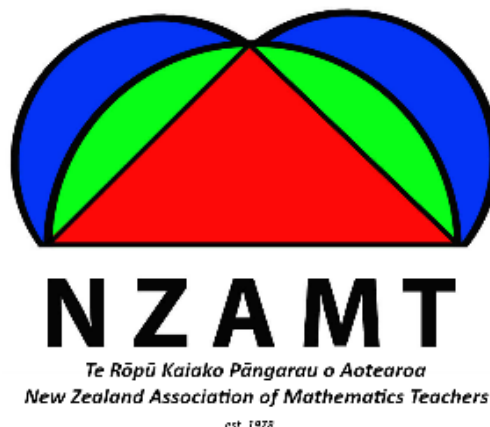


NZAMT



NUMERACY Questions

Written by teachers at camp January 2023

For details on the process idea and content ideas referred to in this booklet, please see [here](#) and [here](#).

Questions with process and content ideas identified

[illegible]

7c			✓			✓				
8a	✓							✓		
8b			✓					✓		
8c		✓				✓				
9a		✓							✓	
9b			✓						✓	
9c	✓			✓						
10a		✓							✓	
10b	✓								✓	
10c			✓							✓
11a			✓	✓						
11b	✓							✓		
11c		✓						✓		
12a		✓				✓				
12b	✓							✓		
12c			✓					✓		
Question	Process Ideas			Content Ideas						
	A	B	C	1	2	3	4	5	6	7
13a		✓		✓						
13b			✓	✓						
13c	✓			✓						
13d	✓			✓						
14a		✓		✓						
14b	✓			✓						
14c			✓	✓					✓	

15a		✓		✓						
15b	✓			✓						
15c			✓						✓	
16a		✓						✓		
16b	✓							✓		
16c			✓						✓	
17a		✓		✓						
17b	✓			✓						
17c			✓						✓	
18a		✓						✓		
18b			✓	✓						
18c	✓								✓	
19a			✓							✓
19b	✓			✓					✓	
19c			✓							✓
20a		✓		✓						
20b			✓	✓						
20c		✓		✓						
21a	✓			✓						
21b			✓	✓						
21c		✓		✓						
22a		✓		✓						
22b		✓		✓						
22c	✓			✓						

23a			✓	✓						
23b		✓		✓						
23c			✓						✓	
24a		✓		✓						
24b	✓			✓						
24c			✓	✓						

Question	Process Ideas			Content Ideas						
	A	B	C	1	2	3	4	5	6	7
25a		✓						✓		
25b		✓						✓		
25c			✓	✓						
26a	✓					✓				
26b		✓				✓				
26c			✓	✓				✓		
27a	✓						✓			
27b			✓					✓		
27c		✓		✓				✓		
28a		✓							✓	
28b			✓						✓	
28c			✓						✓	
29a		✓		✓						✓
29b			✓							✓
29c	✓					✓				
30a		✓		✓		✓				
30b	✓					✓				
30c	✓							✓		
31a			✓	✓						
31b	✓				✓					
31c		✓			✓					
32a		✓		✓				✓		
32b			✓	✓				✓		

32c	✓			✓			✓			
33a			✓	✓						
33b	✓			✓			✓			
33c		✓					✓			
34a		✓			✓					
34b			✓		✓					
34c	✓			✓			✓			
35a		✓					✓			
35b	✓			✓						
35c			✓	✓						
36a		✓					✓			
36b			✓	✓						
36c	✓						✓			

Question	Process Ideas			Content Ideas						
	A	B	C	1	2	3	4	5	6	7
37a		✓		✓						
37b	✓			✓						
37c			✓	✓						
38a	✓			✓						
38b		✓		✓						
38c			✓						✓	
39a		✓						✓		
39b	✓							✓		
39c			✓					✓		
40a		✓		✓						
40b			✓	✓						
40c	✓			✓						
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41b	✓								✓	
41c			✓						✓	
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42b	✓				✓					
42c		✓			✓					
43a		✓							✓	
43b			✓						✓	
43c	✓			✓					✓	
44a		✓				✓				
44b		✓				✓				

44c			✓			✓				
45a	✓			✓						
45b	✓			✓						
45c			✓	✓					✓	
46a		✓					✓			
46b	✓					✓		✓		
46c			✓		✓		✓			
47a	✓							✓		
47b		✓					✓	✓		
47c			✓				✓	✓		
48a		✓		✓						
48b		✓						✓		
48c			✓					✓		

Question	Process Ideas			Content Ideas						
	A	B	C	1	2	3	4	5	6	7
49a		✓					✓			
49b			✓					✓		
49c	✓					✓				
50a		✓						✓		
50b			✓					✓		
50c	✓			✓						
51a	✓			✓						
51b		✓				✓				
51c			✓	✓						
52a	✓			✓						✓
52b		✓		✓				✓		
52c			✓						✓	
53a		✓						✓		
53b	✓			✓				✓		
53c			✓					✓		
54a		✓								✓
54b			✓							✓
54c	✓			✓						
55a		✓						✓		
55b		✓						✓		
55c			✓					✓		
56a		✓			✓					
56b			✓		✓					

56c	✓			✓						
57a			✓						✓	
57b	✓			✓						
57c		✓							✓	
58a	✓					✓				
58b		✓						✓		
58c		✓								
59a	✓			✓						
59b		✓		✓						
59c			✓	✓						
60a		✓		✓				✓		
60b		✓								
60c			✓					✓		

Question	Process Ideas			Content Ideas						
	A	B	C	1	2	3	4	5	6	7
61a	✓			✓						
61b		✓							✓	
61c			✓						✓	
62a	✓									✓
62b		✓								✓
62c			✓							✓
63a		✓			✓				✓	
63b	✓				✓				✓	
63c			✓		✓				✓	
64a		✓		✓						
64b	✓			✓						
64c			✓	✓						

QUESTION ONE: TE HUIA TRAIN

Te Huia runs return services from Frankton (Waikato) to the Strand (Auckland) **twice a day during the week**, and **once on Saturdays**.

Services to Auckland					
Frankton	Rotokauri	Huntly	Papakura	Puhinui	Strand
Depart	Depart	Depart	Arrive	Arrive	Arrive
6.05am	6.14am	6.36am	7.58am*	8.16am*	8.45am*
2.05pm	2.14pm	2.36pm	3.58pm*	4.18pm*	4.45pm*

Services to Waikato					
Strand	Puhinui	Papakura	Huntly	Rotokauri	Frankton
Depart	Depart	Depart	Arrive	Arrive	Arrive
9.35am	10.07am	10.26am	11.37am*	12.07pm*	12.15pm*
5.35pm	6.08pm	6.26pm	7.37pm*	8.07pm*	8.15pm*

a) How long can a passenger be expected to be on the train from the Strand to Rotokauri?

- ☐ 3 hours 42 mins
- ☐ 2 hours 42 mins
- ☐ 3 hours 32 mins
- ☐ 2 hours 32 mins

b) Amiria works in the café that is on the train, serving the passengers with food and drink, from Frankton to the Strand, and return. **Write a calculation** that would show the number of hours she is on board Te Huia for a week (5 weekdays and Saturday).

- c) Pokeno residents would like a train stop in Pokeno. The train stop would be a distance of 41 km from Huntly and 24 km from Papakura. NZTA have decided that the train would be at the station 26 minutes after leaving Papakura i.e. 10:52am when travelling to Frankton. Is this correct? Justify your answer.

QUESTION ONE: TE HUIA TRAIN

Te Huia runs return services from Frankton (Waikato) to the Strand (Auckland) **twice a day during the week**, and **once on Saturdays**.

Services to Auckland					
Frankton	Rotokauri	Huntly	Papakura	Puhinui	Strand
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6.05am	6.14am	6.36am	7.58am*	8.16am*	8.45am*
2.05pm	2.14pm	2.36pm	3.58pm*	4.18pm*	4.45pm*

Services to Waikato					
Strand	Puhinui	Papakura	Huntly	Rotokauri	Frankton
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9.35am	10.07am	10.26am	11.37am*	12.07pm*	12.15pm*
5.35pm	6.08pm	6.26pm	7.37pm*	8.07pm*	8.15pm*

- a) How long can a passenger be expected to be on the train from the Strand to Rotokauri?
- | Evidence | Process | Content |
|----------|---------|---------|
| D | B | 5 |
- b) Amiria works in the café that is on the train, serving the passengers with food and drink, from Frankton to the Strand, and return. **Write a calculation** that would show the number of hours she is on board Te Huia for a week (5 weekdays and Saturday).
- | Evidence | Process | Content |
|---|---------|---------|
| 5 x 2 x 2 hours 40 mins + 2 hours 40
or 11 x 2 hours 40 mins | A | 1, 5 |

- c) Pokeno residents would like a train stop in Pokeno. The train stop would be a distance of 41 km from Huntly and 24 km from Papakura. NZTA have decided that the train would be at the station 26 minutes after leaving Papakura i.e., 10:52am when travelling to Frankton. Is this correct? Justify your answer.

Evidence	Process	Content
Time between Papakura and Huntly = 71min $24 / (24 + 41) \times 71 = 26 \text{ mins}$ Yes, NZTA is correct.	C	1, 5

QUESTION TWO: WORD PLAY

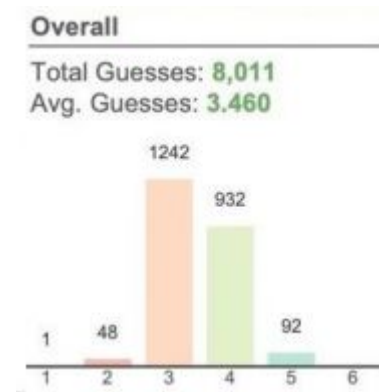
Wordle is an online game that Cruzy plays.

Every day, a five-letter word is chosen by the game which Cruzy has six guesses to get correct. After every guess, each letter is coloured green, yellow, or grey:

- green means that letter is in the answer and in the right position
- yellow means that letter is in the answer but not in the right position
- grey means that letter is not in the answer at all.

C	R	O	W	N
P	A	C	E	D
A	C	U	T	E
E	N	A	C	T
T	R	A	C	E
T	E	A	C	H

Here are Cruzy's statistics after playing Wordle every day for 2 315 days:



a) Based on Cruzy's results so far, what is the probability that the next time she plays, she needs three or less guesses?

- ☐ $\frac{1242}{2315}$
- ☐ $\frac{1242}{8011}$
- ☐ $\frac{1291}{2315}$
- ☐ $\frac{1291}{8011}$

b) Cruzy's average number of guesses is 3.460. Explain what this value means about her Wordle-playing abilities.

- c) Cruzy has played Wordle for 2 315 days. How many years and months has she been playing Wordle for?

years and

months

QUESTION TWO: WORD PLAY

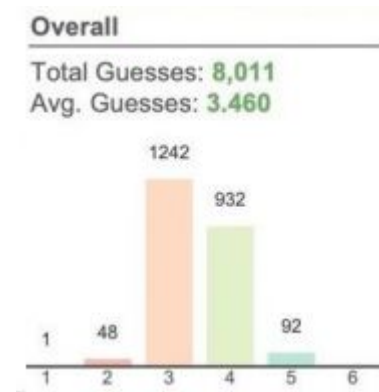
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Every day, a five-letter word is chosen by the game which Cruzy has six guesses to get correct. After every guess, each letter is coloured green, yellow, or grey:

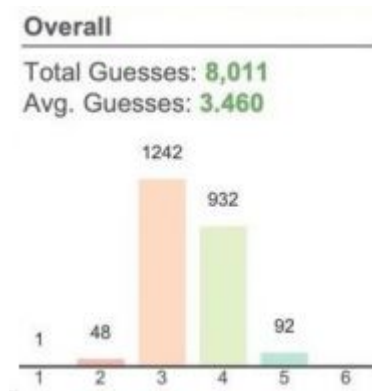
- green means that letter is in the answer and in the right position
- yellow means that letter is in the answer but not in the right position
- grey means that letter is not in the answer at all.

C	R	O	W	N
P	A	C	E	D
A	C	U	T	E
E	N	A	C	T
T	R	A	C	E
T	E	A	C	H

Here are Cruzy's statistics after playing Wordle every day for 2 315 days:



a) Here are Cruzy's statistics after playing Wordle every day for 2,315 days:



Based on Cruzy's results so far, what is the probability that the next time she plays, she needs three guesses or fewer?

☐ $\frac{1242}{2315}$

☐ $\frac{1242}{8011}$ ☐ $\frac{1291}{2315}$ ☐ $\frac{1291}{8011}$		
Evidence	Process	Content
1291/2315	A	7

- b) Cruzy's average number of guesses is 3.460. Explain what this value means about her Wordle-playing abilities.

Evidence	Process	Content
This means that she usually takes between three and four guesses to get the correct word.	C	1

- c) Cruzy has played Wordle for 2 315 days. How many years and months has she been playing Wordle for?

Evidence	Process	Content
6 years and 4 months	B	5

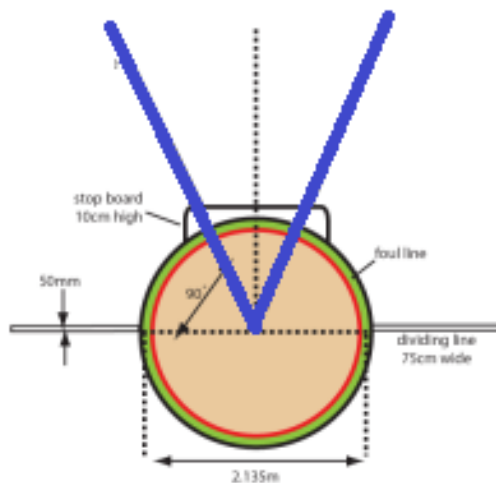
QUESTION THREE: SHOT PUT

Rocky is a shot putter.



Shotput is a sport where Rocky stands in a circle and pushes a heavy ball as far as possible.

- a) When Rocky pushes the ball, it must land between the blue lines. **Estimate** the angle where the ball should land.



degrees

- b) Rocky uses a method called the spin, to push the ball as far as he can. The spin method means he turns 540° before releasing the ball. How many turns is 540° ?

- ☐ One turn
☐ One and a half turns
☐ Two turns

- ☐ Two and a half turns
- ☐ Three turns

c) The other method that Rocky can use is the glide. He practices using both methods, the glide and the spin, and records his results.

Glide	16.97m	17.02m	17.58m	16.85m	18.54m
Spin	17.25m	18.24m	17.44m	16.87m	17.38m

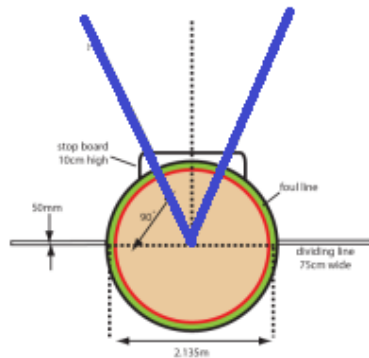
Which technique would you recommend Rocky use? Explain your decision using data from the table.

QUESTION THREE: SHOT PUT

Rocky is a shot putter.

Shotput is a sport where Rocky stands in a circle and pushes a heavy ball as far as possible.

- a) When Rocky pushes his ball, it must land between the blue lines. **Estimate** the angle of where the ball should land.



Evidence	Process	Content
35 degrees [Accept any value between 30 and 40]	B	5

- b) Rocky uses a method called the spin, to push the ball as far as he can. The spin method means he turns 540° before releasing the ball. How many turns is 540° ?
- ☐ One turn
 - ☐ One and a half turns
 - ☐ Two turns
 - ☐ Two and a half turns
 - ☐ Three turns

Evidence	Process	Content
One and a half turns	A	5

- c) The other method that Rocky can use is the glide. He practices using both methods, the glide and the spin, and records his results.

Glide	16.97m	17.02m	17.58m	16.85m	18.54m
-------	--------	--------	--------	--------	--------

Spin	17.25m	18.24m	17.44m	16.87m	17.38m
Which technique would you recommend Rocky use? Explain your decision using data from the table.					
Evidence		Process		Content	
I recommend Rocky use spin. On average, Rocky throws 17.39m with glide and 17.44m with spin. This means he throws 0.05m (or 5cm) further with spin. Note: 5cm is a significantly greater distance in shotput, particularly in competition! Other solutions that take a stance and provide appropriate justification should be accepted.		C		1 and 6	

QUESTION FOUR: ON THE ISLANDS

Joyce lives in Niue. Niue is an island in the Pacific Ocean.



Assume that the map is to scale.

She is flying to Fiji for a conference. To get from Niue to Fiji, Joyce has to travel to New Zealand.

- a) In which direction is Joyce flying when she is travelling from Niue to New Zealand?
- ☐ East
 - ☐ South
 - ☐ South-West
 - ☐ South- East
- b) Niue uses the New Zealand dollar. One New Zealand dollar (NZD) is worth \$1.40 Fijian dollars (FJD). Joyce wants \$550FJD to spend while she is in Fiji.

How much NZD will Joyce need to purchase \$550FJD?

 NZD

- c) Fiji time is 23 hours ahead of Niue time. Joyce leaves Niue on Friday at 1:30pm (Niue time) and arrives in Fiji two days later on Sunday at 9:10am (Fiji time).

How many hours and minutes does the trip actually take for Joyce to get from Niue to Fiji?

	hours and		minutes
--	-----------	--	---------

- d) The flight from Niue to New Zealand takes 3 hours and 30 minutes. If a direct flight from Niue to Fiji existed, Joyce claims that it would take her less than an hour to fly from Niue to Fiji.

Do you support Joyce's claim? Explain your answer, using information from the map.

--

QUESTION FOUR: ON THE ISLANDS

Joyce lives in Niue. Niue is an island in the Pacific Ocean.



Assume that the map is to scale.

She is flying to Fiji for a conference. To get from Niue to Fiji, Joyce has to travel to New Zealand.

- a) In which direction is Joyce flying when she is travelling from Niue to New Zealand?
- ☐ East
- ☐ South
- ☐ South-West
- ☐ South- East

Evidence	Process	Content
South-West	B	4

- b) Niue uses the New Zealand dollar. One New Zealand dollar (NZD) is worth \$1.40 Fijian dollars (FJD). Joyce wants \$550FJD to spend while she is in Fiji.
- How much NZD will Joyce need to purchase \$550FJD?

Evidence	Process	Content
\$392.85	A	1

- c) Fiji is 23 hours ahead of Niue time. Joyce leaves Niue on Friday at 1:30pm (Niue time) and arrives in Fiji two days later on Sunday at 9:10am (Fiji time).

How many hours and minutes does the trip actually take for Joyce to get from Niue to Fiji?		
Evidence	Process	Content
20 hours and 40 minutes	A	5

- d) The flight from Niue to New Zealand takes 3 hours and 30 minutes. If a direct flight from Niue to Fiji existed, Joyce claims that it would take her less than an hour to fly from Niue to Fiji.

Do you support Joyce's claim? Explain your answer, using information from the map.

Evidence	Process	Content
Joyce is not correct. It would take longer than an hour to travel direct from Niue to Fiji. This is because the distance from Niue to Fiji is only half the distance from Niue to NZ.	C	5

QUESTION FIVE: TAHI ART GALLERY

The Tahi Art Gallery sells local art.

- a) Their open sign can be [turned](#) so the letters read “close”.

Note: They hyperlink will take you to a video of the sign being operated.



In what direction and angle does the “n” need to turn in the word *open* to be the “s” in the word *close*? (This is the letter only not the cog itself)

Direction

- ☐ Clockwise
☐ Anticlockwise

Angle: _____degrees

- b) One of the prints available for sale at Tahi Arts Gallery is inspired by Niuean Hiapo Art:



Which geometric transformations has the artist used in this print?

Select all that apply.

- ☐ Symmetry
☐ Reflection

- ☐ Rotation
- ☐ Translation

c) Tahi Art Gallery sells this print in different sizes. Here is the price list:

Type	Length	Width	Cost
Large	76cm	51cm	\$700
Medium	53cm	36cm	\$370

In terms of the cost per cm^2 , which size print is better value for money? Explain your answer, using calculations from the table.

QUESTION FIVE: TAHI ART GALLERY

- a) In what direction and angle does the “n” need to turn in the word *open* to be the “s” in the word *close*?



Evidence	Process	Content
Accept either Clockwise or Anticlockwise, 90 degrees <i>Discuss why in this context, rotating clockwise 270 degrees does not make sense.</i>	B	3

- b) One of the prints available for sale at Tahi Arts Gallery is inspired by Niuean Hiapo Art:



Which geometric transformations has the artist used in this print?

Select all that apply.

- ☐ Symmetry
- ☐ Reflection
- ☐ Rotation
- ☐ Translation

Evidence	Process	Content
Symmetry, reflection, translation All correct answers must be selected	A	3

- c) Tahi Art Gallery sells this print in different sizes. Here is the price list:

Type	Length	Width	Cost
Large	76cm	51cm	\$700
Medium	53cm	36cm	\$370

In terms of the cost per cm^2 , which size print is better value for money? Explain your answer, using calculations from the table.

Evidence	Process	Content
Large = $\\$0.18$ per cm^2 Medium = $\\$0.19$ per cm^2 Both prints have similar cost per cm^2, so I would not say one is better value than the other. Alternative response Large = $3876 \div \\$700$ $= 5.54\text{cm}^2$ for every dollar Medium = $1908 \div \\$370 =$ 5.16cm^2 for every dollar The large print provides more cm^2 for your dollar	C	1, 5

QUESTION SIX: RUGBY WORLD CHAMPIONS



Source: www.photosport.nz

The Black Ferns are the New Zealand Womens' Rugby team.

- a) Players who are selected for the Black Ferns are paid \$20 000 to represent New Zealand. If the player is injured, and cannot play, they are paid 80% of this amount.

How much would an injured player be paid?

- b) In 2022, New Zealand hosted the Rugby World Cup. 34 235 people attended the first game of the Rugby World Cup. The final game had 30% more people at the game.

Calculate the number of people who were at the final game.

 people

- c) The Black Ferns won the 2022 Rugby World Cup, but before the World Cup, they had lost four of their last six games.

It was claimed that the Black Ferns would be lucky to win the World Cup, based on their results.

Do you agree or disagree with this claim? Explain your answer, using the information in the question.

QUESTION SIX: RUGBY WORLD CHAMPIONS

- a) Players who are selected for the Black Ferns are paid \$20 000 to represent New Zealand. If the player is injured, and cannot play, they are paid 80% of this amount.

How much would an injured player be paid?

Evidence	Process	Content
\$16 000	B	1

- b) In 2022, New Zealand hosted the Rugby World Cup. 34 235 people attended the first game of the Rugby World Cup. The final game had 30% more people at the game.

Calculate the number of people who were at the final game.

Evidence	Process	Content
44 506 Accept 44 505	A	1

- c) The Black Ferns won the 2022 Rugby World Cup, but before the World Cup, they had lost four of their last six games.

It was claimed that the Black Ferns would be lucky to win the World Cup, based on their results.

Do you agree or disagree with this claim? Explain your answer, using the information in the question.

Evidence	Process	Content
Black Ferns lost $4/6 = 2/3$ or 66% of their games prior to the Rugby World Cup. Based on the fact that they lost over half of their games, I think they were lucky to win the World Cup.	C	1 and 7

QUESTION SEVEN: POUTAMA WRIST BAND



Source: <https://taratidesignltd.com/products/royal-blue-poutama>

This poutama wrist band is 2.5 inches wide.

- a) Estimate how long the large stone to the left of the poutama wrist band is in inches.

- b) One centimetre is equivalent to 0.393 inches. The calculation required to find the width in centimetres is:

- ☐ $0.393 \div 2.5$
- ☐ $2.5 \div 0.393$
- ☐ 2.5×0.393
- ☐ $2.5 - 0.393$

- c) Tama believes that one third (hau toru) of the poutama is blue (kikorangi). Is his thinking correct? Explain your answer using evidence from the poutama wrist band.

QUESTION SEVEN: POUTAMA DESIGN

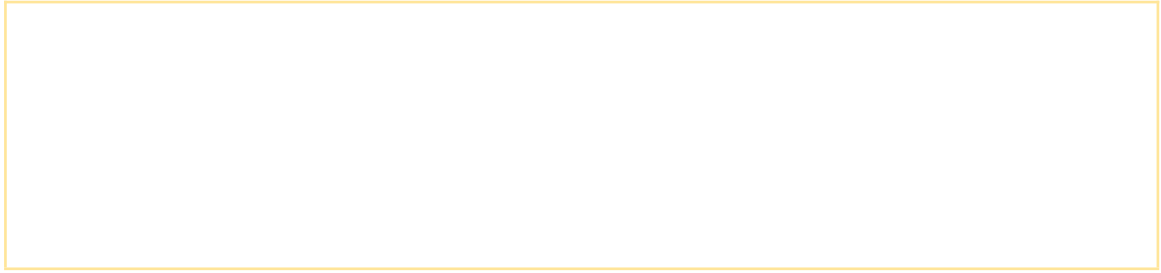
- a) Estimate how long the large stone to the left of the poutama wrist band is in inches.
- | Evidence | Process | Content |
|---|---------|---------|
| My finger is about the width of the poutama. The stone is 2 finger widths so 2×2.5 inches = 5 inches
(Accept any reasonable answer) | B | 5 |
- b) One centimetre is equivalent to 0.393 inches. The calculation required to find the **width** in centimetres is:
- ☐ $0.393 \div 2.5$
☐ $2.5 \div 0.393$
☐ 2.5×0.393
☐ $2.5 - 0.393$
- | Evidence | Process | Content |
|----------|---------|---------|
| B | A | 5 |
- c) Tama believes that one third (hau toru) of the poutama design is blue (kikorangi). Is his thinking correct? Explain your answer using evidence from the poutama wrist band.
- | Evidence | Process | Content |
|---|---------|---------|
| Each poutama is a translation i.e., black to blue to white (3 colours) and an extended repeated pattern. Given the rough rotational symmetry about the centre this would mean Tama is correct | C | 3 |

QUESTION EIGHT: CARVING A PATU



This patu, carved by Turou, is 28.5cm in total length by 9.5cm at its widest part. A patu is approximately 1.5 cm thick.

- a) The piece of kauri that Torou's patu was carved from would most likely have had dimensions of:
- ☐ 29cm x 95m x 15mm
 - ☐ 0.3m x 10cm x 1.5cm
 - ☐ 300mm x 0.1m x 17mm
 - ☐ 0.3m x 95mm x 1.7cm
- b) A carving is always made on the top side of a patu. Turou has modelled the available area, to create his carving design, on a rectangle. Estimate the area of the carved patu and explain whether his answer of 290cm^2 is reasonable.



c) A transformation that can be seen in the design carved into the patu is:

- ☐ an enlargement of the koru
- ☐ a rotation of 90 of the arms (under the nose) is centred at the vertex
- ☐ a horizontal line of symmetry
- ☐ a translation of a koru

QUESTION EIGHT: CARVING A PATU

- a) The piece of kauri the patu was carved from would most likely have had dimensions of:

- ☐ 29cm x 95m x 15mm
- ☐ 0.3m x 10cm x 1.5cm
- ☐ 300mm x 0.1m x 17mm
- ☐ 0.3m x 95mm x 1.7cm

Evidence	Process	Content
C <i>Good to discuss how it needs to be slightly bigger to carve it down</i>	A	5

- b) A carving is always made on the top side of a patu. Turou has modelled the available area, to create his carving design, on a rectangle. Estimate the area of the carved patu and explain whether his answer of 290cm² is reasonable.

Evidence	Process	Content
Area of the carved patu is approximately 20 x 8 = 160cm ² whereas the whole available space is approximately 29 x 10 = 290cm ² . Tupou has not found part of the shape so is incorrect. <i>Accept reasonable answers that demonstrate understanding of the shape of the patu</i>	C	5

- c) A transformation that can be seen in the design carved into the patu is

- ☐ an enlargement of the koru
- ☐ a rotation of 90 of the arms (under the nose) is centred at the vertex
- ☐ a horizontal line of symmetry
- ☐ a translation of a koru

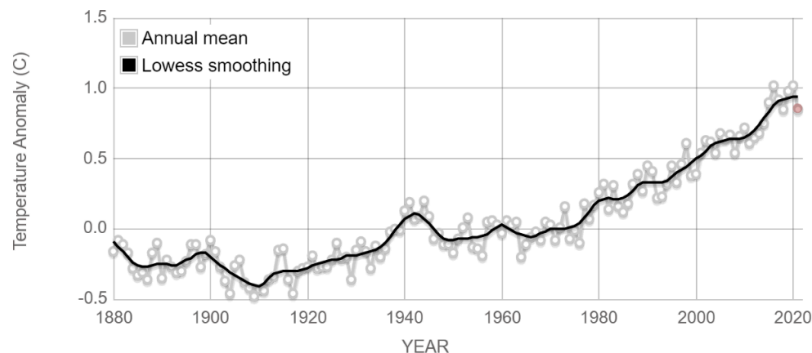
Evidence	Process	Content
B <i>Opportunity for discussion about how some of the pattern is close to these terms but not quite</i>	B	3

QUESTION NINE: GLOBAL SURFACE TEMPERATURE

This graph shows the change in global surface temperature compared to the long-term average from 1951 to 1980.

GLOBAL LAND-OCEAN TEMPERATURE INDEX

Data source: NASA's Goddard Institute for Space Studies (GISS).
Credit: NASA/GISS



Source: <https://climate.nasa.gov/vital-signs/global-temperature/>

- a) Approximately which year had the greatest drop in temperature?

- b) Which year(s) from 1920, did not follow the trend. Explain your response using the graph.

- c) The calculation that NASA scientists did to find the rate of increase in the change in global surface area temperature is best represented by:

- ☐ $(0.9 - 0.1) \div (2020 - 1880)$
☐ $(0.9 - -0.1) \div (1880 - 2020)$
☐ $(-0.1 + 0.9) \div (2020 - 1880)$
☐ $(-0.1 - 0.9) \div (1880 - 2020)$

QUESTION NINE: GLOBAL SURFACE TEMPERATURE

- a) Approximately which year had the greatest drop in temperature?
- | Evidence | Process | Content |
|---------------------------------|---------|---------|
| 1910 (accept between 1900-1910) | B | 6 |
- b) Which year(s) from 1920, did not follow the trend and why?
- | Evidence | Process | Content |
|---|---------|---------|
| 1942 and 1960 as they increased more than expected. Shown by the peaks at these points.
1943 – 1945 as it drops which goes against the increasing trend. | C | 6 |
- c) The calculation that NASA scientists did to find the rate of increase in the change in global surface area temperature is best represented by:
- ☐ $(0.9 - 0.1) \div (2020 - 1880)$
- ☐ $(0.9 - -0.1) \div (1880 - 2020)$
- ☐ $(-0.1 + 0.9) \div (2020 - 1880)$
- ☐ $(-0.1 - 0.9) \div (1880 - 2020)$
- | Evidence | Process | Content |
|----------|---------|---------|
| D | A | 1 |

QUESTION TEN: GREEDY PIG

To play Greedy Pig you need an ordinary 6-sided die.

In each round of the game:

- The dice is rolled
- The result of each roll is added together



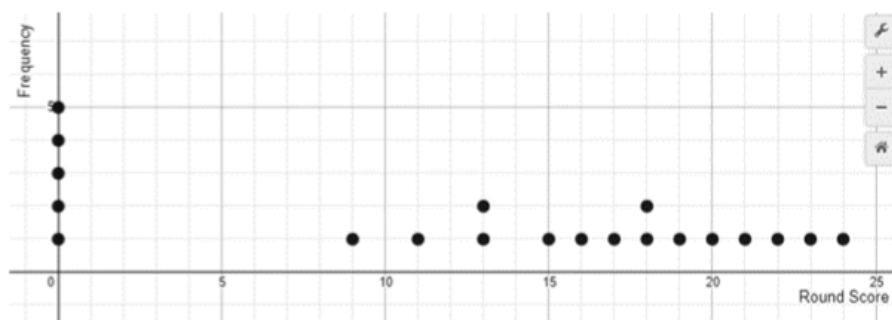
You keep rolling until you decide to stop, or until you roll a 1.

You may choose to stop at any time.

If you choose to stop rolling before you roll a 1, your score is the sum of all the numbers you rolled in that game.

If you roll a 1, your score for that game is 0.

This is a dot plot of the result from Mia's games.



a) How many games of Greedy Pig did Mia play?

b) To find the average score of Mia's games, which calculation would be the most appropriate and representative of Mia's results

- ☐ Range
- ☐ Mean
- ☐ Median
- ☐ Mode

- c) The minimum number of rolls Mia made to get her maximum score of 24 is four. How likely is it that this occurred?

Explain your answer by referencing the dice used to play Greedy Pig.

QUESTION TEN: GREEDY PIG

- a) How many games of Greedy Pig did Mia play?

Evidence	Process	Content
20	B	6

- b) To find the average of Mia's games, which calculation would be the most appropriate and representative of Mia's results

- ☐ Range
- ☐ Mean
- ☐ Median
- ☐ Mode

Evidence	Process	Content
B	A	6

- c) The minimum number of rolls Mia made to get her maximum score of 24 is four. How likely is it that this occurred?

Explain your answer by referencing the dice used to play Greedy Pig.

Evidence	Process	Content
For Mia to get a score of 24 in four rolls, she would need to get four 6's. Since the probability of one 6 is $\frac{1}{6}$, it seems unlikely that this would happen.	C	7

QUESTION ELEVEN: VISIT TO RARO

Valerie is visiting her aunt in Rarotonga over the summer holidays.

a) Valerie wants to gift her aunt Whitbury Chocolates from New Zealand.

Squares



Photo by [Massimo Adami](#) on [Unsplash](#)

250g
\$10.00

Assorted



Photo by [eniko kis](#) on [Unsplash](#)

185g
\$8.50

Valerie believes that the Squares is better value in terms of cost per gram of chocolate.
Do you agree with her claim?

Explain your answer using the price information above.

b) Her flight from Auckland to Rarotonga leaves at 08:50.

It takes Valerie 70 minutes to get to Auckland Airport from her house, and she needs to drop off her bags at the airport 90 minutes before her flight.

Calculate when Valerie needs to leave home to get to the airport on time.

c) Valerie's flight back to Auckland from Rarotonga arrives home late.

She decides to stay at Airport Motel, which is close to the airport and travel home the following day.

There is a free bus she can catch to Airport Motel from the airport. The timetable below shows the time the bus arrives at each location:

Welcome Motel	Holiday House	Airport	Kiwi Inn	Hotel Luxury	Budget Inn	Airport Motel
8:50pm	8:56pm	9:00pm	9:04pm	9:08pm	9:15pm	9:21pm
9:40pm	9:46pm	9:50pm	9:54pm	9:58pm	10:05pm	10:11pm
10:30pm	10:36pm	10:40pm	10:44pm	10:48pm	10:55pm	11:01pm
11:20pm	11:26pm	11:30pm	11:34pm	11:38pm	11:45pm	11:51pm
12:10am	12:15am	12:19am	12:23am	12:27am	12:32am	12:37am

If she arrives at Auckland Airport at 22:05, what is the earliest time she can be at Airport Motel?

QUESTION ELEVEN: VISIT TO RARO

- a) Valerie wants to gift her aunt Whitbury Chocolates from New Zealand.

Squares



Photo by [Massimo Adami](#) on [Unsplash](#)

250g
\$10.00

Assorted



Photo by [eniko kis](#) on [Unsplash](#)

185g
\$8.50

Valerie believes that the Squares is better value in terms of cost per gram of chocolate. Do you agree with her claim?

Explain your answer using the price information above.

Evidence	Process	Content
Squares = \$0.04 per gram Assorted = \$0.05 per gram Valerie is correct that the Squares are (very slightly!) better value.	C	1

- b) Her flight from Auckland to Rarotonga leaves at 08:50.

It takes Valerie 70 minutes to get to Auckland Airport from her house, and she needs to drop off her bags at the airport 90 minutes before her flight.

Calculate when Valerie needs to leave home to get to the airport on time.

Evidence	Process	Content
06:10 6:10am	A	5

c) Valerie's flight back to Auckland arrives home late.

There is a free bus she can catch to Airport Motel from the airport. The timetable below shows the time the bus arrives at each location:

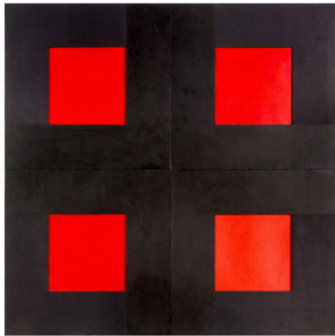
Welcome Motel	Holiday House	Airport	Kiwi Inn	Hotel Luxury	Budget Inn	Airport Motel
8:50pm	8:56pm	9:00pm	9:04pm	9:08pm	9:15pm	9:21pm
9:40pm	9:46pm	9:50pm	9:54pm	9:58pm	10:05pm	10:11pm
10:30pm	10:36pm	10:40pm	10:44pm	10:48pm	10:55pm	11:01pm
11:20pm	11:26pm	11:30pm	11:34pm	11:38pm	11:45pm	11:51pm
12:10am	12:15am	12:19am	12:23am	12:27am	12:32am	12:37am

If she arrives at Auckland Airport at 22:05, what is the earliest time she can be at Airport Motel?

Evidence	Process	Content
23:01 11:01pm	B	5

QUESTION TWELVE: RED SQUARE FOUR

Ralph Hotere was a New Zealand artist. Here is one of his artworks, called Red Square Four:



Red Square Four by Ralph Hotere

- a) Ralph Hotere uses symmetry here to share his thoughts on human rights. How many lines of symmetry are in the whole artwork?

- b) The length of one red square is 30.25cm. It is a quarter of the length of the artwork. Use this information to determine the perimeter of the black square.

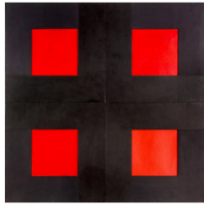
 cm

- c) Merania is inspired by Red Square Four. She wants to create an artwork that includes a red square that is double the length of the red squares in Red Square Four.

Merania claims that the area of her red square will be more than double the area of the original red square.

Is Merania's claim correct? Explain your answer using appropriate calculations.

QUESTION TWELVE: RED SQUARE FOUR



Red Square Four by Ralph Hotere

- a) Ralph Hotere uses symmetry here to share his thoughts on human rights. How many lines of symmetry are in Red Square Four?

Evidence	Process	Content
4	B	3

- b) The length of one red square is 30.25cm. It is a quarter of the length of the artwork. Use this information to determine the perimeter of the black square.

Evidence	Process	Content
484cm	A	5

- c) Merania is inspired by Red Square Four. She wants to create an artwork that includes a red square that is double the length of the red squares in Red Square Four.

Merania claims that the area of her red square will be more than double the area of the original red square.

Is Merania's claim correct? Explain your answer using appropriate calculations.

Evidence	Process	Content
Merania is correct. Area of original square is 915cm^2 Area of Merania's square is $3\,660\text{cm}^2$. The area of Merania's square is four times the original, not double.	C	5

QUESTION THIRTEEN: SEAN'S GYM

Sean has opened up a new gym in Wellington.

The membership details are in the table below.

Level	Joining fee	Monthly fee
Basic	\$20	\$10
Bronze	\$30	\$15
Silver	\$40	\$20
Gold	\$50	\$25

- a) What is the total cost of a yearly bronze membership?

- b) For the New Year, Sean offers a 20% off the monthly fees for people who join the gym before the 31st December. Kate joins on the 30th December and buys the gold package. Alice misses out on the offer and buys the silver package on the 1st January.

Kate says that the price she paid for her gold package is the same price Alice paid for her silver package. Do you agree?

Explain your answer.

Kate's grandad Peter needs to lose weight. Kate has encouraged him to join the gym so that they can go together. Peter chooses the pensioner's daily rate which is \$3 per day. He also wants to join the Monday 'shred' class, which is \$2 extra. He predicts a weight loss of 0.15% per class.

- c) If Peter weighs 127kg, how much weight in grams is he predicted to lose in the first week?

- d) Peter attends the gym three times per week, including the Monday 'shred' class. What will his yearly price for the gym be?

QUESTION THIRTEEN: SEAN'S GYM

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The membership details are in the table below.

Level	Joining fee	Monthly fee
Basic	\$20	\$10
Bronze	\$30	\$15
Silver	\$40	\$20
Gold	\$50	\$25

- a) What is the total cost of a yearly bronze membership?

Evidence	Process	Content
Bronze = $15 \times 12 + 30 = \$210$.	B	1

- b) For the New Year, Sean offers a 20% off the monthly fees for people who join the gym before the 31st December. Kate joins on the 30th December and buys the gold package. Alice misses out on the offer and buys the silver package on the 1st January.

Kate says that the price she paid for her gold package is the same price Alice paid for her silver package. Do you agree?

Explain your answer.

Evidence	Process	Content
Kate: $0.80 \times 25 \times 12 + 50 = \290 Alice: $20 \times 12 + 40 = \$280$ Kate is not right; her gold package is now \$10 more than Alice's silver package	C	1

Kate's grandad Peter needs to lose weight. Kate has encouraged him to join the gym so that they can go together. Peter chooses the pensioner's daily rate which is \$3 per day. He also wants to join the Monday 'shred' class, which is \$2 extra. He predicts a weight loss of 0.15% per class.

c)	If Peter weighs 127kg, how much weight in grams is he predicted to lose in the first week?		
	Evidence	Process	Content
	Peter: $127 \times 0.15 \div 100 = 0.1905$ kg So that is 190.5g	A	1

d)	If Peter weighs 127kg, how much weight in grams is he predicted to lose in the first week?		
	Evidence	Process	Content
	Peter: $3 \times 3 + 2 = 11 \times 4 = 44 \times 12 =$ \$528 per year. Also accept: $\$11 \times 52 \text{ weeks} = \572	A	1

QUESTION FOURTEEN: KEEP THE BEAT

CPR is where the chest is pressed at a regular speed to keep the heart beating. For CPR to work, the chest compressions (the speed the chest is pressed) should be between 100 and 120 beats per minute (bpm).



Photo by [Martin Splitt](#) on [Unsplash](#)

Some recommended songs to help keep the correct beat are:

- "Stayin' Alive" by the Bee Gees (103 bpm)
- "Crazy" by Gnarls Barkley (112 bpm)
- "Just Dance" by Lady Gaga (119 bpm)

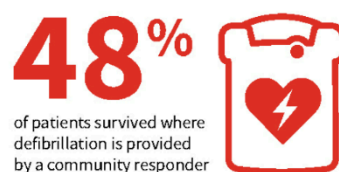
Sally practices her CPR using all 3 songs.

- a) If she does CPR for 3 minutes and 30 seconds, how many chest compressions will she have done using "Crazy" to keep the beat?

- b) It is recommended that when doing chest compressions that you do 30 compressions then give the victim 2 breathes, and repeating this pattern. If Sally is using "Just Dance" for her bpm, how many breathes will she give in 2 minutes?

- ☐ 12
- ☐ 14
- ☐ 16

- c) Here is some information from the New Zealand Red Cross.



Source: [Red Cross Online Shop \(redcrossshop.org.nz\)](https://redcrossshop.org.nz)

Sally calculates that approximately over 1500 people will have received bystander CPR last year.

Explain how Sally came up with this number.

QUESTION FOURTEEN: KEEP THE BEAT

- a) St John's recommends that for CPR to be effective that the chest compressions should be between 100 and 120 beats per minute (bpm).

Some recommended songs to help keep the correct beat are:

- "Stayin' Alive" by the Bee Gees (103 bpm)
- "Crazy" by Gnarls Barkley (112 bpm)
- "Just Dance" by Lady Gaga (119 bpm)

Sally practices her CPR using all 3 songs.

If she does CPR for 3 minutes and 30 seconds, how many chest compressions will she have done using "Crazy" to keep the beat?

Evidence	Process	Content
$112 \times 3.5 = 392$	B	1

- b) It is recommended that when doing chest compressions that you do 30 compressions then give the victim 2 breathes, and repeating this pattern. If Sally is using "Just Dance" for her bpm, how many breathes will she give in 2 minutes?

- ☐ 12
☐ 14
☐ 16

Evidence	Process	Content
14 <i>(14 is the answer as if they work it out mathematically it comes to 15.87 which means in context they have not reached the cut off to do another 2 breathes.)</i>	A	1

119 beats per min 30 2 breathes 60 4 breathes 90 6 breathes 120 8 breathes 150 10 180 12 210 14 240 16 119 x 2 = 238 238 ÷ 30 = 1 min 2 min		
---	--	--

c Here is some information from the New Zealand Red Cross.



Source: [Red Cross Online Shop \(redcrossshop.org.nz\)](http://redcrossshop.org.nz)

Sally calculates that approx. over 1500 people will have received bystander CPR last year.

Explain how Sally came up with this number.

Evidence	Process	Content
More than 2000 per year, means min of 2000 $2000 \times 0.76 = 1520$	C	1, 6

QUESTION FIFTEEN: FISH AND CHIPS

Recently Nemo's Fish and Chips shop put their prices up.

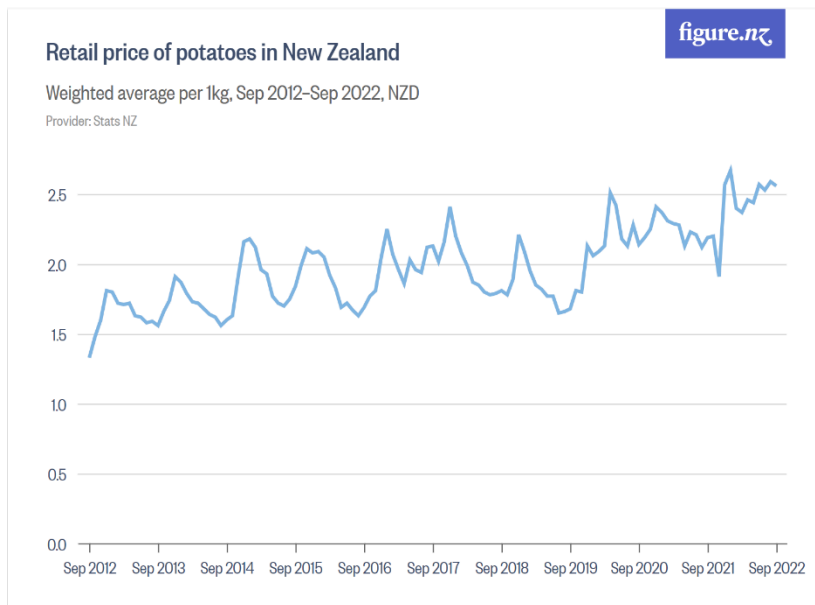
Item	Old price	New price
1 scoop of chips	\$2.50	
Fish	\$3.20	\$3.90
6 chicken nuggets	\$3.60	\$4.10
Donut	\$2.20	\$2.40
Cheese burger	\$5.20	\$5.90

- a) Nemo increased the price of 1 scoop of chips by 20%. What will the new price be?

- b) Dory bought a cheese burger, 2 fish, 6 chicken nuggets and a donut. How much more does this cost her now with the price increase?

- c) Nemo decided to do some research on why he was getting charged more by his suppliers. He found this graph at [Retail price of potatoes in New Zealand - Figure.NZ](#)

The graph below shows the retail price of potatoes in New Zealand.



Explain what has happened to the price of potatoes in this 10-year time period with supporting evidence and describe any unusual features that you notice.

QUESTION FIFTEEN: FISH AND CHIPS

- a) Nemo increased the price of 1 scoop of chips by 20%. What will the new price be?

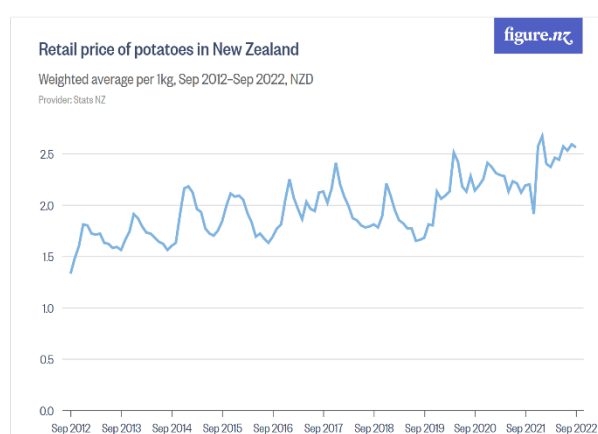
Evidence	Process	Content
$\$2.50 \times 0.2 = 0.5$ So the new price is \$3.00	B	1

- b) Dory bought a cheese burger, 2 fish, 6 chicken nuggets and a donut. How much more does this cost her now with the price increase?

Evidence	Process	Content
Old: $5.2 + (2 \times 3.2) + 3.6 + 2.2 = 17.4$ New: $5.9 + (2 \times 3.9) + 4.1 + 2.4 = 20.2$ Difference: $20.2 - 17.4 = 2.8$ So \$2.80 more	A	1

- c) Nemo decided to do some research on why he was getting charged more by his suppliers. He found this graph at [Retail price of potatoes in New Zealand - Figure.NZ](#)

The graph below shows the retail price of potatoes in New Zealand.



Explain what has happened to the price of potatoes in this 10-year time period with supporting evidence and describe any unusual features that you notice.

Evidence	Process	Content
Overall the price has increased, 2012 was just below \$1.50 per kg, now in 2022 it is just over \$2.50 per kg. If this was a consistent increase it would be $(1/10 = 0.1)$ approx. 10 cents per year $(0.1/1.5 = 6.67\%)$ or 6.67% increase. 2018 and 2019 had a decrease in the prices, which goes against the overall trend.	C	6

QUESTION SIXTEEN: DIAMOND HARBOUR

There is a ferry that people use to travel between Lyttleton and Diamond Harbour.
Below is the 2023 timetable for this service.

Depart Lyttelton		Depart Diamond Harbour	
Mon-Fri	Weekend	Mon-Fri	Weekend
AM 6.15	Sat Only 6.50	AM 6.27	Sat Only 7.02
6.50		7.02	
7.15	Sat & Sun 7.50	7.27	Sat & Sun 8.02
7.40		7.52	
8.05		8.17	9.02
8.50	9.50	9.02	10.02
9.50	10.50	10.02	11.02
10.50	11.20	11.02	11.32
11.50	11.50		
PM 12.50	12.20	PM 12.02	12.02
1.50	12.50	1.02	12.32
2.50	1.20	2.02	1.02
3.20	1.50	3.02	1.32
4.00	2.20	-	2.02
4.25	2.50	4.12	2.32
4.50	3.50	4.37	3.02
5.15	4.50	5.02	4.02
5.45	5.50	5.27	5.02
6.30	6.50	5.57	6.02
7.30	7.50	6.42	7.02
8.30	Sat Only 8.50	7.42	8.02
9.30		8.42	Sat Only 9.02
Fri Only 10.30	9.50	9.42	
	10.50	Fri Only 10.42	10.02
			11.02

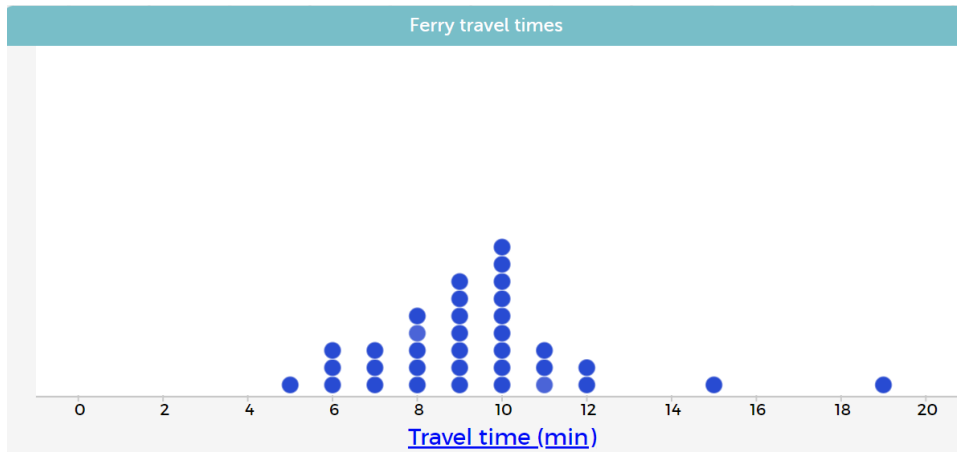
- a) How long does it take for a ferry to travel across the harbour, and then depart for its return trip?

- b) On a weekend day, how often does the ferry service depart from Lyttelton, between 10.50am and 2.50pm?

- ☐ Every 20 min
☐ Every 30 min
☐ Every 40 min

- ☐ Every 50 min
- ☐ Every 60 min

c) Dayle takes the ferry every weekday. This graph shows the ferry travel time for 7 weeks (35 weekdays).



He makes a comment that the **average** ferry trip takes 10 minutes. Do you agree with Dayle? Explain your answer using the graph above.

QUESTION SIXTEEN: DIAMOND HARBOUR

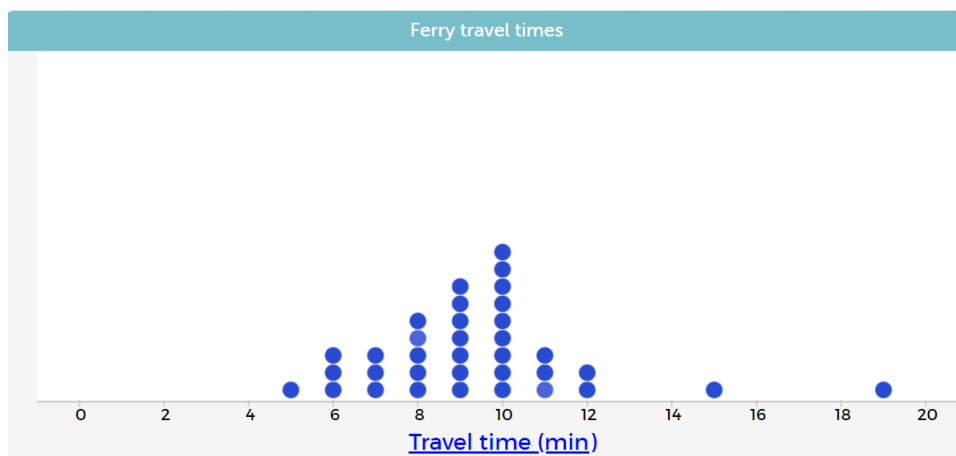
- a) How long does it take for a ferry to travel across the harbour, and then depart for its return trip?

Evidence	Process	Content
Time difference between 6.15am and 6.27am is 12 min	B	5

- b) On a weekend day, how often does the ferry service depart from Lyttleton, between 10.50am and 2.50pm?

Evidence	Process	Content
Every 60 min	A	5

- c) Dayle takes the ferry every weekday. This graph shows the ferry travel time for 7 weeks (35 weekdays).



He makes a comment that the **average** ferry trip takes 10 minutes. Do you agree with Dayle? Explain your answer using the graph above.

Evidence	Process	Content
Possible answers: - Yes as it is the mode with 9/35	C	6

days it takes 10 min. - No as the median is 9 minutes, which is 1 minute quicker. - No as the mean is 9.37 min, which gets rounded down to 9 minutes		
--	--	--

QUESTION SEVENTEEN: ALPS 2 OCEAN CYCLE TRAIL

The Alps 2 Ocean Cycle Trail is a cycle trail that takes cyclists from Aoraki/Mount Cook to Oamaru. It is broken into 8 sections, with each section being graded as either easy, intermediate or easy/intermediate to cycle.

Each section is indicated by coloured dots showing where cyclists can spend the night.



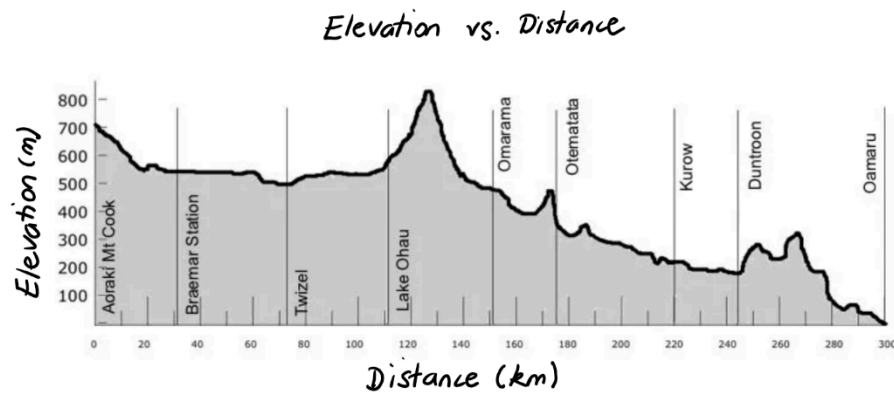
Source: [Alps 2 Ocean Trail \(a2ocycletrails.co.nz\)](http://a2ocycletrails.co.nz)

a) The longest section in km to cycle is:

- ☐ Aoraki/Mount Cook to Braemar Road
- ☐ Braemar Road to Twizel
- ☐ Lake Ohau Lodge to Omarama
- ☐ Otematata to Kurow
- ☐ Duntroon to Oamaru

b) Calculate the total length of the Alps 2 Ocean Cycle Trail.

- c) The sections from Lake Ohau Lodge to Omarama and from Duntroon to Oamaru are graded as Intermediate, so are the hardest ones to cycle. Here is a graph showing how high each section is above sea level (called elevation):



Source: [alps 2 ocean bike trail elevation - Google Search](#)

Explain why the Lake Ohau to Omarama and Duntroon to Oamaru are considered hard to cycle using information from the graph.

QUESTION SEVENTEEN: ALPS 2 OCEAN CYCLE TRAIL

a) The longest section in km to cycle is:

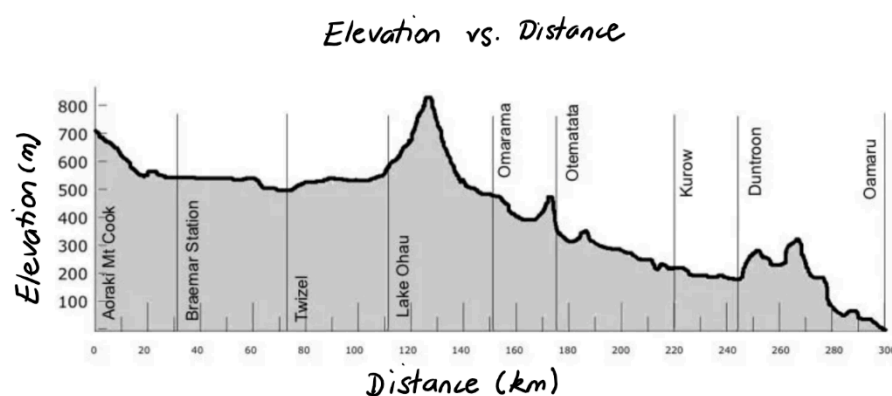
- ☐ Aoraki/Mount Cook to Braemar Road
- ☐ Braemar Road to Twizel
- ☐ Lake Ohau Lodge to Omarama
- ☐ Otematata to Kurow
- ☐ Duntroon to Oamaru

Evidence	Process	Content
Duntroon to Oamaru	B	1

b) Calculate the total length of the Alps 2 Ocean Cycle Trail.

Evidence	Process	Content
$35 + 42 + 38 + 41 + 24 +$ $43 + 23 + 55 = 301 \text{ km}$	A	1

c) The sections from Lake Ohau Lodge to Omarama and from Duntroon to Oamaru are graded as Intermediate, so are the hardest ones to cycle. Here is a graph showing how high each section is above sea level (called elevation):



Source: [alps 2 ocean bike trail elevation - Google Search](#)

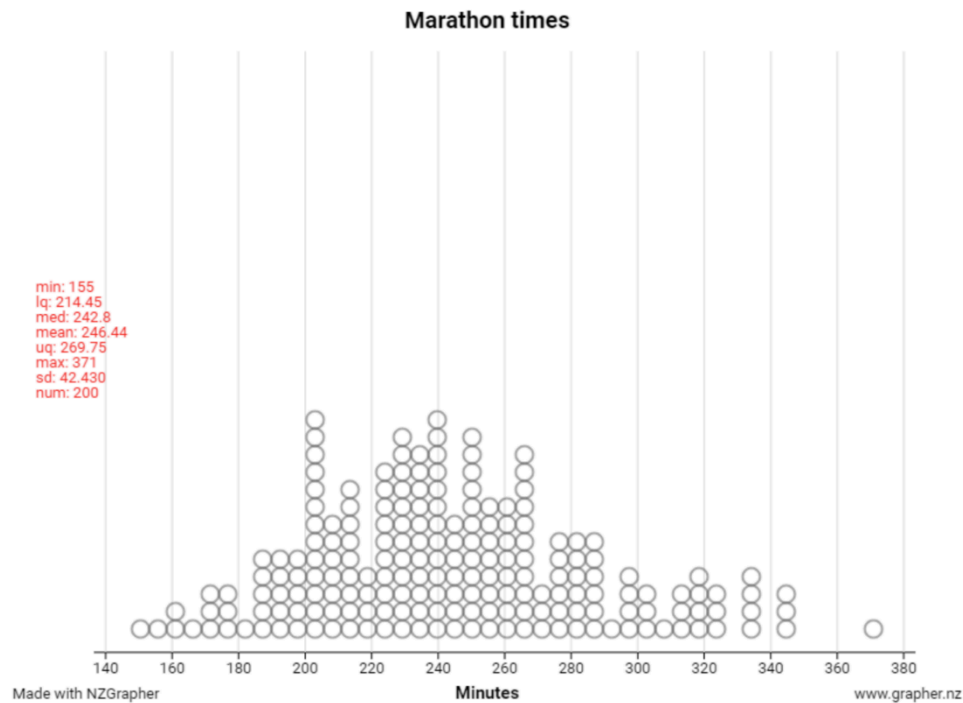
Explain why the Lake Ohau to Omarama and Duntroon to Oamaru are considered hard to cycle using information from the graph.

Evidence	Process	Content
----------	---------	---------

Lake Ohau to Omarama has a steep rise in elevation from 600m to over 800m before decreasing to 500m, compared to Duntroon to Oamaru which has a couple of small increases but has a large decrease from over 300m to approx. 50m. The incline in the first section will take longer to do, so slows people down so even though it is a shorter distance to cycle it has that challenging incline.	C	6
--	---	---

QUESTION EIGHTEEN: Marathon Times

200 marathon times completed in New Zealand has been collected.



- a) If the runner who takes the longest time to complete the course starts as 10am, what time do they cross the finish line?

- b) Asics has stated that only the top 5% of runners can run a marathon in under 3 hours. Explain, using information from this graph, whether you agree with this statement.

c) Ben has been training for his first marathon, but is worried that he is too slow. His training partner has said that as long as he is in the middle 50% of times then he has nothing to worry about. What times does Ben need to complete the marathon in to be in this category?

- ☐ Between 155 minutes and 214.45 minutes
- ☐ Between 155 minutes and 242.8 minutes
- ☐ Between 214.45 minutes and 269.75 minutes
- ☐ Between 242.8 minutes and 371 minutes
- ☐ Between 269.75 minutes and 371 minutes

QUESTION EIGHTEEN: Marathon Times

200 marathon times completed in New Zealand has been collected.



- a) If the runner who takes the longest time to complete the course start as 10am, what time do they cross the finish line?

Evidence	Process	Content
10am + 371 min = 1611 or 4:11pm 371 min = 6 hrs and 11 min	B	5

- b) Asics has stated that only the top 5% of runners can run a marathon in under 3 hours. Explain, using information from this graph, whether you agree with this statement.

Evidence	Process	Content
$11/200 = 0.055 = 5.5\%$ Yes I agree as 5.5% is close to 5%. No I disagree as 5.5% is more than 5%	C	1

- c) Ben has been training for his first marathon, but is worried that he is too slow. His training partner has said that as long as he is in the middle 50% of times then he has

nothing to worry about. What times does Ben need to complete the marathon in to be in this category?		
Evidence	Process	Content
Between 214.45 minutes and 269.75 minutes	A	6

QUESTION NINETEEN – SNAIL RACES

A class of maths students were exploring probability with a game called Snail Races. This is where two dice (6 sided) are rolled and then the numbers on the dice are added together.

Each snail by the sum of two dice. The snail who wins the race is the one who's number is rolled the most often.

Four friends decide to compare their graphs of their races. They are displayed below:

Alice



Bridget



Clark



Daniel



- a) Explain why snail number 1 has never moved in any of the 4 graphs.

- b) What percentage of the time was snail 9 in the top 3, from this friend group?



- c) The class decided to change the rules as snail 8 was winning too much. They play a round where any two dice that adds to 8 is not counted (so snail 8 is not racing). Which snail do you think will be most likely to win now, using the graphs from the friend group to help you explain your reasoning.

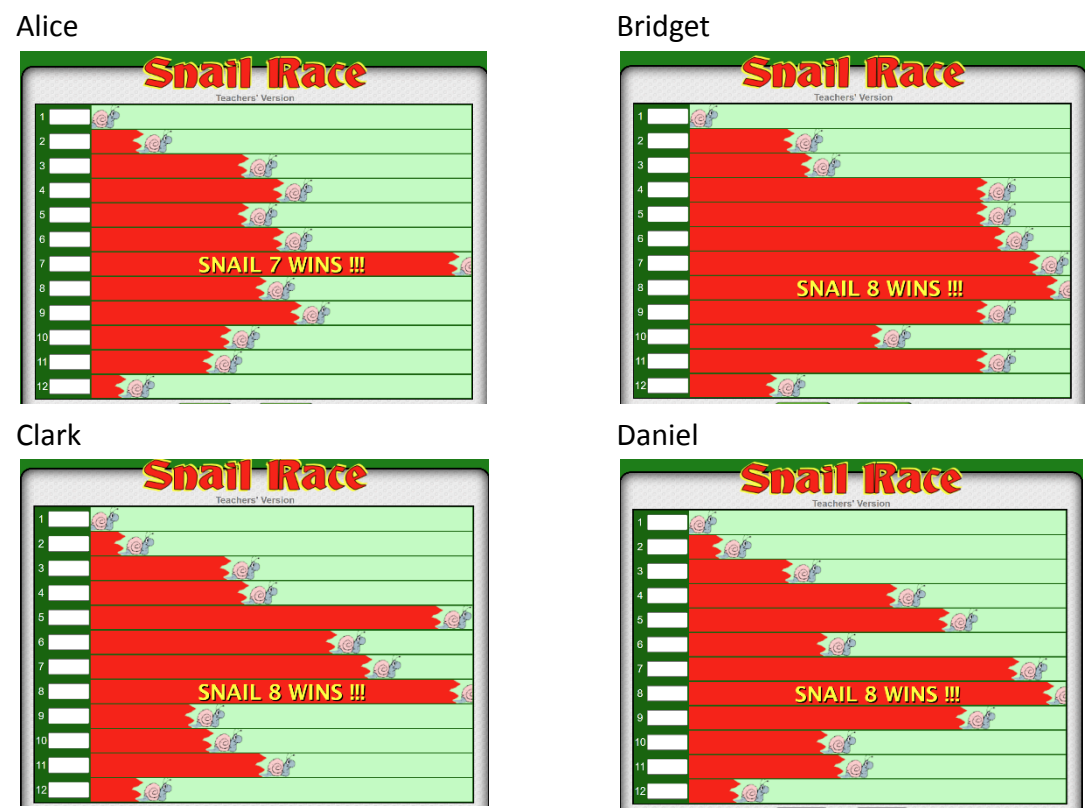
A large empty rectangular box with a yellow border, intended for a student to write a detailed explanation or reasoning for their answer.

QUESTION NINETEEN: SNAIL RACES

A class of maths students were exploring probability with a game called Snail Races. This is where two dice (6 sided) are rolled and then the numbers on the dice are added together.

Each snail by the sum of two dice. The snail who wins the race is the one who's number is rolled the most often.

Four friends decide to compare their graphs of their races. They are displayed below:



a) Explain why snail number 1 has never moved in any of the 4 graphs.		
Evidence	Process	Content
This suggests that this outcome cannot occur. When you roll 2 dice and add the outcomes the lowest result is 2, as the min value for each die is 1, so $1 + 1 = 2$	C	7

b)	What percentage of the time was snail 9 in the top 3, from this friend group?		
	Evidence	Process	Content
	2/4 = 50%	A	1, 6

c)	The class decided to change the rules as snail 8 was winning too much. They play a round where any two dice that adds to 8 is not counted (so snail 8 is not racing). Which snail do you think will be most likely to win now, using the graphs from the friend group to help you explain your reasoning.		
	Evidence	Process	Content
	If Snail 8 did not play/was eliminated in the 4 graphs provided, then I think the next likely to win is 7. Snail 7 won for Alice, so had already beaten Snail 8, got 2nd for Bridget and Daniel and was 3rd for Clark. This indicates to me that the outcome of 7 occurs more frequently than the other outcomes. Can also discuss how 7 has the highest theoretical probability so is the most likely to occur.	C	7

QUESTION TWENTY: KICKATHON

Dan Carter, a rugby player for the New Zealand All Blacks, kicked goals for 24 hours straight at Eden Park in 2022.

He did this to raise money for **UNICEF**. After 24 hours, and 1 598 kicks, \$500 000 New Zealand dollars (NZD) was raised.

- a) What was the average donation per kick?

Johnny Sexton, a rugby player for Ireland, performed a 20-hour kickathon for the **Save the Children** fund earlier in the year in Dublin, Ireland. After 1 280 kicks he raised €300 000.

- b) Dan Carter says that he raised more money than Johnny Sexton **per kick**. Do you agree with him? Explain your answer with supporting calculations. (**€1 = \$1.67 NZD**)

Last week **UNHCR** announced that Handré Pollard, a South African rugby player, has agreed to do a 30-hour kickathon in Ellis Park to help raise money for UNHCR.

Handré Pollard predicts that he will raise more money than Dan Carter and Johnny Sexton if he performs 2 100 kicks and raises \$320 (NZD) per kick.

- c) If he performs 2 100 kicks and raises \$320 NZD per kick, how much more than Dan Carter will he raise?

QUESTION TWENTY: KICKATHON

Dan Carter, a rugby player for the New Zealand All Blacks, kicked goals for 24 hours straight at Eden Park in 2022.

He did this to raise money for **UNICEF**. After 24 hours, and 1 598 kicks, \$500 000 New Zealand dollars (NZD) was raised.

a)	What was the average donation per kick?		
	Evidence	Process	Content
	1 598 ÷ 24 = 66.58 accept or 67 kicks per hour. \$500 000 ÷ 1 598 = \$312.89 per kick or \$313 per kick	B	1

b)	Johnny Sexton, a rugby player for Ireland, performed a 20-hour kickathon for the Save the Children fund earlier in the year in Dublin, Ireland. After 1 280 kicks he raised €300 000. Dan Carter says that he raised more money than Johnny Sexton per kick . Do you agree with him? Explain your answer with supporting calculations. (€1 = \$1.67 NZD)		
	Evidence	Process	Content
	1.67 × 300 000 = \$501 000 Amount per kick = 501 000 ÷ 1280 = \$391.41 No, Johnny Sexton raised \$391.41 per kick which was more than \$312.89 which is what Dan Carter raised per kick.	C	1

c)	Last week UNHCR announced that Handré Pollard, a South African rugby player, has agreed to do a 30-hour kickathon in Ellis Park to help raise money for UNHCR. Handré Pollard predicts that he will raise more money than Dan Carter and Johnny Sexton if he performs 2 100 kicks and raises \$320 (NZD) per kick.		
----	--	--	--

If he performs 2 100 kicks and raises \$320 NZD per kick, how much more than Dan Carter will he raise?		
Evidence	Process	Content
Handré: $2\,100 \times 320 =$ $\$672\,000$ Difference = $\$672\,000$ - $\$500\,000 = \$172\,000$	B	1

QUESTION TWENTY-ONE: FOOTBALL RIVALRY

Lionel Messi and Cristiano Ronaldo are football players.

Below is some information about their matches played and goals scored.

Lionel Messi



League	Matches	Goals
World Cup 2022	7	7
World Cup Qualifiers 2020 – 2022	15	7
Copa América 2021	7	4

Cristiano Ronaldo



League	Matches	Goals
World Cup 2022	5	1
World Cup Qualifiers 2021 – 2022	9	6
UEFA EURO 2021	4	5
UEFA EURO Qualifiers 2019 - 2020	8	11
FIFA Confederations Cup 2017	4	2

- a) Using the World Cup Qualifiers information, what was Lionel Messi's percentage of goals scored from number of matches played?

Lionel Messi's fans say that his results from both the World Cup Qualifiers and the World Cup show that he is the better player than Cristiano Ronaldo.

b) Do you agree with Lionel Messi's fans? Explain your answer.

Over their careers Lionel Messi scores an **average** of 0.79 goals per match. Cristiano Ronaldo scores an **average** of 0.72 goals per match.

c) If Cristiano Ronaldo plays 20 matches how many goals would he be expected to score?

QUESTION TWENTY-ONE: FOOTBALL RIVALRY

- a) Using the World Cup Qualifiers information, what was Lionel Messi's percentage of goals scored from number of matches played?

Evidence	Process	Content
$7 \div 15 \times 100 = 46.67\%$ Messi scored 46.67% goals from the number of matches he played	A	1

- b) Lionel Messi's fans say that his results from both the World Cup Qualifiers and the World Cup show that he is the better player than Cristiano Ronaldo.

Do you agree with Lionel Messi's fans? Explain your answer.

Evidence	Process	Content
Messi: 22 games 14 goals = 63.6% goals scored. Cristiano: 14 games, 7 goals = 50% goals scored. I agree as Messi scored 13.6% more goals than Cristiano	C	1

- c) Over their careers Lionel Messi scores an average of 0.79 goals per match. Cristiano Ronaldo scores an average of 0.72 goals per match.

If Cristiano Ronaldo plays 20 matches how many goals would he be expected to score?

Evidence	Process	Content
$20 \times 0.72 = 14.4$ He would be expected to score between 14 and 15 goals	B	1

QUESTION TWENTY-TWO: PASTA

Below is part of the information on a 500g pack of pasta.

Servings per pack: 3

Serving size: 167g

Nutrient	Average amount per serve	Average amount per 100g
Fat		
Total	0.67g	0.19g
Saturated	0.05g	0.03g
Sodium	666mg	398mg



Source: Photo by [Aleksandra Tanasiienko](#) on [Unsplash](#)

- a) Using the **per serve** information, what percentage of the total fat is the saturated fat?

- b) Is the sodium in two serves of pasta greater than one gram? (1 g = 1000mg)

- c) When pasta is cooked correctly, 75g of uncooked pasta weights 170g when cooked. One serving of uncooked pasta weights approximately 380g. How is this calculated?

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Sodium	666mg	398mg



Source: Photo by [Aleksandra Tanasiienko](#) on [Unsplash](#)

- a) Using the **per serve** information, what percentage of the total fat is the saturated fat?

Evidence	Process	Content
$0.04 \div 0.4 \times 100 = 10\%$	B	1

- b) Is the sodium in two serves of pasta greater than one gram? (1 g = 1000mg)

Evidence	Process	Content
The sodium for two serves is 1 332mg, which is 1.332g. This means two serves of pasta is greater than 1g.	B	1

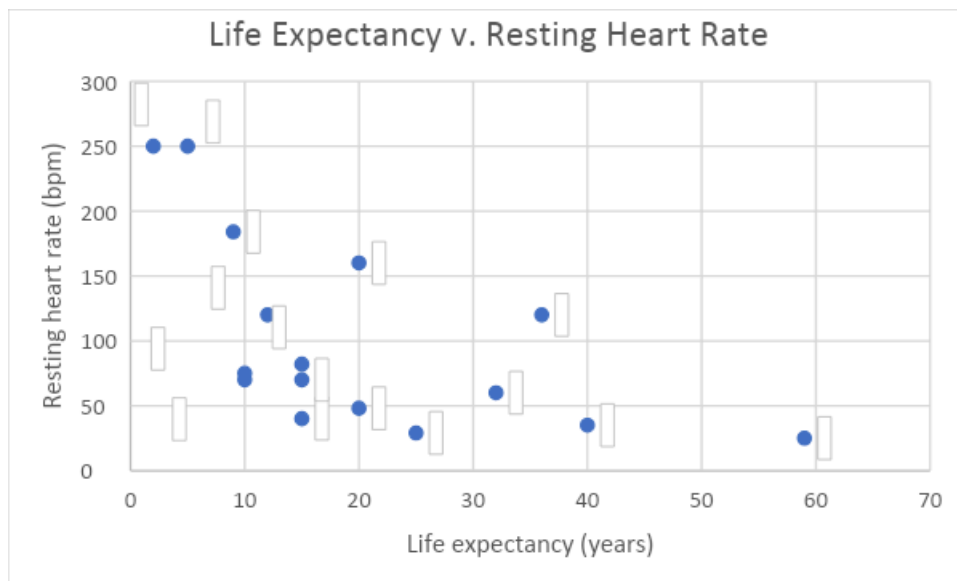
- c) When pasta is cooked correctly, 75g of uncooked pasta weights 170g when cooked. One serving of uncooked pasta weights approximately 380g. How is this calculated?

Evidence	Process	Content
$170 \div 75 \times 167$	A	1

QUESTION TWENTY-THREE: LIFE EXPECTANCY

Barry's class is having a look at the life expectancy of certain animals compared to their resting heart rate (number of times their heart beats per minute).

The information is provided in the graph below.



Barry says that a tiger has a longer life expectancy than a giraffe.

a) Is Barry's statement correct? Use information from the graph to explain your answer.

Barry's friend Sean says that an elephant has a higher heart rate than a whale.

b) How much higher is the elephant's heart rate (bpm) than the whale's heart rate (bpm)?

- c) The teacher has asked the class to make a statement about the graph commenting on something that they have noticed.

Write a statement below, using the information from the graph, about something you notice that is happening in this graph.



QUESTION TWENTY-THREE: LIFE EXPECTANCY

- a) Barry says that a tiger has a longer life expectancy than a giraffe.
- d) Is Barry's statement, correct? Use information from the graph to explain your answer.

Evidence	Process	Content
No, he is not correct. A tiger has a life expectancy of approximately 32 years whereas a giraffe has a life expectancy of 36 years (± 3 years). Or the dot for the giraffe is to the right of the dot for the tiger.	C	1

- b) Barry's friend Sean says that an elephant has a higher heart rate than a whale.
- e) How much higher is the elephant's heart rate bpm) than the whales heart rate (bpm)?

Evidence	Process	Content
Elephant is about 35bpm Whale is about 25bpm, so the elephant is 10bpm higher than a whale. <i>Accept reasonable answers</i>	B	1

- c) The teacher has asked the class to make a statement about the graph commenting on something that they have noticed.
- Write a statement below, using the information from the graph, about something you notice that is happening in this graph.

Evidence	Process	Content
Any of: The smaller the animal the higher the heart rate. The smaller the animal the less the life expectancy.	C	6

Larger animals live longer. The animals with the highest heart rate die sooner. There is a negative relationship between the heart rate and life expectancy.		
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QUESTION TWENTY-FOUR: POSTAGE STAMPS

Moana collects postage stamps from around the world.

- a) Moana's uncle sends her a birthday card from Australia.

The stamp is worth \$2.60 in Australia (AUD). \$1AUD is worth \$1.09 in New Zealand (NZD).

What is the value of the stamp Moana's uncle sent her in NZD?



- b) She finds the 2022 set of New Zealand Black Ferns stamps worth \$19.90 for her aunt on sale, discounted by 5% and decides to purchase these as a gift. What would Moana expect to pay?

- c) Moana loves postage stamps with a kiwi on it and wishes to purchase one.

Which of these 2 options she should purchase?

Explain your answer using information from these online listings.



New Zealand 1989 \$10 Little Spotted Kiwi (Bird) Very Fine Used SG 1297

NZD4.33

Buy It Now

+NZD3.46 shipping

Source:

https://www.ebay.com/b/Birds-Used-New-Zealand-Stamps/70089/bn_27123714



Auckland

Closes: Wed, 11 Jan

NZ postmark of KINGSTON, Lake Wakatipu, 1936, on 1d Kiwi on piece.

Shipping from \$1.70

No reserve

\$3.50

Buy Now

\$7.00

Source: <https://www.trademe.co.nz/a/marketplace/antiques-collectables>



QUESTION TWENTY-FOUR: POSTAGE STAMPS

- a) Moana's uncle sends her a birthday card from Australia.
- The stamp is worth \$2.60 in Australia (AUD). \$1AUD is worth \$1.09 in New Zealand (NZD).
- What is the value of the stamp Moana's uncle sent her in NZD?
- | Evidence | Process | Content |
|----------|---------|---------|
| \$2.83 | B | 1 |
- b) She finds the 2022 set of New Zealand Black Ferns stamps worth \$19.90 for her aunt on sale, discounted by 5% and decides to purchase these as a gift. What would Moana expect to pay?
- | Evidence | Process | Content |
|---|---------|---------|
| 5% of \$19.90 = 0.995
This is approximately \$1 so the discounted price is \$18.90 | A | 1 |
- c) Moana loves postage stamps with a kiwi on it and wishes to purchase one.
- Which of these 2 options she should purchase?
- Explain your answer using information from these online listings.
- | Evidence | Process | Content |
|---|---------|---------|
| The buy now costs are \$4.33 + \$3.46 = \$7.79 and \$7 + \$1.70 = \$8.70 but the second option could be purchased cheaper as it is negotiable. The value of each in the long run is also a consideration. | C | 1 |

QUESTION TWENTY-FIVE: BALLET

Mārama wants to start doing dance lessons. The programme showing the teacher, class and style of dance are shown in the table below.

Teacher	Kate	Emma	Maddie	Summer	Cole
Time of class and style.	3:30 – 4:30 Beginners ballet			3:30 – 4:30 Beginners hip-hop	
		3:45 – 4:30 Beginners jazz	4:00 – 4:45 Tap dance		4:15 – 5:15 Beginners Contemporary
	4:30 – 5:15 Beginners contemporary			4:30 – 5:15 Hip-hop II	
	5:15 – 6:00 Ballet II	5:15 – 6:15 Beginners Jazz	5:15 – 6:00 Jazz II	5:00 – 6:00 Advanced hip-hop	5:30pm – 6:15pm Beginners Jazz

Her school finishes at 3:25pm. It takes 15 minutes to get from school to the venue of the dance lessons.

- a) What is the **earliest** lesson can Mārama choose, without missing any part of the lesson?

- b) If the bus leaves the dance lesson venue to Mārama's home every 12 minutes from the start of the hour, what is the earliest bus she can take to return home if she takes the tap dance class.

- c) Each instructor charges a different amount for their lessons:

Kate	Emma	Maddie	Summer	Cole
\$15 per lesson	10 classes for \$140	\$20 per lesson	\$18 per lesson	5 classes for \$85

		Buy 4 lessons, get 1 free	15% off when 10 lessons are purchased	Limit of 8 students per class
--	--	------------------------------	---	-------------------------------------

Which dance instructor is the best option in terms of cost? Explain your answer using the information provided.

QUESTION TWENTY-FIVE: BALLET

- a) What is the **earliest** lesson can Mārama choose, without missing any part of the lesson?
- | Evidence | Process | Content |
|--|---------|---------|
| Emma 3:45
Accept Maddie 4:00pm, as the 3:45pm lesson requires Mārama to have no delays. | B | 5 |
- b) If the bus leaves the dance lesson venue to Mārama's home every 12 minutes from the start of the hour, what is the earliest bus she can take to return home if she takes a tap dance class.
- | Evidence | Process | Content |
|--|---------|---------|
| 4:48pm (<i>accept 5.00pm with reason that she may need to leave the tap dance class slightly early for the 4:48pm</i>) | B | 5 |
- c) Each instructor charges a different amount for their lessons:
- | Kate | Emma | Maddie | Summer | Cole |
|-----------------|----------------------|--|--|---|
| \$15 per lesson | 10 classes for \$155 | \$20 per lesson
Buy 4 lessons, get 1 free | \$18 per lesson
15% off when 10 lessons are purchased | 5 classes for \$85
Limit of 8 students per class |
- Which dance instructor is the best option in terms of cost? Explain your answer using the information provided.
- | Evidence | Process | Content |
|---|---------|---------|
| Cost for Kate: \$150
Cost for Emma: \$155
Cost for Maddie: \$160
Cost for Summer: \$153
Cost for Cole: \$170
Kate is the best value for money. | C | 1 |

QUESTION TWENTY-SIX: DANCHEONG

Sophia is exploring Korean cultural patterns called Dancheong that are on historical buildings in Korea.

a) Here is a Dancheong she has found online:



Identify at least one geometric transformation you can observe in this Dancheong.

b) Here is another Dancheong she has found:



Source <https://sojoong.joins.com/archives/41392>

What is the total order of rotation for this Dancheong?



c) Sophia found two tile designs online with Dancheong:

- Option 1: 20 cm by 20 cm for \$3.50 per tile
- Option 2: 15 cm by 15 cm for \$2.80 per tile

She would like to make a 60 cm by 60 cm tile mat using tiles from option 1 **or** option 2 **(but not both)**.

Which is the **cheaper option** of the two? Explain your answer with the appropriate calculations.

A large empty rectangular box with a yellow border, intended for the student's calculations and explanation.

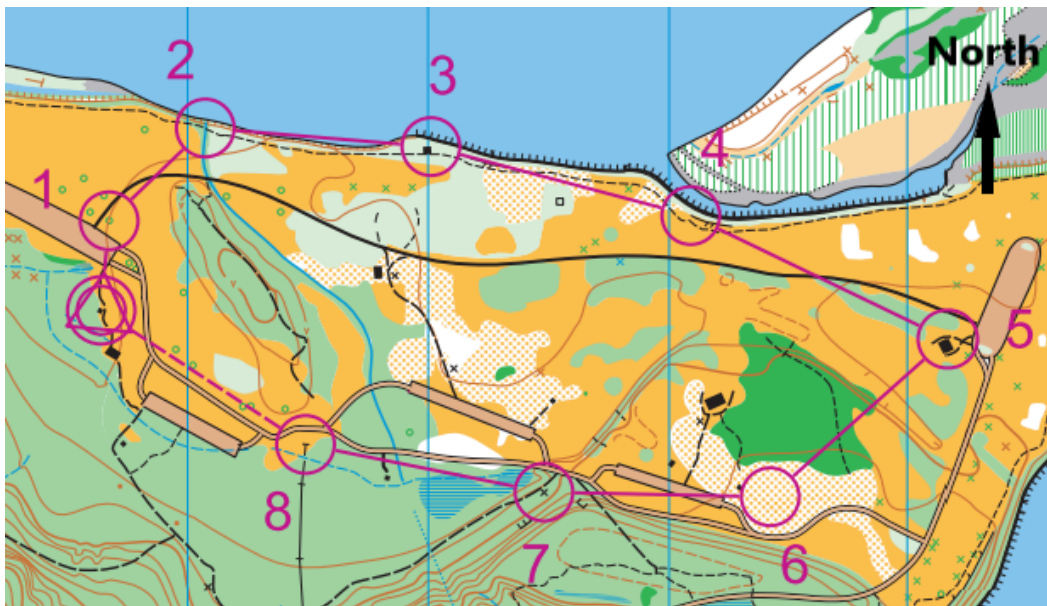
QUESTION TWENTY-SIX: DANCHEONG

- a) Identify **at least one** geometric transformation you can observe in this Dancheong
- | Evidence | Process | Content |
|------------------------------------|---------|---------|
| Reflectional symmetry, translation | A | 3 |
- b) What is the total order of rotation for this Dancheong?
- | Evidence | Process | Content |
|----------|---------|---------|
| 5 | B | 3 |
- c) Sophia found two tile designs online with Dancheong:
- Option 1: 20 cm by 20 cm for \$3.50 per tile
 - Option 2: 15 cm by 15 cm for \$2.80 per tile
- She would like to make a 60 cm by 60 cm tile mat using tiles from option 1 **or** option 2 (**but not both**).
- Which is the **cheaper option** of the two? Explain your answer with the appropriate calculations.
- | Evidence | Process | Content |
|--|---------|---------|
| Option 1: 9 tiles will be needed for \$31.50
Option 2: 16 tiles will be needed for \$44.80
Option 1 will be cheaper. | C | 1, 5 |

QUESTION TWENTY-SEVEN: ORIENTEERING

Orienteering is an outdoor sport where a person uses a map to go from checkpoint to checkpoint.

Brad found this orienteering resource online:



Adapted from <http://www.bsoa.org/docs/misc/Teaching%20Orienteering%20in%20Schools.pdf>

- a) In which compass direction does Brad need to move to get from checkpoint 5 to checkpoint 6?
- ☐ North
 - ☐ North east
 - ☐ West
 - ☐ South-west
- b) Which checkpoint is the closest to checkpoint 7? Justify your answer using the map.

- c) For his health and safety, Brad can only participate in orienteering challenges between sunrise and sunset.

How long can he participate if sunrise is at 6:12am and sunset is at 8:44pm?

hours and minutes

QUESTION TWENTY-SEVEN: ORIENTEERING

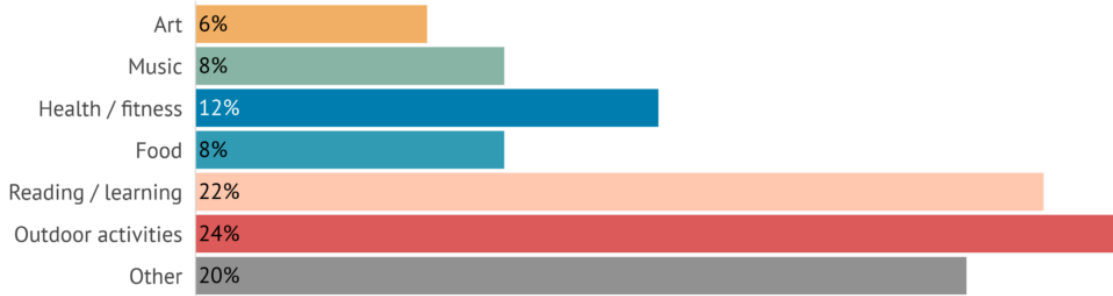
a)	In which compass direction does Brad need to move to get from checkpoint 5 to checkpoint 6?		
	☐ North ☐ North-east ☐ West ☐ South-west		
	Evidence	Process	Content
	b) South west	A	4

b)	Which checkpoint is the closest to checkpoint 7? Justify your answer using the map.		
	Evidence	Process	Content
	By measuring with a ruler 7 to 8 = 3.8 cm and 7 to 6 = 3.5 cm (or another method/tool) Hence 6 is the closest.	C	5

c)	For his health and safety, Brad can only participate in orienteering challenges between sunrise and sunset. How long can he participate if sunrise is at 6:12am and sunset is at 8:44pm?		
	Evidence	Process	Content
	20:44 – 06:12 = 14:32 14 hours and 32 minutes	B	1, 5

QUESTION TWENTY-EIGHT: HOBBIES

Primary Hobby Categories



3,800 responses, weighted by U.S. Census 18+
Survey Dates: May 14 - June 4, 2020
© CivicScience 2020



From: <https://civicscience.com/spending-on-hobbies-reached-62-during-lockdowns/>

a) According to the graph above, what is the most popular hobby?

- ☐ Music
- ☐ Health/ fitness
- ☐ Outdoor activities
- ☐ Food

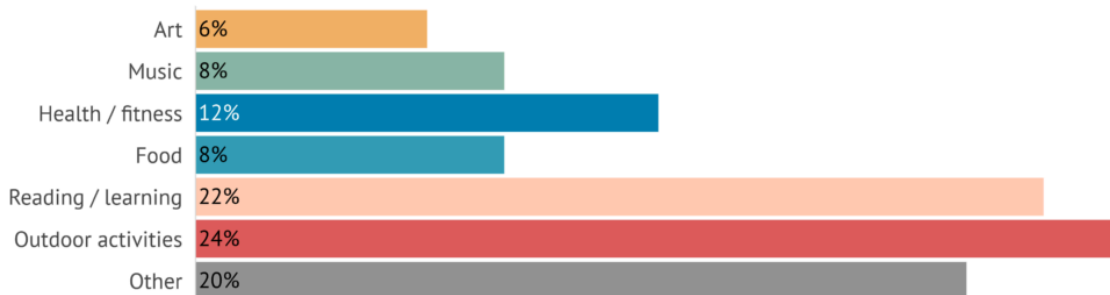
b) Phil claims that outdoor activities are 3 times more popular than music and 4 times more popular than art.

Do you agree with his claim? Explain your answer using the graph.

c) Could a person select more than one hobby in this survey? Explain how you can identify this.

QUESTION TWENTY-EIGHT: HOBBIES

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3,800 responses, weighted by U.S. Census 18+
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a) According to the graph above, what is the most popular hobby?

- ☐ Music
- ☐ Health/ fitness
- ☐ Outdoor activities
- ☐ Food

Evidence	Process	Content
C - Outdoor activities	B	6

b) Phil claims that outdoor activities are 3 times more popular than music and 4 times more popular than art.

Do you agree with his claim? Explain your answer using the graph.

Evidence	Process	Content
Music is 8% and $3 \times 8 = 24$ and Art is 6% and $4 \times 6 = 24$. Phil is correct.	C	6

c) Could a person respond with more than one hobby? Explain how you can identify this.

Evidence	Process	Content
----------	---------	---------

6 + 8 + 12 + 8 + 22 + 24 + 20 = 100 (%) so no they could not. The title also says primary hobby which implies one.	C	6
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QUESTION TWENTY-NINE: SKIING

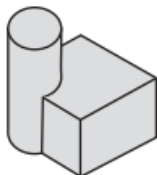
When the weather is good, half of the carparks of a popular ski field fill up by 10:00am.



- a) If the probability of snow at the Remarkable's ski field is 0.7, what is the probability that it does not snow?

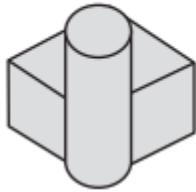
- b) Quinn claims that the car park has been full every day for five days in a week. Explain whether this is likely or not using the information provided.

- c) Here is one of the buildings at the ski field. This is the view of the building from the north:

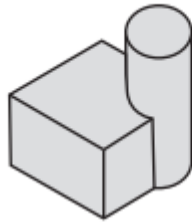


Which of these is a view of the building from the east?

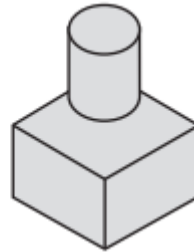
A.



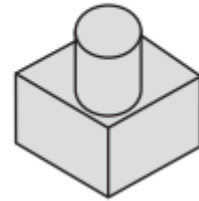
B.



C.



D.



QUESTION TWENTY-NINE: SKIING

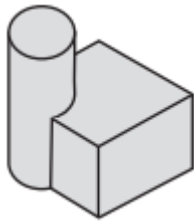
- a) If the probability of snow at the Remarkable's ski field is 0.7, what is the probability that it does not snow?

Evidence	Process	Content
$1 - 0.7 = 0.3$	B	1, 7

- b) Quinn claims that the car park has been full every day for five days in a week. Explain whether this is likely or not using the information provided.

Evidence	Process	Content
Her experience is valid as at the peak of ski-season, it is still possible to have very full car parks early in the morning (10:00am). <i>OR</i> Her experience is valid as an experiment whereas the probability provided is a theoretical probability. <i>OR</i> Her experience is unlikely for other people as the information provided is that there is only 50% of the carpark fills up during ski seasons.	C	7

- c) Here is one of the buildings at the ski field. This is the view of the building from the north:

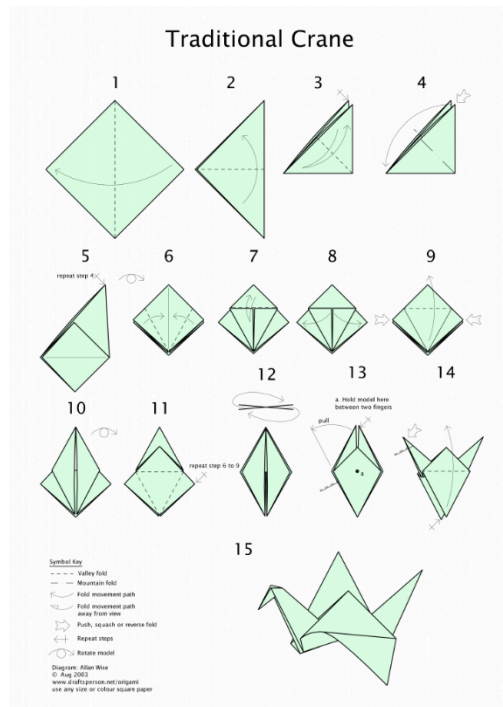


Which of these is a view of the building from the east?

Evidence	Process	Content
C	A	3

QUESTION THIRTY: ORIGAMI

Origami is the art of folding paper. Maeve uses these instructions to fold a paper crane:

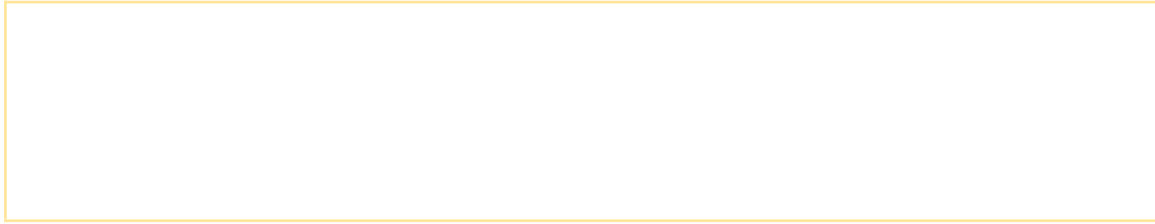


- a) Square paper is used in origami. What percentage of the square paper (step 1) can be seen in the picture for step 5?

%

- b) List the step(s) in this set of instructions where the paper is asymmetrical:

- c) A piece of origami paper is 5 cm long and 5cm wide and 1 mm thick. If Maeve is purchasing 1000 pieces of origami paper, calculate the volume if the papers were stacked on top of each other.



QUESTION THIRTY: ORIGAMI

- a) Square paper is used in origami. What percentage of the square paper (step 1) can be seen in the picture for step 3?
- | Evidence | Process | Content |
|------------------------|---------|---------|
| $\frac{3}{8} = 37.5\%$ | B | 1, 3 |
- b) List the step(s) in this set of instructions where the paper is asymmetrical:
- | Evidence | Process | Content |
|----------|---------|---------|
| 5 | A | 3 |
- c) A piece of origami paper is 5 cm long and 5cm wide and 1 mm thick. If Maeve is purchasing 1000 pieces of origami paper, calculate the volume if the papers were stacked on top of each other.
- | Evidence | Process | Content |
|---|---------|---------|
| $5 \times 5 \times 0.1 \times 1000 = 2500 \text{ cm}^3$ | A | 5 |

QUESTION THIRTY-ONE: CUP CAKES

Jordie has made cupcakes for his brother's birthday. He wants to put a decoration on each cupcake.

a) He finds two companies that make cupcake decorations.

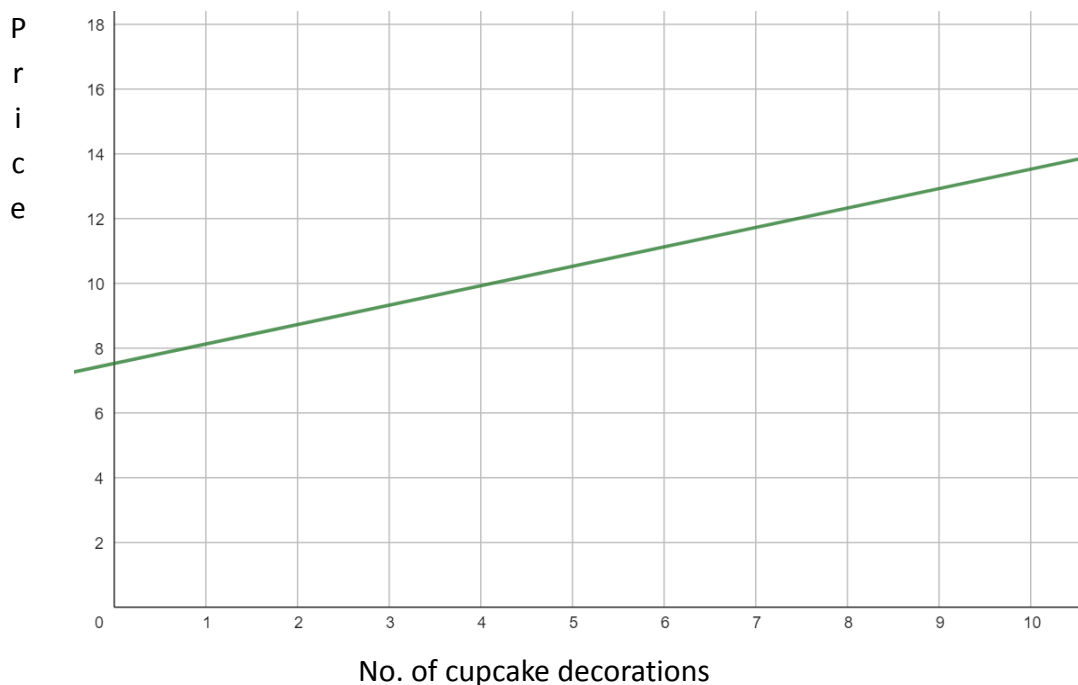
The Cake It Company is selling 12 cake decorations for \$15 with free delivery.

Yummy Cakes is selling \$1.30 per decoration with a delivery cost of \$5.90.

Which option is cheaper for Jordie if he chooses to decorate 10 cupcakes?

Explain your answer with appropriate calculations.

b) Another company, Gumdrops Bakery, charges Jordie using this model.



c) The equation of the line is $y = 0.60x + 7.50$

In this equation, x represents:

- ☐ the number of cupcake decorations
- ☐ the price of cupcake decorations
- ☐ the price per cupcake decoration
- ☐ the delivery cost

d) If Jordie pays Gumdrops Bakery \$9.90, how many cupcakes has he decided to decorate?

QUESTION THIRTY-ONE: CUP CAKES

- a) He finds two companies that make cupcake decorations.

The Cake It Company is selling 12 cake decorations for \$15 with free delivery.
Yummy Cakes is selling \$1.30 per decoration with a delivery cost of \$5.90.

Which option is cheaper for Jordie if he chooses to decorate 10 cupcakes?

Explain your answer with appropriate calculations.

Evidence	Process	Content
Cake It Company \$15 for 1 packet containing 10 or more cupcake decorations. Yummy Cupcakes $1.3 \times 10 + 5.9 = 18.9$ i.e., \$18.90 Cake It Company is cheaper.	C	1

- b) The equation of the line is $y = 0.60x + 7.50$. In this equation, x represents:

- ☐ the number of cupcake decorations
- ☐ the price of cupcake decorations
- ☐ the price per cupcake decoration
- ☐ the delivery cost

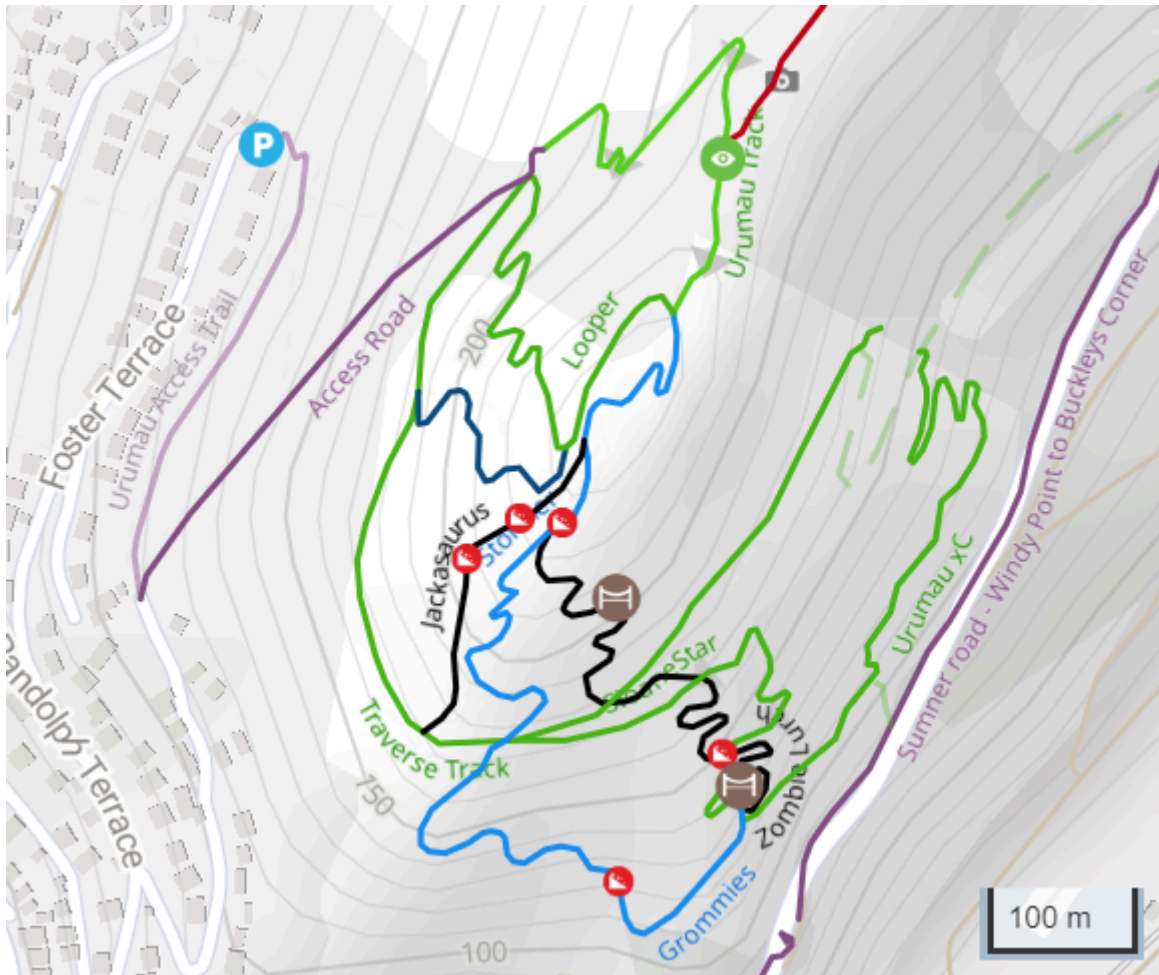
Evidence	Process	Content
The number of cupcake decorations	A	2

- c) If Jordie pays Gumdrops Bakery \$9.90, how many cupcakes has he decided to decorate?

Evidence	Process	Content
4	B	2

QUESTION THIRTY-TWO: MOUNTAIN BIKING

Will likes mountain biking. He regularly cycles in the Urumau Reserve in Lyttleton:



Source: <https://www.trailforks.com/region/christchurch/?activitytype=1&z=14.8&lat=-43.60233&lon=172.73032>

- a) Use the scale to estimate the distance Will bikes if he cycles along the Access Road.

- b) The Uruman xC track is 982m. Will's average speed if takes 4 minutes to cycle the entire track.

Will's friend, Sevu, completes the 703m Grommies track in 3 minutes. Does Sevu complete the Grommies track faster than Will completes the Uruman xC track?

Explain your answer with the appropriate calculations

c) Will's fastest cycling times are below:

1k	2 minutes and 53 seconds
1 mile	4 minutes and 30 seconds

If 1 mile = 1.609km, which distance did Will cycle the fastest?

QUESTION THIRTY-TWO: MOUNTAIN BIKING

- a) Use the scale to estimate the distance Will bikes if he cycles Access Road.
- | Evidence | Process | Content |
|--|---------|---------|
| Accept estimation of the access road to be between 7 to 8 cm. The scale is 1.8 cm to 1m.

3.889 m to 4.444 m | B | 1, 5 |
- b) The Urumau xC track is 982m. Will's average speed if takes 4 minutes to cycle the entire track.
- Will's friend, Sevu, completes the 703m Grommies track in 3 minutes. Does Sevu complete the Grommies track faster than Will completes the Urumau xC track?
- Explain your answer with the appropriate calculations
- | Evidence | Process | Content |
|---|---------|---------|
| Will Urumau xC track: 245.5m per minute
Sevu Grommies track: 234.3m per minute
Will is faster by 11.2m per minute | C | 1, 5 |
- c) Will's fastest cycling times are below:
- 1k 2 minutes and 53 seconds
1 mile 4 minutes and 30 seconds
- If 1 mile = 1.609km, which distance did Will cycle the fastest?
- | Evidence | Process | Content |
|--|---------|---------|
| Will cycled 1k faster than 1 mile.
For 1k, Will cycles 0.431km per min
For 1 mile, Will cycles 0.358km per min | A | 1, 5 |

QUESTION THIRTY-THREE: SURF IT UP!

Caleb wants to buy a new surfboard.

a) Two different companies are selling surf boards:

Splash Boards



Photo by [Sten Rademaker](#) on [Unsplash](#)

\$395
30% off

Deep Dive



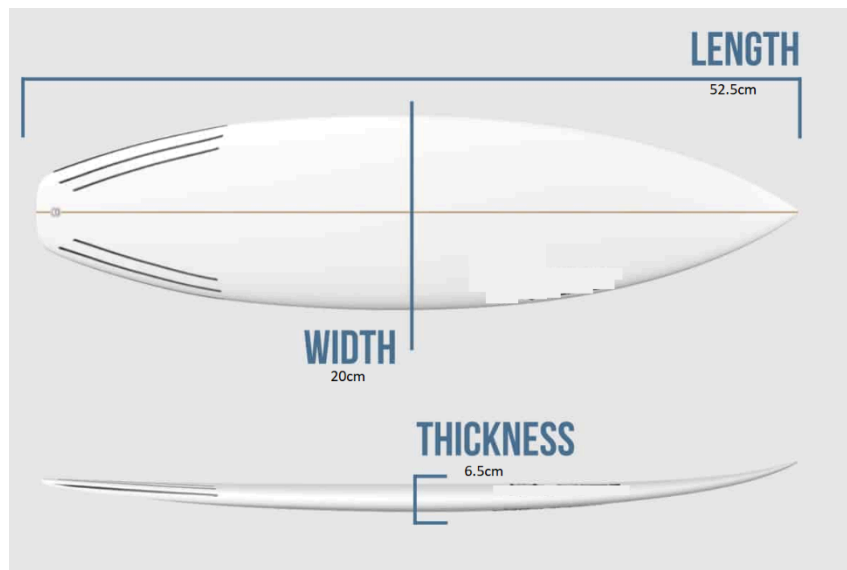
Photo by [Sten Rademaker](#) on [Unsplash](#)

\$340
20% off

Which one would be cheaper for Caleb to purchase?

Explain your answer with appropriate calculations.

b) Caleb purchases one of the surf boards.



The surf store packages the surfboard into a box for Caleb. What is the smallest volume the box can be to fit the surfboard?

c) Convert 52.5cm into mm.

QUESTION THIRTY-THREE: SURF IT UP!

- a) Two different companies are selling surf boards:

Splash Boards



Photo by [Sten Rademaker](#) on [Unsplash](#)

\$395
30% off

Deep Dive



Photo by [Sten Rademaker](#) on [Unsplash](#)

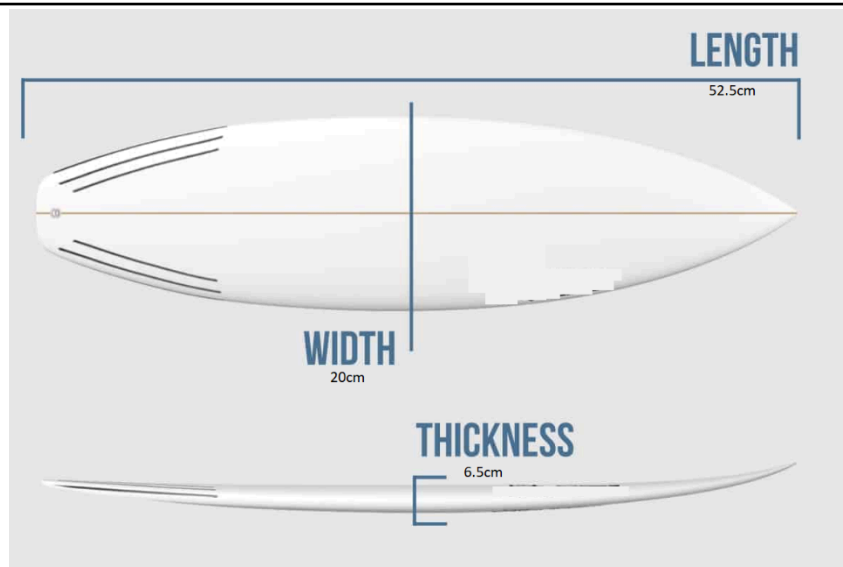
\$340
20% off

Which one would be cheaper for Caleb to purchase?

Explain your answer with appropriate calculations.

Evidence	Process	Content
Splash Boards: $395 \times 0.7 = \$276.50$ Deep Dive: $340 \times 0.8 = \$272$ Deep Dive is cheaper	C	1

- b) Caleb purchases one of the surf boards.



The surf store packages the surfboard into a box for Caleb. What is the smallest volume the box can be to fit the surfboard?

Evidence	Process	Content
$52.5 \times 20 \times 6.5 = 6\,825\text{cm}^3$ 53 x 21 x 7 or other variations as the surfboard can't fit into the box if it has the same dimensions as the box	A	1, 5

c) Convert 52.5cm into mm.

Evidence	Process	Content
525mm	B	5

QUESTION THIRTY-FOUR: CAR JOURNEYS

Margot and her family drive from Tauranga to Whangarei for a family reunion. Her cousin Jenny's family also drives from Tauranga on the same day. Their journeys are shown on the graph below:



Source: <https://nzmaths.co.nz/resource/car-journeys>

- a) Margot's family made 3 stops. What time did each stop occur?

- b) When was the slowest part of the journey for Margot's family, apart from the stops? Explain how you can tell.

- c) Jenny's mum wants to be able to be able to work out their average speed for their journey, without the stops. Write down how she could calculate the average speed.

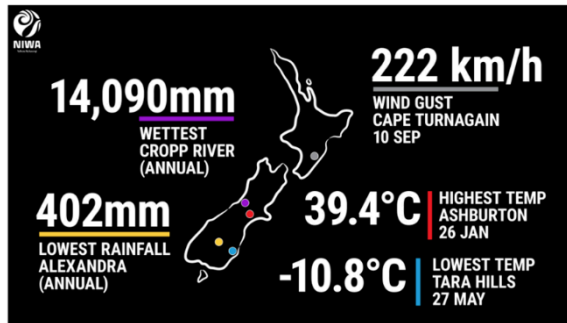
QUESTION THIRTY-FOUR: CAR JOURNEYS

- a) Margot's family made 3 stops. The first was for drinks, the second was for lunch and a swim, and the third was for petrol. What time did each stop occur?
- | Evidence | Process | Content |
|--------------------------|---------|---------|
| 10:30am, 11:45am and 3pm | B | 2 |
- b) When was the slowest part of the journey for Margot's family, apart from the stops? Explain how you can tell?
- | Evidence | Process | Content |
|---|---------|---------|
| The final part of their journey i.e., it took 75 minutes to go 50km
Or it is the least steep (flattest) line | C | 2 |
- c) Jenny's mum wants to be able to be able to work out their average speed for their journey, without the stops. Write down how she could calculate the average speed.
- | Evidence | Process | Content |
|-----------------|---------|---------|
| $400 \div 5.25$ | A | 1,5 |

QUESTION THIRTY-FIVE: WEATHER EXTREMES

The National Institute of Water and Atmospheric Research (NIWA) collects data on weather in New Zealand.

2021: New Zealand's warmest year on record



Source: [NIWA](#)

- a) Convert 14 090mm into cm.

cm

- b) Select all the calculations that give the correct difference between the highest and lowest temperatures:

- ☐ $-10.8 + 39.4$
- ☐ $-10.8 - 39.4$
- ☐ $10.8 - 39.4$
- ☐ $39.4 - -10.8$
- ☐ $39.4 + 10.8$

- c) TJ claims that a wind gust of 222km per hour is the same as saying a wind gust of 3.7km per minute.

Aaron thinks TJ is incorrect, and that 222km per hour is the same as 2.22km per minute.

Whose claim do you agree with? Explain your answer.

QUESTION THIRTY-FIVE: WEATHER EXTREMES

a) Convert 14 090mm into cm.

Evidence	Process	Content
1 409cm	B	5

b) Select all the calculations that give the correct difference between the highest and lowest temperatures:

☐ $-10.8 + 39.4$
☐ $-10.8 - 39.4$
☐ $10.8 - 39.4$
☐ $39.4 - -10.8$
☐ $39.4 + 10.8$

Evidence	Process	Content
☐ $39.4 - -10.8$ ☐ $39.4 + 10.8$	A	1

c) TJ claims that a wind gust of 222km per hour is the same as saying a wind gust of 3.7km per minute.

Aaron thinks TJ is incorrect, and that 222km per hour is the same as 2.22km per minute.

Whose claim do you agree with? Explain your answer.

Evidence	Process	Content
TJ is correct. An hour is 60 minutes, not 100, so	C	1

222km/1hour is equal to 222km/60minutes or 3.7km per minute.		
--	--	--

QUESTION THIRTY-SIX: TRAINING FOR FIRST IV

Sam wants to join the first XV rugby team as soon as possible. He wants to focus on his fitness and will measure his progress each week.

- a) At the end of week one, Sam is able to run 4km without stopping and the stopwatch shows this:



Select the correct conversion:

- ☐ 23.54 min
- ☐ 23 hours, 54 minutes and 31 seconds
- ☐ 23.9 min
- ☐ 23 and a half kilometres

- b) The first XV rugby team does standard press ups to increase upper body strength. This is a table of his results from week 1 to week 5:

Week 1	Week 2	Week 3	Week 4	Week 5
39	40	42	41	43

By looking at the numbers above, is it reasonable for Sam to make this statement to his mates: "I will be doing 50 press ups by week 8, no worries!"

Justify your answer using the table.

--

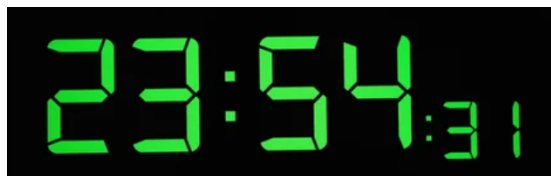
- c) The Bronco is a running drill Sam's first XV rugby team does. His current time for the Bronco is 6 minutes 20 seconds. The first XV record for the Bronco is 4.78 minutes. How much quicker does Sam need to be, so he breaks this record?

minutes and

seconds

QUESTION THIRTY-SIX: TRAINING FOR THE FIRST IV

- a) At the end of week one, Sam is able to run 4km without stopping and the stopwatch shows this:



Which conversion is correct:

- ☐ 23.54 min
- ☐ 23 hours, 54 minutes and 31 seconds
- ☐ 23.9 min
- ☐ 23 and a half kilometres

Evidence	Process	Content
23.9 min	B	5

- b) The first XV rugby team does standard press ups to increase upper body strength. This is a table of his results from week 1 to week 5:

Week 1	Week 2	Week 3	Week 4	Week 5
39	40	42	41	43

By looking at the numbers above, is it reasonable for Sam to make this statement to his mates: "I will be doing 50 press ups by week 8, no worries!"

Justify your answer using the table.

Evidence	Process	Content
The average increase of Sam over the first 5 weeks, from 39 to 43 is just about 4 press ups over five weeks, so Sam will need another 4 to 5 weeks to get to 50 if he keeps this rate. So, it is probably unlikely that he will be able to reach 50 in another 3 weeks. Or, Sam has a percentage increase from week 1 to 5 of $\frac{4}{39} \times 100 =$	C	1

	10.25%. So, if he increased another 10% over 5 weeks, he would only be by 47/48 push ups within the next 5 weeks. So, he probably won't be able to increase his press ups that fast.		
--	--	--	--

c)	The Bronco is a running drill Sam's first XV rugby team does. His current time for the Bronco is 6 minutes 20 seconds. The first XV record for the Bronco is 4.78 minutes. How much quicker does Sam need to be, so he breaks this record?		
	Evidence	Process	Content
	1 minute and 33 seconds	A	5

QUESTION THIRTY-SEVEN: PARIS HERE WE COME!

Milly's family is saving for a trip to France.

- a) Looking at their savings for the first ten weeks, in this table below, how much money did they save per week?

Week	Savings in the bank (\$)
1	1 000
2	1 300
3	1 600
4	1 900
5	2 200
6	2 500
7	2 800
8	3 100
9	3 400
10	3 700

- b) If the family decided to increase their savings by 35% per week, what would the new amount be that they will save per week?

- c) Milly's younger brother is of the opinion that \$1000 NZD will also mean that he will be able to spend €1000 EUR in France. If the exchange rate is as follows:

EUR € - Euro	⇌	NZD \$ - New Zealand Dollar
1.00		1.68

Explain whether this is a correct statement and why/why not?

QUESTION THIRTY-SEVEN: PARIS HERE WE COME

- a) Looking at their savings for the first ten weeks, in this table below, how much money did they save per week?

Week	Savings in the bank (\$)
1	1 000
2	1 300
3	1 600
4	1 900
5	2 200
6	2 500
7	2 800
8	3 100
9	3 400
10	3 700

Evidence	Process	Content
From 1000 to 1300, that is 300 and the same from 1300 to 1600 etc.	B	1

- b) If the family decided to increase their savings by 35% per week, what would the new amount be that they will save per week?

Evidence	Process	Content
$300 \times 35/100 = 105$, so adding that onto the 300, the new amount will be \$405 per week.	A	1

- c) Milly's younger brother is of the opinion that \$1000 NZD will also mean that he will be able to spend €1000 EUR in France. If the exchange rate is as follows:

EUR € - Euro	⇌	NZD \$ - New Zealand Dollar
1.00		1.68

Explain whether this is a correct statement and why/why not?

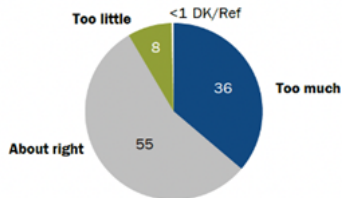
Evidence	Process	Content
----------	---------	---------

Milly's younger brother doesn't realise that each country has a different currency and each currency is stronger/weaker than another currency. In this case, the \$1000NZD is only worth $1000/1.68 = \text{€}595.24$ EUR because you get \$1.68NZD for every €1 EUR you have. So that means the Euro is actually stronger than the NZ dollar. Milly's brother is incorrect	C	1
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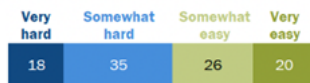
QUESTION THIRTY-EIGHT: WE ARE SOCIAL MEDIA!

54% of teens say it would be hard to give up social media

% of U.S. teens who say that overall, the amount of time they spend on social media is ...



% of U.S. teens who say it would be ___ for them to give up social media



Note: Teens refer to those ages 13 to 17. Figures may not add up to the NET values due to rounding. Those who did not give an answer are not shown.

Source: Survey conducted April 14-May 4, 2022.
"Teens, Social Media and Technology 2022"

Source: [Teens, Social Media and Technology 2022 | Pew Research Center](#)

- a) If 1000 teenagers in the US were interviewed, how many of them would say that it would be "very easy" to give up social media?

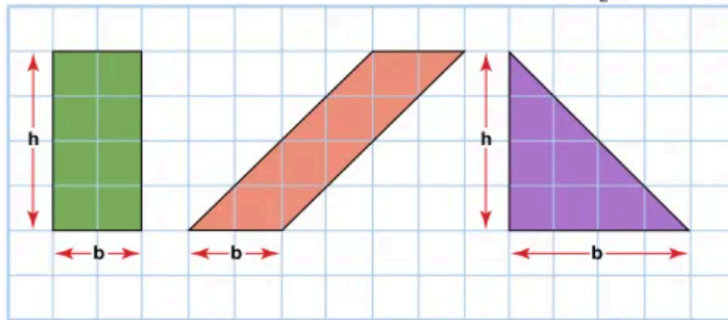
- b) The students in the US that found it "somewhat hard" to give up social media, is 35%. Rewrite as a fraction in its simplest form.

- c) A student in New Zealand sees this data. They go to their teacher at school and makes the statement that 54% of teenagers in New Zealand will find it hard to give up social media. Is this statement justified? Explain your answer using the information given in this question.

QUESTION THIRTY-EIGHT: WE ARE SOCIAL MEDIA!

- a) If 1000 teenagers in the US were interviewed, how many of them would say that it would be “very easy” to give up social media?
- | Evidence | Process | Content |
|---|---------|---------|
| 20/100 is 0.2 and so $0.2 \times 1000 = 200$
ALSO accept:
20/99 is 0.202 and so $0.202 \times 1000 = 202$ teenagers | A | 1 |
- b) The students in the US that found it “somewhat hard” to give up social media, is 35%. Rewrite as a fraction in its simplest form.
- | Evidence | Process | Content |
|-----------------|---------|---------|
| $35/100 = 7/20$ | B | 1 |
- c) A student in New Zealand sees this data. They go to their teacher at school and makes the statement that 54% of teenagers in New Zealand will find it hard to give up social media. Is this statement justified? Explain your answer using the information given in this question.
- | Evidence | Process | Content |
|---|---------|---------|
| New Zealand is a different country and might be subject to different circumstances than US students. It is not the same population and therefore the sample group was from a particular population and can not necessarily be applied to another population, The sample has to be representative of the population. | C | 6 |

QUESTION THIRTY-NINE: SHOW ME THAT SPACE!

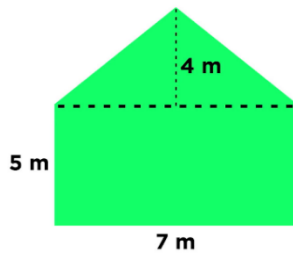


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a) Select the figure(s) with the largest area:

- ☐ Rectangle
- ☐ Parallelogram
- ☐ Triangle

b) Calculate the total area of the front view of the house below.



c) John and Kate solved the following area calculation differently.

ALL sides of this cross shape is 3 units in length



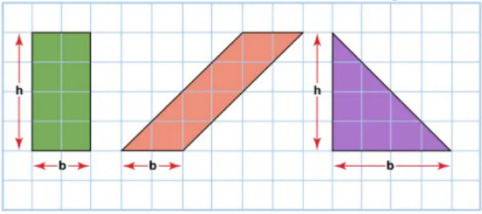
John saw this as two overlapping rectangles and wrote his calculation as $(9 \times 3) + (6 \times 3)$

Kate saw this as 5 squares and wrote the calculation $5 \times 3 \times 3$

Do you agree with John or Kate or both? Justify your choice by explaining their calculations with appropriate calculations.

QUESTION THIRTY-NINE: SHOW ME THAT SPACE!

a)



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Select the figure(s) with the largest area:

☐ Rectangle

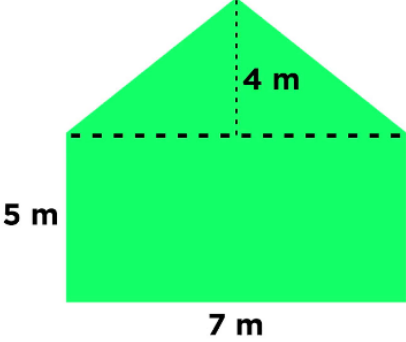
☐ Parallelogram

☐ Triangle

Evidence	Process	Content
None of the above as they all have the same area which is 8	B	5

b)

Calculate the total area of the front view of the house below.



Evidence	Process	Content
$7 \times 5 = 35 \text{ m}^2$ $7 \times 4 \div 2 = 14 \text{ m}^2$ Total area = 49 m^2	A	5

c)

John and Kate solved the following area calculation differently.



John's calculation: $(9 \times 3) + (6 \times 3)$

Kate's calculation: $5 \times 3 \times 3$

Do you agree with John or Kate? Justify your choice by explaining their calculations with appropriate calculations.

Evidence	Process	Content
Both of them are correct. John has divided the cross into two rectangles and then added the two rectangles together whereas Kate split it up into 5 equal squares. But both methods are valid and both equal 45m^2 Explanation: Each square is 3×3 and there are 5 so Kate is correct. For John the longest rectangle has sides $3 \times (3 + 3 + 3) = 3 \times 9$. The shorter rectangle is made up of 2 squares $3 \times (3 + 3) = 3 \times 6$. Adding these together gives $3 \times 9 + 3 \times 6$	C	5

QUESTION FORTY: IT'S MY PARTY!

Maia is planning her birthday party. She wants to invite 12 friends in total.

She has a part time job that pays \$21.20 per hour.

Here is Maia's birthday budget:

Birthday cake	\$70
Decorations	\$245
Other food	\$30 per person

- a) What are the total expenses for Maia's birthday party?

- b) Maia says she needs to work 31 hours to pay for the party.

Is she correct? Justify your answer using the budget and her pay rate.

- c) Maia decides to make a cake instead. How will this impact the number of hours she needs to work?

QUESTION FORTY: IT'S MY PARTY!

Maia is planning her birthday party. She wants to invite 12 friends in total.

She has a part time job that pays \$21.20 per hour.

Here is Maia's birthday budget:

Birthday cake	\$70
Decorations	\$245
Other food	\$30 per person

- a) What are the total expenses for Maia's birthday party?

Evidence	Process	Content
\$675	B	1

- b) Maia says she needs to work 31 hours to pay for the party.

Is she correct? Justify your answer using the budget and her pay rate.

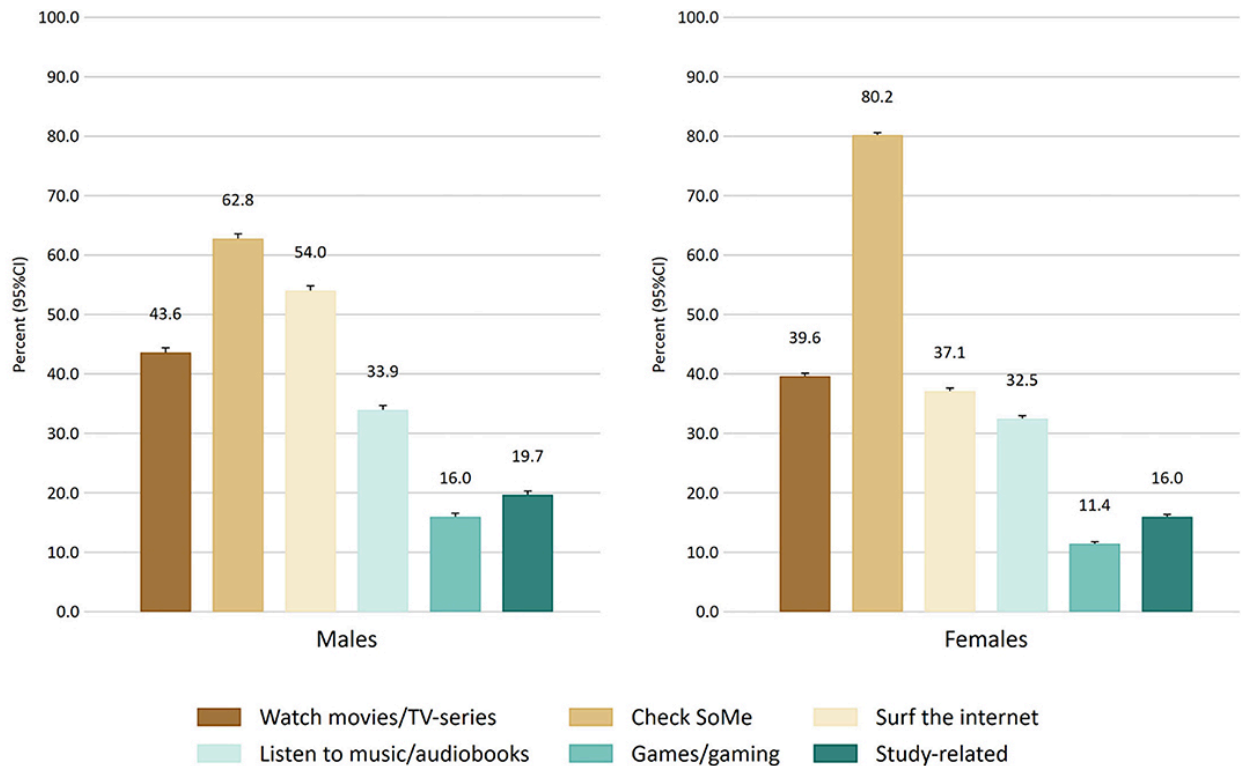
Evidence	Process	Content
She needs to pay \$675. She is paid \$21.20 per hour. $675 \div 21.20 = 31.8$ hours. She is incorrect, she needs to work over 31 hours to earn \$675.	c	1

- c) Maia decides to make a cake instead. How will this impact the number of hours she needs to work?

Evidence	Process	Content
The total becomes \$605. This means she only works $605 \div 21.20 = 29$ hours	A	1

QUESTION FORTY-ONE: WHO NEEDS SLEEP?

The graphs below show how males and females spend their evenings before bedtime. (The abbreviation SoMe is used for Social Media).



P-value for gender differences is 0.002 for 'Listen to music/audiobooks' and <0.001 for all other activities

Source: [fpubh-09-794307-g001.jpg \(1084x696\) \(frontiersin.org\)](https://doi.org/10.3389/fpubh.2020.00001)

a) According to the graph, who was doing the most study-related activities before bedtime?

b) In a class of 30 in an all-girls school, how many students would you expect to be gaming in the evening before bed.

c) Explain which activities show the biggest difference between males and females.

QUESTION FORTY-ONE: WHO NEEDS SLEEP?

- a) According to the graph, who was doing the most study-related activities before bedtime?

Evidence	Process	Content
Males	B	6

- b) In a class of 30 in an all-girls school, how many students would you expect to be gaming in the evening before bed.

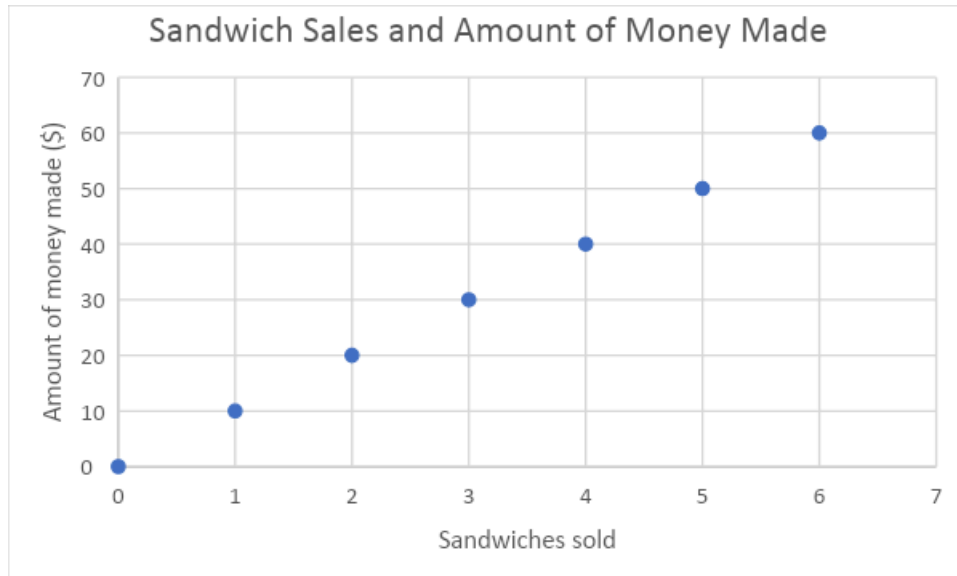
Evidence	Process	Content
$30 \times 11.4/100 = 3.43$ which means between 3 and 4 students	A	6

- c) Explain which activities show the biggest difference between males and females.

Evidence	Process	Content
The biggest difference is in the social media ($80.2 - 62.8 = 17.4$) followed by surfing the internet ($54.0 - 37.1 = 16.9$). With females they tend to spend more time on social media whereas males were more prone to surf the internet in the evenings before bed.	C	6

QUESTION FORTY-TWO: COFFEE SHOP

Lynn owns a café that sells the yummiest sandwiches. She wants to do an analysis of her sandwich sales and how it relates to the amount of money she makes.



a) How much money does she earn if she sells 5 sandwiches?

b) In this scenario, explain what the point (1,10) represents.

c) Lynn wants to earn at least \$240 in a day. What is the least number of sandwiches she would need to sell for this to happen?

QUESTION FORTY-TWO: COFFEE SHOP

- a) How much money does she earn if she sells 5 sandwiches?

Evidence	Process	Content
\$50	B	2

- b) In this scenario, explain what the point (1,10) represents.

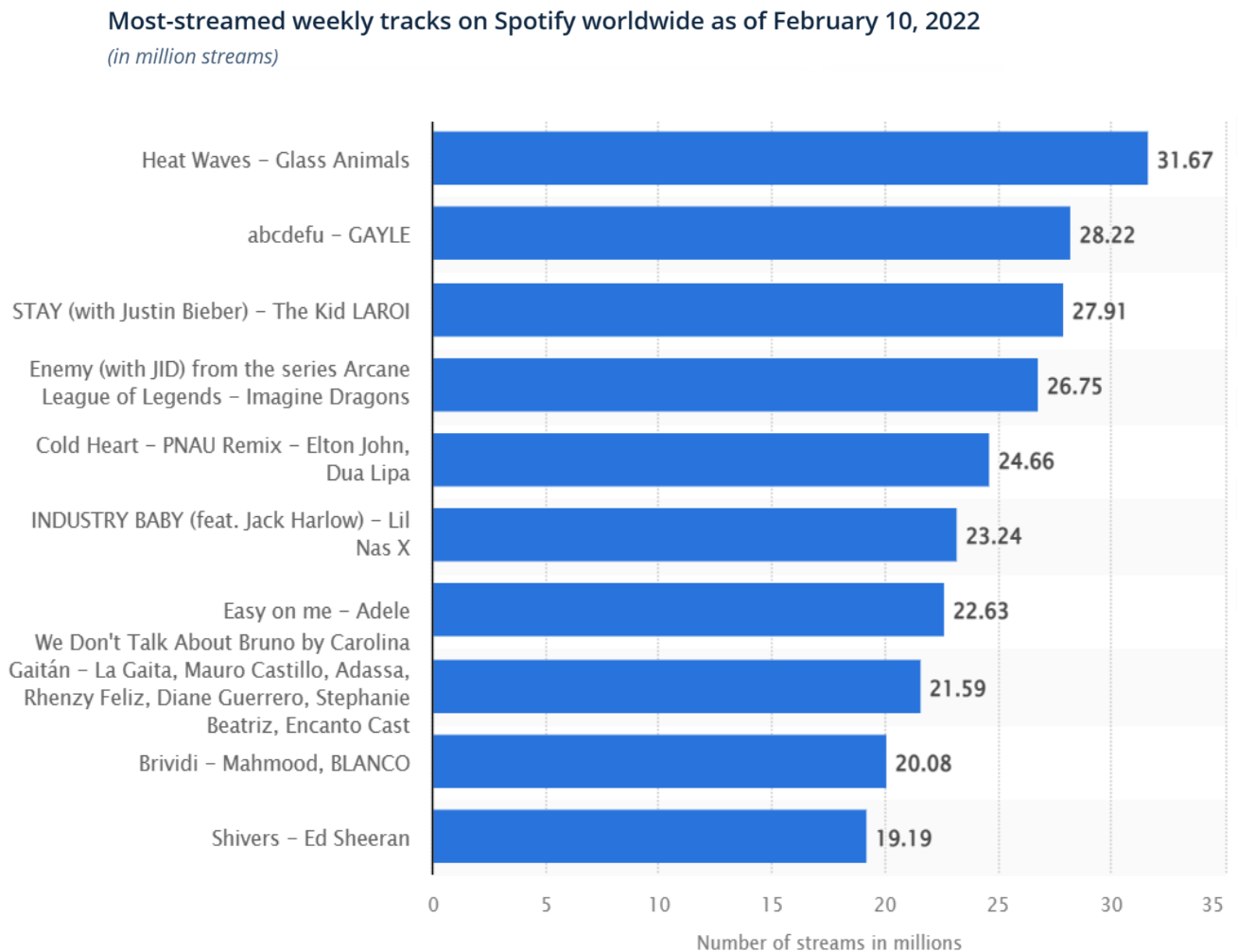
Evidence	Process	Content
The 1 represents the number of sandwiches is sold and the 10 represents the money that Lynn makes. So basically, this represents the cost of one sandwich.	A	2

- c) Lynn wants to earn at least \$240 in a day. What is the least number of sandwiches she would need to sell for this to happen?

Evidence	Process	Content
24 sandwiches	B	2

QUESTION FORTY-THREE: POP UP THE MUSIC!

People can listen to music on Spotify. Each time a person listens to a song on Spotify, it is called a “stream”. The following graph has been created about the most-streamed songs in 2022 on Spotify:



Sourced from: [Spotify: most streamed tracks worldwide 2022 | Statista](#)

a) How many times was Adele’s “Easy on me” streamed?

b) Your friend reads this graph and makes the claim that Spotify would not care much if people didn’t stream Ed Sheeran’s music as he has the fewest number of streams. Is this claim correct? Explain your answer.

- c) Singers on Spotify make \$0.003 each time someone streams their song. How much would Glass Animals make for Heat Waves?

QUESTION FORTY-THREE: POP UP THE MUSIC!

- a) How many downloads did Adele's "Easy on me" get?

Evidence	Process	Content
22.63 million	B	6

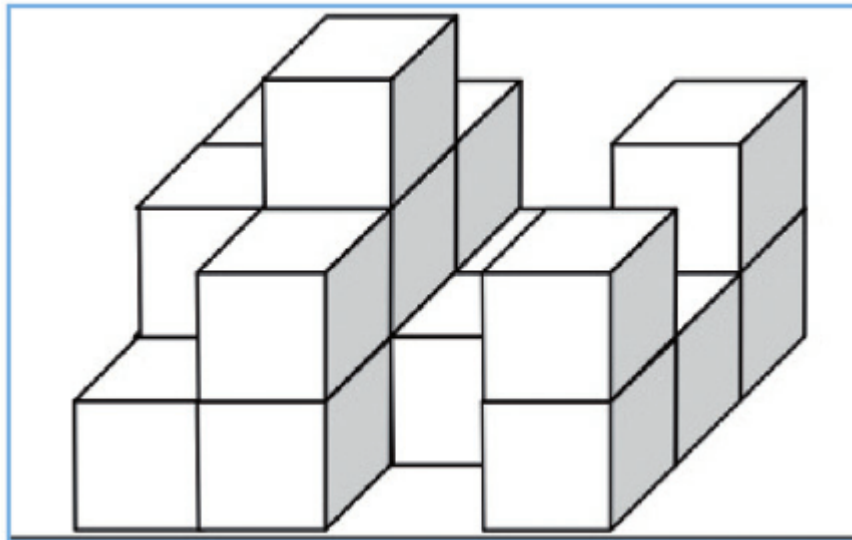
- b) Your friend reads this graph and makes the claim that Spotify would not care much if people didn't download Ed Sheeran's music as he is at the bottom of the graph with the fewest downloads. Is this claim correct? Why/why not?

Evidence	Process	Content
Ed Sheeran's song still had 19 million downloads, so Spotify would not want to miss out on the money they will making from this. It is less than the others, but still worth it	C	6

- c) Singers on Spotify make \$0.003 each time someone streams their song. How much would Glass Animals make for Heat Waves?

Evidence	Process	Content
Glass Animals got 31.67 million streams. $31\,670\,000 \times 0.003 = \$95\,010$	A	1, 6

QUESTION FORTY-FOUR: POP UP THE BLOCKS



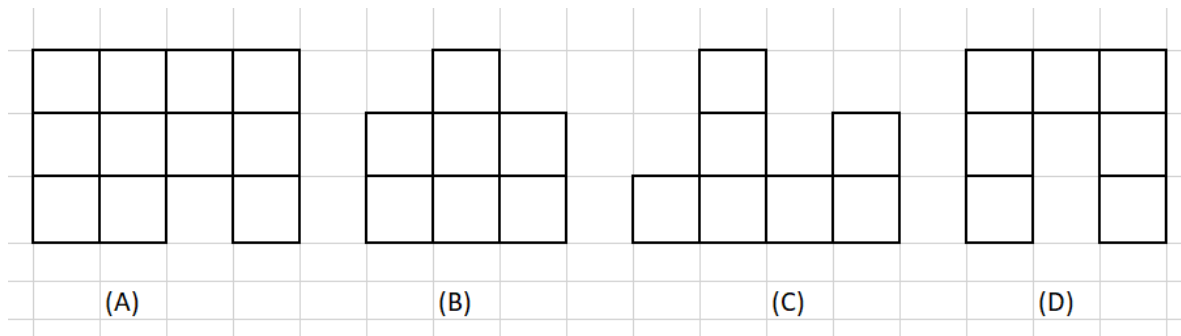
Right-hand view



Sourced: [Item from the test: how many cubes are there in the figure? | Download Scientific Diagram \(researchgate.net\)](#)

a) How many blocks are there altogether in this figure above?

b) Which one of the following 2D views of this shape is **not** a correct picture?



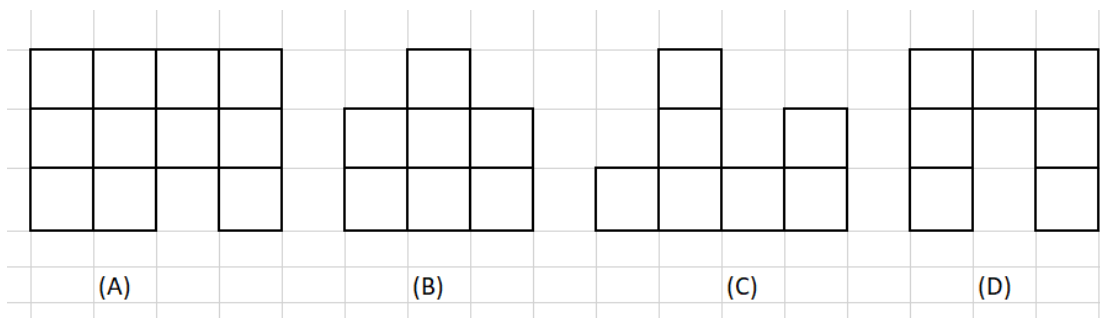
c) You have to hide an extra block so that it is not visible from the right-hand view. What possibilities do you have to hide it? Show with an "X" on the original drawing.

QUESTION FORTY-FOUR: POP UP THE BLOCKS

- a) How many blocks are there altogether in this figure above?

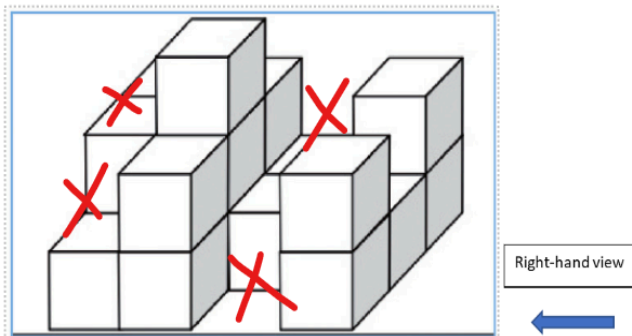
Evidence	Process	Content
19	b	3

- b) Which one of the following 2D views of this shape is **not** a correct picture?



Evidence	Process	Content
D	b	3

- c) You have to hide an extra block so that it is not visible from the right-hand view. What possibilities do you have to hide it?



Evidence	Process	Content
X on the drawing	c	3

QUESTION FORTY-FIVE: SWIMMING PRICES

The admission prices for Christchurch City Council swimming pools are:

Adult - 25% discount for Community Services Card and Super Gold Card cardholders.	\$6.70
Children (under 16 years or secondary student cardholders) - 25% discount for Community Services Card and Super Gold Card cardholders.	\$3.80
Preschool child with parent or caregiver (maximum of two pre-schoolers per parent) during school hours (9am to 3pm on Monday to Friday). Weekends, public holidays and school holidays are excluded.	Free
Family of 5 - (2 adults and 3 children or 1 adult and 4 children)	\$17.10
Family of 2 - (1 adult, 1 child)	\$8.60
Adult multi-visit pass - 20 visits	\$120.60
Annual (yearly) pass	\$719.80

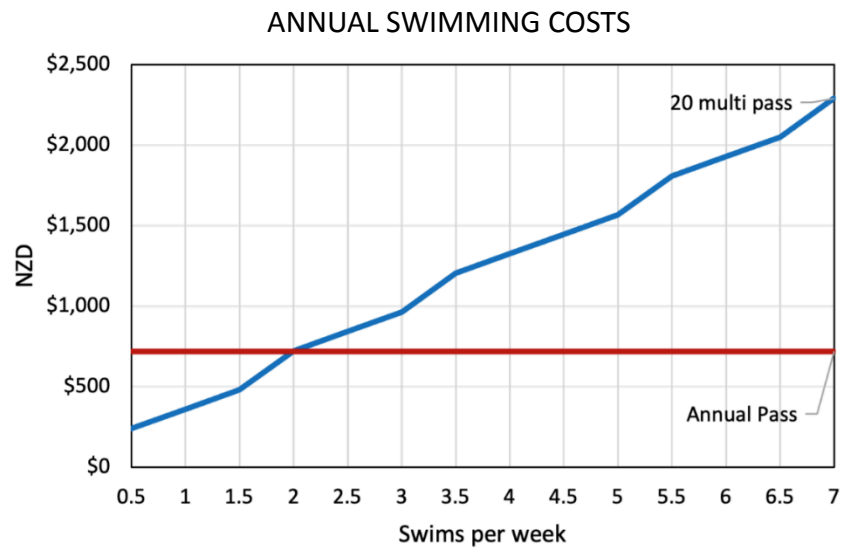
- a) How much does it cost for 1 adult (with a Super Gold Card) and 2 children to go swimming?

- b) Manu wants to go swimming with his family, which consists of 2 adults and 5 children.

They have a Community Services card for all of them.

Calculate the cheapest price that they can pay to all go swimming.

- c) Serena wants to go swimming on a regular basis and is investigating whether she should get an annual pass.



Use the graph above to make a recommendation to Serena about whether she should buy an annual pass or not.

QUESTION FORTY-FIVE: SWIMMING PRICES

The admission prices for Christchurch City Council swimming pools are:

Adult - 25% discount for Community Services Card and Super Gold Card cardholders.	\$6.70
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Preschool child with parent or caregiver (maximum of two pre-schoolers per parent) during school hours (9am to 3pm on Monday to Friday). Weekends, public holidays and school holidays are excluded.	Free
Family of 5 - (2 adults and 3 children or 1 adult and 4 children)	\$17.10
Family of 2 - (1 adult, 1 child)	\$8.60
Adult multi-visit pass - 20 visits	\$120.60
Annual (yearly) pass	\$719.80

- a) How much does it cost for 1 adult (with a KiwiAble Leisure pass) and 2 children to go swimming?

Evidence	Process	Content
25% discount on adult price = \$5.025 $5.025 + 3.80 + 3.80 =$ \$12.625 \$12.60 cash or \$12.63	A	1

- b) Manu wants to go swimming with his family, which consists of 2 adults and 5 children.

They have a Community Services card for all of them.

Calculate the cheapest price that they can pay to all go swimming.

Evidence	Process	Content
Accept any reasonable methods of working. Suggestions:	A	1

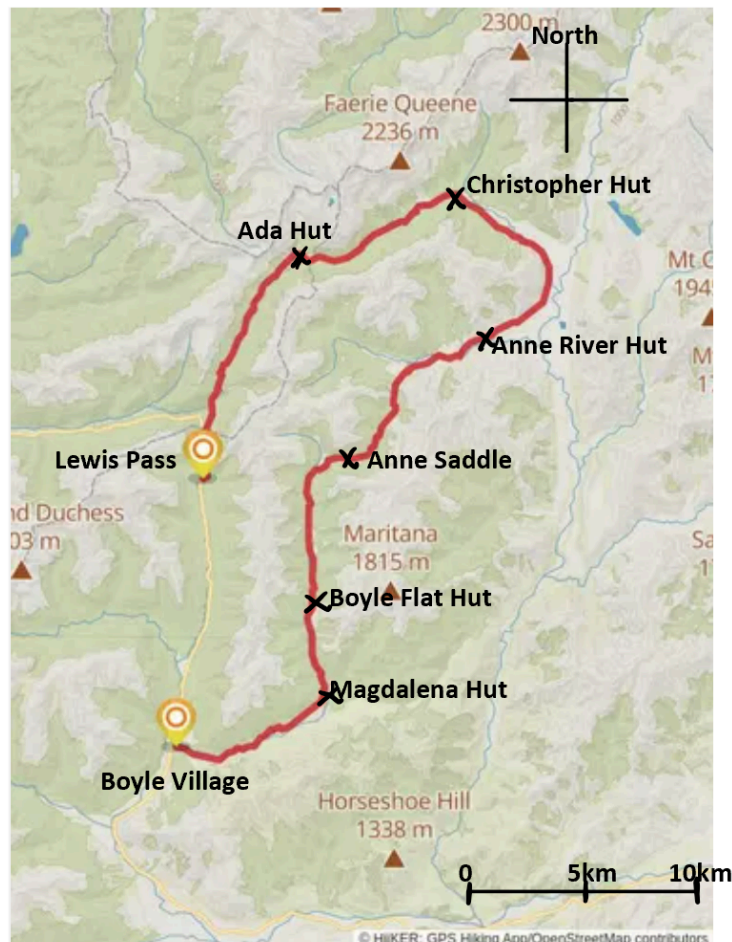
- Family of 5 = $17.10 + 2$ children with community service card (5.70) = \$22.80 - Family of 5 = $17.10 + 1$ adult and 1 child both with community services card ($2.85 + 5.025 = 7.875$) = \$24.975 - 2 adults with CSC = 10.05; 5 children with CSC = 14.25; Total = \$24.3		
--	--	--

- c) Use the graph above to make a recommendation to Serena about whether she should buy an annual pass or not.

Evidence	Process	Content
The blue line, representing the multi pass is below (cheaper) than the red line, representing the annual pass, up till 2 visits per week. If Serena swum 2x per week it would cost her the same amount per swim whether she had paid for the multi pass or annual. If Serena thinks that she will be going swimming 3+ times per week than she should get the annual pass. Twice a week: Multi visit = $120.60/20 = \\$6.03$ per swim 2 swims per week would be \$12.06 per week Annual pass = $719.80/52 = 13.84/2 = \\$6.92$ per swim Which is \$13.84 per week Multi is cheaper at twice a week. Three times a week: Multi visit = $6.03 \times 3 = \\$18.09$ per week Annual = \$13.84 per week Annual is cheaper at three times a week. <i>Accept any reasonable explanation.</i>	C	1, 6

QUESTION FORTY-SIX: ST JAMES WALKWAY

Lydia is planning a tramping trip to the St James Walkway and has printed off this map to help her with her planning.



Source: [St James Walkway Map | Hurunui | New Zealand \(hiiker.app\)](#)

- a) She writes out a direction guide for between the huts, using compass directions only. What is the compass direction from Ada Hut to Christopher Hut?

- ☐ North
- ☐ North East
- ☐ East
- ☐ South East
- ☐ South

- b) If Lydia walks at an average pace of 4.5km per hour, using the scale, how long would it take her (to the nearest hour) to walk from Boyle Flat Hut to the Boyle Village? Explain your solving process.

- c) Her sister Briar thinks that the tallest peak near the walk is Horseshoe Hill, which is 1338m tall. Lydia disagrees. Explain why you think Lydia disagrees with Briar using information from the map?

QUESTION FORTY-SIX: ST JAMES WALKWAY

- a) She writes out a direction guide between the huts, using compass directions only. What is the compass direction between Ada Hut and Christopher Hut?

Evidence	Process	Content
North East	B	4

- b) If Lydia walks at an average pace of 4.5km per hour, using the scale, how long would it take her (to the nearest hour) to walk from Boyle Flat Hut to the Boyle Village?

Evidence	Process	Content
Approx. 15km between Boyle Flat Hut and Boyle Village, at 4.5km/h it would take her 3.33 hours (3 hours and 20 min) <i>Accept any reasonable answer if it has an explanation.</i>	A	3, 5

- c) Her sister Briar thinks that the tallest peak near the walk is Horseshoe Hill, which is 1338m tall. Lydia disagrees. Explain why you think Lydia disagrees with Briar?

Evidence	Process	Content
There are 3 peaks that we can see clearly on the map, Horseshoe Hill at 1338m, Maritana at 1815m and Faerie Queen at 2236m tall. Horseshoe has the lowest number which means it has the smallest height of them, Faerie Queen is the tallest peak at 2236m.	C	2, 4

QUESTION FORTY-SEVEN: TELLING THE TIME

Janelle has an exam. She needs to keep track of the time using a clock.

a) What is the time being displayed on the clock?

- ☐ 1002
- ☐ 1010
- ☐ 1020
- ☐ 0210
- ☐ 2100



b) If the seconds hand (the one pointing near the 7) rotates around the clock 90° , what number would it be closest to now?

c) Janelle knows that the seconds hand takes 60 seconds to complete a full rotation of the clock face.

How many more full rotations will the seconds hand complete before the hours hand is exactly half way between the 10 and 11?

QUESTION FORTY-SEVEN: TELLING THE TIME

- a) What is the time being displayed on the clock?

Evidence	Process	Content
1010	A	5

- b) If the seconds hand (the one pointing near the 7) rotates around the clock 90° , what number would it be closest to now?

Evidence	Process	Content
The 10	B	4, 5

- c) Janelle knows that the seconds hand takes 60 seconds to complete a full rotation of the clock face.

How many more full rotations will the seconds hand complete before the hours hand is exactly half way between the 10 and 11?

Evidence	Process	Content
For the hours hand to be half way between the 10 and 11, the minute hand needs to be at the 6. This is in approx. 20 min so the seconds hand needs to complete 20 full rotations.	C	4, 5

QUESTION FORTY-EIGHT: CAT TOYS

Kairangi is looking to purchase a cat toy for her cat Toby:

KONE Cat Wand



Originally \$24
20% off!

KITSY Cat Teaser



Originally \$17.59
Now \$17.59

- a) Calculate the discounted price of the KONE Cat Wand.

- b) The KITSY Cat Teaser is 450 mm. Convert 450 mm to cm.

- c) The vet tells Kairangi that Toby needs to lose weight. To help Toby lose weight, Kairangi is told to play with him for 15 minutes each day.

The next time Kairangi visits the vet with Toby she says, "I've played with Toby a total of 3 hours in the last 9 weeks."

Has Kairangi played with Toby for 15 minutes each day? Explain your answer with appropriate calculations.

QUESTION FORTY-EIGHT: CAT TOYS

- a) Calculate the discounted price of the KONE Cat Wand.
- | Evidence | Process | Content |
|----------|---------|---------|
| \$19.20 | B | 1 |
- b) The KITSY Cat Teaser is 450mm. Convert 450mm to cm.
- | Evidence | Process | Content |
|----------|---------|---------|
| 45 cm | B | 5 |
- c) The vet tells Kairangi that Toby needs to lose weight. To help Toby lose weight, Kairangi is told to play with him for at least 15 minutes each day.
- The next time Kairangi visits the vet with Toby she says, "I've played with Toby a total of 3 hours in the last 9 weeks."
- Has Kairangi played with Toby for at least 15 minutes each day? Explain your answer with appropriate calculations.
- | Evidence | Process | Content |
|---|---------|---------|
| $15 \times 9 = 135$ minutes
$135 \div 60 = 2.25$ hours
Since 3 hours is greater than 2.25 hours, Kairangi has played with Toby for at least 15 minutes a day. | C | 5 |

QUESTION FORTY-NINE: SAILING



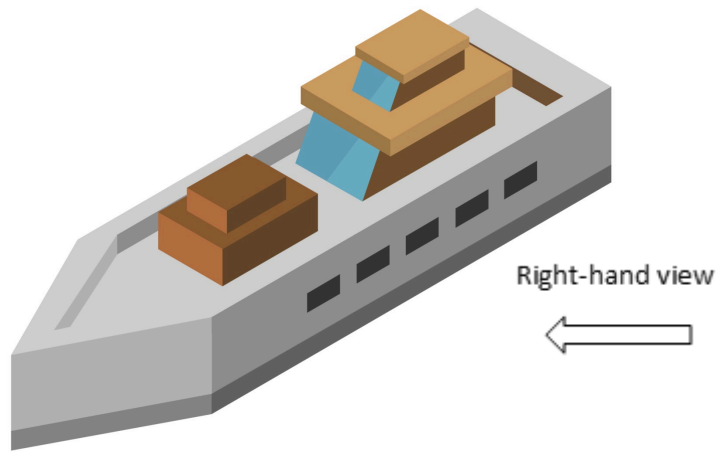
Source: <https://www.nationsonline.org/oneworld/map/new-zealand-map.htm>

a) Akira sails directly from Christchurch to Wellington. What direction is he travelling?

- ☐ North
- ☐ North-east
- ☐ West
- ☐ South-west

b) Is Whanganui or Blenheim closer to Wellington by sea? Explain your answer using the map.

- c) Reiko, Akira's younger brother is playing with a toy ship.



Source: <https://www.vecteezy.com/vector-art/2257166-isometric-ship-on-white-background>

Draw the view from the right of the ship.

QUESTION FORTY-NINE: SAILING

- a) Akira sails directly from Christchurch to Wellington. What direction is he travelling?

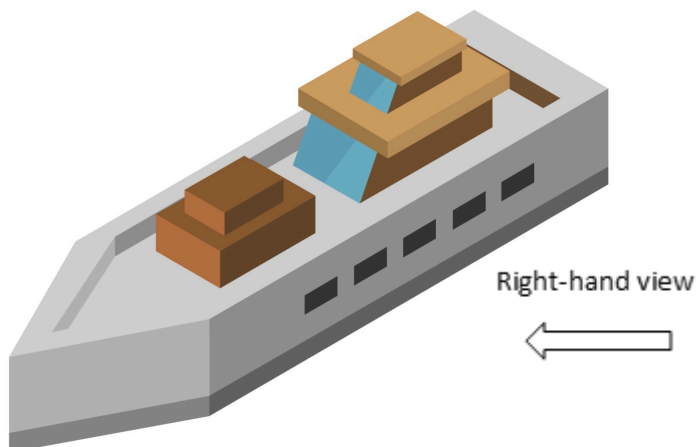
- ☐ North
- ☐ North-east
- ☐ West
- ☐ South-west

Evidence	Process	Content
North-east	B	4

- b) Is Whanganui or Blenheim closer to Wellington by sea? Explain your answer using the map.

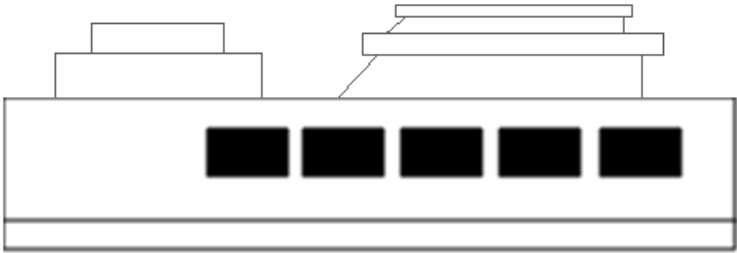
Evidence	Process	Content
The direct line from Blenheim to Wellington is about 1 cm. The direct line from Whanganui to Wellington is about 1.5 cm (both on screen). Therefore, Blenheim is closer.	C	5

- b) Reiko, Akira's younger brother is playing with a toy ship.



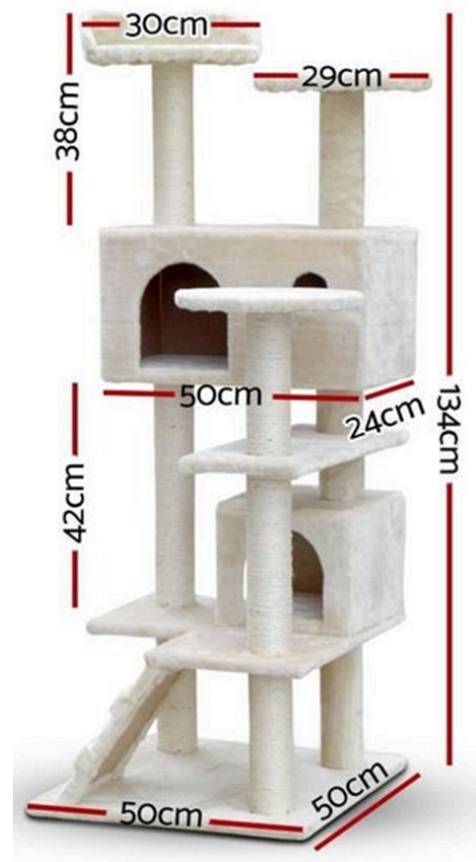
Source: <https://www.vecteezy.com/vector-art/2257166-isometric-ship-on-white-background>

Draw the view from the right of the ship.

Evidence	Process	Content
 Note: Diagram not to scale	A	3

QUESTION FIFTY: CAT TOWER

- a) Calculate the area of the base of the cat tower.



- b) Is a box with a volume of 0.5m^3 big enough to fit the cat tower?

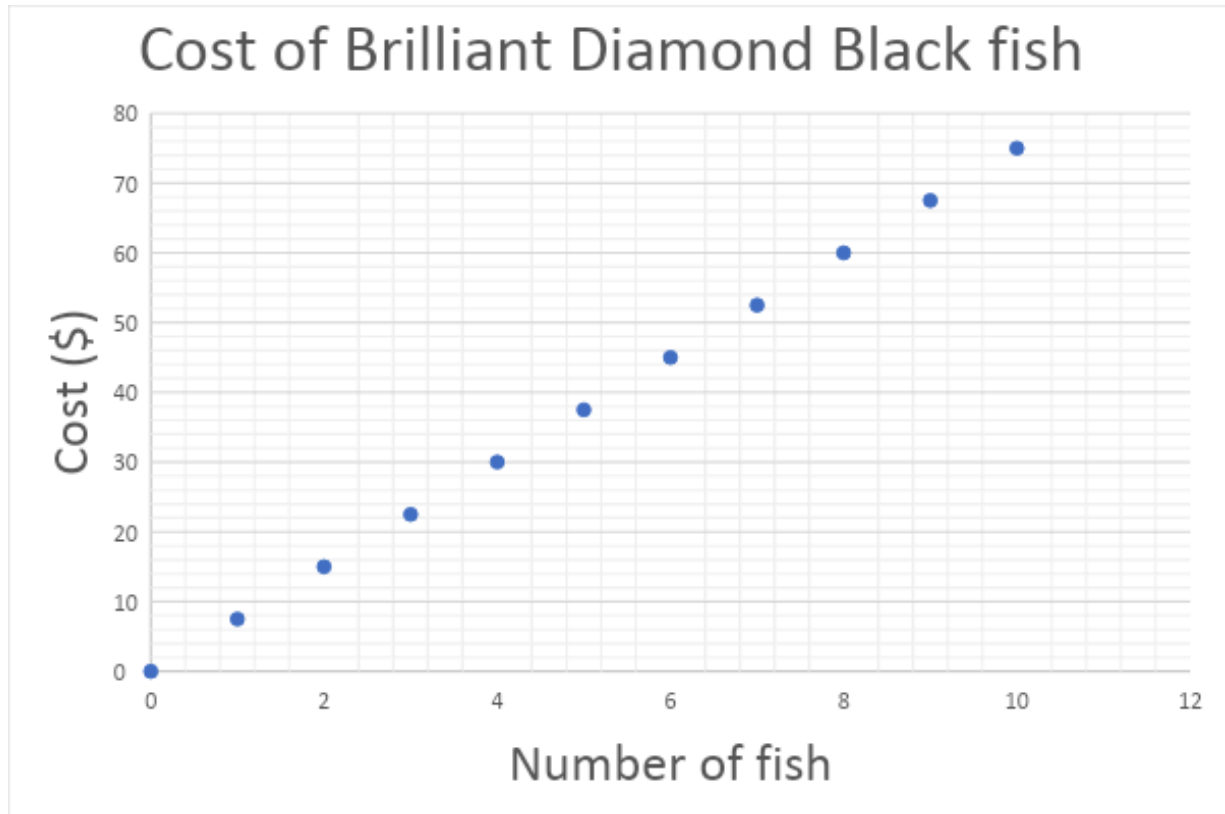
Explain your answer using the cat tower.

- c) A cat can climb up the 134cm tower in 5 seconds. How long would it take a cat to climb up a 201cm tower?

a)	Calculate the area of the base of the cat tower.		
	Evidence	Process	Content
	2 500 cm ² or 0.25 m ² (0.25 m ² is not expected, as area conversions are not in the standard, but a good point of discussion)	B	5
b)	Is a box with a volume of 0.5m ³ big enough to fit the cat tower? Explain your answer using the cat tower.		
	Evidence	Process	Content
	Conversion from cm to m. 0.5 x 0.5 x 1.34 = 0.335 (m ³). Therefore 0.5 m ³ is enough.	C	5
c)	A cat can climb up the 134cm tower in 5 seconds. How long would it take a cat to climb up a 201cm tower?		
	Evidence	Process	Content
	7.5 seconds	A	1

QUESTION FIFTY-ONE: AQUARIUM

Samisoni has plotted an expected cost for Brilliant Diamond Black fish, which cost \$7.50 each.



a) How much will Samisoni have to pay for 25 Brilliant Diamond Black fish?

b) Samisoni found a supplier that can deliver these fish alive to his door for a \$25 freight cost.

How would the graph look different if he plotted $y = 7.5x + 25$ where x is the number of fish and y is the total cost, on the graph provided above?

c) Samisoni looked into two different options of purchasing Ruby Barb fish online:

- Option A: \$8.99 for each fish plus a \$15 freight cost.
- Option B: 5 fish for \$35.50 plus a \$25 freight cost.

Which is better option for Samsoni to purchase 10 Ruby Barb fish online? Explain your answer.

QUESTION FIFTY-ONE: AQUARIUM

- a) How much will Samisoni have to pay for 25 Brilliant Diamond Black fish?
- | Evidence | Process | Content |
|-------------------------------------|---------|---------|
| $7.5 \times 25 = 187.5$
\$187.50 | A | 1 |
- b) Samisoni found a supplier that can deliver these fish alive to his door for a \$25 freight cost.
- How would the graph look different if he plotted $y = 7.5x + 25$ where x is the number of fish and y is the total cost, on the graph provided above?
- | Evidence | Process | Content |
|---|---------|---------|
| The newly plotted graph of $y = 7.5x + 25$ will translate the original graph by 25 units upward (parallel lines). | B | 3 |
- c) Samisoni looked into two different options of purchasing Ruby Barb fish online:
- Option A: \$8.99 each plus a \$15 freight cost.
 - Option B: 5 fish for \$35.50 plus a \$25 freight cost.
- Which is better option for Samsoni to purchase 10 Ruby Barb fish online? Explain your answer.
- | Evidence | Process | Content |
|---|---------|---------|
| Option A: $8.99 \times 10 + 15 = 104.9$
Option B: $35.5 \times 2 + 25 = 96$
Option B is better because it is cheaper. | C | 1 |

QUESTION FIFTY-TWO: STRAY CATS

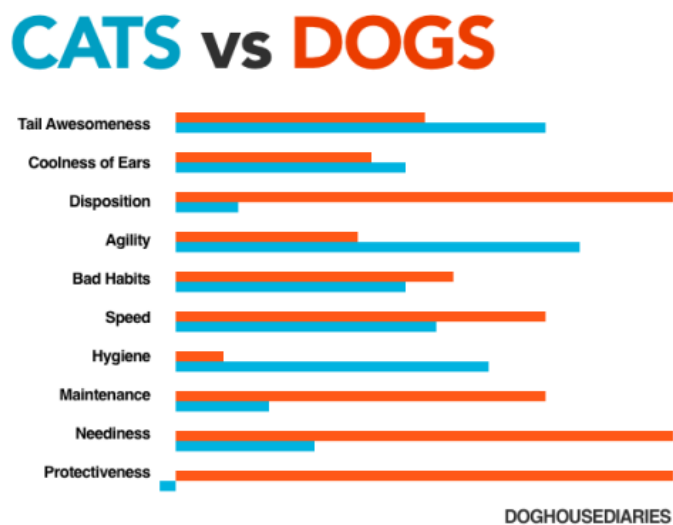
a) There are 2 stray cats that sometimes visit Graeme's house. He leaves food out for them.

- A ginger cat visits 2 days a week;
- The probability of a grey cat visiting is 0.15.

Which cat is more likely to visit during a week?

b) A ginger cat weighing 4.2 kg, a grey cat weighing 3700 g and a black cat weighing 5.3 kg jump on a scale at the same time. What is their total weight in kilograms?

c) Identify which of the characteristics shows the biggest difference between cats and dogs. Explain your answer using features of the graph.



Source:

<https://laughingsquid.com/entertaining-bar-graph-comparing-the-awesome-qualities-of-cats-versus-the-awesome-qualities-of-dogs/>

QUESTION FIFTY-TWO: STRAY CATS

- a) There are 2 stray cats that sometimes visit Graeme's house. He leaves food out for them.
- A ginger cat visits 2 days a week;
 - The probability of a grey cat visiting is 0.15.
- Which cat is more likely to visit during a week?

Evidence	Process	Content
Ginger = 0.29 (2 dp) compared to grey = 0.15. Therefore, the ginger cat is more likely to visit.	A	1, 7

- b) A ginger cat weighing 4.2 kg, a grey cat weighing 3700 g and a black cat weighing 5.3 kg jump on a scale at the same time. What is their total weight in kilograms?

Evidence	Process	Content
$4.2 + 3.7 + 5.3 = 13.2$	B	1, 5

- c) Identify which of the characteristics shows the biggest difference between cats and dogs. Explain your answer.

Evidence	Process	Content
Protectiveness because cat is heading towards the negative directions compared to dogs heading right (furthest alongside with disposition and neediness but cats are on the positive direction for both attributes).	C	6

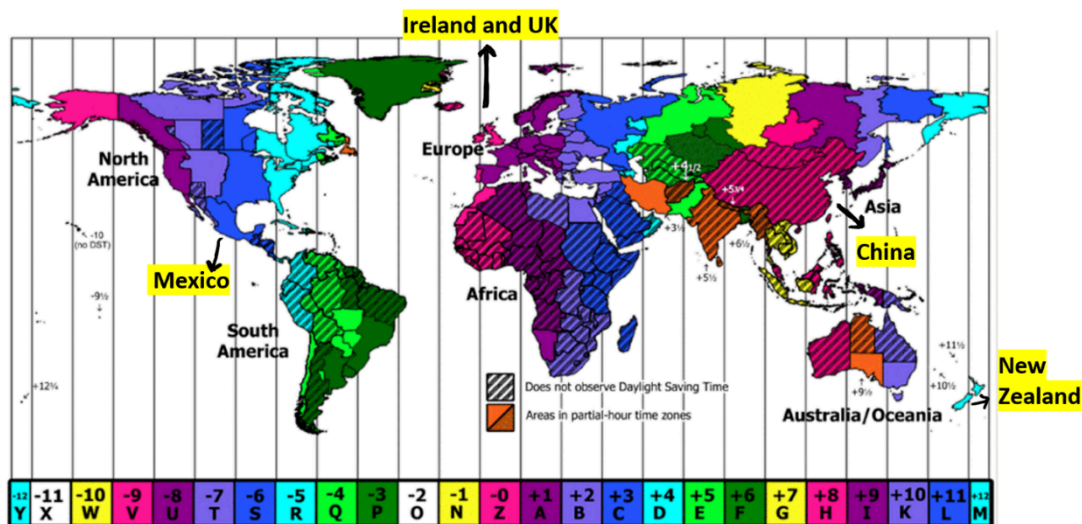
QUESTION FIFTY-THREE: TIME DIFFERENCES

Owen is playing an online game with his friends. His friends live around the world in different time zones.

Below is a map of time zones.

The numbers at the bottom of the graph tells us the time zone compare to GMT (Greenwich Mean Time):

- A positive number means the country is in front of GMT
- A negative number means the country is behind GMT



Source: [World Time Zone Map \(nist.gov\)](http://www.nist.gov/pml/time-and-frequency-division/publications/nist-sp-499.htm)

- a) What is the time difference of New Zealand from the GMT?
- ☐ -12 hours
 - ☐ -11 hours
 - ☐ +11 hours
 - ☐ +12 hours
- b) Owen, who lives in New Zealand, is wanting to play an online game against Tadhg, who lives in Ireland.

They both log on at 8am NZ time.

They play online for 2.5hours.

What will the time be in Ireland when they finish playing?

- c) What is the time difference is between China and Mexico? Use the graph to explain how you calculated the time difference.

Provide an example of what local times would be.

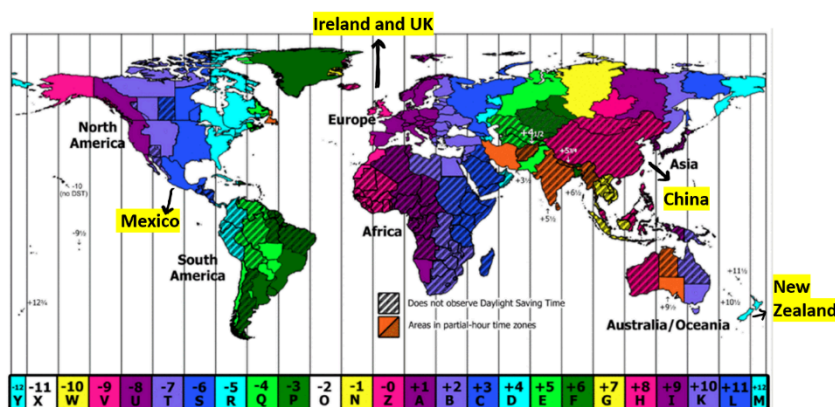
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Source: [World Time Zone Map \(nist.gov\)](http://WorldTimeZoneMap.nist.gov)

a) What is the time difference of New Zealand from the GMT?

Evidence	Process	Content
+12 hours	B	5

b) Owen, who lives in New Zealand, is wanting to play an online game against Tadhg, who lives in Ireland. If they both log on at 8am NZ time, then play online for 2.5 hours, what will the time be in Ireland when they finish playing?

Evidence	Process	Content
8am in NZ = 8pm in Ireland. If they play for 2.5 hours then it will be	A	1, 5

10.30pm (2230) when they log off.		
-----------------------------------	--	--

- c) What is the time difference is between China and Mexico? Use the graph to explain how you calculated the time difference.

Provide an example of what local times would be.

Evidence	Process	Content
China is pink which is 8 hours forward of the GMT, while Mexico is blue which is 6 hours behind the GMT. If China is 8 hours positive and Mexico is 6 hours negative, then the difference is 14 hours between them. If it was 12am (0000) in China then it would be 10am the previous day in Mexico. <i>Accept any reasonable answer.</i>	C	5

QUESTION FIFTY-FOUR: TRAVELLING WEATHER

Below is the weather forecast for the Auckland region for the next twenty-eight days.



- a) If today is the 11th, what is the probability that it will rain between now and the 28th?

- b) Janette says that it usually rains one out of four days.

Looking at the diagram above, do you agree with this? Use the information in the diagram to explain your answer.

- c) Kate is visiting her family in Christchurch in the next 28 days.

Here is the weather forecast for Christchurch:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1  19° / 10°	2  21° / 13°	3  24° / 14°	4  20° / 11°
5  22° / 10°	6  23° / 12°	7  20° / 12°	8  17° / 11°	9  21° / 11°	10  18° / 11°	11  19° / 11°
12  22° / 11°	13  20° / 11°	14  19° / 11°	15  20° / 11°	16  17° / 12°	17  17° / 9°	18  17° / 8°
19  19° / 9°	20  17° / 11°	21  18° / 11°	22  20° / 12°	23  20° / 12°	24  19° / 11°	25  20° / 11°
26  22° / 12°	27  19° / 12°	28  16° / 10°	29  19° / 11°	30  18° / 12°	31  20° / 12°	

What is the difference between the highest Auckland temperature and the lowest Christchurch temperature?

QUESTION FIFTY-FOUR: TRAVELLING WEATHER

- a) If today is the 11th, what is the probability that it will rain between now and the 28th?

Evidence	Process	Content
9/18 or 9/17	B	7

- b) Looking at the diagram above, do you agree with this? Use the information in the diagram to explain your answer.

Evidence	Process	Content
14/28 days = 50% I don't agree with this as in this diagram it rains 50% of the time. However, this is not a usual amount of rain and the answer may be nearer 25%.	C	7

- c) What is the difference between the highest Auckland temperature and the lowest Christchurch temperature?

Evidence	Process	Content
Highest Auckland: = 26 Lowest Christchurch: =8 Answer = $26 - 8 = 18$	A	1

QUESTION FIFTY-FIVE: TIME TRAVEL

Bernadette lives in Christchurch. She is a life coach with clients around the world.

- a) This week, she has a Zoom call scheduled to speak to Anne in Ireland on Saturday night at **midnight** Christchurch time.

Ireland is 13 hours behind Christchurch time. What time will it be in Ireland?

- b) Bernadette has a mentor called Cindy. Cindy lives in California, USA.

Bernadette and Cindy speak weekly on Saturday 4pm in California, USA, which is 1pm Sunday New Zealand time.

What is the time difference between New Zealand and California, USA?

- c) Cindy would like to have a call with Anne and Bernadette at the same time. Anne is coming over for a visit to New Zealand. She says that she will be able to be in Christchurch for 1 pm call on Sunday.

If Anne leaves Ireland on Friday morning at 9am. The flight to Christchurch from Dublin in Ireland will take 37 hours 25 minutes with a 3-hour stopover in Dubai and a 30-minute stopover in Sydney.

Will Anne be in Christchurch for the 1pm call on Sunday? Explain your answer.

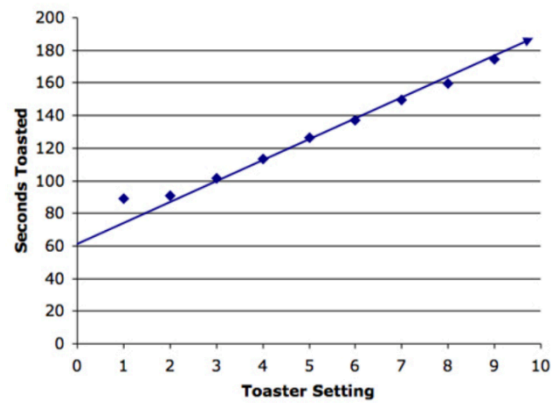
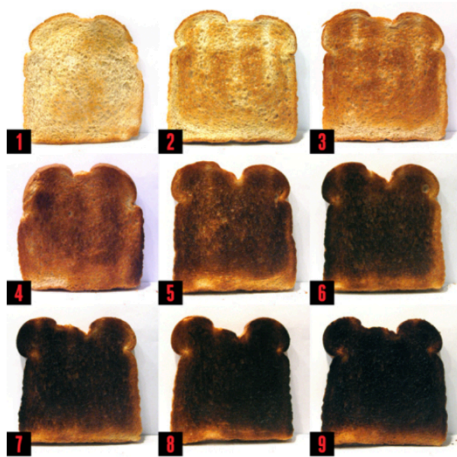
QUESTION FIFTY-FIVE: TIME TRAVEL

- a) As Ireland is 13 hours behind Christchurch time, what time will it be with Anne in Ireland?
- | Evidence | Process | Content |
|-----------------|---------|---------|
| 11 am in Dublin | B | 5 |
- b) Bernadette and Cindy speak weekly on Saturday 4pm in Palm Springs, which is 1pm Sunday Christchurch time.
- What is the time difference between Christchurch New Zealand and Palm Springs California?
- | Evidence | Process | Content |
|--|---------|---------|
| Palm Springs is 21 hours behind Christchurch | B | 5 |
- c) Cindy would like to have a call with Anne and Bernadette at the same time. Anne is coming over for a visit to New Zealand. She says that she will be able to be in Christchurch for 1 pm call on Sunday.
- If Anne leaves Ireland on Friday morning at 9am. The flight to Christchurch from Dublin in Ireland will take 37 hours 25 minutes with a 3-hour stopover in Dubai and a 30-minute stopover in Sydney.
- Will Anne be in Christchurch for the 1pm call on Sunday? Explain your answer.
- | Evidence | Process | Content |
|---|---------|---------|
| 9am Friday Dublin is 10pm Friday in Christchurch.
Total flight time taken = 37 hrs 25 mins + 3 hrs + 30 minutes.
Total flight time taken = 40hrs 55 mins.
So 10 pm Friday + 40hrs 55 mins = 2.55 pm on Sunday. | C | 5 |

Therefore, she will not be on time for the call.		
--	--	--

QUESTION FIFTY-SIX: LET'S TOAST THIS!

Amy wants to see if there is a mathematical relationship between a toaster setting and how long it was toasted for.



Sourced: [Toaster Regression, Ctd. – dy/dan \(mrmeyster.com\)](http://mrmeyster.com)

a) How long was the bread toasted for when the toaster setting was at 3?

b) Explain what the point (6,138) means?

c) Some students in the local art class decided to use toast to design this eye of toast using different levels of toasted bread.



Sourced from: [Nick Holmes...: Photo \(tumblr.com\)](#)

Calculate the percentage of bread that had to be burnt in order to create this artwork.

Level of toastedness	Number of pieces of toast required
Slightly toasted	280
Medium toasted	80
Dark toasted	60
Burnt	40

--

QUESTION FIFTY-SIX: LET'S TOAST THIS!

- a) How long was the bread toasted for when the toaster setting was at 3?

Evidence	Process	Content
100 seconds <i>Accept between 100 and 105 seconds</i>	B	2

- b) Explain what the point (6,138) means?

Evidence	Process	Content
It means that at a setting of 6 for the toaster, for this experiment the toast was in the toaster for 138 seconds.	C	2

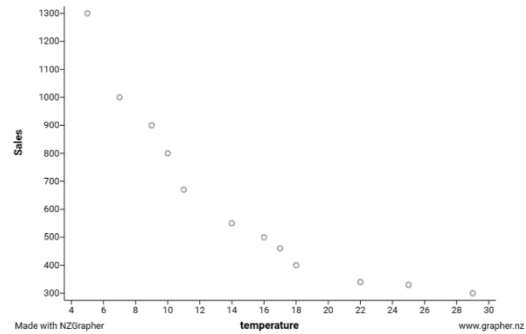
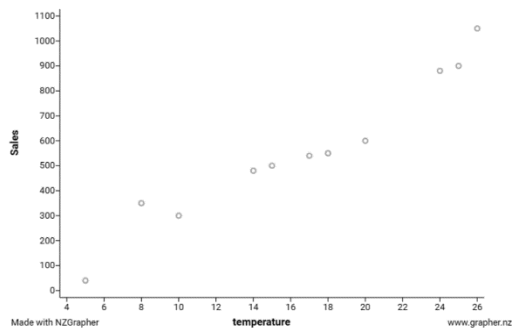
- c) Calculate the percentage of bread that had to be burnt in order to create this artwork.

Level of toastedness		Number of pieces of toast required
Slightly toasted		280
Medium toasted		80
Dark toasted		60
Burnt		40
Evidence	Process	Content
$40/460 \times 100 = 8.7\%$ (1 d.p)	A	1

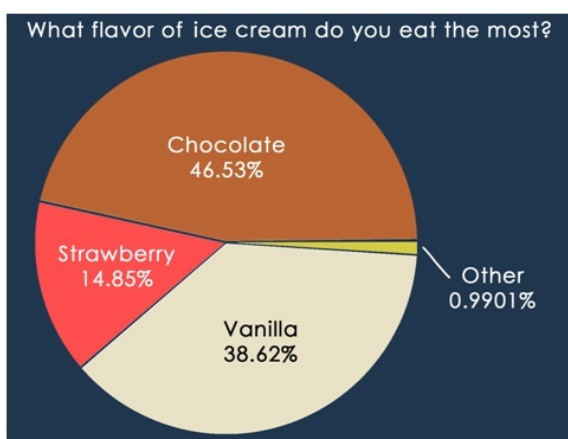
QUESTION FIFTY-SEVEN: CHECK THE TEMPERATURE

Methven has a shop that sells coffee and another that sells ice-cream.

- a) Which of the two graphs is likely to represent the ice-cream shop's sales when compared to temperature? Explain your answer.



- b) When the temperature was 20°C the business sold \$600 worth of ice-creams. How much money was made by selling chocolate ice-creams?

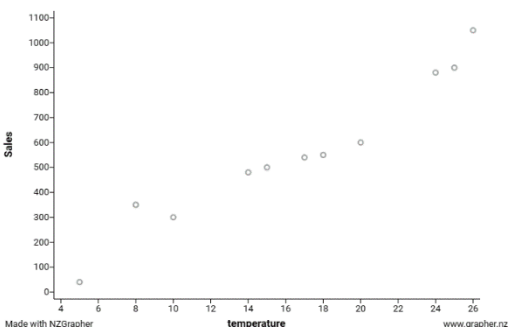


c) Estimate the number of sales for a temperature of 12°C using the table below:

Temperature	Number of sales
5	500
7	550
9	670
10	800
11	900
14	1 000
16	1 300

QUESTION FIFTY-SEVEN: CHECK THE TEMPERATURE

- a) Which of the two graphs is likely to represent the ice-cream shop's sales when compared to temperature? Explain your answer.

Evidence	Process	Content
Ice cream sales  Explanation: Ice-cream sales will tend to increase when it is warmer so this is graph is the likely graph because the sales increase as temperature increases.	C	6

- b) When the temperature was 20°C the business sold \$600 worth of ice-creams. How much money was made by selling chocolate ice-creams?

Evidence	Process	Content
$46.53\% \text{ of } 600 = 279.18$ The business made \$279.18 from chocolate ice-creams.	A	1

- c) Estimate the number of sales for a temperature of 12°C using the table below:

Temperature	Number of sales
5	500
7	550
9	670
10	800
11	900
14	1 000
16	1 300

Evidence	Process	Content
\$925	B	6

QUESTION FIFTY-EIGHT: BARBIE

Margot Robbie is an Australian actress. She is playing Barbie in the upcoming Barbie movie. Margot wore this dress to the 2023 Golden Globe awards.

- a) Identify at least one transformation property that has been used in her dress. Describe how the transformation has been used.



Source: [Margot Robbie Is Giving Aquatic Barbie at the 2023 Golden Globes \(instyle.com\)](https://www.instyle.com/margot-robbie-golden-globes-2023)

- b) Barbie's official birthday is the 9th of March, 1959. Margot Robbie's birthday is 2nd of June, 1990. How much older than Margot is Barbie?

 years

- c) Mattel is the company that produces Barbie. In 2020, Mattel sold \$1.35 billion worth of Barbie products.

If the Barbie movie generates 23% of the amount that Mattel earned from Barbie in 2020, how much will the movie generate?

QUESTION FIFTY-EIGHT: BARBIE

- a) Identify at least one transformation property that has been used in her dress. Describe how the transformation has been used.
- | Evidence | Process | Content |
|--|---------|---------|
| Reflection – using a vertical axis it has been reflected across her body;
Translation – the lines are being translated down each time;
Enlargement – the lines get larger and smaller at certain point.
<i>Accept any reasonable answers.</i> | A | 3 |
- b) Barbie's official birthday is the 9th of March, 1959. Margot Robbie's birthday is 2nd of June, 1990. How much older than Margot is Barbie?
- | Evidence | Process | Content |
|--|---------|---------|
| Difference between 1959 and 1990 is 31 years, so Barbie is 31 years older. | B | 5 |
- c) In 2020, Mattel (the company that produces Barbie) sold \$1.35 billion worth of Barbie dolls and accessories. If the Barbie movie generates 23% of the amount that Mattel earned from Barbie in 2020, how much will the movie generate?
- | Evidence | Process | Content |
|--|---------|---------|
| $0.23 \times 1.35 = \$0.3105$
billion (USD) | B | 1 |

QUESTION FIFTY-NINE: ENGAGEMENT RINGS

David Beckham has bought his wife, Victoria Beckham, 14 engagement rings in the time that they have been together.



SOURCE: [victoria beckham engagement rings cost graph - Google Search](#)

a) Her first engagement ring was worth \$85 000 in 1998. This ring is now worth 83% more than in 1998. How much would this ring be worth now?

- ☐ \$70 550
- ☐ \$110 500
- ☐ \$153 000
- ☐ \$155 550
- ☐ \$161 500

b) Her 5th ring is worth £2 000 000 (British Pounds). It is a 17-karat (diamond size) pear cut diamond. The diamond size is 60% of the ring's value. How much is each karat of the diamond worth?

- c) Most engagement rings are made out of gold, which has a carat rating. This tells the buyer what percentage of the gold in their ring is pure gold vs other metals also used.

Karat Gold	Parts Gold	% Gold
9kt	9 in 24	37.5%
10kt	10 in 24	41.67%
12kt	12 in 24	50%
14kt	14 in 24	58.33%

Using the above chart, calculate what percentage gold would be in an 18kt (karat gold) ring? Explain the process you used to solve this problem.

QUESTION FIFTY-NINE: ENGAGEMENT RINGS

- a) Her first engagement ring was worth \$85 000 in 1998. This ring is now worth 83% more than in 1998. How much would this ring be worth now?

- ☐ \$70 550
- ☐ \$110 500
- ☐ \$153 000
- ☐ \$155 550
- ☐ \$161 500

Evidence	Process	Content
$85\,000 \times 1.83 = \$155\,550$ (USD)	A	1

- b) Her 5th ring is worth £2 000 000 (British Pounds). It is a 17-karat (diamond size) pear cut diamond. The diamond size is 60% of the ring's value. How much is each karat of the diamond worth?

Evidence	Process	Content
$0.6 \times 2\,000\,000 = \text{£}1\,200\,000$ $1\,200\,000 / 17 = \text{£}70\,588.24$	B	1

- c) Most engagement rings are made out of gold, which has a karat rating. This tells the buyer/wearer what percentage of the gold in their ring is pure gold vs other metals also used.

Karat Gold	Parts Gold	% Gold
9kt	9 in 24	37.5%
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14kt	14 in 24	58.33%

Using the above chart, calculate what percentage gold would be in an 18kt (karat gold) ring? Explain the process you used to solve this problem.

Evidence	Process	Content
18 in 24 = 0.75 = 75% All parts are out of 24, so there must be 24 parts, and 18 means 18 parts gold, so $18/24 = 75\%$	C	1

QUESTION SIXTY: MUSIC

David Gray is a musician from Ireland.

- a) He played his first concert in Belfast, North Ireland on 15 December 1999.

His most recent concert was in Auckland, New Zealand on 26 November 2022.

How long was it between his first concert in Belfast and his most recent concert in Auckland?

	years		months and		days
----------------------	-------	----------------------	------------	----------------------	------

- b) The table below shows the number of concerts David has performed.

1	2022	43
2	2000	27
3	2003	20
4	2001	18
5	2011	7
6	2002	5
7	1999	2
8	2007	1
	2014	1
	2015	1
	2019	1

Using the information from the table above what percentage of concerts did David perform in 2011?

- c) David's most famous album was White Ladder. Below are the lengths in minutes and seconds of each song on the album.

No.	Title	Writer(s)	Length
1.	"Please Forgive Me"		5:35
2.	"Babylon"		4:25
3.	"My Oh My"	Gray, McClune	4:37
4.	"We're Not Right"	Gray, McClune, Polson	3:03
5.	"Nightblindness"		4:23
6.	"Silver Lining"		6:00
7.	"White Ladder"	Gray, McClune, Polson	4:14
8.	"This Year's Love"		4:05
9.	"Sail Away"		5:15
10.	"Say Hello Wave Goodbye"	Almond, Ball, Morrison	9:03

Mathew loves listening to David Gray. He wants to listen to the entire album before football practice at 3.25 pm.

It is now 2.33 pm. Will Mathew have enough time to listen to the album? Explain your answer using the information above.

QUESTION SIXTY: MUSIC

- a) He played his first concert in Belfast, North Ireland on 15 December 1999.

His most recent concert was in Auckland, New Zealand on 26 November 2022.

How long was it between his first concert in Belfast and his most recent concert in Auckland?

Evidence	Process	Content
22 years 11 months and 11 days	B	5

- b) Using the information from the table above what percentage of concerts did David perform in 2011?

Evidence	Process	Content
$7 \div 126 \times 100 = 5.56\%$	B	1

- c) David's most famous album was White Ladder. Below are the lengths in minutes and seconds of each song on the album.

No.	Title	Writer(s)	Length
1.	"Please Forgive Me"		5:35
2.	"Babylon"		4:25
3.	"My Oh My"	Gray, McClune	4:37
4.	"We're Not Right"	Gray, McClune, Polson	3:03
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9.	"Sail Away"		5:15
10.	"Say Hello Wave Goodbye"	Almond, Ball, Morrison	9:03

Mathew loves listening to David Gray. He wants to listen to the entire album before football practice at 3.25 pm.

It is now 2.33 pm. Will Mathew have enough time to listen to the album? Explain your answer using the information above.

Evidence	Process	Content
----------	---------	---------

Total = 50minutes 40 seconds Mathew has 52 minutes until Chad picks him up so yes he will have time to listen to the album.	C	5
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QUESTION SIXTY-ONE: CATS

Jacinta is looking after a kitten called Chad. The table below has information on how she can take care of Chad.

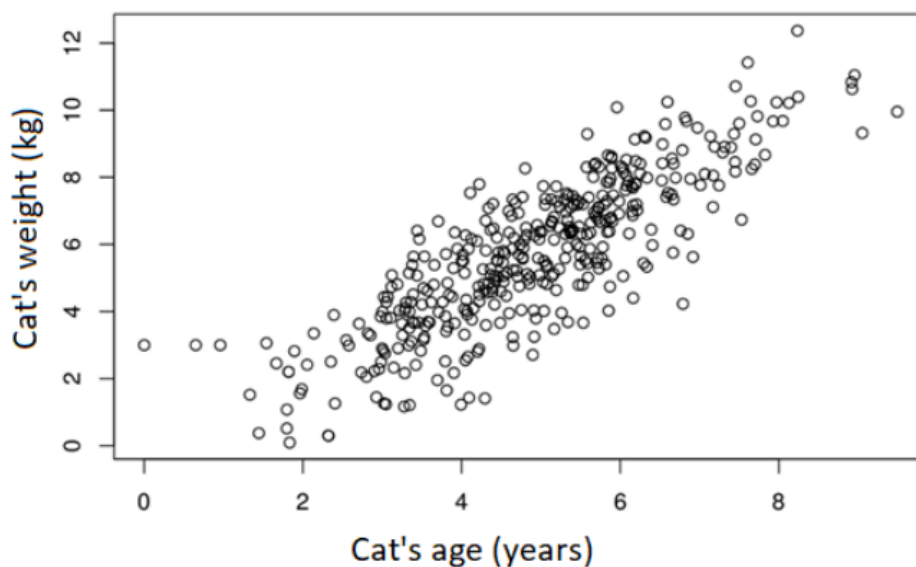
kitten weight and feeding chart

AGE	WEIGHT	AMOUNT PER FEEDING	SCHEDULE
0-1 week	50-150 grams	2-6 ml	Every 2 hours
1-2 weeks	150-250 grams	6-10 ml	Every 2-3 hours
2-3 weeks	250-350 grams	10-14 ml	Every 3-4 hours
3-4 weeks	350-450 grams	14-18 ml	Every 4-5 hours
4-5 weeks	450-550 grams	18-22 ml	Every 5-6 hours
5-8 weeks	550-850 grams	(weaning; offer ample wet food)	Every 6 hours

Chad will be living Jacinta and her family for 8 weeks.

- What is the maximum amount of milk Chad could be fed in the first 2 weeks?
- Jacinta's daughter Katie wants to know how much Chad will weigh when he is four years old.

Use the chart below to estimate the difference between the maximum weight and the minimum weight of a four-year-old cat.



c) Katie's brother Ciaran says that the older the cat the heavier it will weigh.

Do you agree with him? Use your graph to help explain your answer.

QUESTION SIXTY-ONE: CATS

Jacinta is looking after a kitten called Chad. The table below has information on how she can take care of Chad.

kitten weight and feeding chart

AGE	WEIGHT	AMOUNT PER FEEDING	SCHEDULE
0-1 week	50-150 grams	2-6 ml	Every 2 hours
1-2 weeks	150-250 grams	6-10 ml	Every 2-3 hours
2-3 weeks	250-350 grams	10-14 ml	Every 3-4 hours
3-4 weeks	350-450 grams	14-18 ml	Every 4-5 hours
4-5 weeks	450-550 grams	18-22 ml	Every 5-6 hours
5-8 weeks	550-850 grams	(weaning; offer ample wet food)	Every 6 hours

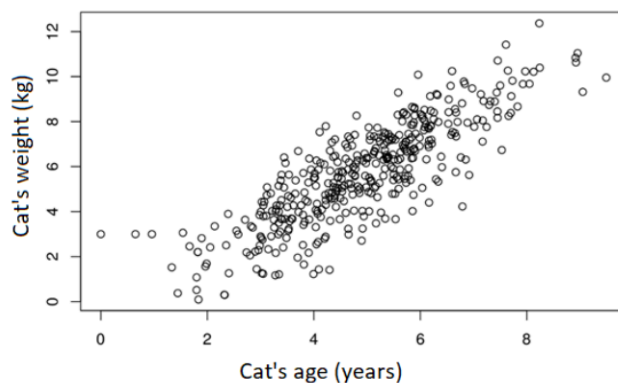
Chad will be living Jacinta and her family for 8 weeks.

- a) What is the maximum amount of milk Chad could be fed in the first 2 weeks?

Evidence	Process	Content
598mL	A	1

- b) Jacinta's daughter Katie wants to know how much Chad will weigh when he is four years old.

Use the chart below to estimate the difference between the maximum weight and the minimum weight of a four-year-old cat.



Evidence	Process	Content
----------	---------	---------

8 – 1.5 = 6.5kgs or any reasonable answer	B	6
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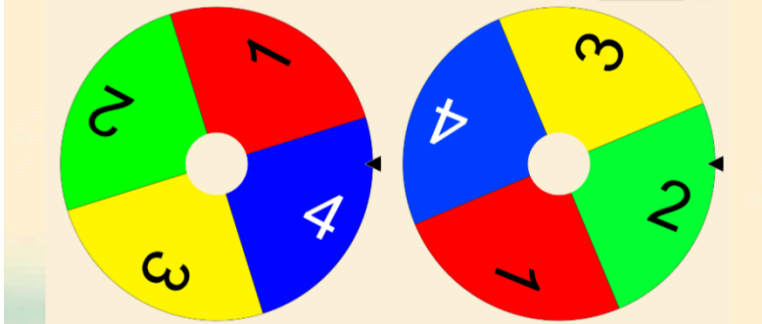
c) Katie's brother Ciaran says that the older the cat the heavier it weighs.

Do you agree with him? Use your graph to help explain your answer.

Evidence	Process	Content
The graph is sloping upwards or you can see that the older cats are of higher weights or any reasonable answer.	C	6

QUESTION SIXTY-TWO: SPINNING WHEELS

In a school gala there are prizes for winning by getting the highest product, found by multiplying together the numbers spun on each wheel.



- a) How many different products can be calculated when the wheels are spun, using one number from each wheel?

- b) Which statement is correct about the possible outcomes from spinning the two wheels?

- ☐ There is only one way of getting an 8
- ☐ There is only one way of getting a 12
- ☐ There are only two ways of getting a 9
- ☐ There are only two ways of getting an 8

- c) A parent complains and says that some products are more likely than others. Explain whether the parent is correct.

QUESTION SIXTY-TWO: SPINNING WHEELS

- a) How many different products can be calculated when the wheels are spun, using one number from each wheel?

Evidence	Process	Content
1, 2, 3, 4, 6, 8, 9, 12, 16 There are 9 possible products	A	7

- b) Which statement is correct about the possible outcomes from spinning the two wheels?

- ☐ There is only one way of getting an 8
- ☐ There is only one way of getting a 12
- ☐ There are only two ways of getting a 9
- ☐ There are only two ways of getting an 8

Evidence	Process	Content
D	B	7

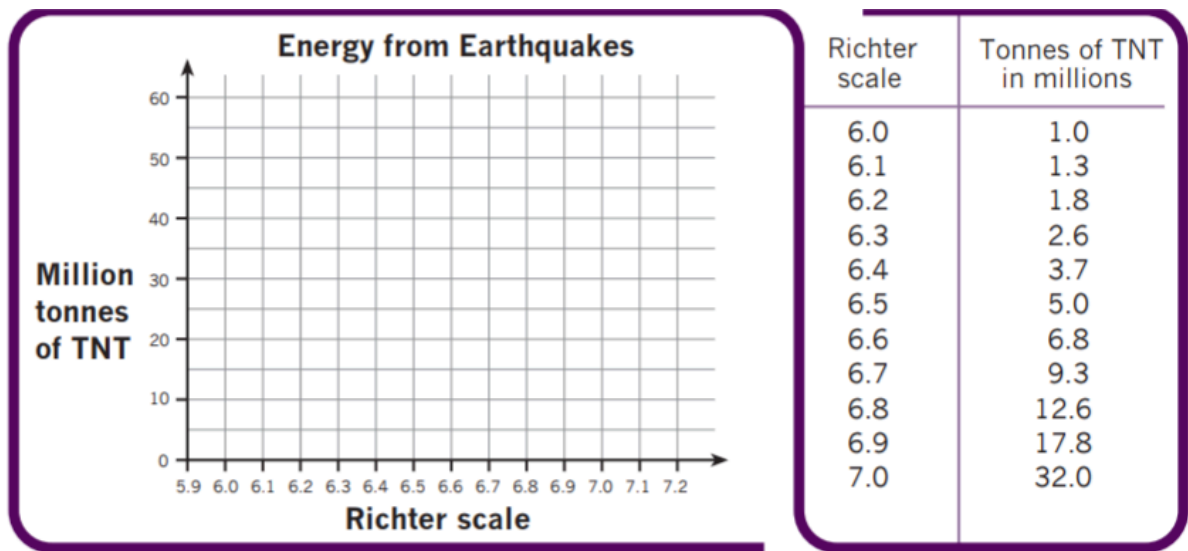
- c) A parent complains and says that some products are more likely than others. Explain whether the parent is correct.

Evidence	Process	Content
The numbers 2, 3, 6, 8 and 12 can all be found in 2 ways and 4 in 3 ways, the rest only have one.	C	7

QUESTION SIXTY-THREE: EARTHQUAKE ENERGY

You can measure the amount of energy that is released in an earthquake by comparing it to the energy released by trinitrotoluene (TNT)

a) Mark in the points from the table on the graph below.

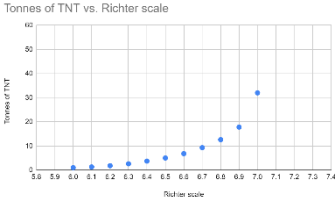


b) Approximately how many tonnes of TNT does 5.9 on the Richter scale equate to?

c) What do you notice happens as the Richter scale increases?

QUESTION SIXTY-THREE: EARTHQUAKE ENERGY

- a) Mark in the points from the table on the graph below.

Evidence	Process	Content
	B	2, 6

- b) Approximately how many tonnes of TNT does 5.9 on the Richter scale equate to?

Evidence	Process	Content
Estimating from the graph 5.9 is between 0.8 and 0.9 million tonnes of TNT	A	2, 6

- c) What do you notice happens as the Richter scale increases?

Evidence	Process	Content
As the Richter scale increases by 0.1 the millions of tonnes doesn't increase by the same number but goes up in bigger amounts.	C	2, 6

QUESTION SIXTY-FOUR: OBSTACLE COURSE

Kairangi wants to buy training equipment for a Dog Obstacle course.



- a) In New Zealand, a tax of 15% is added to each product. If the equipment is \$501.59, calculate the amount of tax Kairangi will need to pay on the equipment.

- b) The equipment is sent in a box that is 65cm long, 65cm high and 10cm deep.

Because of the size of the parcel, the postage is calculated using this formula:

$$\text{Cost} = \text{length} \times \text{height} \times \text{depth} \times 530$$

(Length, height and depth are in m)

How much postage will Kairangi need to pay?

- c) Kairangi will be driving to the Dog Obstacle competition. She drives 115km down State Highway 1 for 2 hours.

Her friend, Manu, is travelling to the same event. He drives down the State Highway 16. His average speed is 59.55km per hour.

Kairangi thinks she will get to the competition faster than Manu. Is she correct? Explain your answer.

--

QUESTION SIXTY-FOUR: OBSTACLE COURSE

- a) In New Zealand, a tax of 15% is added to each product. If the equipment is \$501.59, calculate the amount of tax Kairangi will need to pay on the equipment.
- | Evidence | Process | Content |
|---|---------|---------|
| $0.15 \times 501.59 = 75.2385$
\$75.24 | B | 1 |
- b) The equipment is sent in a box that is 65cm long, 65cm high and 10cm deep.
- Because of the size of the parcel, the postage is calculated using this formula:
Cost = length $\times$ height $\times$ depth $\times$ 530
(Length, height and depth are in m)
- How much postage will Kairangi need to pay?
- | Evidence | Process | Content |
|----------|---------|---------|
| \$22.40 | A | 1 |
- c) Kairangi will be driving to the Dog Obstacle competition. She drives 115km down State Highway 1 for 2 hours.
- Her friend, Manu, is travelling to the same event. He drives down the State Highway 16. His average speed is 59.55km per hour.
- Kairangi thinks she will get to the competition faster than Manu. Is she correct? Explain your answer.
- | Evidence | Process | Content |
|---|---------|---------|
| Kairangi's speed is $115 \div 2 = 57.5$ (km/hour).
Kairangi's is incorrect as she is driving slower. | C | 1 |