WALT show the understanding of integers
Success Criteria I can add and subtract negative and positive numbers.

1.1 Integers review

Navigator

Q1 Columns 1–3, Q2 Columns 1–3, Q3, Q4 Column 1, Q6, Q7, Q11, Q13	Q1 Columns 2–4, Q2 Columns 2–4, Q3, Q4 Column 2, Q5, Q6, Q7, Q8, Q10(a), Q11, Q12, Q13	Q1 Columns 3 & 4, Q2 Columns 3 & 4, Q3, Q4 Column 2, Q5, Q6, Q7, Q8, Q9, Q10(b), Q11, Q12, Q14, Q15

Fluency

1 Simplify the following by writing a single sign between the two numbers, then calculate the answer.

(a) +4 + (+9)	**(b)** -7 + (+5)	**(c)** +5 + (+3)	**(d)** +2 – (+6)
(e) +10 – (+13)	**(f)** -3 + (+8)	**(g)** +12 + (+6)	**(h)** -1 – (+9)
(i) -15 + (+8)	**(j)** +8 – (+9)	**(k)** -8 – (+13)	**(l)** -19 + (+11)
(m) +16 – (+9)	**(n)** -14 + (+7)	**(o)** -4 – (+22)	**(p)** -17 + (+23)

2 Simplify the following by writing a single sign between the two numbers, then calculate the answer.

WE2

(a) +5 + (-4)	**(b)** +7 + (-9)	**(c)** +5 – (-11)	**(d)** -7 – (-6)
(e) -4 – (-9)	**(f)** -3 – (+8)	**(g)** -14 – (+3)	**(h)** +12 – (-8)
(i) +19 – (+13)	**(j)** 0 – (-3)	**(k)** -8 – (-16)	**(l)** +15 + (-22)
(m) -11 – (-7)	**(n)** -13 + (-9)	**(o)** +25 + (-31)	**(p)** -27 – (-16)

3 Write a negative or a positive integer to describe the following situations.

(a) 350 m above sea level
(b) a loss of $4800
(c) rewinding a TV program 6 minutes
(d) depositing $73 into your bank account
(e) 2 levels below the ground floor of a building
(f) 19 metres under water
(g) a company profit of $10 750
(h) fast forwarding a TV program 34 minutes
(i) withdrawing $200 from your bank account
(j) a plane flying at an altitude of 8100 metres

4 Place the following in descending order (largest to smallest).

(a) +4, 0, -7, +11, -2	**(b)** -23, 1, 0, -9, +7
(c) -3, 4, 0, 11, -15, 1	**(d)** -5, 8, 19, -43, -2, 6
(e) 14, -72, 5, 26, -1, -38	**(f)** 32, -19, 0, 17, -56, 4

5 Calculate:

(a) 2 + 7 – 5	**(b)** -3 + 10 – 5	**(c)** -6 + 4 – 8	**(d)** -15 + 9 + 8
(e) 11 + 14 – 23	**(f)** -7 – 8 – (-9)	**(g)** 4 + 5 – (-5)	**(h)** -6 + (-9) – (+9)

Understanding

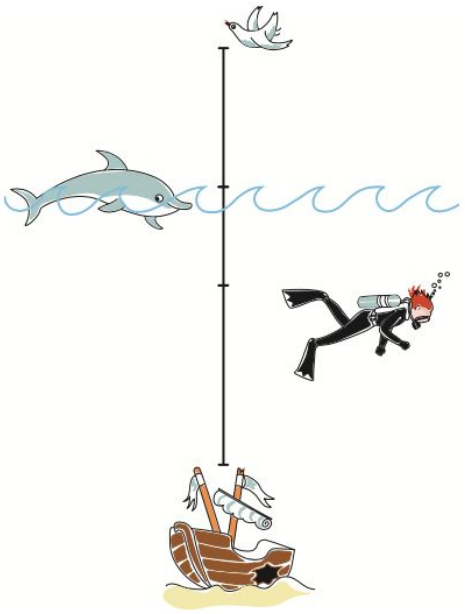
6 **(a)** Copy the diagram and label it according to the following information.

The bird is 24 metres above the water.

A scuba diver is 17 metres below the surface.

The wreck of a ship is 31 metres below the diver.

A dolphin has just broken the surface of the water.



(b) Use your diagram to determine:

(i) the distance between the bird and the diver

(ii) the distance between the wreck and the dolphin.

7 The maximum and minimum temperatures recorded during 1 week of June on Mount Kosciuszko were:

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Maximum (°C)	11	13	8	6	9	12	13
Minimum (°C)	-3	-1	-7	-5	-4	-1	0

(a) On which day was the lowest minimum recorded?

(b) One which day was the highest minimum recorded?

(c) What was the difference between the maximum and the minimum temperatures on:

(i) Thursday **(ii)** Friday?

(d) On which day was the difference between the maximum and the minimum temperatures the greatest?

8 On Monday, Rachel withdrew $120 from her bank account at an ATM. On Tuesday, she used her bankcard to pay $87 for her shopping from the same account. On Thursday, her employer deposited her salary of $243 into the account, and her mum also deposited $50 for her birthday. On Friday, Rachel used the account to pay a $109 bill online.

(a) Write one long integer calculation that shows each of the events mentioned above as an addition or a subtraction. (Hint: Begin by writing the $120 withdrawal as -120.)

(b) Complete your calculation to determine the following.

(i) Did Rachel have more or less money in her account by the end of the week?

(ii) How much more or less?

9 Puerto Rico Trench is the deepest trench on the floor of the Atlantic Ocean. The bottom of the trench is 8605 metres below sea level. Mount McKinley is the highest mountain in North America at 6194 metres above sea level. If Mount McKinley could be picked up and dropped into the Puerto Rico Trench, what depth of water would be between the top of the mountain and sea level?

Reasoning

10 A magic square is one for which the numbers in every row, column and diagonal add up to the same 'magic' total.

Complete the following magic squares, by first working out the magic total.

(a)

-6		-2
	-3	
		0

(b)

6			-18
	2		8
	0	-8	
12		-2	-12

11 Calculate the following by considering their 'mirror image' journeys on the opposite side of the number line.

(a) $-27 + 14$ **(b)** $-59 + 36$ **(c)** $-87 + 62$

(d) $-31 - 29$ **(e)** $-68 - 43$ **(f)** $-75 - 58$

(g) $-47 + (-62)$ **(h)** $-71 - (-26)$ **(i)** $-96 - (+31)$

12 **(a)** Complete the following calculations.

(i) $-2 + 3$ **(ii)** $-5 + 11$ **(iii)** $-8 + 17$ **(iv)** $-21 + 34$

(b) Now, reverse the order of the two numbers in the above additions, and calculate the resulting subtractions (e.g. $-4 + 6$ becomes $6 + -4$, or $6 - 4$).

(c) What do you notice? Comment on your observation.

(d) What do we call the property of numbers that enables us to add them or multiply them in any order?

(e) Use your observation from part **(c)** to calculate the following.

(i) $-34 + 45$ **(ii)** $-53 + 69$ **(iii)** $-72 + 99$ **(iv)** $-98 + 113$

Open-ended

13 The thermometer at the weather station on Mount Wellington read -4°C at 5 a.m. one day in July. By 2 p.m., the temperature had reached the day's maximum of 9°C. Suggest what the thermometer reading might have been at:

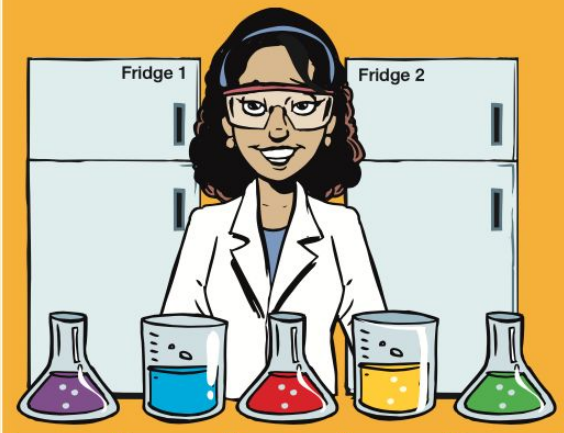
(a) 8.30 a.m. **(b)** midday.

14 List three integers that would give a negative answer when added to -17.

15 List three integers that would give a positive answer when subtracted from -17.

Outside the Square — Problem solving

Lab maths



A	B	C	D	E
Max: 2°C Min: -3°C	Max: 0°C Min: -4°C	Max: -4°C Min: -9°C	Max: -3°C Min: -7°C	Max: 13°C Min: 2°C

Professor Berner has two fridges in her laboratory in which she needs to safely store five different chemicals, A, B, C, D and E.

Each chemical has a maximum and a minimum safe temperature at which it can be stored—anything outside this range and it will explode!

Each fridge can be set to any temperature Professor Berner chooses.

Use the information on the labels below to decide the temperature to which Professor Berner needs to set each fridge and which chemicals go in which fridge.

Strategy options

- Guess and check.
- Work backwards.

Check your answers

(e) 400 (f) 945 (g) 9 (h) 14

Exercise 1.1 (p. 8)

1 (a) +13 (b) -2 (c) +8 (d) -4

(e) -3 (f) +5 (g) +18 (h) -10

(i) -7 (j) -1 (k) -21 (l) -8

(m) +7 (n) -7 (o) -26 (p) +6

2 (a) +1 (b) -2 (c) +16 (d) -1

(e) +5 (f) -11 (g) -17 (h) +20

(i) +6 (j) +3 (k) +8 (l) -7

(m) -4 (n) -22 (o) -6 (p) -11

3 (a) +350 (b) -4800 (c) -6 (d) +73 (e) -2

(f) -19 (g) +10 750 (h) +34 (i) -200 (j) +8100

4 (a) +11, +4, 0, -2, -7 (b) +7, 1, 0, -9, -23

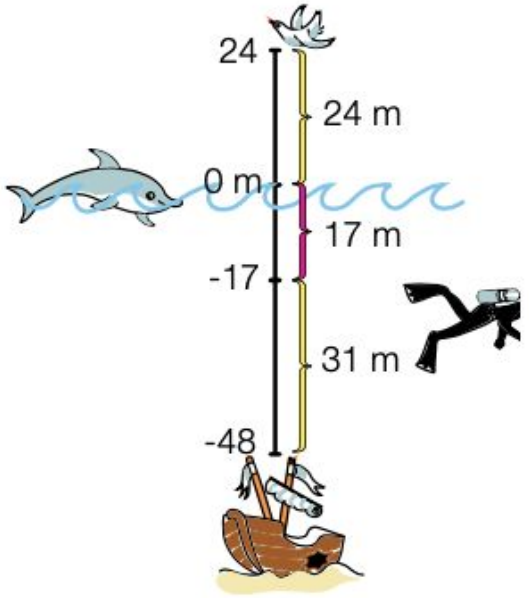
(c) 11, 4, 1, 0, -3, -15 (d) 19, 8, 6, -2, -5, -43

(e) 26, 14, 5, -1, -38, -72 (f) 32, 17, 4, 0, -19, -56

5 (a) 4 (b) 2 (c) -10 (d) 2

(e) 2 (f) -6 (g) 14 (h) -24

6 (a)



(b) (i) 41 m (ii) 48 m

7 (a) Wednesday (b) Sunday

(c) (i) 11°C (ii) 13°C

(d) Wednesday

8 (a) $-120 - 87 + 243 + 50 - 109$

(b) (i) less (ii) $23 less

9 2411 m

10 (a) magic total = -9

-6	-1	-2
1	-3	-7
-4	-5	0

(b) magic total = -12

6	-4	4	-18
-16	2	-6	8
-14	0	-8	10
12	-10	-2	-12

11 **(a)** -13 **(b)** -23 **(c)** -25

(d) -60 **(e)** -111 **(f)** -133

(g) -109 **(h)** -45 **(i)** -127

12 **(a)** **(i)** 1 **(ii)** 6 **(iii)** 9 **(iv)** 13

(b) **(i)** $+3 - 2 = 1$ **(ii)** $+11 - 5 = 6$

(iii) $+17 - 8 = 9$ **(iv)** $+34 - 21 = 13$

(c) The answers to both **(a)** and **(b)** are the same.

(d) commutative law

(e) **(i)** 11 **(ii)** 16 **(iii)** 27 **(iv)** 15

Open-ended – Sample answers

13 **(a)** 1°C **(b)** 6°C

14 +1, +5, -10 (or +10, -1, -5)

15 -18, -19, -20