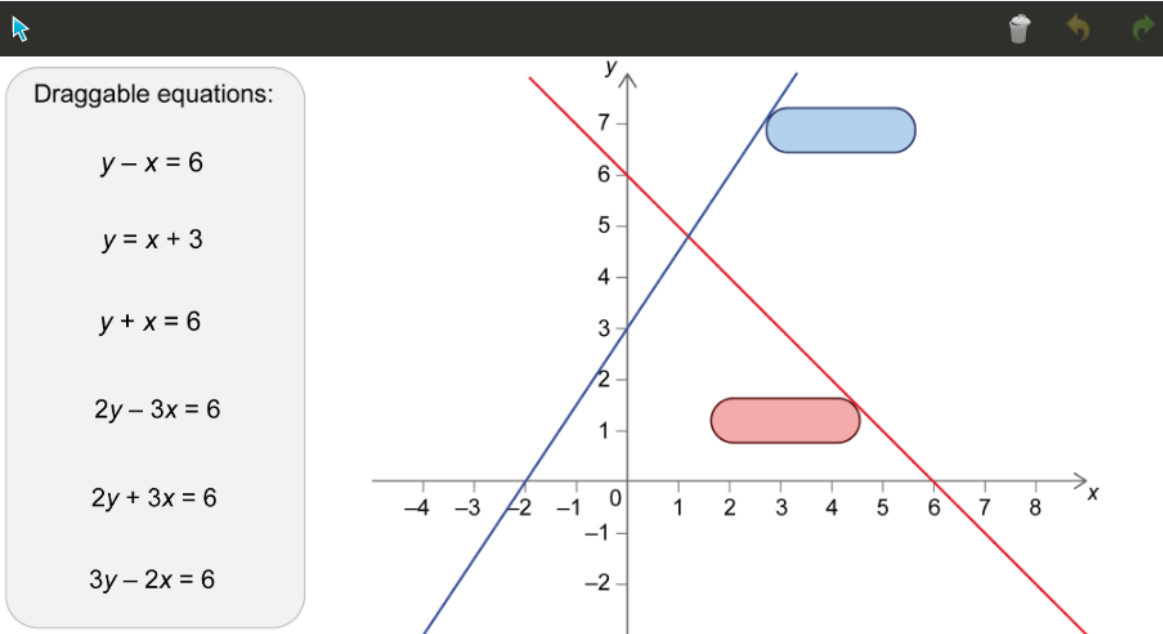


2019 November Maths eAssessment

Question 1a (2 marks)

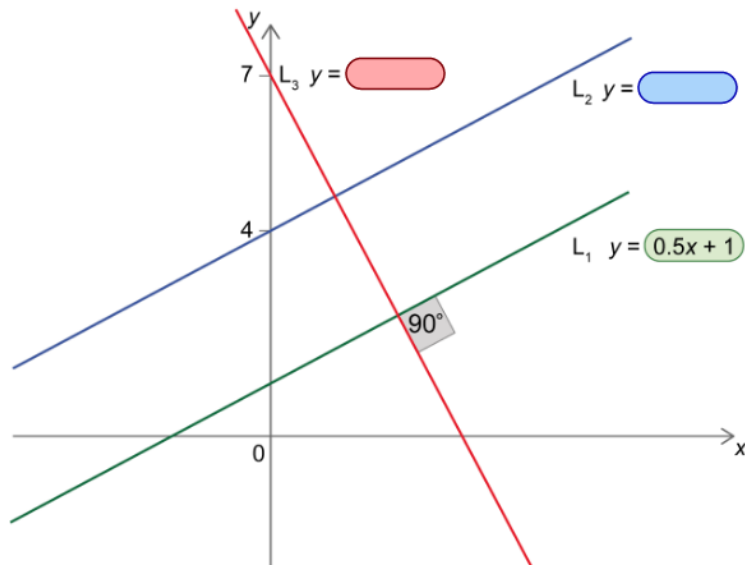
Select the line equations and place them with the corresponding lines.



Not Started
Question 1b (2 marks)

Line L_3 is perpendicular to both L_1 and L_2

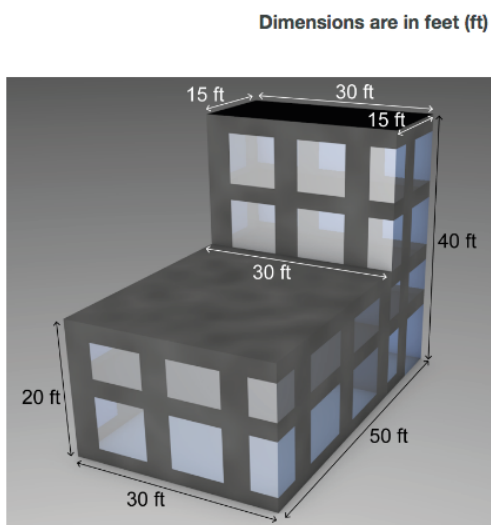
Write down the equation of the lines L_2 and L_3 .



Question 2 (8 marks)

Below is a 3D diagram for an office building. The dimensions are in feet (ft).

Question 2a (3 marks)



Calculate the volume of the office building in cubic feet.

Rich text editor interface with a toolbar containing buttons for Bold (B), Italic (I), Undo, Redo, Underline (U), Text Color (x), Background Color (x), Bulleted List, Numbered List, Link, and Unlink. Below the toolbar is a text area for the answer.



Question 2b (3 marks)

The number of employees in the office building each day is given in the table below.

Day	Working days				
	Monday	Tuesday	Wednesday	Thursday	Friday
Number of employees	105	70	90	75	60

Find the mean number of employees in the office building during the working days.

B *I* | ← → | U $\times_2$ $\times^n$ | $\frac{\square}{\square}$ $\frac{\square}{\square}$ | Ω Σ | Styles |



Question 2c (2 marks)

To control the temperature in the office building, a central air-conditioning unit is needed.

The power (P) of the air-conditioning unit is measured in horsepower (hp) and can be found using the following formula:

$$P = \frac{(6V + 500N)}{9000}$$

Where:

V is the volume in cubic feet.

N is the mean number of employees during the working days.

Using your answers from part (a) and part (b), **determine** the value of P needed for controlling the temperature in this office building.

B *I* | ← → | U $\times_2$ $\times^n$ | $\frac{\square}{\square}$ $\frac{\square}{\square}$ | Ω Σ | Styles |

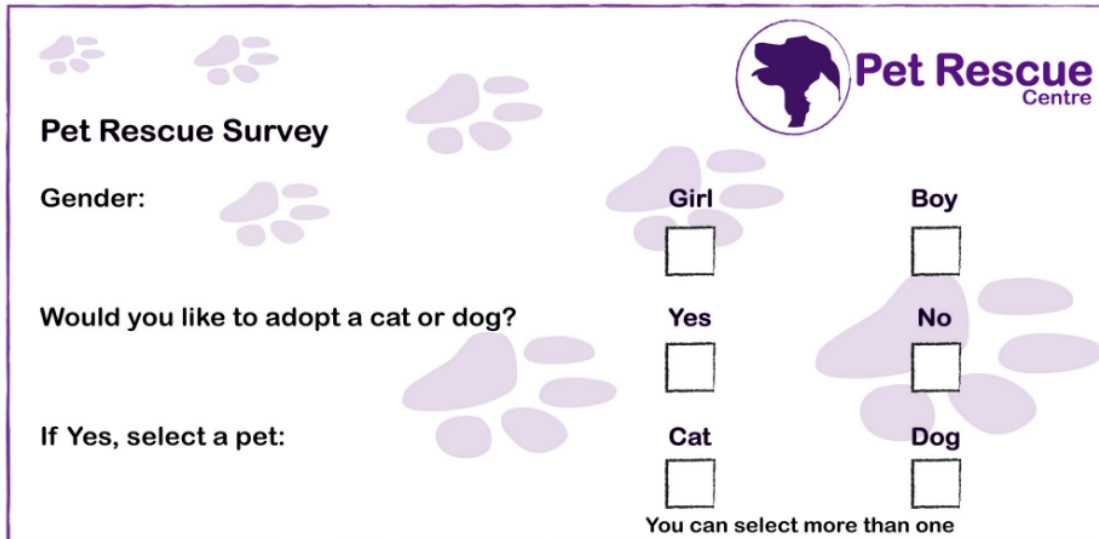


Question 3a (1 mark)

Izumi is a volunteer at a pet rescue centre which has cats and dogs for adoption. At the next school festival, she will try to convince students to adopt a pet from the pet rescue centre.

Izumi decides to run a survey in her school before the festival.

She asked the following questions:



Pet Rescue Survey

Gender:

Girl ☐ Boy ☐

Would you like to adopt a cat or dog?

Yes ☐ No ☐

If Yes, select a pet:

Cat ☐ Dog ☐

You can select more than one

©

The image and Venn diagram show the survey results for the girls.

Event C represents: Would like to adopt a cat

Event D represents: Would like to adopt a dog

No girl selected both cat and dog.

Determine the percentage of girls who would not like to adopt a pet. Write your answer on the Venn diagram.



41 %

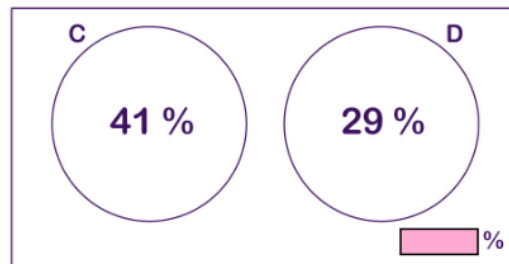


Cat

29 %



Dog





Question 3b (1 mark)

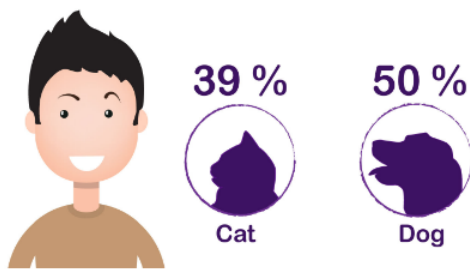
Events C and D are mutually exclusive. **State** how this is represented in the Venn diagram.

Rich text editor toolbar: B, I, $\leftarrow$, $\rightarrow$, U, $\times_2$, $\times^2$, $\equiv$, $\equiv$, Ω , Σ , Styles,



Question 3c (1 mark)

The image shows the survey results for the boys.



31 % of the boys answered they would not like to adopt a pet. Based on the percentages provided, **state** how it can be concluded that some boys selected both cat and dog.

Rich text editor toolbar: B, I, $\leftarrow$, $\rightarrow$, U, $\times_2$, $\times^2$, $\equiv$, $\equiv$, Ω , Σ , Styles,



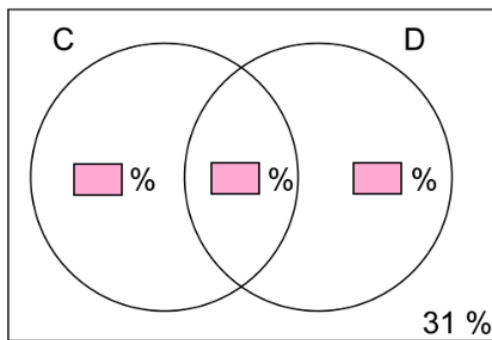
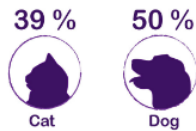


Question 3d (4 marks)

Izumi draws the following Venn diagram to summarize the survey results for the boys.

Event C represents: Would like to adopt a cat

Event D represents: Would like to adopt a dog



Find the missing values and complete the Venn diagram.

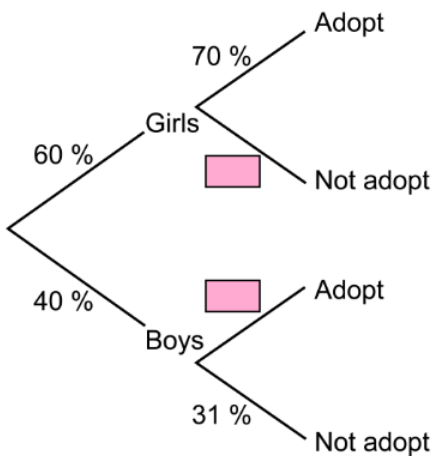
B **I**

U $\times_2$ $\times^e$ $\frac{1}{x}$ $\frac{1}{x^e}$ Ω Σ

Styles



Question 3e (3 marks)



On the festival day, 60 % of the students are girls and 40 % are boys. **Calculate** the probability that a student at the festival will adopt a pet from the pet rescue centre.

B **I**

U $\times_2$ $\times^e$ $\frac{1}{x}$ $\frac{1}{x^e}$ Ω Σ

Styles



Question 4 (8 marks)

The image shows a jar containing 50 cent coins and \$1 coins.

The ratio of the 50 cent coins to the \$1 coins is 5 : 7.



©



Question 4a (1 mark)

The number of \$1 coins in the jar is 140.

Show that the number of 50 cent coins is 100.

Rich text editor interface with a toolbar containing buttons for Bold (B), Italic (I), Undo, Redo, Underline (U), Text color (x), Background color (x), Bulleted list, Numbered list, Link (Ω), and Unlink (Σ). Below the toolbar is a text area for the answer.



Question 4b (2 marks)

Hence, **determine** the total value of the coins in the jar.

Question 4c (5 marks)

Another jar contains 50 cent coins, \$1 coins and \$2 coins.

The number of 50 cent coins, \$1 coins and \$2 coins are in the ratio 2 : 4 : 3.



©

The number of the three types of coins are in the ratio 2 : 4 : 3, respectively. The total value of the coins is \$1760. **Find** the total number of coins in the jar.

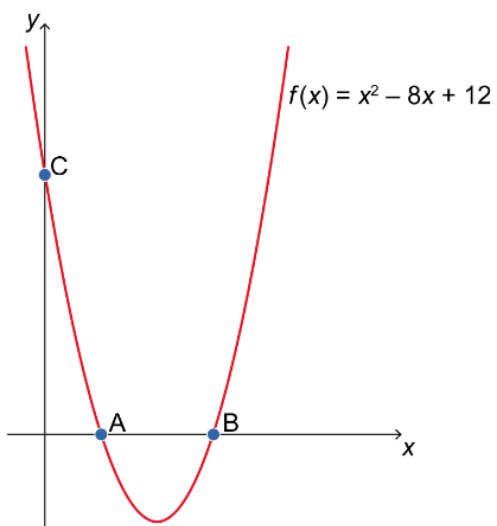
Rich text editor interface with a toolbar containing buttons for Bold (B), Italic (I), Undo, Redo, Underline (U), Text color (x), Background color (x), Bulleted list, Numbered list, Link (Ω), and Unlink (Σ). Below the toolbar is a text area for the answer.





Question 5 (6 marks)

The following diagram shows part of the graph of a quadratic function $f(x) = x^2 - 8x + 12$



©



Question 5a (1 mark)

Write down the coordinates of point C.

B **I** x_2 x^2 Ω Σ

Styles



Question 5b (4 marks)

Find the coordinates of points A and B.



Question 5c (1 mark)

The function f is reflected on the y -axis

Write down the coordinates of point B after the reflection.

B **I** x_2 x^2 Ω Σ

Styles

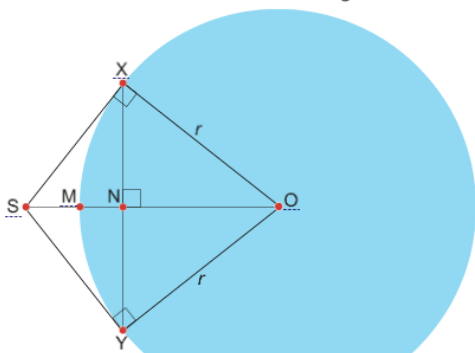
Question 6 (15 marks)

The following video introduces how we are able to observe the Earth from the International Space Station.

This media is interactive

Hover over the letters to reveal the label.

Diagram not to scale



Key: radius (r) = 6372 km



SX and SY are tangents to the circle.
Given that angle XSY is 140° , **show that**
angle XOY is 40° .



The radius of the Earth is $r = 6372$ km

Determine the length of the minor arc XY.



OS is perpendicular to the chord XY. Find the length of ON to the nearest km.

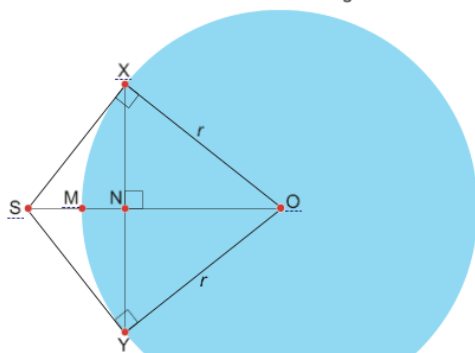


Hence, **determine** the length of MN.

This media is interactive

Hover over the letters to reveal the label.

Diagram not to scale



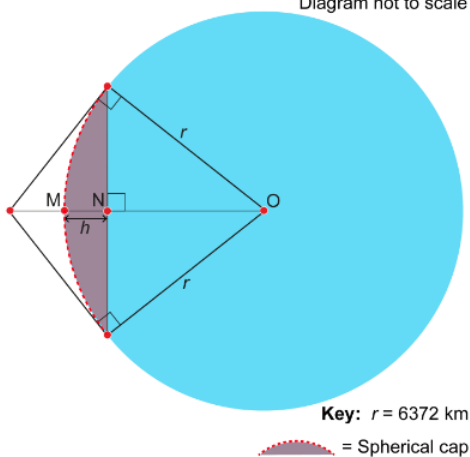
Key: radius (r) = 6372 km





Not Started
Question 6e (3 marks)

This media is interactive



The surface area (A) of the spherical cap is $A = 2\pi rh$ where

r is the radius of the Earth,

h is the height of the spherical cap (MN)

Calculate the surface area (A) of the spherical cap. Give your answer in standard form correct to two significant figures.

Rich text editor toolbar with buttons for Bold (B), Italic (I), Undo, Redo, Underline (U), Text color (x), Background color (x), Bulleted list, Numbered list, Link (Ω), and Unlink (Σ). Below the toolbar is a text input area.



Question 6f (3 marks)

Hence, **find** the percentage of Earth the International Space Station can see at any one time.



Not Started
Question 7 (19 marks)

The following video describes how different fuels for vehicles can impact emissions on communities and environments.





Cost in £	Vehicle A (electric-powered)	Vehicle B (petrol-powered)
Vehicle	?	18 000
Fuel per mile	0.035	0.085
Annual fuel	?	1190



Question 7a (3 marks)

Vehicle A is advertised to buy for £31 250. As part of a government incentive the vehicle cost is reduced by 20 %.

Calculate the vehicle cost after the government incentive for vehicle A.



Question 7b (2 marks)

A person drives 14 000 miles on average per year.

Determine the annual fuel cost of vehicle A.



Question 7c (2 marks)

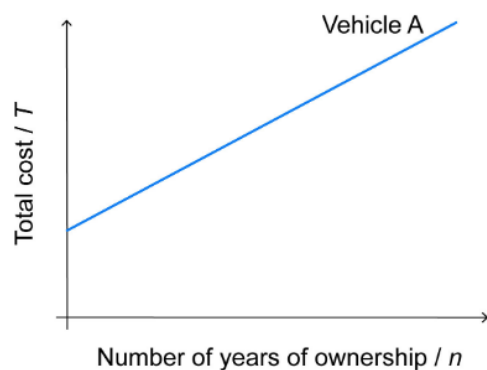
Cost in £	Vehicle B (petrol-powered)
Vehicle	18 000
Fuel per mile	0.085
Annual fuel	1190

The total cost (T) of owning a vehicle is the sum of the vehicle price and the annual fuel cost.

Show that the total cost (T) of owning vehicle B after 7 years is £26 330.

Question 7d (2 marks)

The following graph shows the linear relationship for the total cost, T , of owning Vehicle A for n years, driving 14 000 miles per year.



©

Write down a linear equation for the total cost, T , of owning vehicle A for n years.

Rich text editor interface with a toolbar containing buttons for Bold (B), Italic (I), Undo, Redo, Underline (U), Text color, Background color, Bulleted list, Numbered list, Link, Unlink, and a dropdown menu labeled 'Styles'. Below the toolbar is a large text area for writing the linear equation.

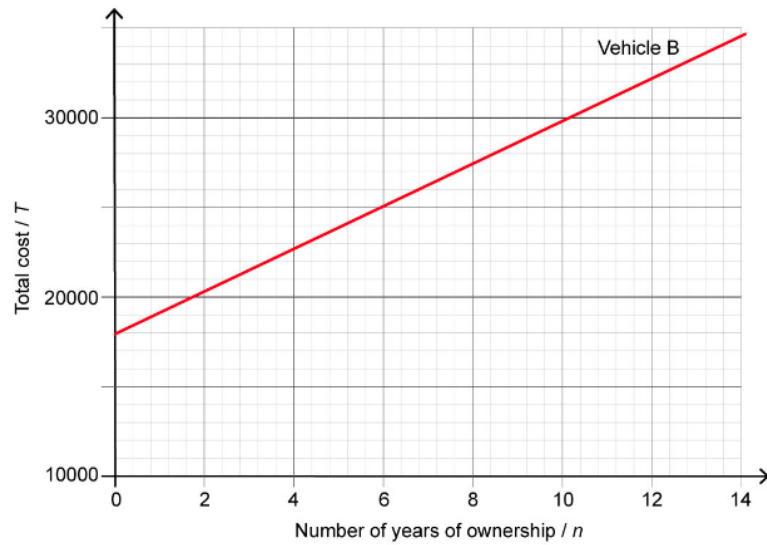
Question 7e (10 marks)

Discuss whether vehicle A or vehicle B is a better buy. Use the information provided in the table and your answers from parts (a) to (d). In your answer, you should:

- identify **three** relevant factors to consider when deciding whether to buy vehicle A or vehicle B
- draw a graph that describes the linear relationship for the total cost (T) of owning vehicle A for n years
- determine after how many years the total cost of owning vehicle A is equal to vehicle B
- justify whether vehicle A or vehicle B is a better buy and how this may impact communities and the environment
- comment on the accuracy of the total cost for owning the different vehicles.

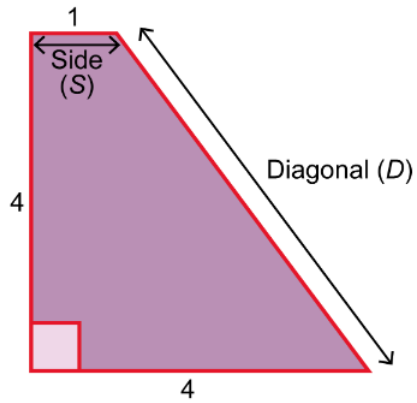


Draggable points:



Question 8a (3 marks)

In this task you will investigate sides and perimeters of trapeziums.



Show that the diagonal of the trapezium is 5 units.

Rich text editor toolbar with options for bold, italic, text color, background color, bulleted list, numbered list, link, and unlink. Below the toolbar is a large text area for the answer.



Drag the stage slider to see how trapeziums are produced. 

Stage control



Stage: 

Stage (n)	Side (S)



Question 8b (1 mark)

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

Stage (n)	Side (S)
1	1
2	4
3	7
4	10
5	
6	

Reset



Question 8c (1 mark)

Describe in words **one** pattern you see in the table for S .

B

I

↶

↷

U

$\times_a$

$\times^a$

≡

≡

Ω

Σ

Styles



Question 8b (1 mark)

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

Stage (n)	Side (S)
1	1
2	4
3	7
4	10
5	
6	

Reset



Question 8d (2 marks)

Determine a general rule for S in terms of n .

B *I*

U $\times_2$ $\times^2$ $\frac{1}{2}$ $\div 2$ Ω Σ

Styles



Question 8e (3 marks)

Verify your general rule for S .

B *I*

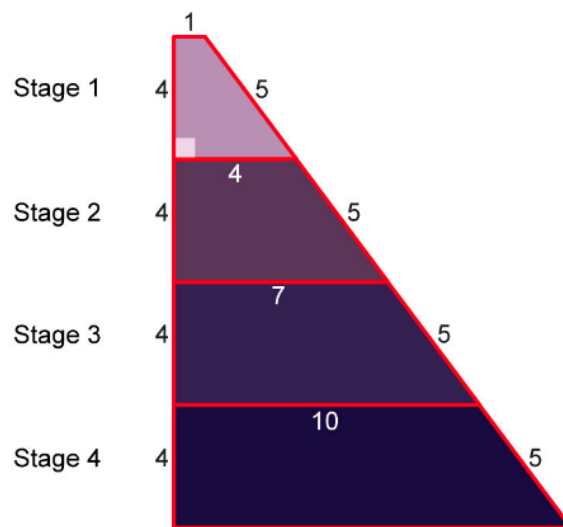
U $\times_2$ $\times^2$ $\frac{1}{2}$ $\div 2$ Ω Σ

Styles



Question 8f (20 marks)

The diagram below shows the trapeziums formed in each stage.



Stage (n)	Side (S)	Perimeter (P)
1	1	14
2	4	20
3	7	26
4	10	32
5		
6		

Reset

Investigate the values in the table to find a relationship for the perimeter (P) of each trapezium in terms of n . In your answer, you should:

- predict more values and record these in the table
- describe in words a pattern for column P
- write down a general rule for P in terms of n
- test your general rule for P
- verify and justify your general rule for P
- ensure that you communicate all your working appropriately.