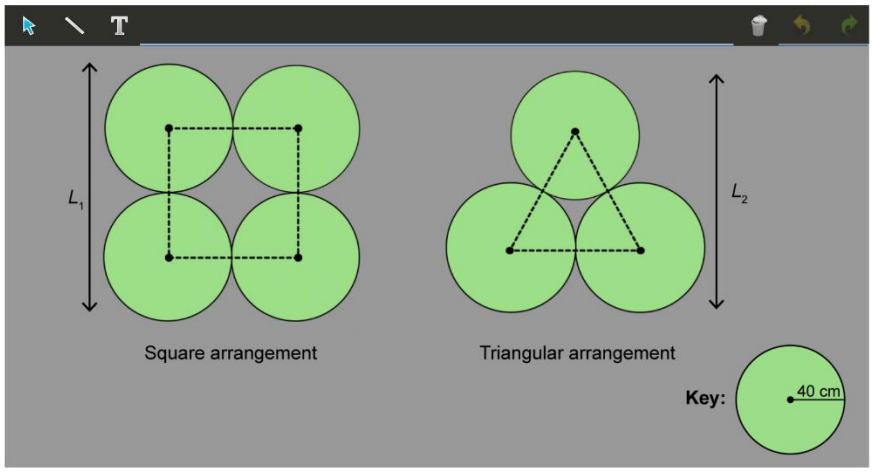
Question 7d (1 mark)



1 (7 marks)
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3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

Scroll down to continue

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Question 7d (1 mark)

Determine the length of L_1 for the square arrangement.

Question 7e (3 marks)

Find the length of L_2 for the triangular arrangement.

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

Scroll down to continue

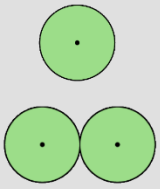
Question 7f (10 marks)

Design a rooftop garden to grow the tomato plants. Your design should make best use of all the rooftop garden space to grow as many tomato plants as possible.

In your answer you should:

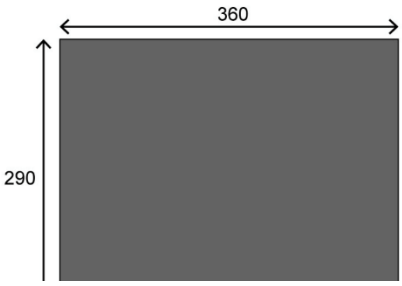
- identify **three** relevant factors for your design
- show calculations for your design
- show your design on the canvas
- calculate the cost to a sensible degree of accuracy (using your result in part (c))
- justify whether your results make sense in the context of the question.

Draggable circular spaces:



Rooftop garden

Diagram to scale
Lengths in centimetres



Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

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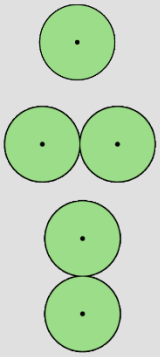
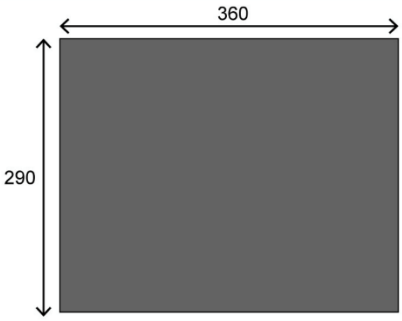
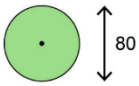
Assistance

circular spaces:





Key:



80

Circular space for each tomato plant to grow

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
Question 7a
Question 7b
Question 7c
Question 7d
Question 7e
Question 7f
8 (31 marks)

Relevant factors:

Scroll down to continue

Calculations and justification:

Question 8 (31 marks)

A sequence of shapes is created using sticks. In this question you will investigate the number of sticks (S) forming these shapes.

Interact with the stage control to see how S increases.

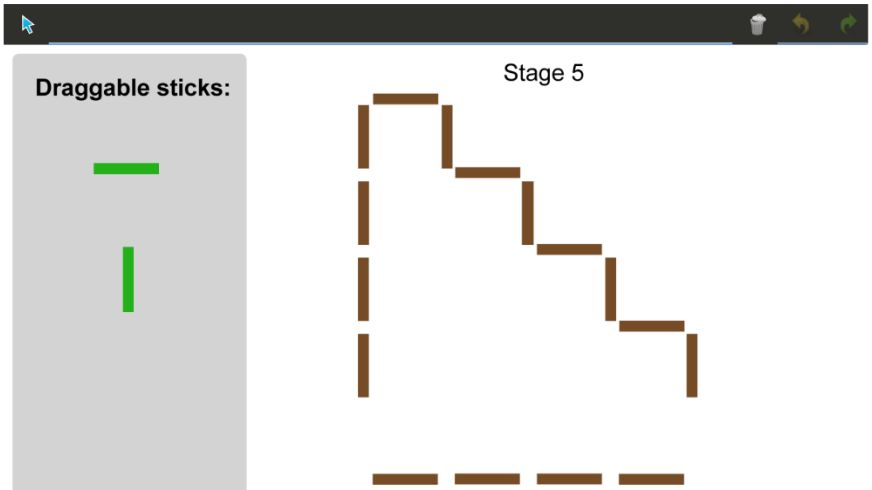
$S = 4$

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Question 8a
Question 8b
Question 8c
Question 8d
Question 8e
Question 8f

Scroll down to continue

Question 8a (1 mark)

Construct stage 5 by completing the diagram on the canvas.



1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Question 8a
Question 8b
Question 8c
Question 8d
Question 8e
Question 8f

Scroll down to continue

Question 8b (1 mark)

Write down the missing values in the table up to row 6.

Stage number (n)	Number of sticks (S)
1	4
2	8
3	12
4	16
5	
6	

Reset

Question 8c (2 marks)

Describe, in words, two patterns in the table for the number of sticks (S).

Styles

Question 8d (2 marks)

Write down, in simplest form, a general rule for S in terms of n.

Styles

Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Question 8a
Question 8b
Question 8c
Question 8d
Question 8e
Question 8f

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Question 8b (1 mark)

Write down the missing values in the table up to row 6.

Stage number (n)	Number of sticks (S)
1	4
2	8
3	12
4	16
5	
6	

Reset

Question 8e (3 marks)

Verify your general rule for S.

Styles

Question 8f (22 marks)

Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Question 8a
Question 8b
Question 8c
Question 8d
Question 8e
Question 8f

Question 8f (22 marks)

The following sequence of shapes is formed using external and internal sticks. You will now investigate the total number of sticks (T) which includes the external and internal sticks.

Interact with the stage control to see how T increases.

Stage control

Stage 1

$T = 4$

Stage number (n)	External sticks (S)	Internal sticks (L)	Total number of sticks (T)
	4	0	4

Scroll down to continue

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Question 8a
Question 8b
Question 8c
Question 8d
Question 8e
Question 8f

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Stage number (n)	External sticks (S)	Internal sticks (L)	Total number of sticks (T)
1	4	0	4
2	8	2	10
3	12	6	18
4	16	12	28
5			
6			

Reset

Scroll down to continue

lues in the table to find

1 (7 marks)
2 (9 marks)
3 (4 marks)
4 (9 marks)
5 (9 marks)
6 (9 marks)
7 (22 marks)
8 (31 marks)
Question 8a
Question 8b
Question 8c
Question 8d
Question 8e
Question 8f

Investigate the values in the table to find a relationship for the total number of sticks (T) in terms of n. In your answer, you should communicate the following in an organized and coherent manner:

- predict more values and record these in the table
- describe in words a pattern in the table for total number of sticks (T)
- write down, in simplest form, a general rule for T in terms of n
- test and verify your general rule for T
- justify your general rule for T.