Answers - Negative numbers

Year: Year 4

Answer to Question 1

a. The liquid is at **7 °C**, which is above freezing.
b. The liquid is at **−6 °C**, which is below freezing.
c. The liquid is just below the zero mark at **−1 °C**, which is below freezing.
d. The liquid is at **0 °C**, which is exactly at freezing point.

Answer to Question 2

a. The negatives are −7 and −2, then 0, then 4 and 5: **−7, −2, 0, 4, 5**.
b. The negatives are −12, −3 and −1, then 3 and 10: **−12, −3, −1, 3, 10**.
c. All are negative, so the one with the biggest digit part is the smallest: **−200, −22, −20, −2**.

Answer to Question 3

a. The boxes are at −4, −1, 2 and 4: **−4, −1, 2, 4**.
b. The red dot is **−3**.
c. Start at −3 and count up 4: −2, −1, 0, 1. So the number is **1**.

Answer to Question 4

a. The numbers go down by 2: −1 − 2 = −3, −3 − 2 = −5, −5 − 2 = −7. The next three are **−3, −5, −7**.
b. The numbers go up by 3: −1 + 3 = 2, 2 + 3 = 5, 5 + 3 = 8. The next three are **2, 5, 8**.
c. The numbers go down by 2: **−2, −4, −6**.
d. The numbers go up by 1: **−1, 0, 1**.

Answer to Question 5

a. −3 is negative and 2 is positive, so **−3 < 2**.
b. −8 is further left than −5, so **−8 < −5**.
c. 0 is to the right of −1, so **0 > −1**.
d. −51 is further left than −15, so **−15 > −51**.
e. Every positive number is bigger than a negative one, so **4 > −40**.

Answer to Question 6

a. From −4 to 3 is 7 degrees. The difference is **7 degrees**.
b. From −2 to 5 is 7 degrees. The difference is **7 degrees**.
c. From −6 to −1 is 5 degrees. The difference is **5 degrees**.
d. From −7 to 0 is 7 degrees. The difference is **7 degrees**.

Answer to Question 7

a. The smallest temperature is −6 °C, so **Aberdeen** was the coldest.
b. **Aberdeen (−6), Leeds (−4), Belfast (−2), Cardiff (1), Plymouth (3)**.
c. From −6 to 3: 6 steps to zero, then 3 more, so 6 + 3 = **9 degrees**.
d. Below freezing means below 0 °C: **Aberdeen, Leeds and Belfast**.

Answer to Question 8

a. From −2 to 3: 2 floors to reach 0, then 3 more, so 2 + 3 = **5 floors**.
b. From −1 to 2: 1 floor to 0, then 2 more, so 1 + 2 = **3 floors**.
c. Count down 6 from 4: 3, 2, 1, 0, −1, −2. It stops at **floor −2**.
d. −1 is higher, because it is nearer to zero and to the right on the number line: **−1 > −2**.

Answer to Question 9

a. The smallest number is −24, so **freezer B** is the coldest.
b. −16 or colder means −16 or less: −18 and −24 qualify. **Freezers A and B** are cold enough. (−15 is warmer than −16.)
c. −18 + 6 = **−12 °C**. This is warmer than −16 °C, so it is **not** cold enough.
d. From −24 up to −15 is 9 steps, so **9 degrees** colder.

Answer to Question 10

a. The diver is **−12 m**.
b. From −12 to 0 is 12 and from 0 to 8 is 8, so 12 + 8 = **20 m**.
c. −12 + 5 = **−7 m**.
d. From −35 up to −12 is 23 steps, so **23 m** below.

Answer to Question 11

a. Reds 5 − 2 = **3**; Blues 2 − 5 = **−3**; Greens 3 − 3 = **0**; Yellows 1 − 4 = **−3**.

b. **Reds (3), Greens (0), Blues (−3), Yellows (−3)**. The Blues and Yellows are equal.
c. Greens score 5 and let in 3: 5 − 3 = **2**.
d. From −3 up to 3 is 6 steps, so **6 goals**.

Answer to Question 12

a. 0 − 4 = −4 and −4 − 3 = **−7**.
b. −7 + 9 = **2** (count 7 to reach 0 and then 2 more).
c. From −5 to 2 is 5 + 2 = **7 squares** apart.
d. 10 − 2 = **8 squares**.

Answer to Question 13

a. The temperature falls 2 each hour: 5, 3, 1, −1, −3. Table: **3, 1, −1, −3**.
b. The temperature reaches 0 °C between 2 pm (1 °C) and 3 pm (−1 °C), so the water starts to freeze at **about 2:30 pm**, and it is frozen by 3 pm.
c. −3 − 2 = **−5 °C**.
d. From 5 down to −5 is 10 degrees, so **10 degrees**.

Answer to Question 14

a. −3 + 4 = **1 °C**.
b. 1 + 2 = **3 °C**.
c. 3 − 5 = **−2 °C**.
d. The temperatures are −3, 1, 3 and −2. It was warmest at **lunch time (3 °C)** and coldest at **8 am (−3 °C)**.

Answer to Question 15

a. The lowest of all is −9 °C on **Thursday**; the highest of all is 5 °C on **Wednesday**.
b. Monday: from −5 to 2 is 5 + 2 = 7. Tuesday: from −7 to 0 is 7. Wednesday: from −1 to 5 is 1 + 5 = 6. Thursday: from −9 to −2 is 7. So the differences are **7, 7, 6 and 7 degrees**.
c. The differences of Monday, Tuesday and Thursday are all **7 degrees**; Wednesday has the smallest, 6.
d. On Thursday the highest temperature was −2 °C, which is below freezing. On Tuesday the highest was exactly 0 °C, which is not below freezing. So **Thursday** is the only day that was always below freezing. The forecaster is correct.
e. **−9, −7, −5, −1** (Thursday, Tuesday, Monday, Wednesday).

Answer to Question 16

a. **−28, −22, −19, −15**.
b. From −22 up to −15 is **7 degrees**.
c. From −28 up to −15 is **13 degrees** fall.
d. Warmest −15, coldest −28: difference **13 degrees**.
e. −28 + 8 = **−20 °C**.

Answer to Question 17

a. **100 m**.
b. From −100 up to −50 is **50 m**.
c. From −50 down to −150 is **100 m**.
d. Surface to −100: 100 m. Up to −50: 50 m. Down to −150: 100 m. Up to the surface: 150 m. Total: 100 + 50 + 100 + 150 = **400 m**.
e. 100 ÷ 5 = **20 seconds**.

Answer to Question 18

a. The temperature falls 6 each time: 6, 0, −6, −12, −18. Table: **0, −6, −12, −18**.
b. At 1 000 m it is exactly 0 °C. At **2 000 m** it is below freezing (−6 °C), so 2 000 m is the first height that is below freezing.
c. −18 °C, which is **18 degrees below zero**.
d. At 2 000 m it is −6 °C. Is −6 below −3? Yes, −6 is less than −3. So **yes**, she needs her coat.
e. 5 × 6 = 30, so it is **30 degrees colder**: 6 − 30 = −24 °C.

Answer to Question 19

a. The most west is the smallest number: the **stone bridge (−8)**. The most east is the **windmill (9)**.
b. From −8 to 9: 8 + 9 = **17 paces**.
c. −3 + 6 = **3**. He stops at 3 paces east of the oak tree. The nearest landmark is the red barn (5), which is 2 paces away.
d. From −8 to 5 is 13 paces. Half of 13 is 6.5. So the treasure is at −8 + 6.5 = −1.5, which is between the duck pond (−3) and the old oak tree (0).

Answer to Question 20

a. Tuesday: 5 − 8 = **−3**. Wednesday: −3 + 6 = **3**. Thursday: 3 − 4 = **−1**.
b. He owes money when the number is negative: on **Tuesday (−3)** and **Thursday**

(−1).

c. On Tuesday he owes **£3**.
d. −1 + 10 = **9**, so he has £9 and is **no longer** owing money.

Answer to Question 21

a. Clue 1 says that A is the coldest, so **A = −6 °C**. Clue 2: B is 3 degrees warmer than D. The remaining temperatures are −2, 1 and 4. Two of these are 3 apart in two ways: −2 and 1, or 1 and 4. So (D, B) is (−2, 1) or (1, 4). Clue 3 says C is warmer than B. If B = 4 then nothing is warmer, so B = 1 and D = −2. The only temperature left is 4, so **C = 4 °C**. The answers are **A = −6, B = 1, C = 4, D = −2**.
b. C = 4 and 4 − 7 = **−3 °C**. Town D is at −2 °C. −3 is less than −2, so C is now **colder** than D, not warmer.
c. From −6 to 4 is 6 + 4 = **10 degrees**.