



# CAPSTONE

1

Calculate the number of pillars required to construct this beam bridge, and complete the given table.

In case of Beam bridge

- Bridge length - Total length of the bridge (in metres)
- Pillar frequency - Distance at which pillars are placed on the bridge (in metres)
- Total Number of Pillars - Pillars required to complete the bridge
- Total Number of Pillars - Bridge length  $\div$  Pillar frequency
- For actual number of pillars - Use " Ceiling () " in case of decimals.

Bridge length (m)	Pillar frequency (m)	Total number of pillars	Actual number of pillars
40	20	$\frac{40}{20} =$	
100	20	$\frac{100}{20} =$	
50	20	$\frac{50}{20} =$	
L	20		
L	F		

2

Calculate the number of pillars required, number of long and short cables that will be used to construct the suspension bridge, and complete the given table.

- Number of short cables required =  $4 \times$  (Number of pillars)
- Number of long cables required =  $4 \times$  (Number of pillars)

Bridge length (m)	Pillar frequency (m)	Number of pillars	Number of short cables	Number of long cables
40	20			
100	20			
50	20			
L	20	$\text{Ceiling} \left( \frac{L}{20} \right) = N$		
L	F	$\text{Ceiling} \left( \frac{L}{F} \right) = N$		



3 In the first two rows of Q1, which of the following parameters changed?

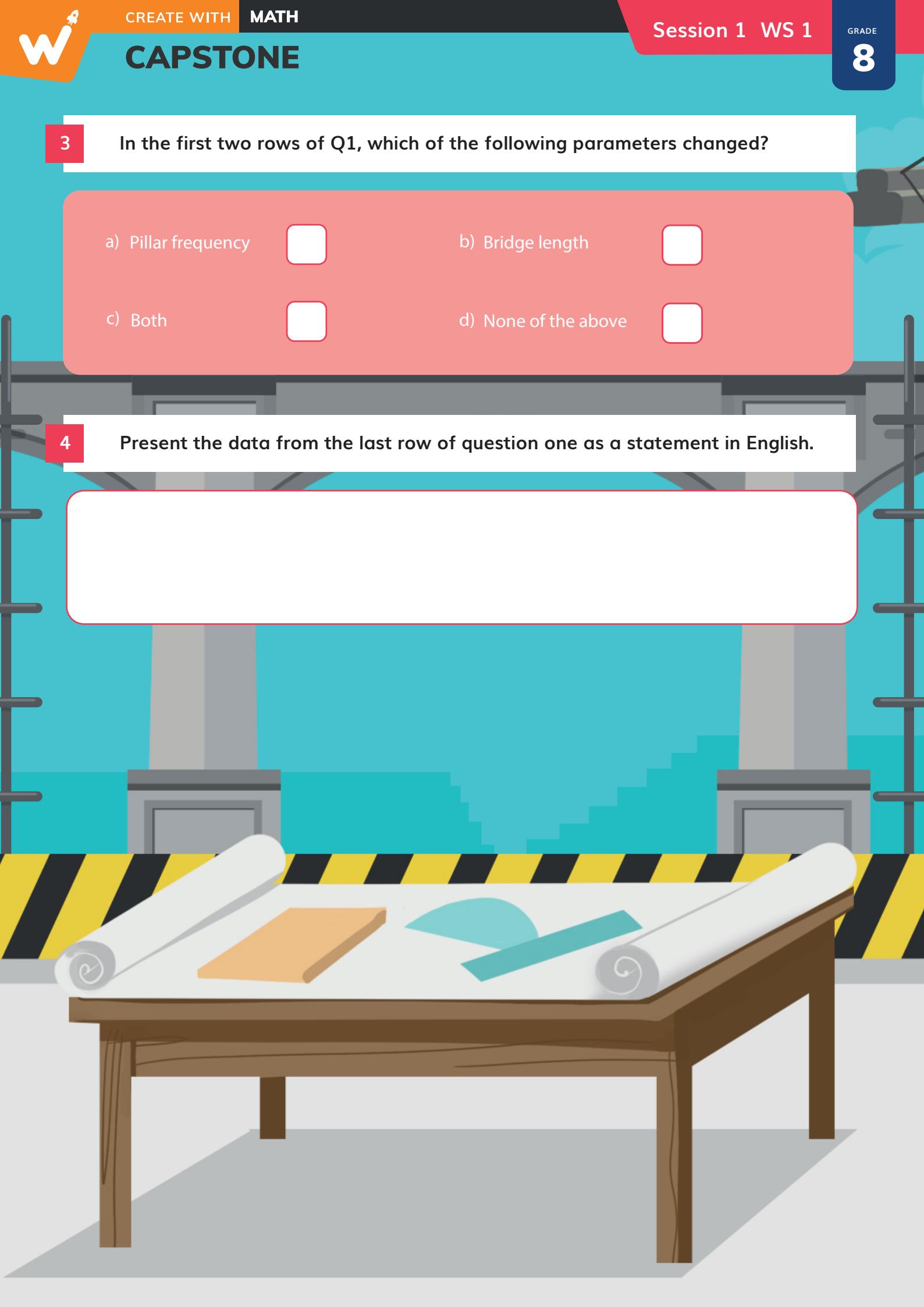
a) Pillar frequency

b) Bridge length

c) Both

d) None of the above

4 Present the data from the last row of question one as a statement in English.





# CAPSTONE

1 Calculate the number of units in the truss bridge, and fill out the given table:

In case of Truss Bridge:

- Computation for number of units required = Bridge length ÷ Base length of the unit
- For actual of units - Use “ Floor () ” in case of decimals.

Bridge length (m)	Base length of the unit (m)	Total number of units	Actual number of units
50	10	$\frac{50}{10} =$	
75	10	$\frac{75}{10} =$	
L	10		
L	$L_o$		

2 Given the number of units in the truss bridge, calculate the number of members (A, B and C). Complete the given table using your calculations.

In case of Truss Bridge:

- Number of members (Type A) =  $4 \times$  (Number of units)
- Number of members (Type B) =  $2 \times$  (Number of units - 1)
- Number of members (Type C) = (Number of units)

Bridge length (m)	Number of units	Number of slant members	Number of top members	Number of cross members
50	5			
75	7			
L	N			

3 Present the data from the last row of Q1 as a statement in English.



# CAPSTONE

1

Given the dimensions of the bridge and the unit rate of concrete, calculate the total cost of concrete for the bridge and complete the given table.

Bridge length (m)	Width of concrete (m)	Depth of concrete (m)	Unit rate of concrete (\$/ $\text{m}^3$ )	Total cost of concrete (\$)
60	20	5	200	
80	20	5	200	
l	20	5	c	

2

Given the length of the bridge and the cost of constructing one pillar, calculate the cost of the construction of pillars for each of the following cases:

Bridge length (m)	Pillar frequency (m)	Number of pillars	Cost of 1 pillar (\$)	Total cost of pillars (\$)
30	50	1	100000	
75	50	2	100000	
l	50	$\text{Ceiling}\left(\frac{l}{50}\right) = n$	100000	
l	50	$\text{Ceiling}\left(\frac{l}{50}\right) = n$	p	

3

Present the data from the last row of question 1 as a statement in English.



# CAPSTONE

1

Given the number of cables, the length of a cable, and the cost of 1 m of the cable, calculate the total cost of cables in the cable stayed bridge.

Number of cables	Cable length (m)	Cost of 1 m of cable (\$)	Total cost of cables (\$)
4	$15\sqrt{2}$	1000	
8	$15\sqrt{2}$	1000	
5	$15\sqrt{2}$	1000	
n	l	1000	
n	l	c	

2

The length of a short cable is  $L_s$ , the length of a long cable is  $L_l$ , and the cost of 1 m of a cable is  $C_c$ . If a bridge has N pillars, then the number of each type of cable is  $4N$ . Using this information, write the expression that represents the total cost of all the cables.

3

Given the number of members, the length of one member, and the cost of 1 m of the member, calculate the total cost of members in the truss bridge.

Number of members	Length of a member (m)	Cost of 1 m of member (\$)	Total cost of members (\$)
10	$5\sqrt{5}$	1000	
20	$5\sqrt{5}$	1000	
n	$5\sqrt{5}$	1000	
n	l	1000	
n	l	c	



4

A Truss bridge has the following dimensions:

- Number of units =  $N$
- Number of members of type A =  $4N$
- Length of member of type A =  $L_A$
- Number of members of type B =  $2(N-1)$
- Length of member of type B =  $L_B$
- Number of members of type C =  $N$
- Length of member of type C =  $L_C$
- Cost of 1 m of a member =  $C_M$

Using the information above, figure out the expression for the total cost of all the members.

